wood.

North Carolina Department of Transportation
Preliminary Site Assessment
State Project: R-2307B
WBS Element: 37944.1.FR5

Iredell County

Parcel 199
J.T. JR. & J.W Alexander Property
468 NC 150 (River Highway)
Mooresville, North Carolina
January 25, 2018

Wood Environment and Infrastructure Solutions, Inc.
Project: 188322307

John Maas, LG
Senior Geologist

Helen Corley, LG, BCES
Senior Assoc. Hydrogeologist

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

In response to the North Carolina Department of Transportation (NCDOT) Request for Proposal, dated September 17, 2018, Wood Environment and Infrastructure Solutions, Inc. (Wood) has performed a Preliminary Site Assessment (PSA) for Parcel 199. The investigation was conducted in accordance with Wood's Technical and Cost proposal dated September 27, 2018. 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 on the north side of River Highway and west of Regency Center Dr., approximately nine hundred feet west of I-77, as shown in the Vicinity Map, **Figure 1**. The parcel, which is located at 468 NC 150 (River Highway), is currently occupied by an active Shell gas station and convenience store. It is identified as Parcel 199 and as J.T JR. & J.W. Alexander property (Site) within the NCDOT R-2307B design file. The Site is in Mooresville of Iredell County, North Carolina. The area of investigation within the parcel as shown on **Figure 2**.

The following report summarizes a geophysical survey and describes our subsurface field investigation at the site. The report also presents onsite soil analyses to evaluate potential soil contamination within Parcel 199, the J.T JR. & J.W. Alexander property.

A discrepancy was found between the Request for Proposal (RFP) and the GeoEnvironmental Report for planning dated October 27, 2014. The RFP lists the subject address as 491 NC 150 but the GeoEnvironmental Report for planning and the Iredell County GIS website have the subject address listed as 468 NC 150. In addition, field observations indicate the correct subject address to be 468 NC 150, therefore this address is used hence forth.

1.1 Site History

The Site is occupied by a Shell gas station constructed in 2000 along River Highway. Wood interviewed the gas station manager in person on September 21, 2018. She stated that the gas station is served by the municipal water and sewer systems. This parcel appears on

the Underground Storage Tank (UST) Facility Database as Facility #00-0-0000010706 and one closed incident (Incident #21541) is associated with the facility. According to the Report of the Tank Removal (dated February 2000) prepared by Spectrum-Nationwide Environmental, Inc. (Spectrum), J.T. Alexander and Sons are the owner and operator of the USTs (responsible party). J.T. Alexander and Sons retained Spectrum to remove the four USTs, three 8,000-gallon gasoline USTs and one 10,000-gallon diesel UST. During the removal of the USTs, petroleum-impacted soil was encountered.. Approximately 18 cubic yards of petroleum-impacted soil was removed and disposed off-site. Following removal of the USTs, soil samples were collected from beneath the tanks for laboratory analysis of Total Petroleum Hydrocarbons (TPH), Gasoline Range Organics (GRO) and Diesel Range Organics (DRO). Analytical results did not identify TPH concentrations which exceeded the North Carolina State Action Level. A Notice of No Further Action for Incident #21541 was issued by NCDEQ in April 2000. Select documentation obtained from the NCDEQ Laserfiche website relating to NCDEQ UST Incident #21541 is included in **Appendix A**.

1.2 Site Description

The Site is located in a commercial area of Mooresville in Iredell County and is comprised of approximately 0.99 acres. At the time of the PSA field implementation, the parcel was occupied by a Shell gas station and convenience store. The majority of the Site ground cover is comprised of concrete and asphalt with grassy areas. The active UST basin and eight canopy-covered fuel dispenser pumps are located outside of the area of investigation but the Easement underlies the canopy area. Furthermore, the Cut line appears to abut the edge of Canopy. The general topography of the Site area is sloping toward the east. Photographs taken of the Site are included in **Appendix B**.

2.0 GEOLOGY

2.1 Regional Geology

The Site is located within the Charlotte Terrane of the Piedmont Physiographic Province of North Carolina. According to the 1985 State Geologic Map of North Carolina, the area is underlain by granitic rock of Permian/Pennsylvanian age.

2.2 Site Geology

Site geology was observed through the drilling of eight shallow direct push probe soil borings (P199B1 to P199B8). Figure 2 presents the boring locations and Site layout. The borings did not exceed a total depth of 10 feet bgs. Soils encountered in the borings consisted mostly of red silty clay underlain by tan fine-grained sandy silt. Staining was not observed in the borings. Groundwater was not encountered in the borings. Based on observations of topography of the Site vicinity, the groundwater flow direction is inferred to be generally to the southeast or east. Boring logs are presented in **Appendix C**.

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 One Call was contacted on November 5th to report the proposed drilling activities and subsequently notify affected utilities for the parcel. GEL Solutions (GEL) was procured by Wood to perform utility locating and perform a geophysical survey at the Site. Innovation Environmental Technologies, Inc. (IET) of Concord, North Carolina was retained by Wood to perform the direct push sampling for soil borings and RED Lab instrumentation was scheduled.

Wood understands that acquisition of the right-of-way is necessary for the widening of NC 150. Boring locations were strategically placed within the parcel to maximize the opportunity to encounter potential contaminated soil. Boring depths were extended to approximately 10 feet bgs.

3.2 Site Reconnaissance

Wood personnel performed a Site reconnaissance on September 21, 2018. During the Site reconnaissance, the area was visually examined for the presence of areas/obstructions that could potentially affect the subsurface investigation. The active UST basin was observed to be west of the convenience store and located outside of the investigation area. No other potential obstructions were noted during the reconnaissance.

3.3 Geophysics Survey Results and Utility Locating

The geophysical survey of the Site occurred between October 15 and 25, 2018. GEL performed an electromagnetic (EM) survey of the Site with a ground penetrating radar (GPR) survey conducted across select EM anomalies. Time domain electromagnetic methodology (TDEM) was also utilized to measure electrical conductivity of subsurface materials. GEL's complete geophysical report is presented as **Appendix D**. GEL did not identify subsurface geophysical anomalies within the limits of investigation which indicated the presence of USTs. The anomalies represented in the data were indicative of known metallic surface features and/or cultural interference.

In advance of drilling activities, GEL performed utility locating at the Site between October 15 and 25, 2018. GEL identified an underground electrical line, a waterline, and a telecommunications line on the eastern portion of the parcel and a waterline on the western portion of the parcel. In addition, an unknown utility was identified extending from the central grass-covered median to the fuel dispenser pump islands. Overhead powerlines were located along the southern portion of the Site along River Highway.

3.4 Soil Sampling

Wood conducted drilling activities at the Site on November 15, 2018. Wood's drilling subcontractor, IET, advanced eight direct push soil borings across the area of investigation to an approximate depth of 10 feet bgs. Figure 2 presents the Site Map with boring

locations and identifications. Boring locations targeted subsurface design features and potential environmental sources in the area of investigation dependent on utility clearance.

The purpose of soil sampling was to determine if a petroleum release had impacted the Site and if so, to estimate the volume of impacted soil that might require special handling during construction activities. Soil sampling was performed utilizing direct push methods accompanied by field screening for volatile organic compounds (VOCs) using a photoionization detector (PID). The soil borings were screened with the PID at approximate two-foot intervals. The soil interval exhibiting the highest PID reading from each boring was selected for analysis of TPH-DRO, TPH-GRO, benzene, toluene, ethylbenzene, and xylene (BTEX), total aromatics, and polycyclic aromatic hydrocarbons (PAH) soil via onsite ultraviolet fluorescence (UVF). If no PID readings greater than 10 parts per million (ppm) were identified then the two to four foot interval was sampled. Eight samples were collected from the borings for UVF onsite analysis.

4.0 SOIL SAMPLING RESULTS

Based on the PID field screening and UVF hydrocarbon analysis, evidence of petroleum hydrocarbon impacts was not identified within the area of investigation.

No PID readings above 10 ppm were detected in the eight soil borings. The PID field screening results are summarized in **Table 1** and provided on the boring logs in Appendix C.

Results from the onsite UVF petroleum soil analyses are presented in **Table 2**, with instrument generated tables in **Appendix E**. 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 Limits of 50 milligrams per kilogram (mg/kg) for GRO and 100 mg/kg for DRO were not detected in the samples from the eight borings advanced at the site. The hydrocarbon analysis results from the QED QROS Hydrocarbon Analyzer are provided in Appendix E.

5.0 CONCLUSIONS

Based on site observations and UVF onsite analysis, petroleum-impacted soil contamination was not identified above the NCDEQ Action level of 100 mg/kg for DRO and 50 mg/kg for GRO.

The following bulleted summary is based upon Wood's evaluation of field observations, and onsite and offsite quantitative analyses of samples collected from the Site on November 15, 2018.

- The parcel is located in the area of proposed highway widening activities and is occupied by a Shell gas station and convenience store. The majority of the site ground cover is comprised of concrete and asphalt with some grassy areas surrounding the edge of the property.

- Results of the geophysical survey did not identify subsurface anomalies which indicated the presence of USTs within the area of investigation

- The current UST basin and fuel dispenser pump islands were observed to be outside the area of investigation but the Easement underlies the canopy area. Furthermore, the Cut line appears to abut the edge of Canopy. .

- Four USTs were removed from the Site in February 2000. Samples collected from beneath the USTs did not identify TPH-DRO or TPH-GRO concentrations which exceeded the North Carolina State Action Level.

- Eight soil borings were advanced to an approximate depth of 10 feet bgs. Groundwater was not encountered in the borings. Samples from each boring were screened at two-foot intervals in the field by a PID. No PID readings above 10 ppm were detected in the eight soil borings. Soils encountered in the borings consisted mostly of red silty clay underlain by tan fine-grained sandy silt. Staining was not observed in the borings.

- Elevated TPH values above the NCDEQ Action Limit of 50 mg/kg for GRO were not detected in the samples from eight borings advanced at the site.
- Elevated TPH values above the NCDEQ Action Limit of 100 mg/kg for DRO were not detected in the samples from eight borings advanced at the site.

6.0 RECOMMENDATIONS

Based on these PSA results, Wood does not recommend further assessment or soil sampling in the area of investigation. Before construction of NCDOT's final design, Wood recommends that NCDOT field check that the location of canopy and buried fuel lines will not be impacted by construction.

TABLES

Table 1
PID Field Screening Results
R-2307B, Parcel 199, J.T. JR. J.W. Alexander-Iredell County
Mooresville, North Carolina

SAMPLE ID	Sample Date	Sample Depth (feet bgs)	PID Screening (ppm)
P199B1-2-4	11/14/2018	2-4	0
P199B2-2-4	11/14/2018	2-4	0
P199B3-2-4	11/14/2018	2-4	0
P199B4-2-4	11/14/2018	2-4	0
P199B5-2-4	11/14/2018	2-4	0
P199B6-2-4	11/14/2018	2-4	0
P199B7-2-4	11/14/2018	2-4	0
P199B8-2-4	11/14/2018	2-4	0
		Prepared By/Date	DRH 11/27/18
		Checked By/Date	RPD 12/5/18

Notes: PPM = Parts Per Million
ft bgs = feet below ground surface

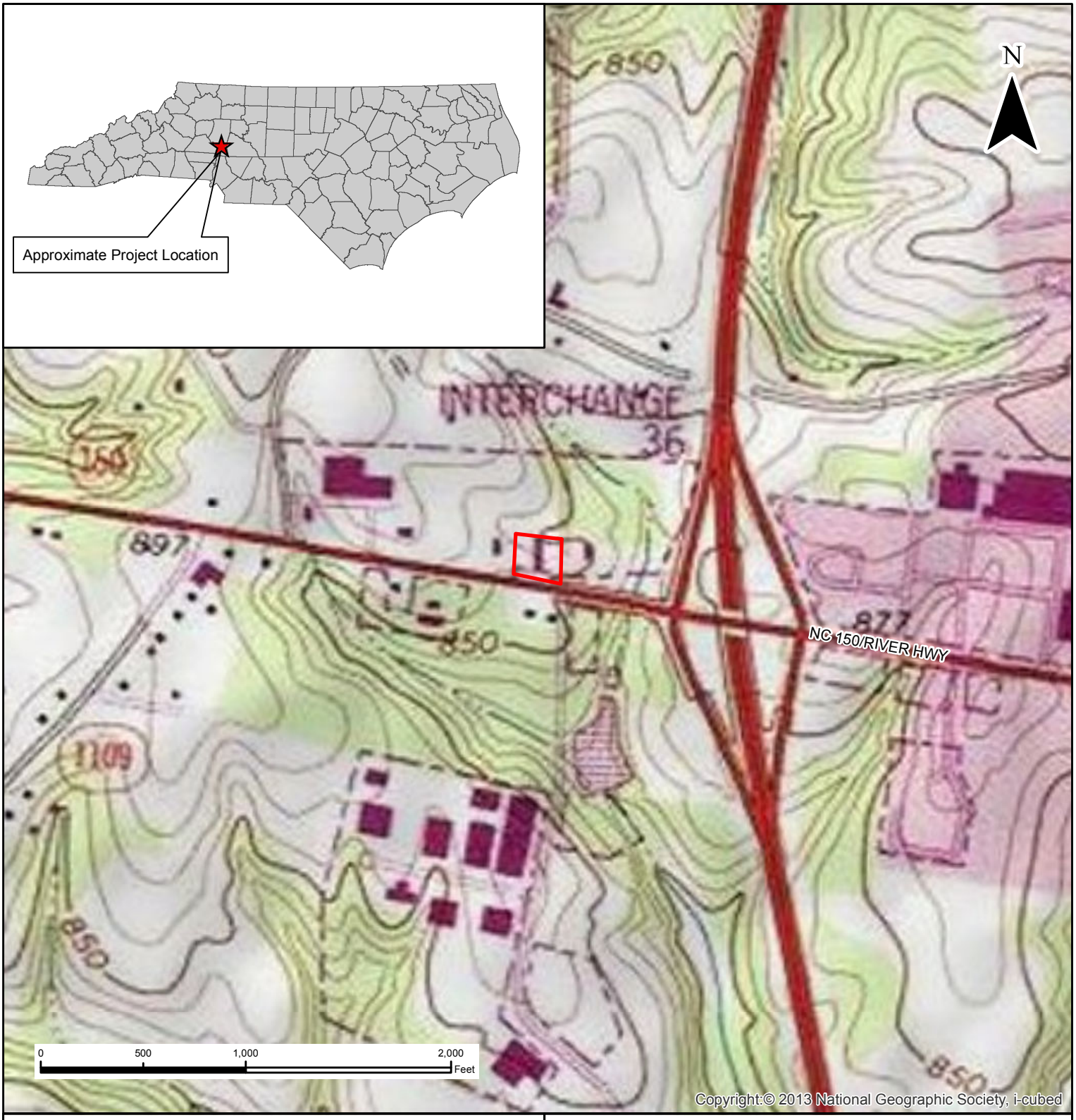
Table 2
UVF Petroleum Soil Results, 11/14/2018
R-2307B, Parcel 199, J.T. JR. & J.W. Alexander-Iredell County
Mooresville, North Carolina

Sample ID Number	Sample Depth (ft bgs)	BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PAHs (mg/kg)
NC State Action Level	**NA**	**NA**	**50**	**100**	**NA**
P199B1-2-4	2-4	<6.2	<6.2	<6.2	<2
P199B2-2-4	2-4	<0.52	<0.52	1.2	<0.17
P199B3-2-4	2-4	<0.56	<0.56	1.2	<0.18
P199B4-2-4	2-4	<0.31	<0.31	<0.31	<0.1
P199B5-2-4	2-4	<0.31	<0.31	<0.31	<0.1
P199B6-2-4	2-4	<0.23	<0.23	4.1	<0.07
P199B7-2-4	2-4	<0.27	<0.27	<0.27	<0.09
P199B8-2-4	2-4	<0.27	<0.27	0.27	<0.09

NOTES:
(mg/kg) = Millograms per kilogram
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
BTEX = Benzene, Toluene, Ethylbenzene and Xylenes
PAHs = Polycyclic Aromatic Hydrocarbon
ft bgs = feet below ground surface
NA= Not applicable

Prepared By/Date DRH 11/27/18
Checked By/Date RPD 12/5/18

FIGURES



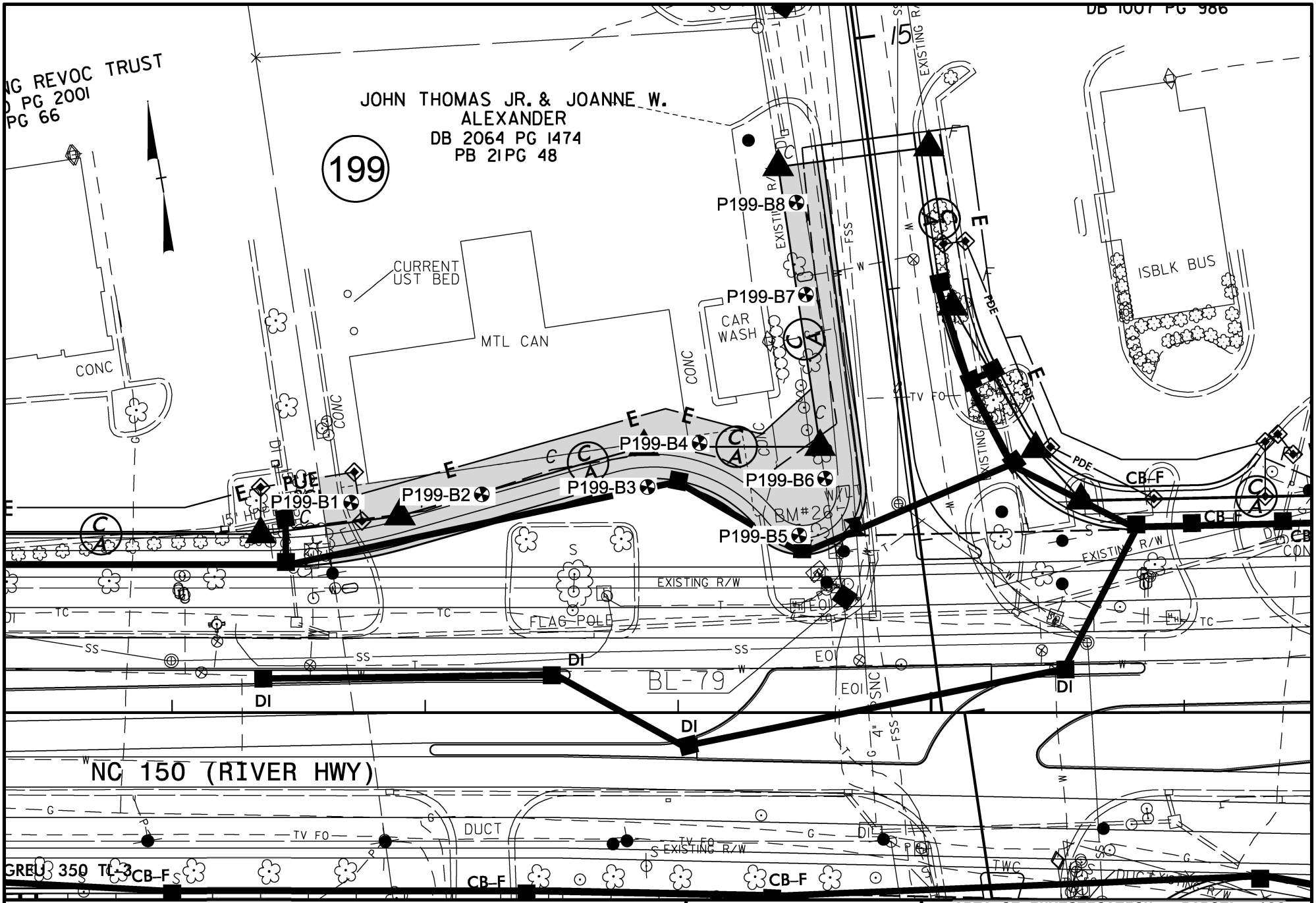
wood.

VICINITY MAP

Parcel 199
John Thomas Jr. & Joanne W. Alexander
468 NC 150 (River Hwy)
Mooresville, North Carolina

Site Boundary

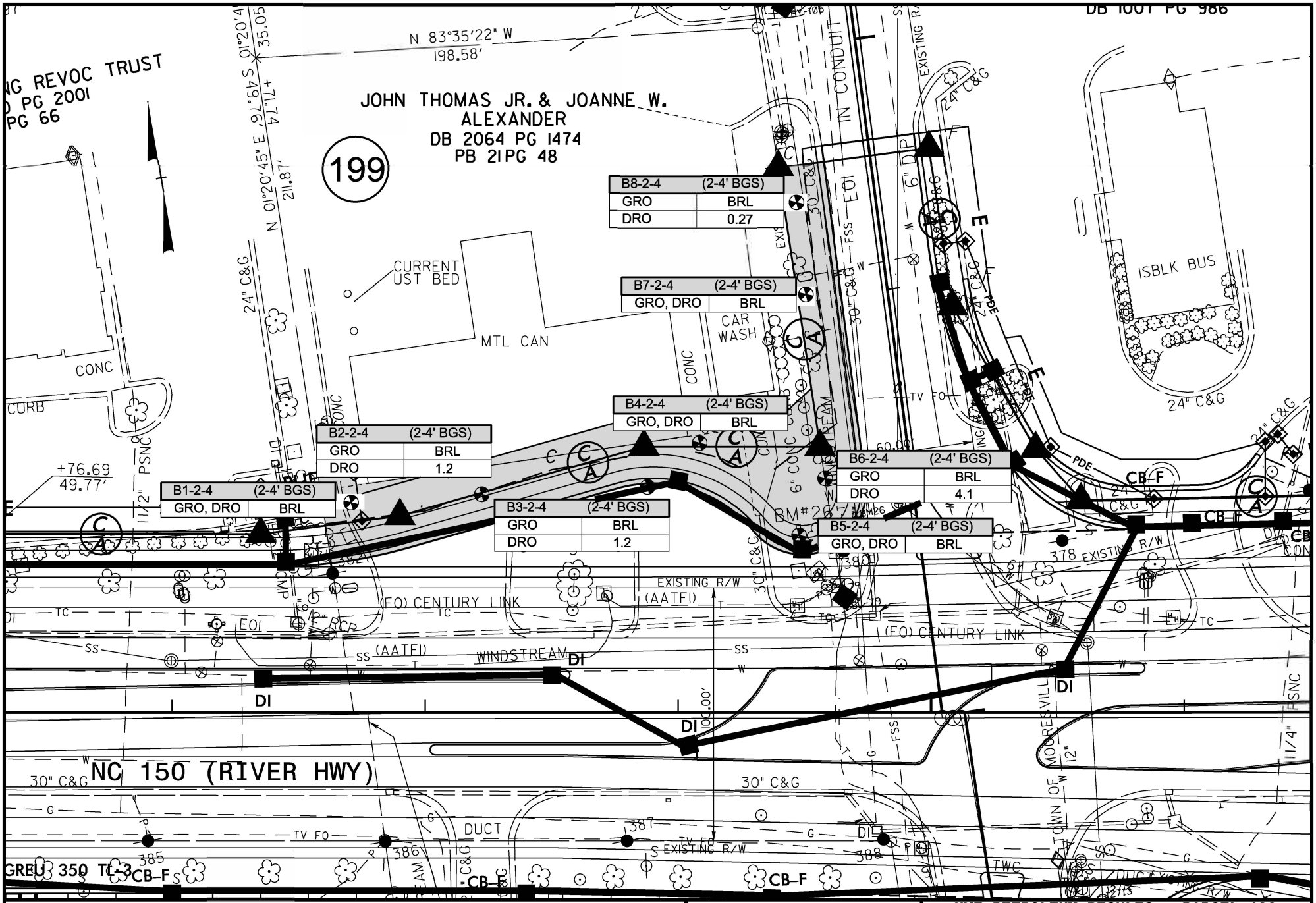
Prepared By: LMM	Checked By: AJF	Project No.:	Figure No.:
Date: 9/20/2018	Date: 9/20/2018	188322307	1



wood.

AREA OF INVESTIGATION - PARCEL 199
J.T. JR. & J.W. ALEXANDER, R-2307B
468 NC 150 (RIVER HWY)
MOORESVILLE, NC 28117

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LPL	1/24/19	HPC	1/24/19	188322307	2



AREA OF INVESTIGATION
BORING LOCATION
GRO = GASOLINE RANGE ORGANICS
DRO = DIESEL RANGE ORGANICS
BRL = BELOW REPORTING LIMITS

25' 0' 25' 50'
12.5'
(ENGLISH)

wood.

UVF PETROLEUM RESULTS - PARCEL 199
J.T. JR & J.W. ALEXANDER, R-2307B
NC 150 (RIVER HWY)
MOORESVILLE, NC 28117

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LPL	1/24/19	HPC	1/24/19	188322307	3

APPENDIX A
HISTORIC REPORTS AND DOCUMENTS

NCDENR

COPY

NORTH CAROLINA DEPARTMEI
ENVIRONMENT AND NATURAL RESOU

DIVISION OF WASTE MANAGE

April 12, 2000

JAMES B. HUNT JR.
GOVERNOR

BILL HOLMAN
SECRETARY

WILLIAM L. MEYER
DIRECTOR

J.T. Alexander & Sons
PO Box 88
Mooresville, North Carolina 28115
Attn: Tom Laws

RE: Soil Sample Results from
Underground Storage Tank Closure

I-77 Texaco
Highway 150 & I-77
Iredell County, N.C.
Facility ID # 0-010706
Incident No. Pending

Dear Mr. Laws:

The UST Section of the Division of Waste Management at the Mooresville Regional has received the laboratory analyses from twelve (12) soil samples collected during the clos four regulated underground storage tank systems at the subject site. The report arrived on Fe 29, 2000. Based on the reported results, no further action is required at this time.

Should you have any questions, please do not hesitate to call me at 704.663.1699, ex

Sincerely,

Bradley D. Murphy
Hydrogeologic Technician II

cc: Fay Sweat - Raleigh Incident File

POLLUTION INCIDENT/U.S.T. LEAK REPORTING FORM

Department of Environment, Health, Natural Resources
Division of Environmental Management
GROUNDWATER SECTION

Confirm. GW Contamination (Y/N) ____
Major Soil Contamination (Y/N) ____
Minor Soil Contamination (Y/N) Y

Incident # 21541

Date Incident Occurred or Leak Detected 3/2/00

INCIDENT DESCRIPTION

Incident Location/Name I-77 TEXACO

Address Rt. 8 Box 378 / Highway 158

City/Town Mocksville County Iredell Region MRO

Briefly Describe Incident Tanks removed. TPH found at 5 ppm.

PIRF & SITE CLOSURE (attached)

POTENTIAL SOURCE OWNER-OPERATOR

Potential Source Owner-Operator Thomas Laws Telephone 704.664.1566

Company J.T. Alexander & Sons Street Address PO Box 88

City Mocksville County Iredell State NC Zip Code 27115

OWNERSHIP
0. N/A 1. Municipal 2. Military 3. Unknown (4. Private) 5. Federal 6. County 7. State

OPERATION TYPE
0. N/A 1. Public Service 2. Agricultural 3. Residential 4. Educational/Relig. 5. Industrial (6. Commercial) 7. Mining

POLLUTANTS INVOLVED

MATERIALS INVOLVED	AMOUNT LOST	AMOUNT RECOVERED
Gasoline	Unknown	Unknown

SOURCE OF POLLUTION

PRIMARY SOURCE OF POLLUTION (Select one)
1. Intentional dump
2. Pit, pond, lagoon
(3.) Leak-underground
4. Spray irrigation
5. Land application
6. Animal feedlot
7. Source unknown
8. Septic tank
9. Sewer line
10. Stockpile
11. Landfill
12. Spill-surface
13. Well
14. Dredge spoil
15. Nonpoint source

PRIMARY POLLUTANT TYPE (Select one)
1. Pesticide/herbicide
2. Radioactive waste
(3.) Gasoline/diesel
4. Heating oil
5. Other petroleum prod
6. Sewage/septage
7. Fertilizer
8. Sludge
9. Solid waste leachate
10. Metals
11. Other inorganics
12. Other organics

LOCATION
(1.) Facility
2. Railroad
3. Waterway
4. Pipeline
5. Dumpsite
6. Highway
7. Residence
8. Other

SETTING
1. Residential
2. Industrial
(3.) Urban
4. Rural

Site Priority Ranking ____

D.E.M. Regional Contact Brad Murphy Signature [signature] Date 4/12/00

GW-61 Revised 3/92

IMPACT ON DRINKING WATER SUPPLIES

WELLS AFFECTED 1. YES (2. NO)

NUMBER OF WELLS AFFECTED ____

Well(s) Contaminated: (User Name)

1.
2.
3.

4.

5.

Circle Appropriate Responses

Lab Samples Taken By: 1. DEM 2. DHS (3. Responsible Party) 4. Other 5. None

Samples Taken Include: 1. Groundwater (2. Soil)

LOCATION OF INCIDENT

7 1/2 Min. Quad Name: Mooresville, NC

Lat. : Deg : Min : Sec : 35° 35' 40"

5 Min. Quad Number: M66V

Long. : Deg : Min : Sec : 80° 51' 43"

Draw Sketch of Area or Attach Additional Maps

see attached map

GW/UST-3 Notice of Intent: UST Permanent Closure or Change-In-Service

FOR TANKS IN **NC**

Return Completed Form To:
The appropriate DEM Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only
Incident Number 10
Date Received 12/10/1999

INSTRUCTIONS
Complete and return thirty (30) days prior to closure or change-in-service.

I. OWNERSHIP OF TANK(S)

Tank Owner Name: J. T. Alwxander & Son
(Corporation, Individual, Public Agency, or Other Entity)
Street Address: P.O. Box 88/Statesville Hwy.
County: Iredell
City: Mooresville State: N. C. Zip Code: 28115
Tel. No. (Area Code): (704) 6641566

II. LOCATION OF TANK(S)

Facility Name or Company: I-77 Texaco
Facility ID # (If available): 0-010706
Street Address or State Road: Rt 8 Box 378/Hwy 150
County: Iredell City: Morsvle Zip Code: 28115
Tel. No. (Area Code):

III. CONTACT PERSON

Name: Mr. Tom Laws Job Title: Telephone Number: (704) 6641566

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN SERVICE

1. Contact Local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessments.
4. If Removing Tanks or Closing in Place refer to API Publications 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used Underground Petroleum Storage Tanks".
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.
7. The **site assessment** portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After January 1, 1994, **all closure site assessment reports must be signed and sealed by a P.E. or L.G.**
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

(Contractor) Name: Spectrum-Nationwide Environmental, Inc.
Address: P. O. Box 7351-Charlotte State: N. C. Zip Code: 28241
Contact: Larry Boone Phone: (704) 3342164
Primary Consultant: Mr. Richard J. Planigan, P.E Phone: (704) 8927250

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY: CLOSURE – Removal	CLOSURE – Abandonment In Place	CHANGE-IN-SERVICE – New Contents Stored
1	8,000 g.	Gasoline	X		
2	8,000 g.	Gaaoline	X		
3	8,000 g.	Gasoline	X		
4	10,000 g.	Diesel Fuel	X		

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title: LARRY Boone- Vice-President
Signature: Larry Boone
*Scheduled Removal Date:
Date Submitted: 12/7/99

*If scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date.

GW/UST-3 (Rev.12/01/93) White Copy - Regional Office Yellow Copy - Central Office Pink Copy - Owner

Spectrum Environmental

REPORT OF THE TANK REMOVAL

I-77 TEXACO
ROUTE 8, BOX 378
HIGHWAY 150 WEST
MOORESVILLE, N. C. 28115

PREPARED FOR:

MR. TOM LAWS
J. T. ALEXANDER & SON
P. O. BOX 88/STATESVILLE HIGHWAY
MOORESVILLE, N. C. 28115

PREPARED BY:

SPECTRUM-NATIONWIDE ENVIRONMENTAL, INC.
P. O. BOX 7351
CHARLOTTE, N. C. 28241

FEBRUARY, 2000

RICHARD J. FLANIGAN
PROFESSIONAL ENGINEER

125 SPINNAKER COURT
DAVIDSON, N.C 28036
(704) 892-7250

PROFESSIONAL ENGINEER STATEMENT

UNDERGROUND STORAGE TANK ABANDONMENT AND ACTIVITIES AT THE I-77 TEXACO, ROUTE 8, BOX 378/HIGHWAY 150 WEST, MOORESVILLE, N. C., WERE COMPLETED BY SPECTRUM-NATIONWIDE ENVIRONMENTAL, INC. THE COLLECTION OF SOIL SAMPLES AND DEVELOPMENT OF THE FINDINGS ASSOCIATED WITH THE REMOVAL WERE PERFORMED IN ACCORDANCE WITH GOOD ENGINEERING PRACTICES. SOIL SAMPLES WERE TAKEN AT LOCATIONS OUTLINED IN THE GROUNDWATER SECTION GUIDELINES FOR THE INVESTIGATION AND REMEDIATION OF SOILS AND GROUNDWATER NCDENR GROUNDWATER SECTION, VOLUME II, JANUARY 2, 1998.

THIS PE STATEMENT CERTIFIES THAT ONLY THOSE ACTIVITIES OUTLINED IN THIS REPORT WERE UNDER MY DIRECT CONTROL AND SUPERVISION. ALL OTHER ACTIVITIES PERFORMED ON THE SITE OUTSIDE THE SCOPE OF WORK IN THIS REPORT HAVE NOT BEEN CERTIFIED BY ME.

Richard J. Flanigan, N.C.P.E.
14 February, 2000

Spectrum Environmental

UNDERGROUND STORAGE TANK CLOSURE REPORT GW/UST-12

February 25, 2000

I. General Information

A. Ownership of UST(S)

J.T. Alexander and Sons
PO Box 88.
Mooresville, NC 28115
704-664-1566

B. Facility Information

I-77 Texaco
Rt. 8 Box 378/ Hwy. 150
Mooresville, NC 28115
Facility ID# 0-010706
Iredell County

C. Contacts **Primary Contact**

Thomas Laws
J.T. Alexander and Sons
PO Box 88.
Mooresville, NC 28115
704-664-1566

Closure Contractor

Stephen M. Hamilton, President
Spectrum-Nationwide Environmental, Inc.
PO Box 7351
Charlotte, NC 28241
704-334-2164

Primary Consultant

Richard J. Flanigan, N.C.P.E.
125 Spinnaker Court
Davidson, NC 28036
704-892-7250

Laboratory

Blue Ridge Labs
PO Box 2940
Lenoir, NC 28645
828-728-0149
State Certification # 272

UST Information

Tank Number	Installation dates	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
1	1975	8,000	8' x 21'4"	Gasoline	Gasoline
2	1975	8,000	8' x 21'4"	Gasoline	Gasoline
3	1975	8,000	8' x 21'4"	Gasoline	Gasoline
4	1975	10,000	8' x 26'7"	Diesel	Diesel

E. Site Characteristics

1. **Past Releases:** There have been no known releases at this site.
2. **Facility Active or Inactive:** The facility is currently being upgraded into a new convenience store.
3. **Surrounding Property:** The surrounding property use is industrial and commercial.
4. **Site Geology/hydrogeology:**

The subject site is located in the Charlotte Belt within the Piedmont Physiographic province of central North Carolina. According to the North Carolina Geological Survey, Geologic Map of North Carolina (1991), the site is underlain by granitic rock. Competent land surface rock exposures were not noted within the general area of the subject site. The topography consists of gently sloping to moderately steep soils that have a subsoil that is dominantly red, friable clay loam or firm clay.

In the Piedmont Province groundwater is accumulated from direct precipitation. Groundwater recharge in the Iredell County area occurs in interstream areas and the discharge is into streams, lakes and swamps. In valleys, the water table generally is at or near the surface; on wide flat uplands the water table generally is not more than a few tens of feet below the surface: and on sharp hills the water table may be more than 100 feet BLS.

The local groundwater flow direction and depth for the subject site was estimated from observations made at the site and from review of the Mooresville, NC USGS 7.5 minute topographic quadrangle. The site is located within the upper portion of an un-named tributary to Lake Norman. The tributary appears to influence the groundwater flow direction at the subsurface of the facility. Based on field observations of the topographic map the regional groundwater flow beneath the site appears to flow to the South. The estimated depth to ground water beneath the site is approximately 30-40 feet below land surface. The area is serviced by Iredell County Water Department.

II. Closure Procedures

A. **Describe preparations for closure:** NCDENR Mooresville Regional Office was sent the Notice of Intent Form (GW/UST-3) on 12-7-99.
The Mooresville Fire Dept. was notified of the tank removal project.
The utility locators, NC One Call, were notified of the activity.

B. **Amount of residual material pumped out of the tanks:** The USTs were empty.

C. **Describe disposal of the residual material:** The product was removed by J.T. Alexander and Sons for resale in other stores. 500 lb. of carbon dioxide (dry ice) were placed in the tanks to purge the volatile gases. Oxygen levels in the tanks were less than 8%.

D. **Excavation**:

1. **Describe excavation:** The USTs were located in the left parking lot of the convenience store. The soil was dry. The dimensions of the tank cavity, for the gasoline and diesel tanks, were 45 feet long by 33 feet wide by 11.5 feet deep.

2. **Depth of tank burial (from land surface to top of tank):** The depth of tank burial from land surface to the top of the gasoline tanks was 3 feet.

3. **Quantity of soil removed:** Approximately 75 cubic yards of soil were removed from the excavation to be able to remove the tanks.

4. **Describe soil type:** The soil type was silty clay.

5. **Type of backfill used**: The type of back fill used was silty clay and ABC gravel. The source of the soil was from a local quarry.

E. Contaminated Soil.

1. **Describe how it was determined to what extent to excavate the soil:** Only enough soil was excavated to allow access to the USTs for removal procedures. A Photoionization Detector (PID) was used to determine if the soil removed during the excavation was contaminated. The location did reveal soil contamination during the excavation of the gasoline tanks. The contaminated soil was located in the area of the fill pipes. Two truck loads (18 cubic yards) of contaminated soil were immediately removed from the site for disposal.
2. **Describe method of temporary storage:** Two truck loads (18 cubic yards) of contaminated soil were immediately removed from the site for disposal.

III. Site Investigation

A. **Provide information on field screening and observations**: The PHOTOVAC Micro TIP MP-1000 photoionization detector (PID) was used for field screening for contaminated soil. The Micro TIP was calibrated to display concentration in units equivalent to parts per million (ppm). First, a supply of zero air, which contains no ionizable gases or vapors, is used to set the zero point. Then, span gas, containing a known concentration of a photoionizable gas or vapor, is used to set the sensitivity. Isobutylene at 100 ppm was used as the span gas. The field screening was done by holding the PID next to the soil that had been recently removed and observing the meter to determine if contaminated soil was present. In addition, soil samples were placed in plastic bags. The bags were placed in the sun, allowed to warm up and then were read with the PID.

Describe soil sampling points and sampling procedures used: The location of the soil samples taken were from under each end of the tanks and from the center, two feet into virgin soil. The grab samples were taken from the excavation off the backhoe bucket. The depth of the soil samples from the land surface was 13 feet. The samples were from the floor of the excavation. The product lines and the pump islands were not sampled. The owner plans on reusing the lines. The samples were identified as sample numbers 1 through 12 and are located on the site maps. The laboratory findings are reported as parts per million (ppm) TPH (5030)on all of the soil samples taken.(3550 for the diesel tank).

A. **Describe groundwater or surface water sampling procedures used:** No ground water or surface water sampling was done.

B. **Quality control measures:** NA

Describe decontamination procedures: NA

Describe time and date samples were collected: Soil samples were collected on 2-2-00 and submitted to the laboratory on 2-3-00.

Describe samples collected for quality control purposes: The samples were taken using disposable gloves. The soil was quickly packed into sterile glass jars and placed into a cooler filled with ice. The samples were taken to the laboratory for analysis. (see Chain of Custody).

Describe how results of quality control samples may have effected results: NA

E. **Investigation results:**

Site Sensitivity Evaluation (SSE) A SSE was not performed because the depth to groundwater was not determined. A well water survey was not conducted in the area.

Describe methods of analyses used (EPA Numbers): Spectrum Environmental instructed the laboratory to analyze the soil samples for Total Petroleum Hydrocarbons (TPH) by EPA GC Method with SW-846 Methods 5030 (purge and trap) and 3550 (sonification extraction). The NCDENR requires sample preparation Method 5030 when analyzing for low to medium boiling point fuels which include gasoline and gasohol. Sample preparation method 3550 is required when analyzing for high boiling point fuels such as jet fuels, kerosene, fuel oil #2 and diesel. The laboratory findings are reported as parts per million (PPM) TPH (3550 or 5030).

TABLE 1
LABORATORY RESULTS

		TPH 5030 or 3550		**PID (VOC)**
Soil Sample location				
tank: #1 gasoline	1	<10 ppm		<10 ppm
	2	<10		<10
	3	<10		<10
tank #2 gasoline	4	5		17
	5	<10		<10
	6	<10		<10
tank #3 gasoline	7	<10		<10
	8	<10		<10
	9	<10		<10
tank #4 diesel	10	<10	<10	<10
	11	<10	<10	<10
	12	<10	<10	<10
soil pile				15-46

See samples received on 2-3-00

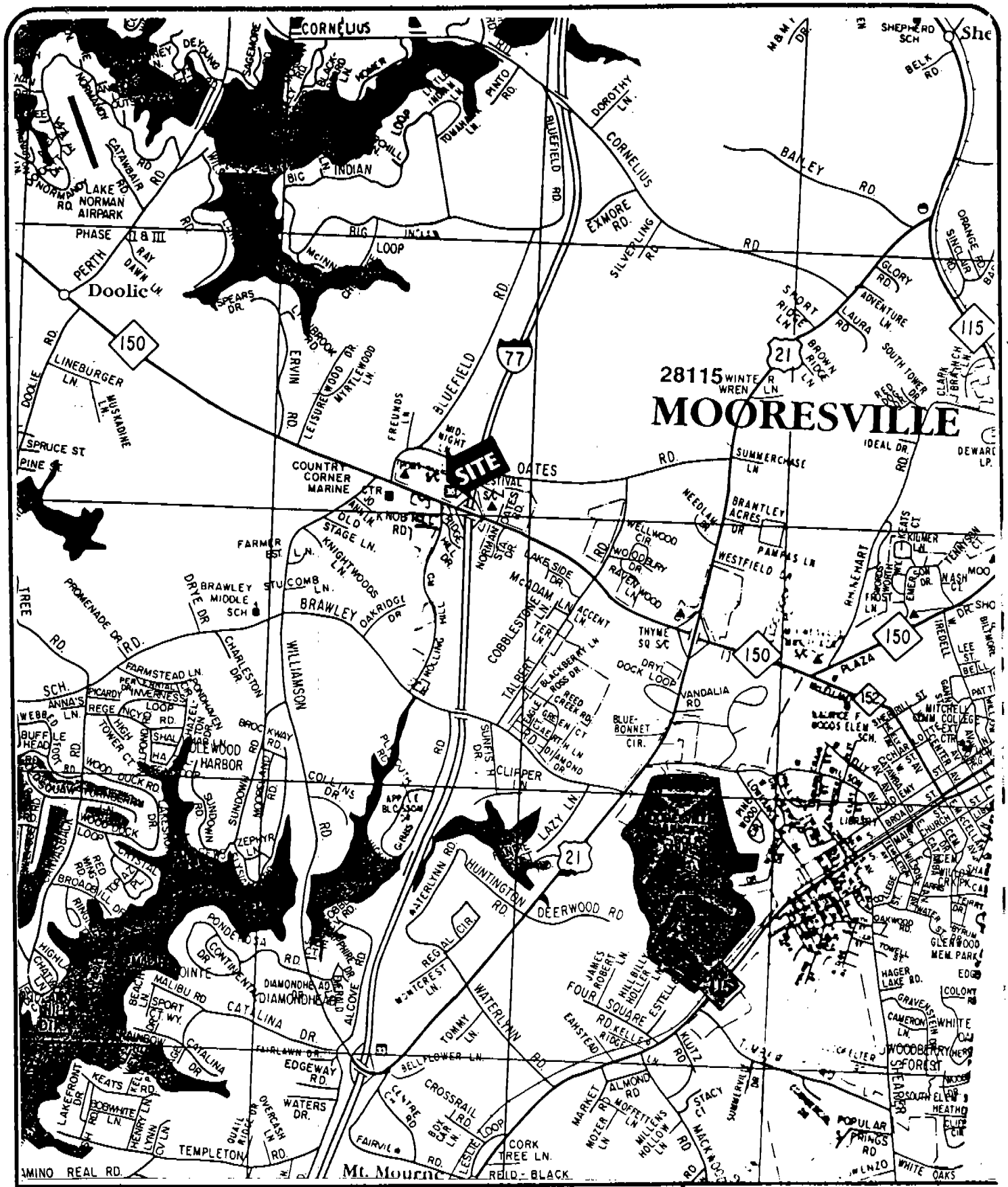
1. **Describe analytical results for samples:** Field analysis indicated that the sample locations were not impacted. The laboratory analysis confirmed that the soil was not impacted under the gasoline and diesel tanks. All of these samples were below the NCDENR limits.

IV. CONCLUSIONS AND RECOMMENDATIONS

1. Field analysis indicate that the sample locations were not impacted.
2. The laboratory analysis confirmed that the soil was not impacted under the gasoline tanks. All of the samples were below the NCDENR limits.
3. Spectrum Nationwide Environmental, Inc. anticipates that NCDENR will not require further assessment activities at this site.

Stephen M. Hamilton
President

cc: NCDENR Mooresville Region Office

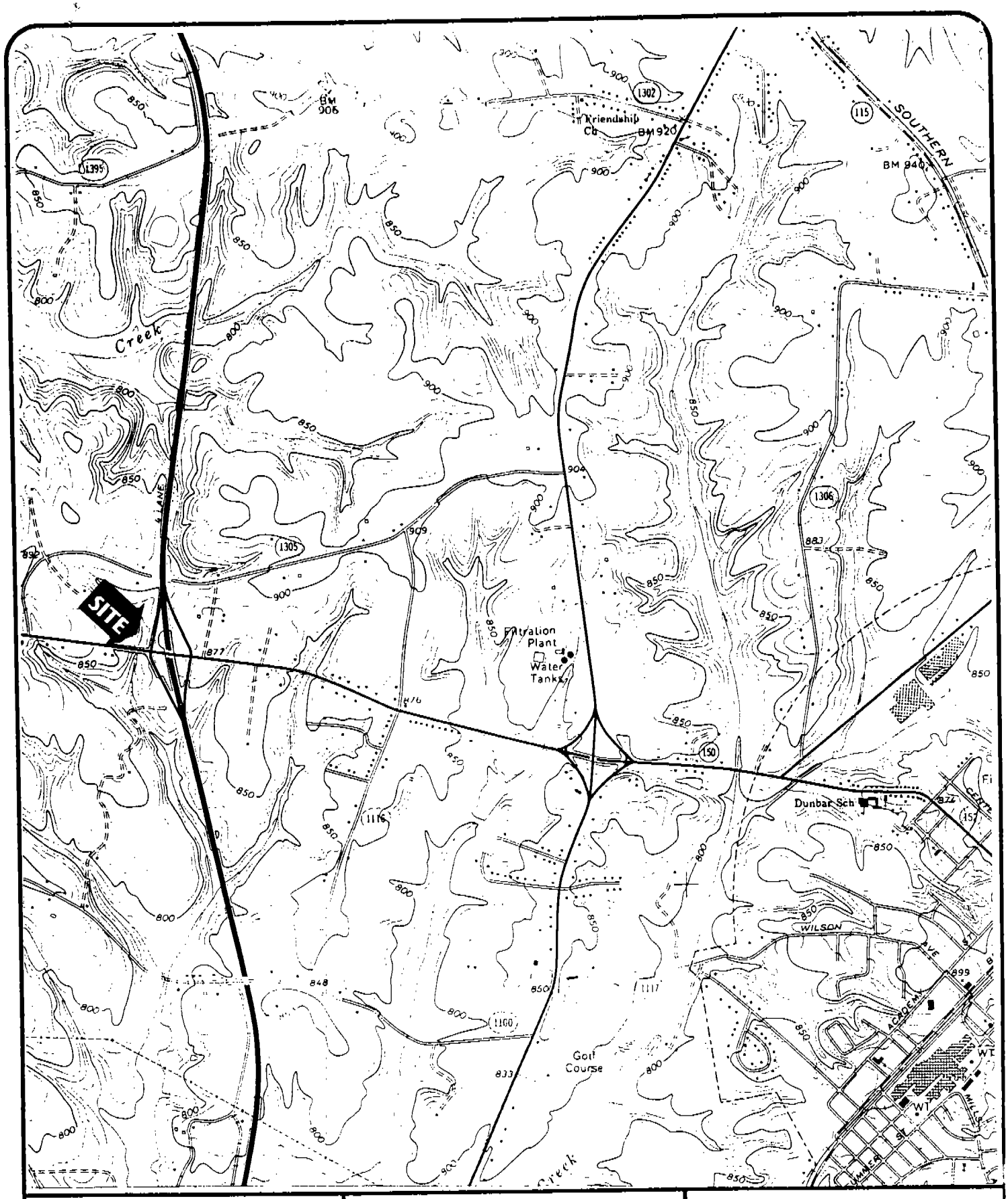


Ref: I-77 Texaco
Hwy 150
Mooresville, NC

Spectrum Environmental

P.O. Box 7351
Charlotte, NC 28241
PH (704) 334-2164

Site Location

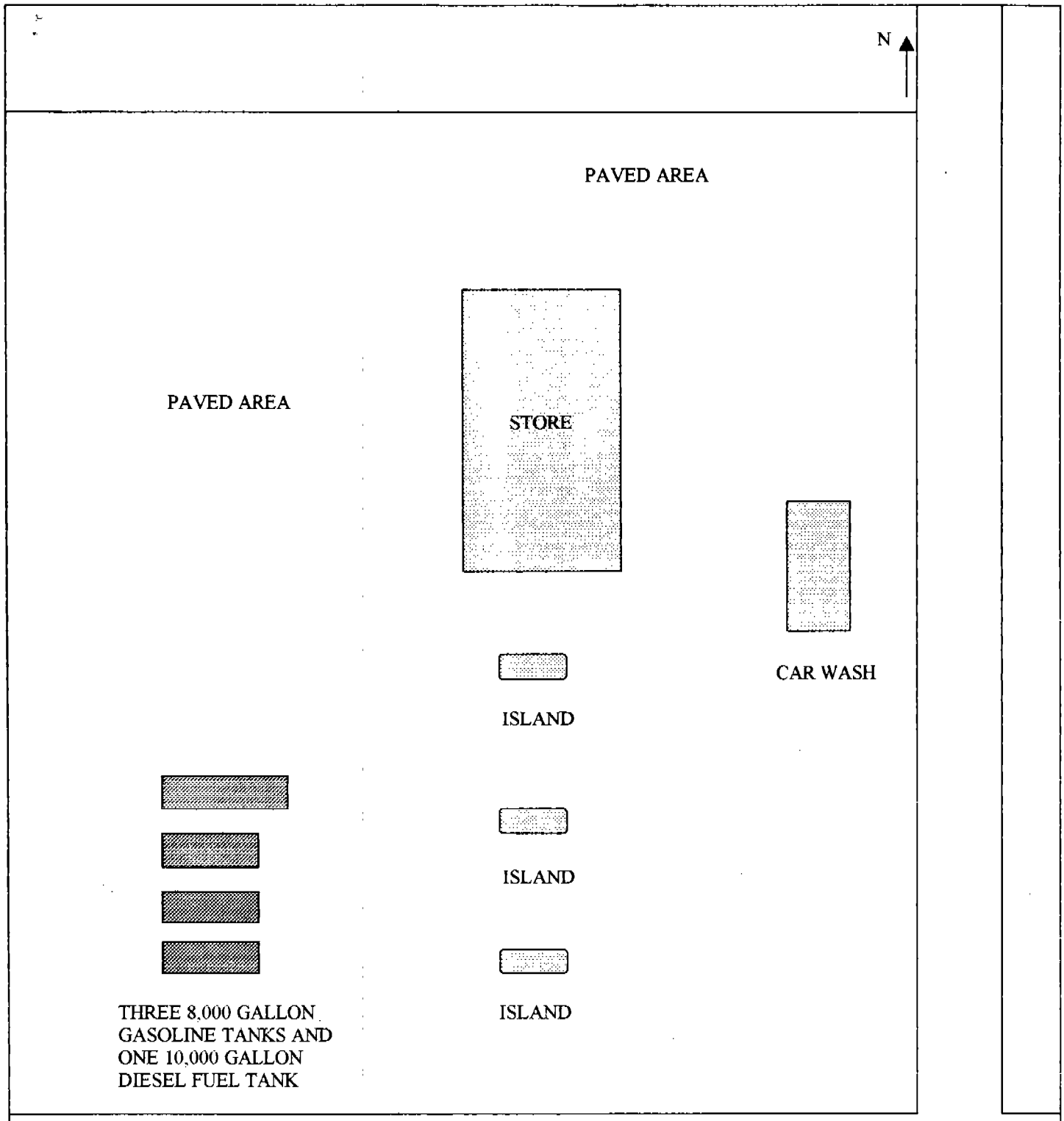


Ref: Mooresville, NC
NC USGS 7.5 Min.
Topographic

Spectrum Environmental

P.O. Box 7351
Charlotte, NC 28241
PH (704) 334-2164

General Site location
I-77 Texaco

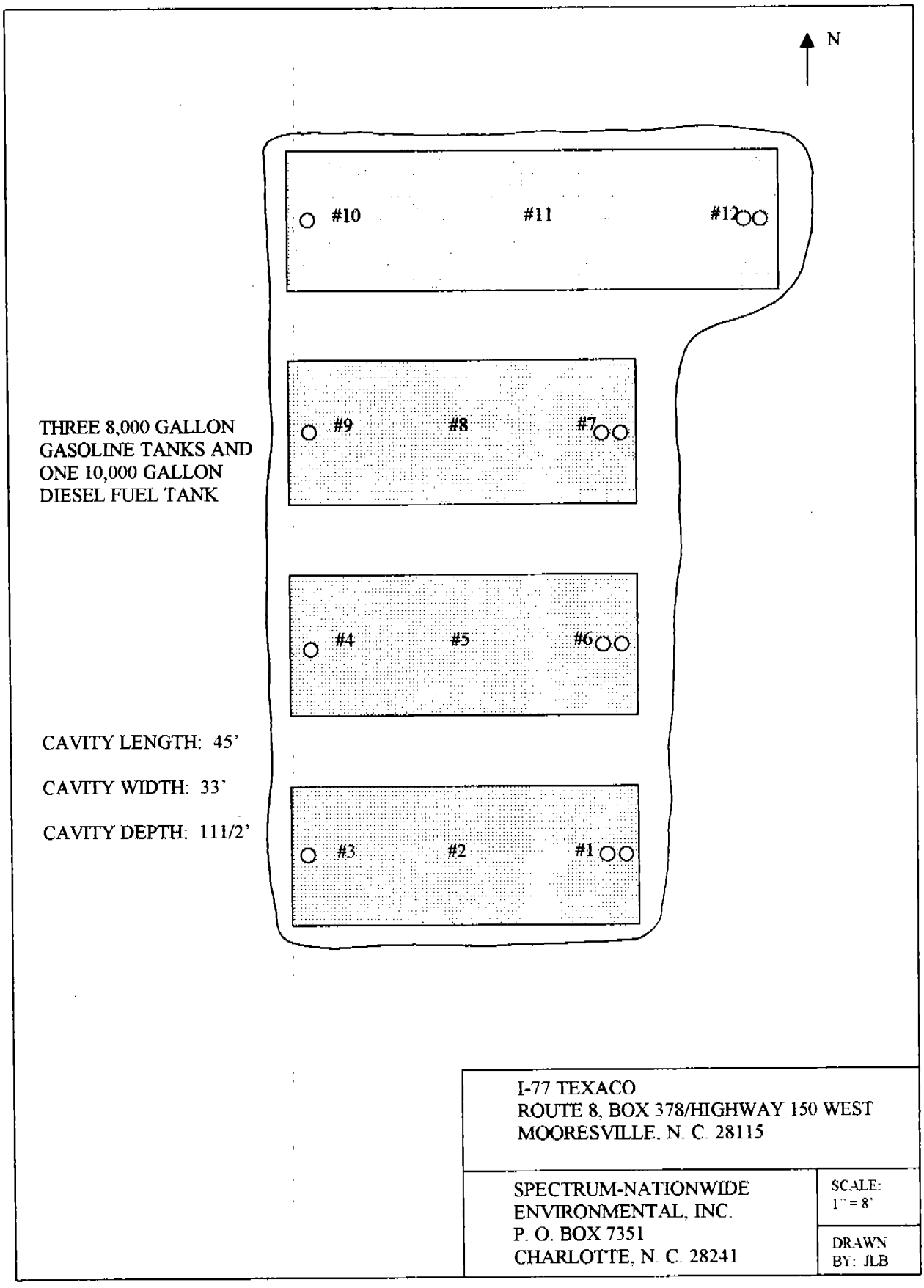


I-77 TEXACO
ROUTE 8, BOX 378/HIGHWAY 150 WEST
MOORESVILLE, N. C. 28115

SPECTRUM-NATIONWIDE
ENVIRONMENTAL, INC.
P. O. BOX 7351
CHARLOTTE, N. C. 28241

SCALE:
1" = 30'

DRAWN
BY: JLB



I-77 TEXACO
ROUTE 8, BOX 378/HIGHWAY 150 WEST
MOORESVILLE, N. C. 28115

SPECTRUM-NATIONWIDE
ENVIRONMENTAL, INC.
P. O. BOX 7351
CHARLOTTE, N. C. 28241

SCALE: 1" = 8'

DRAWN BY: JLB

APPENDIX

Appendix A	Notification of Intent to Close GW/UST
Appendix B	Site Investigation Report for Permanent Closure GW/UST-2
Appendix C	Certificate of Tank Disposal
Appendix D	Certificate of Disposal of Contaminated Soil
Appendix E	Chain of Custody Records
Appendix F	Laboratory Analytical Results

GW/UST-3 Notice of Intent: UST Permanent Closure or Change-In-Service

FOR TANKS IN **NC**

Return Completed Form To:
The appropriate DEM Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only
I. D. Number _____
Date Received _____

INSTRUCTIONS
Complete and return thirty (30) days prior to closure or change-in-service.

I. OWNERSHIP OF TANK(S)

Tank Owner Name: J. T. Alexander & Son
(Corporation, Individual, Public Agency, or Other Entity)
Street Address: P.O. Box 88/Statesville Hwy.
County: Iredell
City: Mooresville State: N. C. Zip Code: 28115
Tel. No. (Area Code): (704) 6641566

II. LOCATION OF TANK(S)

Facility Name or Company: I-77 Texaco
Facility ID # (if available): 0-010706
Street Address or State Road: Rt 8 Box 378/Hwy 150
County: Iredell City: Morsvle Zip Code: 28115
Tel. No. (Area Code): _____

III. CONTACT PERSON

Name: Mr. Tom Laws Job Title: _____ Telephone Number: (704) 6641566

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

1. Contact Local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessments.
4. If Removing Tanks or Closing in Place refer to API Publications 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used Underground Petroleum Storage Tanks".
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.
7. The **site assessment** portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After January 1, 1994, **all closure site assessment reports must be signed and sealed by a P.E. or L.G.**
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

(Contractor) Name: Spectrum-Nationwide Environmental, Inc.
Address: P. O. Box 7351-Charlotte State: N. C. Zip Code: 28241
Contact: Larry Boone Phone: (704) 3342164
Primary Consultant: Mr. Richard J. Flanigan, P.E Phone: (704) 8927250

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY: CLOSURE – Removal	CLOSURE – Abandonment In Place	CHANGE-IN-SERVICE – New Contents Stored
1	8,000 g.	Gasoline	X		
2	8,000 g.	Gaaoline	X		
3	8,000 g.	Gasoline	X		
4	10,000 g.	Diesel Fuel	X		

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title: LARRY Boone - Vice-President
*Scheduled Removal Date: _____
Signature: Larry Boone
Date Submitted: 12/7/99

*If scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date.

GW/UST-2 Site Investigation Report For Permanent Closure or Change-in-Service of U.S.T.

FOR TANKS IN NC

Return Completed Form To:
The appropriate DWQ Regional Office according to the county of the facility's location. [SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only
I.D. Number _____
Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Owner Name: J.T. Alexander & Son
Corporation, Individual, Public Agency, or Other Entity)
Street Address: P.O. Box 88 / Statesville Hwy.
County: Iredell
City: Mooresville State: NC Zip Code: 28115
Telephone Number: (704) 6664-1566
(Area Code)

II. Location of Tank(s)

Facility Name: I-77 Texaco
(or Company)
Facility ID # (if available): 0-010706
Street Address Rt. 8. Box 378 / Hwy. 150
(or State Road)
County: Iredell City: Mooresville Zip Code: 28115
Telephone Number: ( )
(Area Code)

III. Contact Person

Name: Tom Laws Job Title: Manager Tel. No. (704) 664-1566
Closure Contractor: Spectrum-Datlowide Environmental Address: P.O. Box 7351 Charlotte, NC 28241 Tel. No. (704) 334-2164
Primary Consultant: Richard J. Flanigan PE Address: 125 Spinaker Ct. Davidson, NC 28036 Tel. No.: (704) 892-7250
Lab: Blue Ridge Labs Address: P.O. Box 2940 Lenoir, NC 28645 Tel. No. (828) 758-0149

IV. U.S.T. Information / V. Excavation Condition

Tank No.	Size in Gallons	Tank Dimensions	Last Contents	Water In Excavation Yes	Water In Excavation No	Free Product Yes	Free Product No	Notable Odor or Visible Soil Contamination Yes	Notable Odor or Visible Soil Contamination No
1	8000	8' x 21'4"	Gasoline		X		X		X
2	"	"	"		X		X		X
3	"	"	"		X		X		X
4	10,000	8' x 26'7"	Diesel		X		X		X

VI. Additional Information Required

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DWQ in the written report and sketch.

NOTE: If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing the signature and seal of the P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning-in-place)

- [X] Contact local fire marshal.
- [X] Notify DWQ Regional Office before abandonment.
- [X] Drain & flush piping into tank.
- [X] Remove all product and residuals from tank.
- [X] Excavate down to tank.
- [X] Clean and inspect tank.
- [X] Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
- [X] Cap or plug all lines except the vent and fill lines.
- [X] Purge tank of all product & flammable vapors.
- [X] Cut one or more large holes in the tanks.
- [X] Backfill the area.

Date Tank(s) Permanently closed: 2-2-00
Date of Change-In-Service: _____

ABANDONMENT IN PLACE

- [ ] Fill tank until material overflows tank opening.
- [ ] Plug or cap all openings.
- [ ] Disconnect and cap or remove vent line.
- [ ] Solid inert material used - specify: _____

REMOVAL

- [X] Create vent hole.
- [X] Label tank.
- [X] Dispose of tank in approved manner.

Final tank destination: Metrolyde Tank Service Union County, NC

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative	Signature	Date Signed
Stephen Hamilton Agent for J.T. Alexander		2-25-00

NATIONWIDE TANK AND ENVIRONMENTAL SERVICES, INC.
P.O. Box 472349
Charlotte, NC 28247-2349
Phone: (704) 846-6930

CERTIFICATE OF DISPOSAL

CERTIFICATE # 1126 DATE 2/14/00

CONTRACTOR	LOCATION
Spectrum-Nationwide Environmental	I-77 Texaco
P. O. Box 7351	Route 8, Box 378
Charlotte, N. C. 28241	Highway 150 West
	Mooresville, N. C. 28115

TRANSPORTATION MILEAGE

TYPE OF TANK	SIZE	CONTENT IN GAL.	TANK ID #
Fuel	8,000 gal.	Empty	SNE112610819
Fuel	8,000 gal.	Empty	SNE112610820
Fuel	8,000 gal.	Empty	SNE112610821
Fuel	10,000 gal.	Empty	SNE112610822

Nationwide Tank Service certifies that the above mentioned tanks have been properly disposed of and the contents and sludges processed in full compliance with the local, state, and federal regulations.

Nationwide Tank and Environmental Services, In

John L. Boone

DeBruhl Environmental Excavating, Inc.
2937 Gibbon Road
Charlotte, NC 28269
(704)598-2681

CERTIFICATE OF NON-HAZARDOUS WASTE DISPOSAL

This is to certify that DeBruhl Environmental Excavating, Inc., received approximately 18 cubic yards of petroleum contaminated soil for remediation from:

REF: Spectrum-Nationwide Env., Inc.

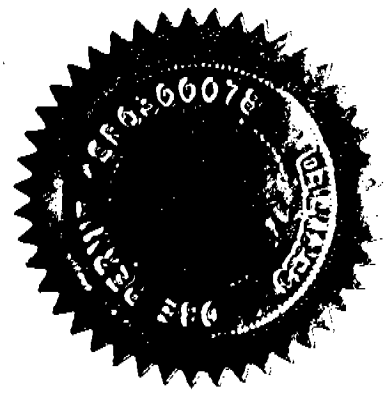
Site: J.T. Alexander & Sons
I-77 Texaco/Hwy 150
Rt. 8, Box 378
Mooresville, NC

This soil has been land applied for remedial treatment in accordance with provisions of Article 21, Chapter 143, of the General Statutes of North Carolina as amended, and other applicable Laws, Rules, and Regulations, Permit No. SR0300078.

Signed: Randy DeBruhl

Randy DeBruhl,
President

Date: February 4, 2000



APPENDIX B
PHOTOGRAPH LOG

PHOTO 1:

View of overhead power lines, and the neighboring property, facing west.

Photo taken 9/21/18.

PHOTO 2:

View of the Shell gas station, convenience store and pump islands.

Photo taken 9/21/18.

PHOTO 3:

View of the carwash onsite, facing northwest.

Photo taken 9/21/18.

APPENDIX C
BORING LOGS

SOIL BORING FIELD WORKSHEET

BORING #	**B-1**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 199.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0	Red Sandy SILT	
10	0.0	Tan Brown Silty SAND	
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-2**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 199.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0	Light Tan Silty SAND	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-3**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 199.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.4	Red Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0	Red Sandy SILT w/Clay	
8	0.0	Tan Silty SAND	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-4**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 199.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0	Tan Sandy SILT	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-5**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 199.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0	Red Brown Sandy SILT w/Clay	
8	0.0		
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-6**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 199.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0	Tan Sandy SILT	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-7**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 199.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty SAND	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0	Red Brown Sandy SILT w/Clay	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-8**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 199.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty SAND	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0	Red Brown Sandy SILT w/Clay	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

APPENDIX D
GEOPHYSICAL REPORT

GEL Solutions

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

www.gel-solutions.com

November 2, 2018

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

Re: Report for Geophysical Survey to Identify Underground Storage Tanks
And Underground Utilities
Parcel #199
491 NC 150 (River Highway)
Mooresville, North Carolina 28117

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 October 15, 2018 through October 25, 2018.

1.0 Summary of Results

No subsurface anomalies were identified in the geophysical data that indicated the presence of USTs. The anomalies represented in 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 radio-frequency electromagnetic (EM), 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 underground utilities and USTs at the site. A brief description of each technology is presented in the following paragraphs.

Radio-Frequency Electromagnetic

Radio-Frequency Electromagnetic (EM) utility locating equipment consists of a transmitter and a dual-function receiver. The receiver can be operated in a “passive” mode or in an “active” mode. The two modes of operation provide various levels of detection capabilities depending on the specific target or application.

The EM system is operated in the “active” mode by either inducting or conducting a signal into the underground utility to be traced. A transmitter is placed over and in line with a suspected buried utility. The transmitter induces a signal, which propagates along the buried utility. As the receiver is moved back and forth across the suspected path of the utility, the trace signal induces a signal into the receiver’s coil sensor. A visual and audio response indicates when the receiver is directly over the buried utility.

Another means of detecting in the "active" mode utilizes a method to "conduct" a signal within the buried utility. To accomplish this, a cable from the transmitter is clamped onto an exposed section of the buried utility and a signal propagates along the buried line. This technique minimizes any interference caused by parasitic emissions from adjacent cables in congested areas. When the system is utilized in the "passive" mode, the receiver is responding to a 60 Hertz cycle current energized by underground utilities.

Interference can and may occur when buried utilities intersect or are adjacent to each other. This effect referred to as "bleed-off" may provide a false response to the identification of the tracked utility. "Bleed-off" is caused by utilities that may be energized in the "active" or "passive" mode.

Ground Penetrating Radar Methodology

A RAMAC digital radar control system configured with a 450-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 October 15 through October 25, 2018 at the 11 DOT parcels located in the immediate vicinity of Highway 150 in Mooresville, NC. Interpretation of the GPR data was conducted in the field and any potential anomalies were marked in the field. GPR data processing typically included band pass filtering, background removal, horizontal smoothing, and gain adjustments. TDEM was also used to scan the project site. Any electromagnetic anomalies detected during field activities that were indicative of buried metallic objects were also marked in the field.

There were no subsurface geophysical anomalies detected within the limits of Parcel #199 during this investigation that indicated the presence of USTs. The anomalies represented in the data shown on Figure 1 are indicative of known metallic surface features and/or cultural interference.

The locations of underground utilities were designated using EM and GPR equipment, and their locations were marked with paint on the land surface, and additionally shown in Figure 1. Positioning data was obtained using a Trimble R10 GPS antenna.

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,

William R. Adgate
Senior Project Manager

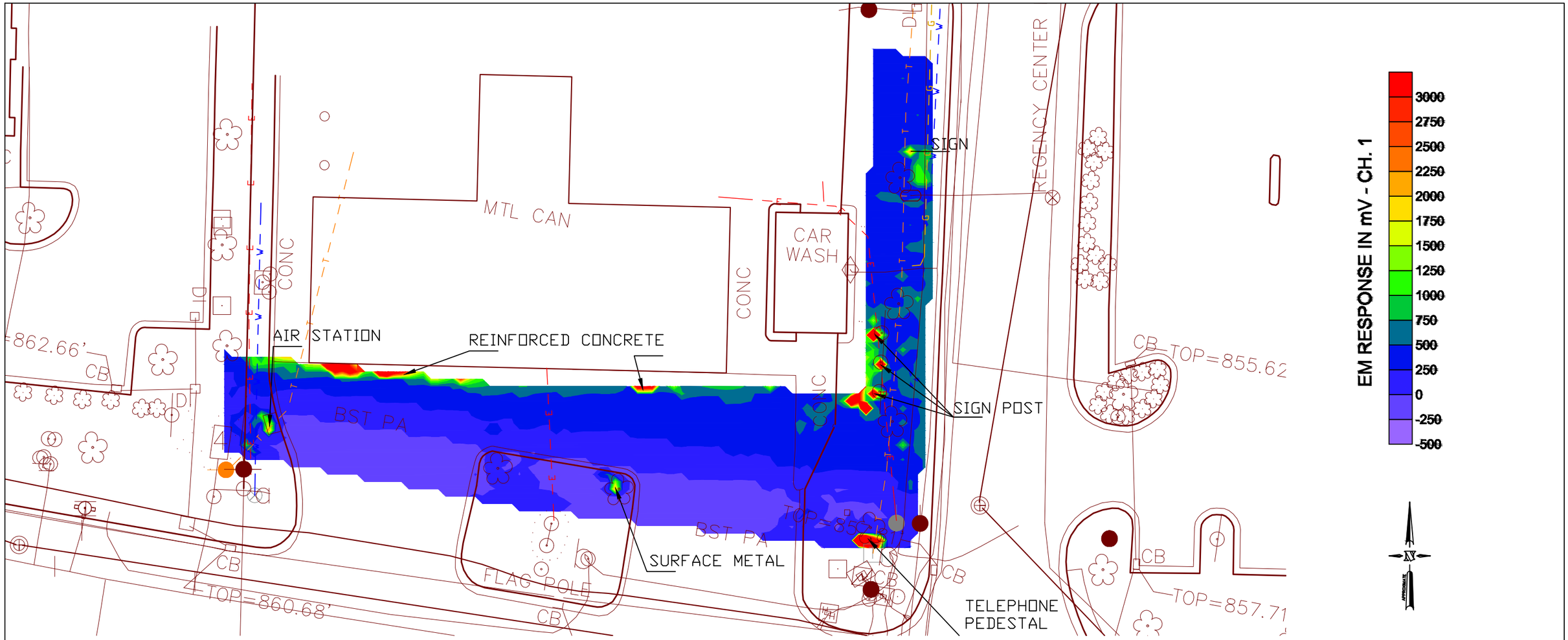
Enclosures
fc: 199.AMEC01118.Report.pdf

Site Photos

Photo 1: Looking south from northeast corner

Photo 2: Looking west from southeast corner

Photo 3: Looking north from southwest corner



LEGEND

- UK — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND UNKNOWN UTILITY LINE
- W — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND WATER LINE
- E — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND ELECTRICAL POWER LINE
- G — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND GAS LINE
- T — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND COMMUNICATIONS LINE
- LIMITED ACCESSIBILITY

GRAPHIC SCALE

0' 15' 30' 60' 120'

(IN FEET)
1 inch = 30 ft.

NOTES

1) UNDERGROUND FEATURES WERE LOCATED USING VISUAL EVIDENCE, GROUND PENETRATING RADAR (GPR), AND TIME DOMAIN ELECTROMAGNETIC (TDEM) METHODS. OTHER BURIED UTILITIES AND STRUCTURES 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 UTILITIES AND STRUCTURES MAY ONLY BE POSSIBLE WITH VACUUM OR OTHER EXCAVATION METHODS.
2) FIELD SURVEY CONDUCTED ON 10.15.2018 - 10.24.2018.
3) GEOPHYISICAL DATA GENERATED USING MALA GEOSCIENCE GPR SYSTEM CONFIGURED WITH A 450MHZ 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.

GEL SOLUTIONS
55 SHILOH ROAD, SUITE 6
ASHEVILLE, NC 28803
(828) 782-3523
WWW.GEL-SOLUTIONS.COM

PROJECT: AMEC01118

GEOPHYSICAL INVESTIGATION FOR USTs
PARCEL #199
491 NC 150 (RIVER HIGHWAY)
MOORESVILLE, NORTH CAROLINA

RESULTS OF GEOPHYSICAL INVESTIGATION

FIGURE
1

DATE: 10/30/18

DRAWN BY: JAT APPRV. BY: WRA

APPENDIX E
RESULTS FROM ONSITE UVF SOIL ANALYSES

QED

QROS

Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd
Charlotte, NC 28208

Samples taken Wednesday, November 14, 2018
Samples extracted Wednesday, November 14, 2018
Samples analysed Thursday, November 15, 2018

Contact: Helen Corley

Operator Ian Ros

Project: NCDOT Mooresville - Parcel 199

U00904

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	P199B1-2-4	246.0	<6.2	<6.2	<6.2	<6.2	<1.2	<2	<0.25	0	0	0	V.Deg.PHC,(FCM),(OCR),(P)
s	P199B2-2-4	20.6	<0.52	<0.52	1.2	1.2	0.78	<0.17	<0.021	0	83.6	16.4	Deg Fuel 77.1%,(FCM)
s	P199B3-2-4	22.2	<0.56	<0.56	1.2	1.2	0.81	<0.18	<0.022	0	88.3	11.7	Deg Fuel 78.3%,(FCM)
s	P199B4-2-4	12.4	<0.31	<0.31	<0.31	<0.31	<0.06	<0.1	<0.012	0	85	15	Residual HC,(P)
s	P199B5-2-4	12.4	<0.31	<0.31	<0.31	<0.31	<0.06	<0.1	<0.012	0	59.4	40.6	Residual HC,(P)
s	P199B6-2-4	9.2	<0.23	<0.23	4.1	4.1	0.56	<0.07	<0.009	0	87.3	12.7	Deg.Hydr.Oil 57.2%,(FCM)
s	P199B7-2-4	10.9	<0.27	<0.27	<0.27	<0.27	<0.05	<0.09	<0.011	0	0	0	V.Deg.PHC,(FCM),(P)
s	P199B8-2-4	10.7	<0.27	<0.27	0.27	0.27	<0.05	<0.09	<0.011	0	0	0	V.Deg.Diesel 58.1%,(FCM),(P)

Initial Calibrator QC check OK

Final FCM QC Check OK 92.8 %

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

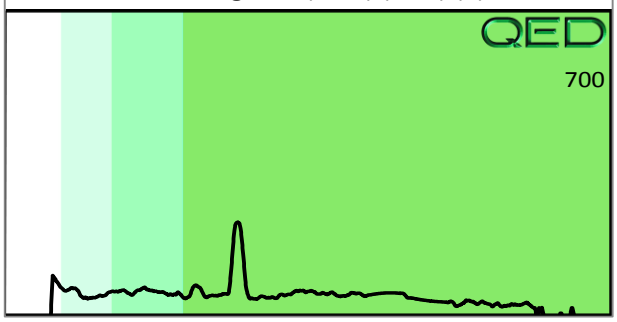
B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modifed Result.

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

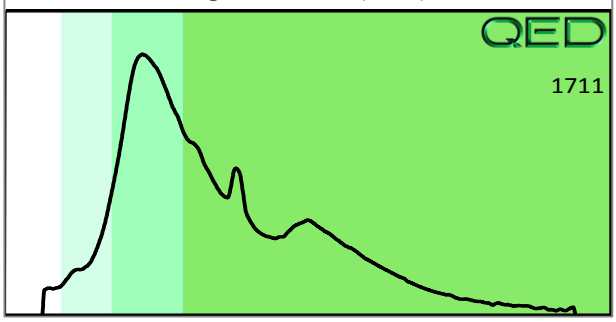
QED Hydrocarbon Fingerprints

Project: NCDOT Mooresville - Parcel 199 ##################

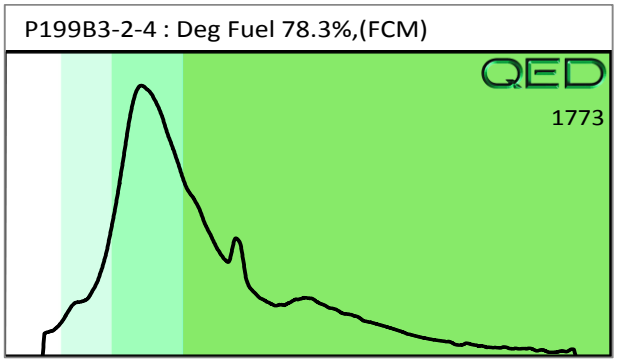
P199B1-2-4 : V.Deg.PHC,(FCM),(OCR),(P)



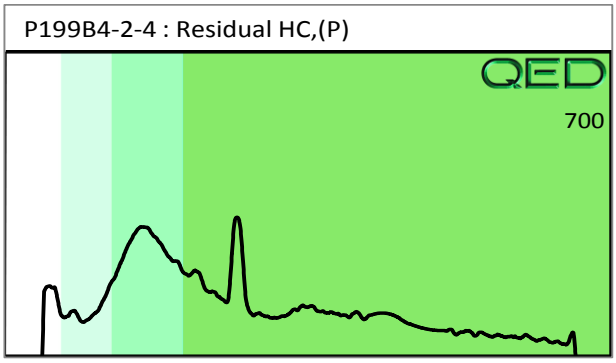
P199B2-2-4 : Deg Fuel 77.1%,(FCM)



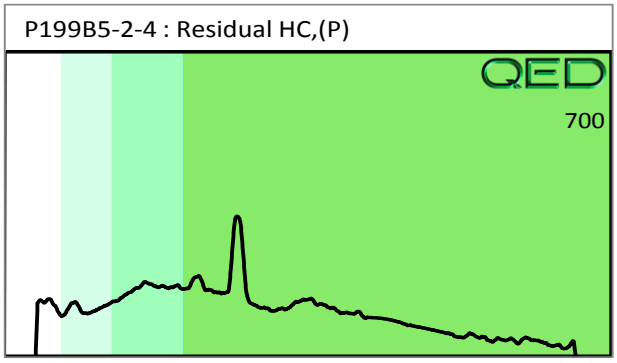
P199B3-2-4 : Deg Fuel 78.3%,(FCM)



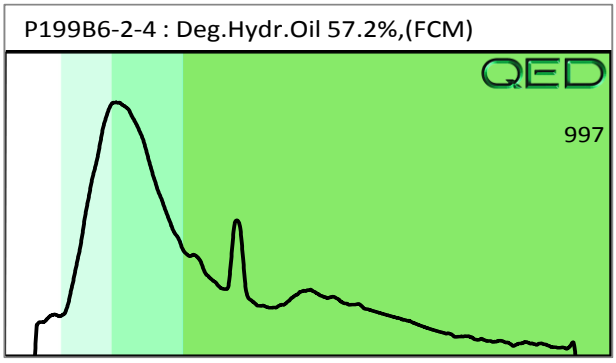
P199B4-2-4 : Residual HC,(P)



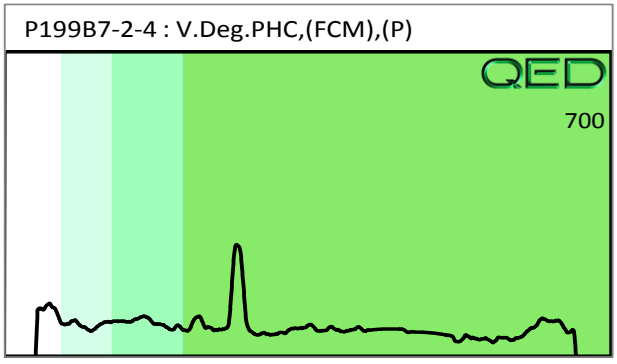
P199B5-2-4 : Residual HC,(P)



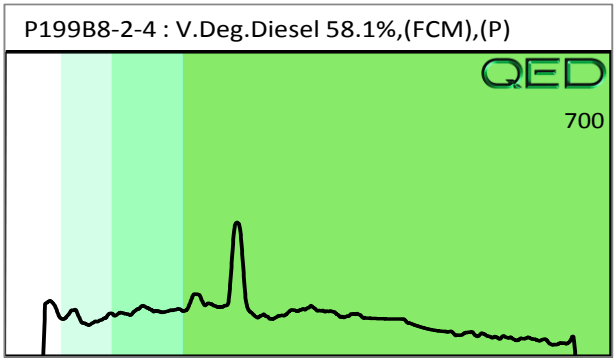
P199B6-2-4 : Deg.Hydr.Oil 57.2%,(FCM)



P199B7-2-4 : V.Deg.PHC,(FCM),(P)



P199B8-2-4 : V.Deg.Diesel 58.1%,(FCM),(P)



wood.

North Carolina Department of Transportation

Preliminary Site Assessment
State Project: R-2307B
WBS Element: 37944.1.FR5
Parcel Number: 4647766074
Iredell County

Parcel 206
Sams Investments, LLC
391 NC 150 (West Plaza Drive)
Mooresville, North Carolina
January 25, 2019

Wood Environment and Infrastructure Solutions, Inc.
Project: 188322307

John Maas, LG
Senior Geologist

Helen Corley, LG, BCES
Senior Assoc. Hydrogeologist

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

In response to the North Carolina Department of Transportation (NCDOT) Request for Proposal, dated September 17, 2018, Wood Environment and Infrastructure Solutions, Inc. (Wood) has performed a Preliminary Site Assessment (PSA) for Parcel 206. The investigation was conducted in accordance with Wood's Technical and Cost proposal dated September 27, 2018. 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 on the south side of West Plaza Drive three hundred feet east of the I-77 off ramp as shown in the Vicinity Map, **Figure 1**. The parcel, which is located at 391 NC 150 (West Plaza Drive), is occupied by an active Shell gas station and convenience store. It is identified as Parcel 206 and as Sams Investments, LLC property (Site) within the NCDOT R-2307B design file. The Site is in Mooresville of Iredell County, North Carolina. The area of investigation within the parcel as shown on **Figure 2**.

The following report summarizes a geophysical survey and describes our subsurface field investigation at the Site. The report also presents onsite soil analyses to evaluate potential soil contamination within Parcel 206, the Sams Investments, LLC property.

1.1 Site History

The Site is occupied by a Shell gas station and convenience store constructed in 1990 along West Plaza Drive. Wood interviewed the store manager Ms. Crystal Blankenship on September 21, 2018. Ms. Blankenship was not aware of past incidents on the property. This parcel appears on the NCDEQ Underground Storage Tank (UST) Facility Database as Facility ID #00-0-0000010641. No known groundwater incidents were identified at the Site. No files associated with the site were on the NCDEQ Laserfiche website.

1.2 Site Description

The Site is located in a commercial area of Mooresville in Iredell County and is comprised of approximately 1.14 acre. At the time of the PSA field implementation, the parcel was

occupied by a Shell gas station and convenience store. The majority of the Site ground cover is comprised of concrete and asphalt with vegetative cover on the western portion of the Site. The active UST bed is located south of the metal canopy and outside of the area of investigation. One of the four fuel dispenser islands underneath the metal canopy appears to be located within the area of investigation and future construction. The general topography of the Site area is sloping toward the south. Photographs taken of the site are included in **Appendix A**.

2.0 GEOLOGY

2.1 Regional Geology

The Site is located within the Charlotte Terrane of the Piedmont Physiographic Province of North Carolina. According to the 1985 State Geologic Map of North Carolina, the area is underlain by granitic rock of Permian/Pennsylvanian age.

2.2 Site Geology

Site geology was observed through the drilling of 12 shallow direct push probe soil borings (P206B1 to P206B12). **Figure 2** presents the boring locations and site layout. The borings did not exceed a total depth of 10 feet below ground surface bgs. Soils encountered in the borings consisted mostly of red and orange fine-grained sandy clay underlain with brown fine-grained sandy silt and clay. Staining was not observed in the borings. Groundwater was not encountered in the borings. Based on observations of topography of the Site vicinity, the groundwater flow direction is inferred to be generally to the south or southwest. 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 One Call was contacted on November 5th to report the proposed drilling activities and subsequently notify affected utilities for the parcel. GEL Solutions (GEL) was procured by Wood to perform utility locating and perform a geophysical survey at the Site. Innovation Environmental Technologies, Inc. (IET) of Concord, North Carolina was retained by Wood to perform the direct push sampling for soil borings and RED Lab instrumentation was scheduled.

Wood understands that acquisition of the right-of-way is necessary for the widening of NC 150. Boring locations were strategically placed within the parcel to maximize the opportunity to encounter potential contaminated soil.

3.2 Site Reconnaissance

Wood personnel performed a site reconnaissance on September 21, 2018. During the site reconnaissance, the area was visually examined for the presence of areas/obstructions that could potentially affect the subsurface investigation. The western portion of the site contained vegetation and steep slopes that restricted the probe rig access. Borings were advanced using a stainless steel hand auger in areas where probe rig access was restricted. The active UST basin was located south of the metal canopy, outside the area of investigation.

3.3 Geophysics Survey Results and Utility Locating

The geophysical survey of the site occurred between October 15 and 25, 2018. GEL performed an electromagnetic (EM) survey of the site with a ground penetrating radar (GPR) survey conducted across select EM anomalies. Time domain electromagnetic methodology (TDEM) was also utilized to measure electrical conductivity of subsurface materials. GEL's complete geophysical report is presented as **Appendix C**. GEL identified two subsurface geophysical anomalies within the area of investigation which were not attributed to visible cultural features or buried utilities. The first anomaly was located approximately 15 feet north of the northwestern corner of the metal canopy and was identified as a Possible UST. The second anomaly was located approximately 20 feet west of the northwestern corner of the metal canopy and identified as a No Confidence object due to lack of a clear hyperbolic-shaped reflector. Other anomalies identified at the Site

were indicative of known metallic surface features, reinforced concrete and/or cultural interference. The approximate location of the Possible UST is shown on Figure 2.

In advance of drilling activities, GEL performed utility locating at the Site between October 15 and October 25, 2018. GEL identified several underground electrical and telecommunication lines along the perimeter of the parcel and extending through the center portion of the parcel. Overhead powerlines were located along the northern portion of the Site along West Plaza Drive.

3.4 Soil Sampling

Wood conducted drilling activities at the site between November 15 and 16, 2018. Wood's drilling subcontractor, IET, advanced twelve total soil borings across the area of investigation. Ten of the borings were advanced to an approximate depth of 10 feet bgs using direct-push methods and two of the borings were advanced to an approximate depth of five feet bgs using a stainless-steel hand auger. Several of the direct-push borings were advanced near the edges of the Possible UST and No Confidence anomalies, as discussed below. Other boring locations targeted subsurface design features and potential environmental sources in the area of investigation dependent on utility clearance. Figure 2 presents the Site Map with boring locations and identifications.

The purpose of soil sampling was to determine if a past petroleum release had impacted the site and if so, to estimate the volume of impacted soil that might require special handling during construction activities. Wood conducted field screening of the soil borings for volatile organic compounds (VOCs) with a photoionization detector (PID) at approximate two-foot intervals. The soil interval exhibiting the highest PID reading was retained from each boring for analysis of total petroleum hydrocarbons (TPH)-diesel range organics (DRO), TPH-gasoline range organics (GRO), benzene, toluene, ethylbenzene, and xylene (BTEX), total aromatics, and polycyclic aromatic hydrocarbons (PAH) soil via on-site ultraviolet fluorescence (UVF). Fifteen samples were collected from the borings for UVF on-site analysis.

4.0 SOIL SAMPLING RESULTS

Based on PID field screening and UVF hydrocarbon analyses from November 15 and 16, 2018, evidence of petroleum hydrocarbon impacts were identified within the area of investigation.

Elevated PID readings, above ten parts per million (ppm) were detected in borings P206B5 and P206B12 which were located near the Possible UST. The elevated PID readings ranged from 15.9 ppm in boring P206B12 at an approximate depth of four to six feet bgs to 270.4 ppm in boring P206B5 at an approximate depth of two to four feet bgs. No elevated PID readings were detected in the remaining 10 borings advanced at the Site. The PID field screening results are summarized in **Table 1** and proved on the boring logs in Appendix B.

Results from the onsite UVF petroleum soil analyses are presented in **Table 2**, with instrument generated tables in **Appendix D**. 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 100 milligrams per kilogram (mg/kg) for DRO were not detected in the samples from the 12 borings advanced at the Site. An elevated TPH value above the NCDEQ Action limit of 50 mg/kg for GRO was detected in sample P206-B5 2-4 (51.4 mg/kg) located near the Possible UST. Elevated TPH-GRO concentrations were not identified in the samples from the remaining 11 borings advanced at the Site. The hydrocarbon fingerprint match for sample P206B-5 2-4 was identified as degraded gasoline. The hydrocarbon analysis results from the QED QROS Hydrocarbon Analyzer are provided in Appendix D.

5.0 CONCLUSIONS

Based on the geophysical survey, site observations, UVF analysis, and laboratory analysis, petroleum-impacted soil contamination was identified as defined by exceedances of the NCDEQ Action level of 50 mg/kg for GRO.

The following bulleted summary is based upon Wood's evaluation of field observations, and onsite and offsite quantitative analyses of samples collected from the Site on November 15 and November 16, 2018.

- The parcel is located in the area of proposed highway widening activities is a property occupied by a Shell gas station and convenience store. The majority of the Site ground cover is comprised of concrete and asphalt with vegetative cover on the western portion of the Site.

- Results of the geophysical survey identified a possible buried UST on the northern portion of the Site.

- An active UST basin was identified south of the metal canopy and outside the area of investigation. One of the four fuel dispenser islands were identified within the area of investigation underneath the metal canopy.

- Ten soil borings were advanced to an approximate depth of 10 feet bgs via a direct-push rig and two soil borings were advanced to an approximate depth of 5 feet bgs via a stainless steel hand auger. Groundwater was not encountered in the borings. Soils encountered in the borings consisted mostly of red and orange fine-grained sandy clay underlain with brown fine-grained sandy silt and clay. Staining was not observed in the borings.

- An elevated TPH-GRO value above the NCDEQ Action Limit of 50 mg/kg was detected in the sample from boring P206B5 at an approximate depth of two to four feet bgs. Boring P206B5 was located in the vicinity of the Possible UST and edge of canopy on the northern portion of the Site. No other elevated TPH-GRO or TPH-DRO values were detected in the soil borings.

- The estimated one area of impacted soils is shown on **Figure 5**. Estimated soil volume for the area near boring P206B5 is 900 cubic feet or 33 cubic yards based on an unsaturated soil thickness of four feet bgs.

6.0 RECOMMENDATIONS

Based on these PSA results, the possible UST identified during the geophysical survey should be removed in accordance with the NCDEQ guidelines with a release to soil. During the UST closure by removal, petroleum-impacted soil that may be intercepted during the road construction should be excavated and disposed offsite. If NCDOT's current design becomes final then Wood recommends that NCDOT remove and close properly the dispenser and fuel piping that would be intercepted by the R-2307B construction.

TABLES

Table 1
PID Field Screening Results
R-2307B, Parcel 206, Sams Investments, LLC-Iredell County
Mooresville, North Carolina

SAMPLE ID	Sample Date	Sample Depth (feet bgs)	PID Screening (ppm)
P206B1-2-4	11/15/2018	2-4	0
P206B2-2-4	11/15/2018	2-4	8.8
P206B3-2-4	11/15/2018	2-4	0
P206B4-2-4	11/15/2018	2-4	0.1
P206B5-2-4	11/15/2018	2-4	270.4
P206B5-8-10	11/15/2018	8-10	2.3
P206B6-2-4	11/15/2018	2-4	1.2
P206B7-2-4	11/15/2018	2-4	0
P206B8-2-4	11/15/2018	2-4	0
P206B9-2-4	11/15/2018	2-4	0
P206B10-2-4	11/15/2018	2-4	0
P206B11-2-4	11/16/2018	2-4	0
P206B11-8-10	11/16/2018	8-10	0
P206B12-4-6	11/16/2018	4-6	15.9
P206B12-8-10	11/16/2018	8-10	0.2
		Prepared By/Date	DRH 11/27/18
		Checked By/Date	RPD 12/7/18

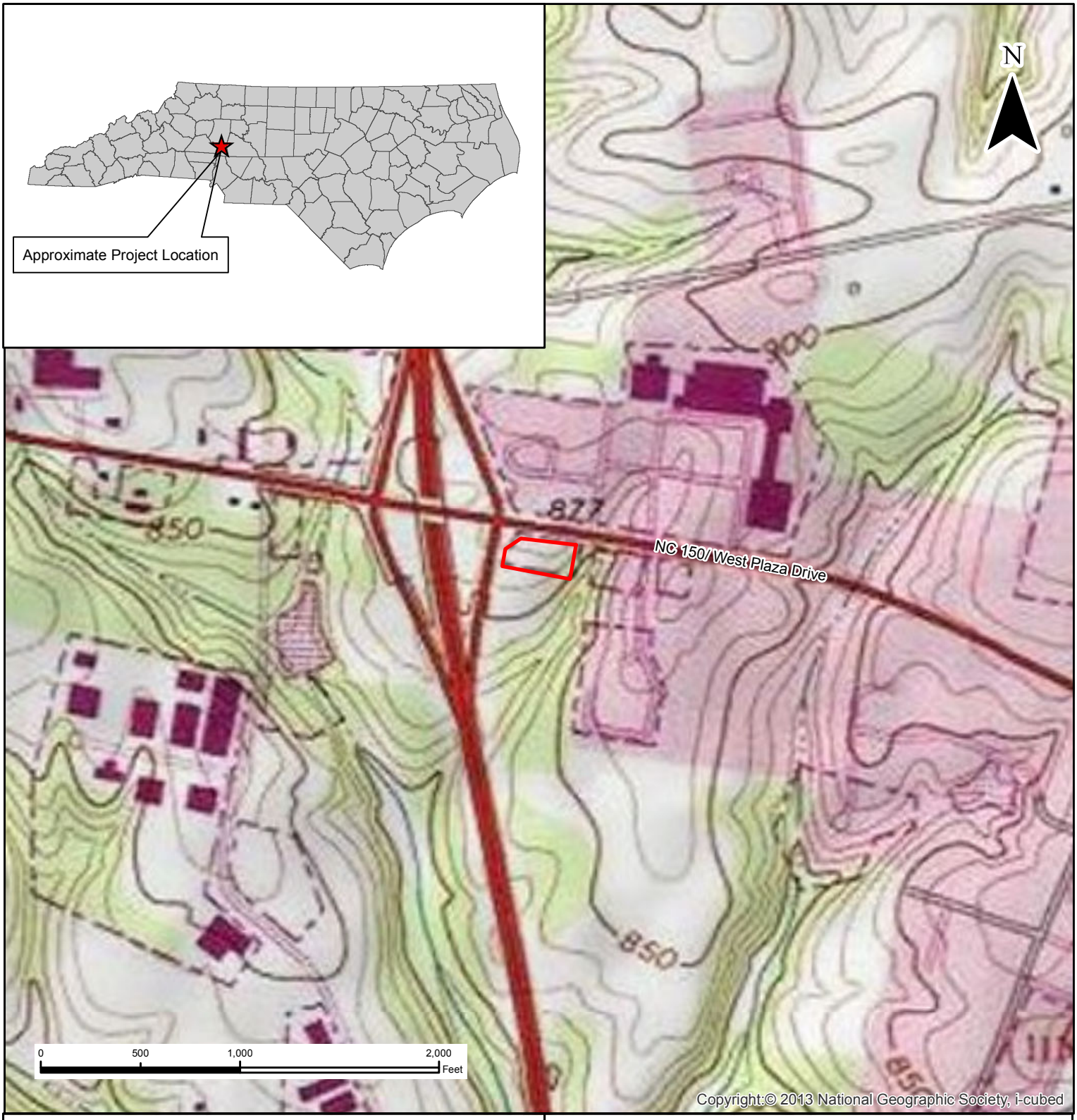
Notes: PPM = Parts Per Million
ft bgs = feet below ground surface

Table 2
UVF Petroleum Soil Results, 11/15/2018-11/16/2018
R-2307B, Parcel 206, Sams Investments, LLC-Iredell County
Mooresville, North Carolina

Sample ID Number	Sample Depth (ft bgs)	BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PAHs (mg/kg)
NC State Action Level	**NA**	**NA**	**50**	**100**	**NA**
P206B1-2-4	2-4	<0.29	<0.29	<0.29	<0.09
P206B2-2-4	2-4	<0.44	<0.44	<0.44	<0.14
P206B3-2-4	2-4	<0.44	<0.44	<0.44	<0.14
P206B4-2-4	2-4	<0.27	<0.27	0.27	<0.08
P206B5-2-4	2-4	<0.47	**51.4**	63.3	0.27
P206B5-8-10	8-10	<0.46	<0.46	0.46	<0.15
P206B6-2-4	2-4	<0.39	<0.39	1.0	<0.12
P206B7-2-4	2-4	<0.27	<0.27	0.36	<0.09
P206B8-2-4	2-4	<0.27	<0.27	<0.27	<0.09
P206B9-2-4	2-4	<0.55	<0.55	<0.55	<0.18
P206B10-2-4	2-4	<0.47	<0.47	<0.47	<0.15
P206B11-2-4	2-4	<0.24	<0.24	<0.24	<0.08
P206B11-8-10	8-10	<0.46	<0.46	0.74	<0.15
P206B12-4-6	4-6	<0.28	<0.28	0.28	<0.09
P206B12-8-10	8-10	<0.53	<0.53	0.96	<0.17

NOTES: Prepared By/Date DRH 11/27/18
(mg/kg) = Millograms per kilogram Checked By/Date RPD 12/7/18
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
BTEX = Benzene, Toluene, Ethylbenzene and Xylenes
PAHs = Polycyclic Aromatic Hydrocarbon
ft bgs = feet below ground surface
Bold cells indicate exceedance of NC State Action Levels
NA= Not applicable

FIGURES



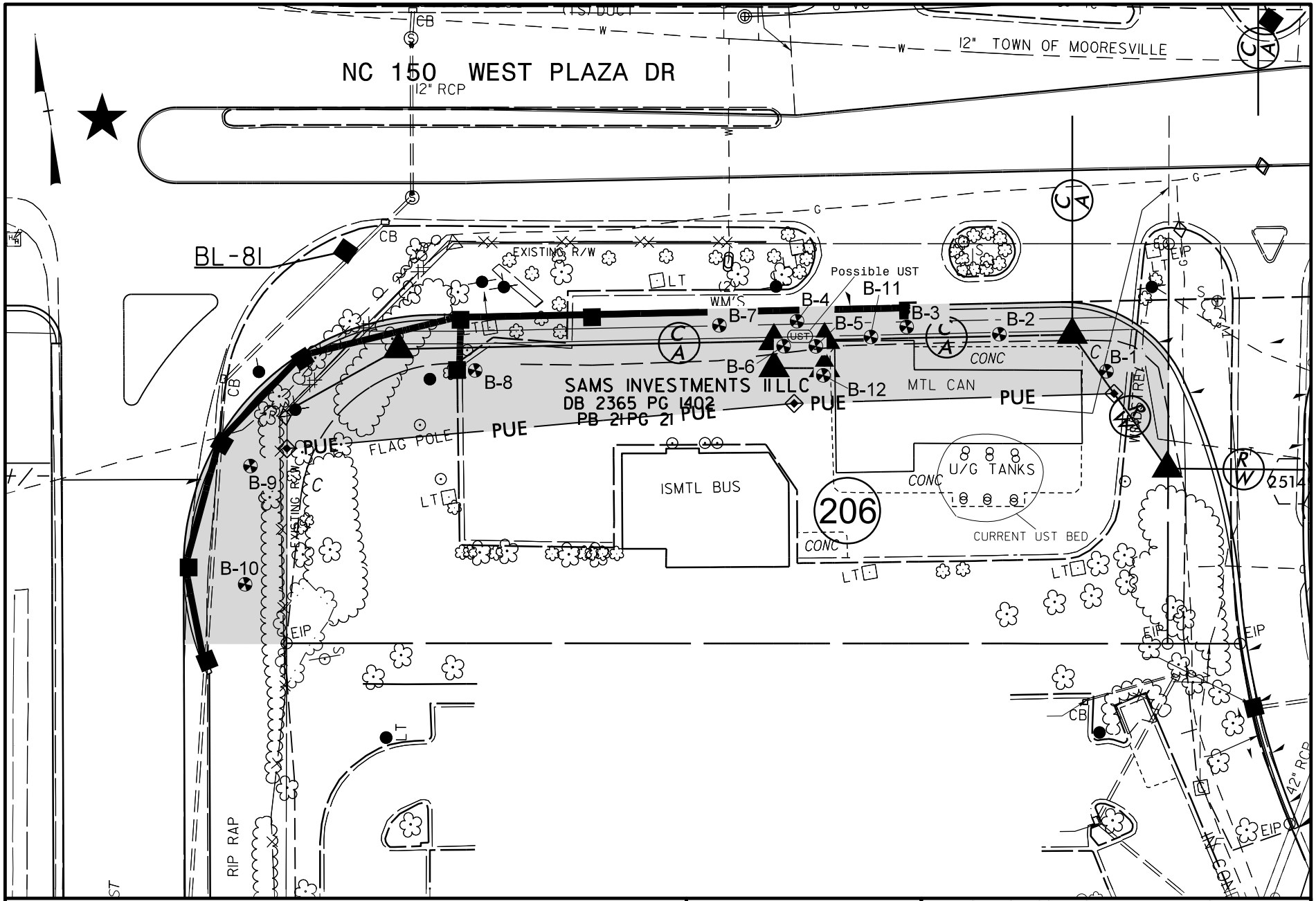
wood.

VICINITY MAP

Parcel 206
Sams Investments LLC
391 NC 150 (West Plaza Drive)
Mooresville, North Carolina

Site Boundary

Prepared By: LMM Date: 12/12/2018	Checked By: AJF Date: 12/12/2018	Project No.: 188322307	Figure No.: 1



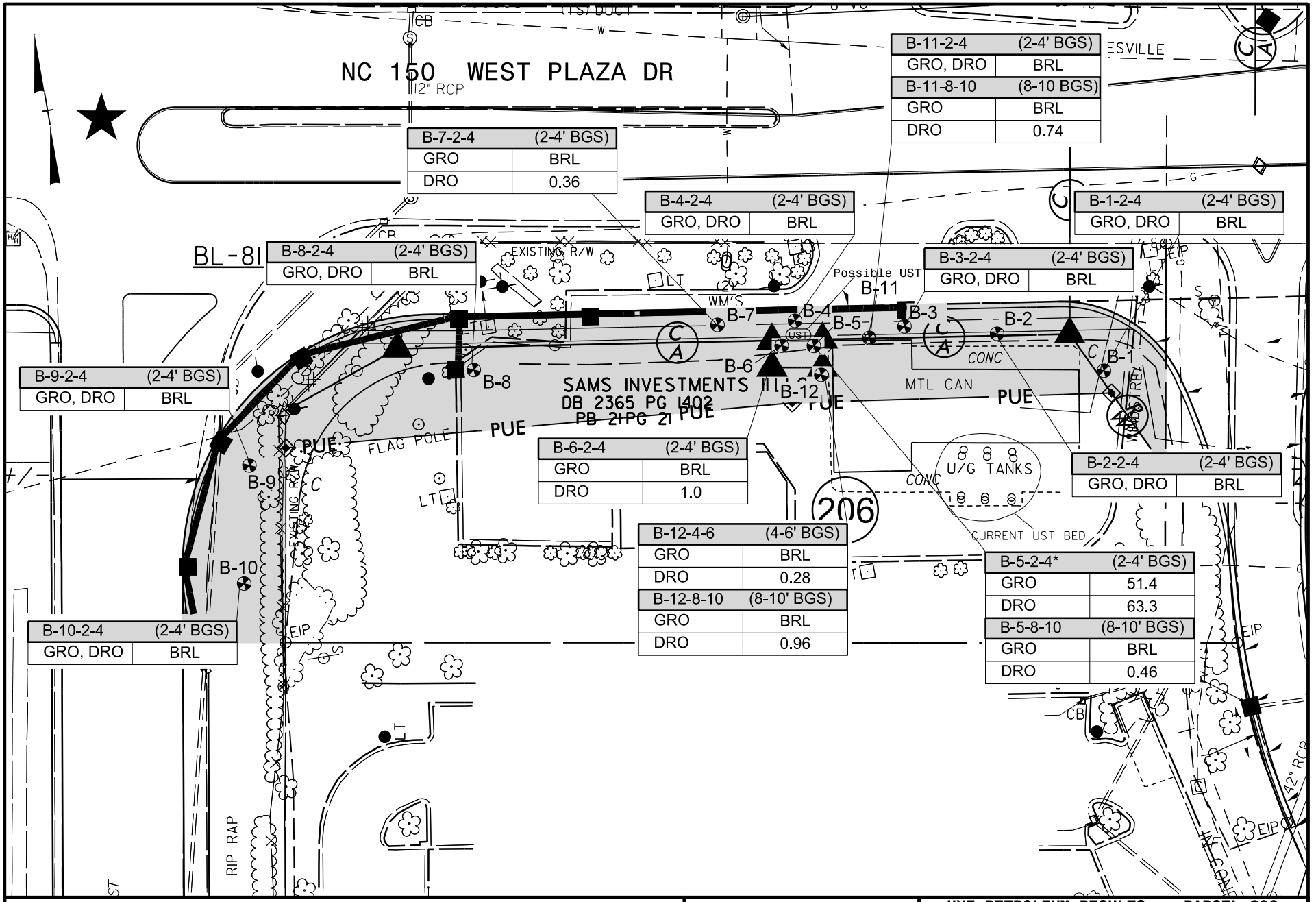
BORING LOCATION

25′ 0′ 25′ 50′
12.5′
(ENGLISH)

wood.

BORING LOCATION MAP - PARCEL 206
SAMS INVESTMENTS LLC, R-2307B
391 NC 150 (WEST PLAZA DRIVE)
MOORESVILLE, NC 28117

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	1/23/19	HPC	1/23/19	188322307	2



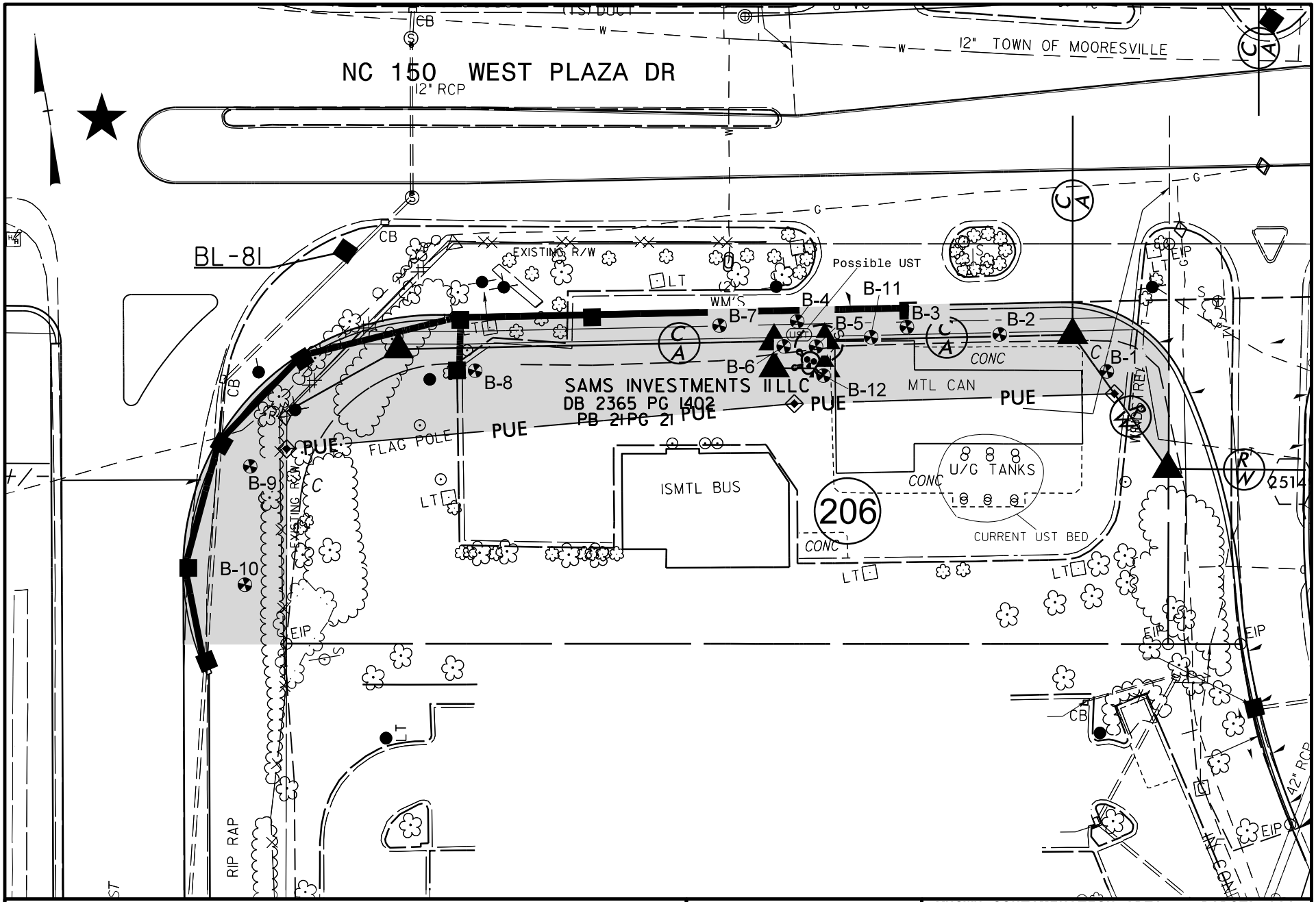
BORING LOCATION
GRO=GASOLINE RANGE ORGANICS
DRO=DIESEL RANGE ORGANICS
PAH=POLYCYCLIC AROMATIC HYDROCARBONS
CONCENTRATIONS SHOWN IN MILLIGRAMS PER KILOGRAMS (mg/kg)
UNDERLINED CONCENTRATIONS EXCEED NCDEQ STATE ACTION LIMITS
BGS=BELOW GROUND SURFACE
BRL=BELOW REPORTING LIMIT

25' 0' 25' 50'
12.5'
(ENGLISH)

wood.

UVF PETROLEUM RESULTS - PARCEL 206
SAMS INVESTMENTS LLC, R-2307B
391 NC 150 (WEST PLAZA DRIVE)
MOORESVILLE, NC 28117

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	1/23/19	HPC	1/23/19	188322307	3



wood.

KNOWN CONTAMINATION AREA - PARCEL 206
SAMS INVESTMENTS LLC, R-2307B
391 NC 150 (WEST PLAZA DRIVE)
MOORESVILLE, NC 28117

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	1/23/19	HPC	1/23/19	188322307	4

APPENDIX A
PHOTOGRAPH LOG

PHOTO 1:

View of overhead power lines facing west.

Photo taken 9/21/18.

PHOTO 2:

Uneven concrete and asphalt west of the Shell store.

Photo taken 9/21/18.

PHOTO 3:

View of gas pump islands on site, facing north.

Photo taken 9/21/18.

PHOTO 4:

View of the geophysical anomaly north of the metal canopy.

Photo taken 10/15/18.

APPENDIX B
BORING LOGS

SOIL BORING FIELD WORKSHEET

BORING #	**B-1**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Orange Sandy CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0	Brown Sandy Silt w/Clay	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-2**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.5	Brown, Red Sandy CLAY	
4	8.8		Sample taken at 2-4'
6	1.7		
8	1.6		
10	0.5	Red Silty CLAY	
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-3**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.7	Brown Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0	Brown Sandy CLAY	
8	0.0		
10	0.1		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-4**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Brown Sandy CLAY	
4	0.1		Sample taken at 2-4'
6	0.2		
8	0.0	Red Silty CLAY	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**B-5**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Gray, Red Sandy CLAY	
4	270.4		Sample taken at 2-4'
6	6.8		
8	3.6	Red Silty CLAY	
10	2.3	Red, Orange Sandy SILT	Sample taken at 8-10'
		*Boring terminated at 10'	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-6**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Tan Brown, Gray Sandy SILT	
4	1.2		Sample taken at 2-4'
6	1.2	Red Silty CLAY	
8	0.8		
10	0.0	Red, Orange Sandy SILT	
		*Boring terminated at 10'	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-7**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Tan Brown, Gray Sandy SILT	
4	0.0		Sample taken at 2-4'
6	0.8		
8	0.0	Red Silty CLAY	
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

SOIL BORING FIELD WORKSHEET

BORING #	**B-8**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Tan Brown, Gray Sandy SILT	
4	0.0		Sample taken at 2-4'
6	0.6		
8	0.0	Red Silty CLAY	
10	0.5		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-9**	BORING DEPTH (ft)	**5**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Sandy SILT	
4	0.0		Sample taken at 2-4'
6	0.0	*Boring terminated at 5'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-10**	BORING DEPTH (ft)	**5**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy, 40°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Tan Silty SAND	
4	0.0	Red Orange Silty SAND	Sample taken at 2-4'
6	0.0	*Boring terminated at 5'	

Log Completed By: **DRH**

Page: **1**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**B-11**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/16/2018**			WEATHER CONDITIONS	**Sunny, 48˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Orange Sandy CLAY	
4	0.0		Sample taken at 2-4'
6	0.0	Red Brown Sandy CLAY	
8	0.0		
10	0.0		Sample taken at 8-10'
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-12**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 206.**
DATE DRILLED	**11/16/2018**			WEATHER CONDITIONS	**Sunny, 48˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**Hand Auger**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Brown, Gray Silty CLAY, Product Odor	
4	0.7		
6	16.0		Sample taken at 4-6'
8	0.1	Red Silty CLAY	
10	0.2	Red Orange, Silty CLAY	Sample taken at 8-10'
		*Boring terminated at 10'	

Log Completed By: **DRH**

APPENDIX C
GEOPHYSICAL REPORT

GEL Solutions

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

www.gel-solutions.com

November 2, 2018

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

Re: Report for Geophysical Survey to Identify Underground Storage Tanks
And Underground Utilities
Parcel #206
391 NC 150 (West Plaza Drive)
Mooresville, North Carolina 28117

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 October 15, 2018 through October 25, 2018.

1.0 Summary of Results

Two subsurface anomalies were identified in the geophysical data. 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. The anomalies were denoted as "Possible UST" and "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 radio-frequency electromagnetic (EM), 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 underground utilities and USTs at the site. A brief description of each technology is presented in the following paragraphs.

Radio-Frequency Electromagnetic

Radio-Frequency Electromagnetic (EM) utility locating equipment consists of a transmitter and a dual-function receiver. The receiver can be operated in a "passive" mode or in an "active" mode. The two modes of operation provide various levels of detection capabilities depending on the specific target or application.

The EM system is operated in the "active" mode by either inducting or conducting a signal into the underground utility to be traced. A transmitter is placed over and in line with a suspected buried utility. The transmitter induces a signal, which propagates along the buried utility. As the receiver is moved back and forth across the suspected path of the utility, the trace signal induces a signal into the receiver's coil sensor. A visual and audio response indicates when the receiver is directly over the buried utility.

Another means of detecting in the "active" mode utilizes a method to "conduct" a signal within the buried utility. To accomplish this, a cable from the transmitter is clamped onto an exposed section of the buried utility and a signal propagates along the buried line. This technique minimizes any interference caused by parasitic emissions from adjacent cables in congested areas. When the system is utilized in the "passive" mode, the receiver is responding to a 60 Hertz cycle current energized by underground utilities.

Interference can and may occur when buried utilities intersect or are adjacent to each other. This effect referred to as "bleed-off" may provide a false response to the identification of the tracked utility. "Bleed-off" is caused by utilities that may be energized in the "active" or "passive" mode.

Ground Penetrating Radar Methodology

A RAMAC digital radar control system configured with a 450-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 October 15 through October 25, 2018 at the 11 DOT parcels located in the immediate vicinity of Highway 150 in Mooresville, NC. Interpretation of the GPR data was conducted in the field and any potential anomalies were marked in the field. GPR data processing typically included band pass filtering, background removal, horizontal smoothing, and gain adjustments. TDEM was also used to scan the project site. Any electromagnetic anomalies detected during field activities that were indicative of buried metallic objects were also marked in the field.

Two subsurface geophysical anomalies were detected during the investigation of Parcel #206 as depicted in Figure 1. The anomalies were indicative of “Possible UST” and "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.”

The locations of underground utilities were designated using EM and GPR equipment, and their locations were marked with paint on the land surface, and additionally shown in Figure 1. Positioning data was obtained using a Trimble R10 GPS antenna.

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,

William R. Adgate
Senior Project Manager

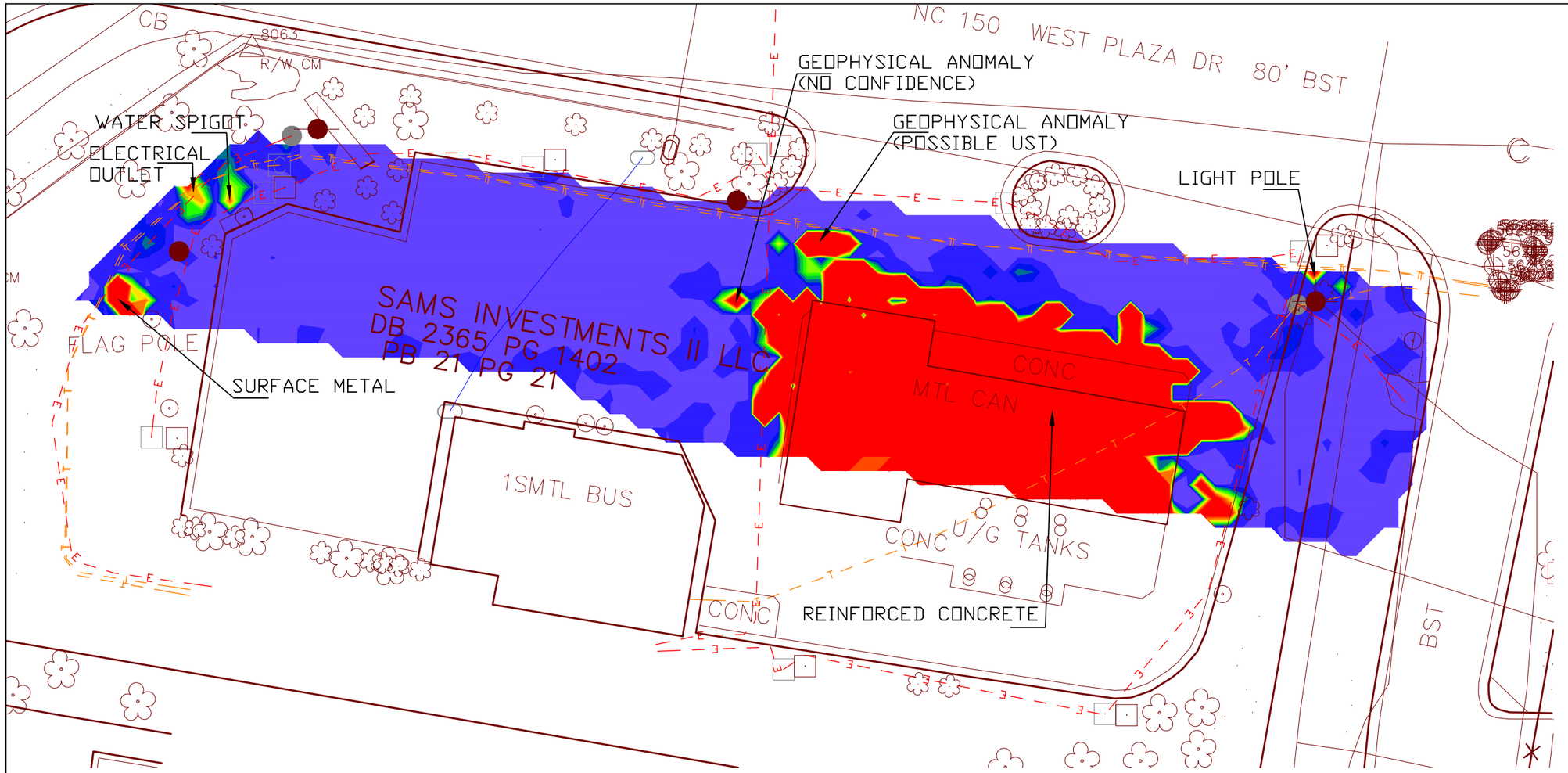
Enclosures
fc: 206.AMEC01118.Report.pdf

Site Photos

Photo 1: Looking west from northeast corner

Photo 2: Showing surface metal and obstructions in northwest corner

Photo 3: GPR/EM anomaly



LEGEND

- UK — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND UNKNOWN UTILITY LINE
- W — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND WATER LINE
- E — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND ELECTRICAL POWER LINE
- G — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND GAS LINE
- T — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND COMMUNICATIONS LINE
- LIMITED ACCESSIBILITY

GRAPHIC SCALE

0' 15' 30' 60' 120'

(IN FEET)
1 inch = 30 ft.

NOTES

1) UNDERGROUND FEATURES WERE LOCATED USING VISUAL EVIDENCE, GROUND PENETRATING RADAR (GPR), AND TIME DOMAIN ELECTROMAGNETIC (TDEM) METHODS. OTHER BURIED UTILITIES AND STRUCTURES 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 UTILITIES AND STRUCTURES MAY ONLY BE POSSIBLE WITH VACUUM OR OTHER EXCAVATION METHODS.
2) FIELD SURVEY CONDUCTED ON 10.15.2018 - 10.24.2018.
3) GEOPHYISICAL DATA GENERATED USING MALA GEOSCIENCE GPR SYSTEM CONFIGURED WITH A 450MHZ 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.

GEL SOLUTIONS
55 SHILOH ROAD, SUITE 6
ASHEVILLE, NC 28803
(828) 782-3523
WWW.GEL-SOLUTIONS.COM

PROJECT: AMEC01118

GEOPHYSICAL INVESTIGATION FOR USTs
PARCEL #206
391 NC 150 (WEST PLAZA DRIVE)
MOORESVILLE, NORTH CAROLINA

RESULTS OF GEOPHYSICAL INVESTIGATION

FIGURE 1

DATE: 10/30/18

DRAWN BY: JAT APPRV. BY: WRA

APPENDIX D
RESULTS FROM ONSITE UVF SOIL ANALYSES

QED

AQROS

Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd.
Charlotte, NC 28208

Samples taken Thursday, November 15, 2018
Samples extracted Thursday, November 15, 2018
Samples analysed Thursday, November 15, 2018

Contact: Helen Corley

Operator Derick Haydin

Project: NCDOT Mooresville - Parcel 206

U00904

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	P206B1 2-4	11.6	<0.29	<0.29	<0.29	<0.29	<0.06	<0.09	<0.012	0	0	0	,(FCM)
s	P206B2 2-4	17.7	<0.44	<0.44	<0.44	<0.44	<0.09	<0.14	<0.018	0	100	0	PHC not detected
s	P206B3 2-4	17.7	<0.44	<0.44	<0.44	<0.44	<0.09	<0.14	<0.018	0	100	0	PHC not detected
s	P206B4 2-4	10.6	<0.27	<0.27	0.27	0.27	<0.05	<0.08	<0.011	0	84.7	15.3	Deg Fuel 90.9%,(FCM)
s	P206B5 2-4	19.0	<0.47	51.4	63.3	114.7	6.9	0.27	<0.019	99.2	0.7	0.1	Deg.Gas 73.6%,(FCM)
s	P206B5 8-10	18.4	<0.46	<0.46	0.46	0.46	<0.09	<0.15	<0.018	0	96.5	3.5	Deg Fuel 82.7%,(FCM)
s	P206B6 2-4	15.5	<0.39	<0.39	1	1	0.49	<0.12	<0.015	41.8	47.2	11	Road Tar 76.7%,(FCM),(BO)
s	P206B7-2-4	10.8	<0.27	<0.27	0.36	0.36	0.17	<0.09	<0.011	44.2	46.6	9.2	Road Tar 93%,(FCM)
s	P206B8 2-4	10.7	<0.27	<0.27	<0.27	<0.27	<0.05	<0.09	<0.011	0	100	0	Residual HC

Initial Calibrator QC check OK Final FCM QC Check OK 106.3 %

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

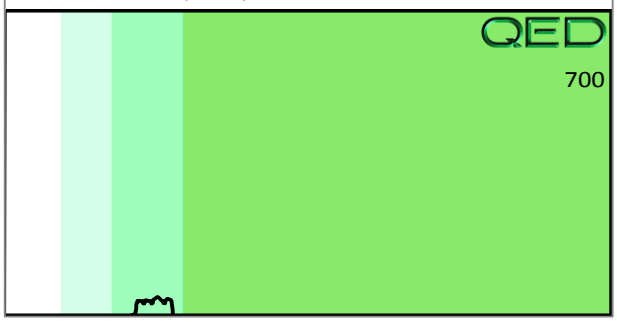
B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modifed Result.

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

QED Hydrocarbon Fingerprints

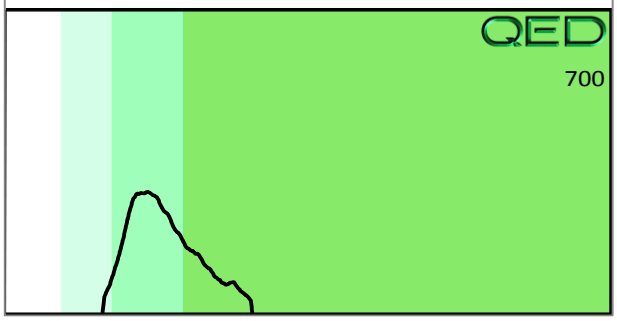
Project: NCDOT Mooresville - Parcel 206 ##################

P206B1 2-4 : ,(FCM)

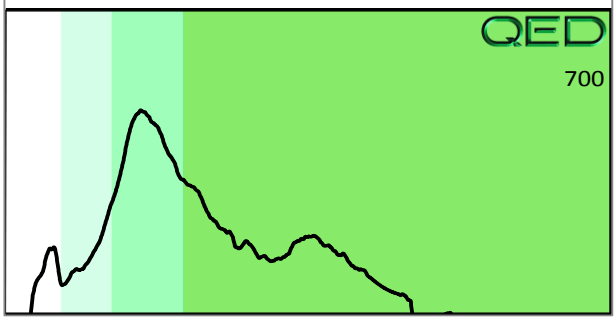


P206B2 2-4 : PHC not detected

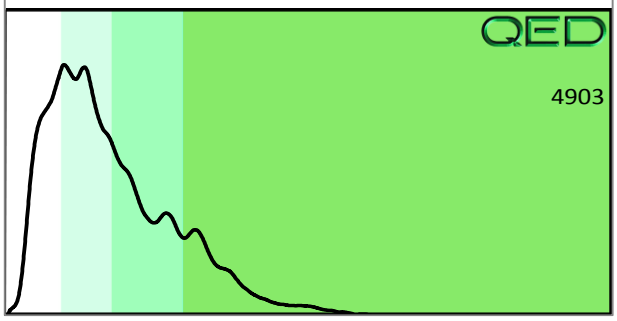
P206B3 2-4 : PHC not detected



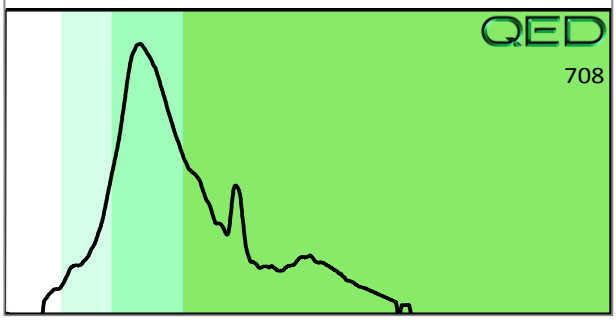
P206B4 2-4 : Deg Fuel 90.9%,(FCM)



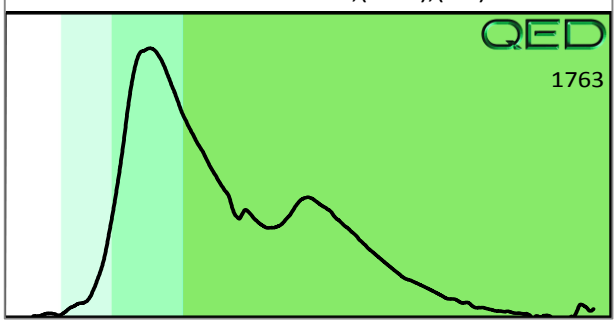
P206B5 2-4 : Deg.Gas 73.6%,(FCM)



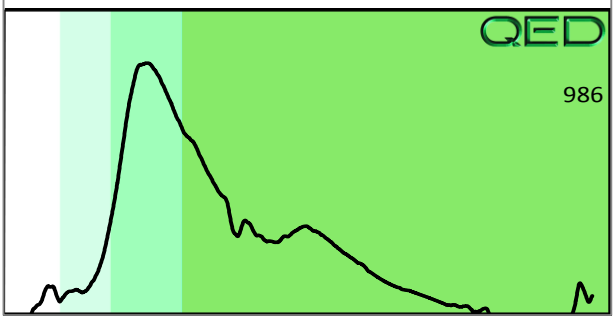
P206B5 8-10 : Deg Fuel 82.7%,(FCM)



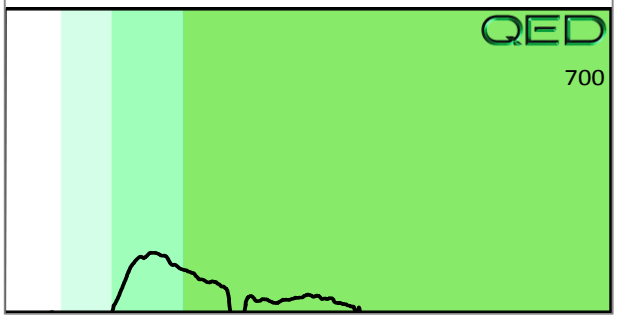
P206B6 2-4 : Road Tar 76.7%,(FCM),(BO)



P206B7-2-4 : Road Tar 93%,(FCM)



P206B8 2-4 : Residual HC



QED

AQROS

Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd.
Charlotte, NC 28208

Samples taken Thursday, November 15, 2018
Samples extracted Thursday, November 15, 2018
Samples analysed Thursday, November 15, 2018

Contact: Helen Corley

Operator Derick Haydin

Project: NCDOT Mooresville - Parcel 206

U00904

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	P206B9 2-4	22.0	<0.55	<0.55	<0.55	<0.55	<0.11	<0.18	<0.022	0	0	0	PHC not detected
s	P206B10 2-4	19.0	<0.47	<0.47	<0.47	<0.47	<0.09	<0.15	<0.019	0	0	0	PHC not detected

Initial Calibrator QC check OK

Final FCM QC Check OK 105.2 %

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

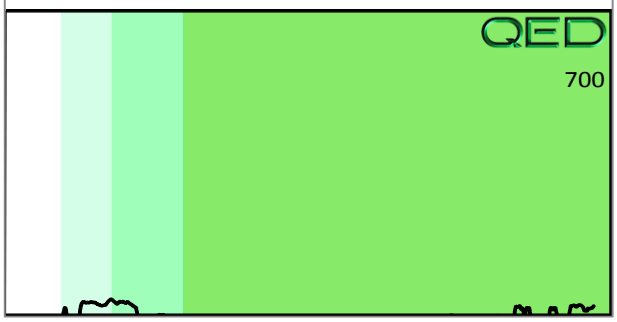
B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modifed Result.

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

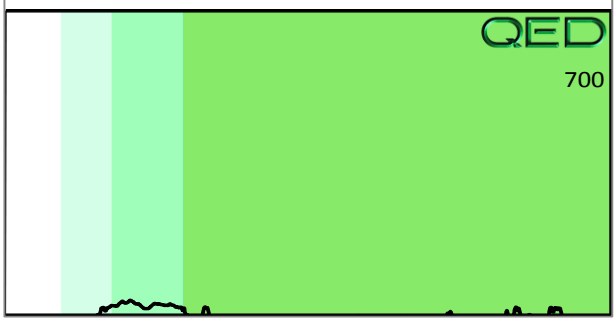
QED Hydrocarbon Fingerprints

Project: NCDOT Mooresville - Parcel 206 ##################

P206B9 2-4 : PHC not detected



P206B10 2-4 : PHC not detected



Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd
Charlotte, NC 28208

Samples taken Friday, November 16, 2018
Samples extracted Friday, November 16, 2018
Samples analysed Friday, November 16, 2018

Contact: Helen Corley

Operator Derick Haydin

Project: NCDOT Mooresville - Parcel 206

U00904

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	P206B11-2-4	9.7	<0.24	<0.24	<0.24	<0.24	<0.05	<0.08	<0.01	0	72.4	27.6	Residual HC
s	P206B11-8-10	18.3	<0.46	<0.46	0.74	0.74	0.39	<0.15	<0.018	0	75.9	24.1	Deg.PHC 75.2%,(FCM)
s	P206B12-4-6	11.0	<0.28	<0.28	0.28	0.28	0.15	<0.09	<0.011	0	83.6	16.4	Road Tar 92%,(FCM)
s	P206B12-8-10	21.3	<0.53	<0.53	0.96	0.96	0.43	<0.17	<0.021	0	87.1	12.9	Road Tar 75.3%,(FCM)

Initial Calibrator QC check OK Final FCM QC Check OK 100.8 %

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

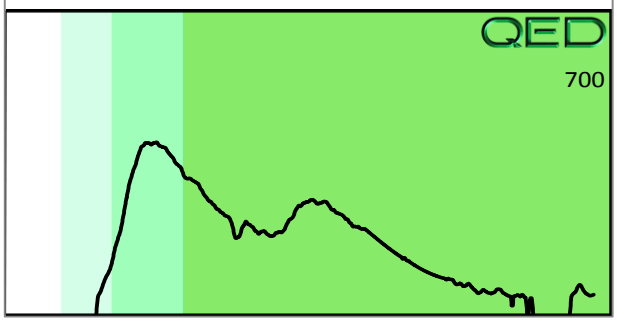
B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modifed Result.

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

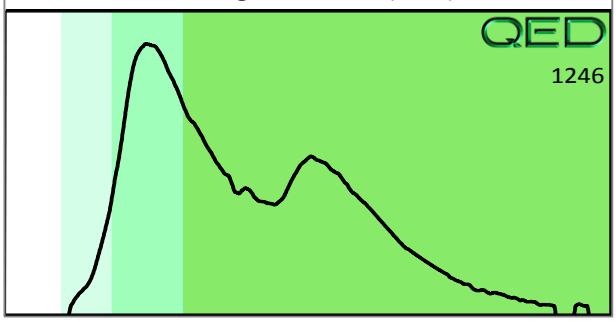
QED Hydrocarbon Fingerprints

Project: NCDOT Mooresville - Parcel 206 ##################

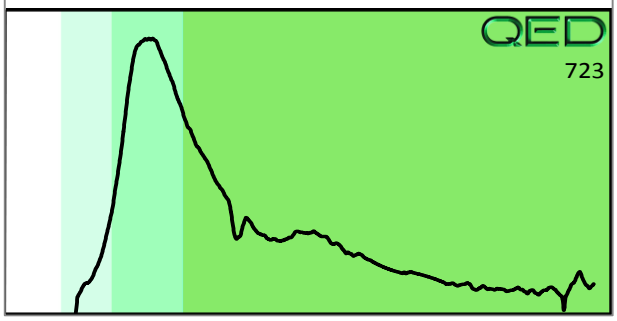
P206B11-2-4 : Residual HC



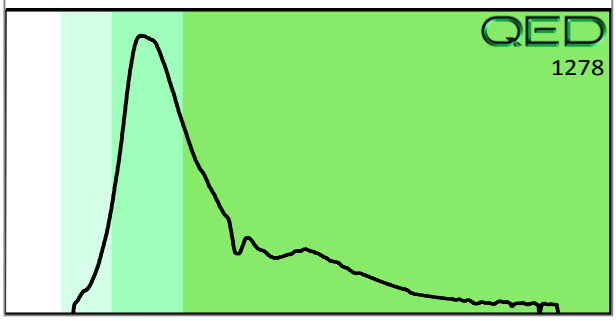
P206B11-8-10 : Deg.PHC 75.2%,(FCM)



P206B12-4-6 : Road Tar 92%,(FCM)



P206B12-8-10 : Road Tar 75.3%,(FCM)



wood.

North Carolina Department of Transportation

Preliminary Site Assessment
State Project: R-2307B
WBS Element: 37944.1.FR5
Parcel Number: 4647768207
Iredell County

Parcel 209
John R. Graham Jr. Property
388 NC 150 (West Plaza Drive)
Mooresville, North Carolina
January 25, 2019

Wood Environment and Infrastructure Solutions, Inc.
Project: 188322307

John Maas, LG
Senior Geologist

Helen Corley, LG, BCES
Senior Assoc. Hydrogeologist

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

In response to the North Carolina Department of Transportation (NCDOT) Request for Proposal, dated September 17, 2018, Wood Environment and Infrastructure Solutions, Inc. (Wood) has performed a Preliminary Site Assessment (PSA) for Parcel 209. The investigation was conducted in accordance with Wood's Technical and Cost proposal dated September 27, 2018. 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 on the north side of West Plaza Drive and west of the road Straightaway Dr., approximately 600 feet east of I-77, as shown in the Vicinity Map, **Figure 1**. The parcel, which is located at 338 NC 150 (West Plaza drive), is currently occupied by an active Valero gas station and convenience store. It is identified as Parcel 209 and John R. Graham Jr. property (Site) within the NCDOT R-2307B design file. The Site is in Mooresville of Iredell County, North Carolina. The area of investigation within the parcel as shown on **Figure 2**.

The following report summarizes a geophysical survey and describes our subsurface field investigation at the Site. The report also presents onsite soil analyses to evaluate potential soil contamination within Parcel 209, the John R. Graham Jr. property.

1.1 Site History

The Site is occupied by one Valero gas station and convenience store constructed in 1972 along West Plaza Drive. Wood interviewed the gas station manager, in person on September 21, 2018. The manager stated that the gas station was on public water and sewer. This parcel appears on the NCDEQ Underground Storage Tank (UST) Facility Database as Facility ID #00-0-0000032870. One closed incident was identified at the Site. No incident number was shown on Division of Waste Management Site Locator Tool.

According to an UST Closure Report (by Petroleum Environmental Consultants, Inc. (PEC), dated March 30, 1999) the Site was formerly part of Port City Exxon. The parcel was reportedly divided and the service station sold in 1989. On March 10, 1999, PEC conducted

a UST closure of a 1,000-gallon used oil tank. Using a backhoe bucket, PEC took two grab samples from underneath the UST basin, at approximately 7 feet bgs. These soil samples were analyzed for oil and grease by EPA method 9071 and volatile organic compounds by EPA method 8021. Laboratory results indicated both samples were below state soil action levels. NCDEQ requested additional sampling/analyses to complete a UST Closure Assessment Report in May 1999. On June 11, 1999 PEC returned to the Site and installed one hand auger soil boring in the center of the former tank basin to a depth of 7 feet bgs. The sample was analyzed for nonvolatile and semi-volatile organic compounds by EPA method 3550. The laboratory analytical report indicated no detections for compounds above their respective reporting limits. A notice of No Further Action was administered by NCDEQ in July 1999. UST Closure Report excerpts and associated documents are included in **Appendix A**.

1.2 Site Description

The Site is located in a commercial area of Mooresville in Iredell County and is comprised of approximately 0.56 acres. At the time of the PSA field implementation, the parcel was occupied by a Valero gas station and convenience store. The majority of the Site ground cover is comprised of concrete and asphalt with grass areas along the perimeter of the parcel. The active UST basin is located within the area of investigation, west of the metal canopy. According to the NCDEQ UST Registered Tanks Database, there are three 12,000-gallon gasoline USTs currently in use at the Site. Two of the four fuel dispenser islands are within the area of investigation underneath the metal canopy. The general topography of the Site area is sloping toward the south. Photos taken of the Site are included in **Appendix B**.

2.0 GEOLOGY

2.1 Regional Geology

The Site is located within the Charlotte Terrane of the Piedmont Physiographic Province of North Carolina. According to the 1985 State Geologic Map of North Carolina, the area is underlain by granitic rock of Permian/Pennsylvanian age.

2.2 Site Geology

Site geology was observed through the drilling of six shallow direct push probe soil borings (P209B1 to P206B6). Figure 2 presents the boring locations and Site layout. The borings did not exceed a total depth of 10 feet bgs. Soils encountered in the borings consisted mostly of red silty clay underlain by red orange sandy silt. Staining was not observed in the borings. Groundwater was not encountered in the borings. Based on observations of topography of the Site vicinity, the groundwater flow direction is inferred to be generally to the south. Boring logs are presented in **Appendix C**.

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 One Call was contacted on November 5th to report the proposed drilling activities and subsequently notify affected utilities for the parcel. GEL Solutions (GEL) was procured by Wood to perform utility locating and perform a geophysical survey at the Site. Innovation Environmental Technologies, Inc. (IET) of Concord, North Carolina was retained by Wood to perform the direct push sampling for soil borings and RED Lab analytical instrumentation was scheduled.

Wood understands that acquisition of the right-of-way is necessary for the widening of NC 150. Boring locations were strategically placed within the parcel to maximize the opportunity to encounter potential contaminated soil. Boring depths were extended to approximately 10 feet bgs.

3.2 Site Reconnaissance

Wood personnel performed a Site reconnaissance on September 21, 2018. During the Site reconnaissance, the area was visually examined for the presence of areas/obstructions that

could potentially affect the subsurface investigation. No obstructions were noted during the reconnaissance. The current tank basin was observed to be located within the area of investigation, directly west of the metal canopy. Other obstructions were not observed during the reconnaissance.

3.3 Geophysics Survey Results and Utility Locating

The geophysical survey of the Site occurred between October 15 and 25, 2018. GEL performed an electromagnetic (EM) survey of the Site with a ground penetrating radar (GPR) survey conducted across select EM anomalies. Time domain electromagnetic methodology (TDEM) was also utilized to measure electrical conductivity of subsurface materials. GEL's complete geophysical report is presented as **Appendix D**. GEL identified one subsurface geophysical anomaly was detected within the limits of investigation that indicated the presence of USTs. The anomaly was denoted as "Known UST" which is the current active UST basin located in the western area of the Site. The other anomalies identified at the Site were indicative of known metallic surface features and/or cultural interference.

In advance of drilling activities, GEL performed utility locating at the Site between October 15, 2018 and October 25, 2018. GEL identified underground electric, water, and telecommunications on the parcel. Telecommunication utilities were found to extend west to east along West Plaza Drive on the southern edge of the parcel. A water line was identified on the eastern portion of the parcel extending north and south along Straightaway Drive. Underground electric utilities were found north of the convenience store extending east toward Straightaway Drive, southeast from the convenience store beneath the asphalt, and south on the western portion of the parcel crossing West Plaza Drive. Overhead distribution powerlines were located along the southern portion of the Site along West Plaza Drive.

3.4 Soil Sampling

Wood conducted drilling activities at the Site on November 15, 2018. Wood's drilling subcontractor, IET, advanced six direct push soil borings across the area of investigation to an approximate depth of 10 feet bgs. Figure 2 presents the Site Map with boring locations and identifications.

The purpose of soil sampling was to determine if a petroleum release had impacted the Site and if so, to estimate the volume of impacted soil that might require special handling during construction activities. Wood conducted field screening of the soil borings for volatile organic compounds (VOCs) with a photoionization detector (PID) at approximate two-foot intervals. The soil interval exhibiting the highest PID reading was retained from each boring for analysis of total petroleum hydrocarbons (TPH)-diesel range organics (DRO), TPH-gasoline range organics (GRO), benzene, toluene, ethylbenzene, and xylene (BTEX), total aromatics, and polycyclic aromatic hydrocarbons (PAH) soil via onsite ultraviolet fluorescence (UVF). Six samples were collected from the borings for UVF on-site analysis.

4.0 SOIL SAMPLING RESULTS

Based on PID field screening and UVF hydrocarbon analysis, evidence of petroleum hydrocarbon impacts was not identified within the area of investigation.

Elevated PID readings, above ten parts per million (ppm), were not detected during soil field screening. The PID field screening results are summarized in **Table 1** and provided on the boring logs in Appendix C.

Results from the onsite UVF petroleum soil analyses are presented in **Table 2**, with instrument generated tables in **Appendix E**. 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 Limits of 50 milligrams per kilogram (mg/kg) for GRO and 100 mg/kg for DRO were not detected in samples from the six

borings advanced at the Site. The hydrocarbon analysis results from the QED QROS Hydrocarbon Analyzer are provided in **Appendix E**.

5.0 CONCLUSIONS

Based on the geophysical survey, Site observations, and UVF onsite analysis, petroleum-impacted soil contamination was not identified above the NCDEQ Action level of 100 mg/kg for DRO or 50 mg/kg for GRO.

The following bulleted summary is based upon Wood's evaluation of field observations, and onsite and offsite quantitative analyses of samples collected from the Site on November 15, 2018.

- The parcel located in the area of proposed highway widening activities is occupied by a Valero gas station and convenience store. The majority of the Site is comprised of concrete and asphalt with grass areas along the perimeter of the parcel.

- Results of the geophysical survey identified the active known UST bed. Other identified geophysical anomalies were indicative of known metallic surface features and/or cultural interference.

- One former UST was identified during a review of the NCDEQ storage tank databases that was removed March 1999. No release was discovered during tank closure, soil samples confirmed TPH GRO & DRO were below state action limits.

- Site reconnaissance identified the current active UST basin is within the area of investigation, directly west of the metal canopy. Two of the four fuel dispenser islands are in the area of investigation underneath the metal canopy.

- Six soil borings were advanced to an approximate depth of 10 feet bgs. Groundwater was not encountered in the borings. One sample from each boring was selected for onsite UVF Hydrocarbon analysis. Soils encountered in the borings consisted mostly of red silty clay underlain by red orange sandy silt. Staining was not observed in the borings.

- Elevated TPH values above the NCDEQ Action Limit of 50 mg/kg for GRO were not detected in the samples from six borings advanced at the Site.
- Elevated TPH values above the NCDEQ Action Limit of 100 mg/kg for DRO were not detected in the samples from six borings advanced at the Site.

6.0 RECOMMENDATIONS

Based on these PSA results, Wood does not recommend further assessment or soil sampling in the area of investigation. Wood does recommend the current UST system be removed or relocated in accordance with the NCDEQ UST guidelines. During the UST closure by removal, identified petroleum-impacted soil that may interfere with road construction should be excavated and disposed offsite.

TABLES

Table 1
PID Field Screening Results
R-2307B, Parcel 209, John R. Graham Jr.-Iredell County
Mooresville, North Carolina

SAMPLE ID	Sample Date	Sample Depth (feet bgs)	PID Screening (ppm)
B209B1-2-4	11/15/2018	2-4	0
B209B2-2-4	11/15/2018	2-4	0.1
P209B3-2-4	11/15/2018	2-4	0
P209B4-2-4	11/15/2018	2-4	0
P209B5-2-4	11/15/2018	2-4	0
P209B6-2-4	11/15/2018	2-4	0

Prepared By/Date DRH 12/10/2018
Checked By/Date RFS 12/12/2018

Notes: PPM = Parts Per Million
ft bgs = feet below ground surface

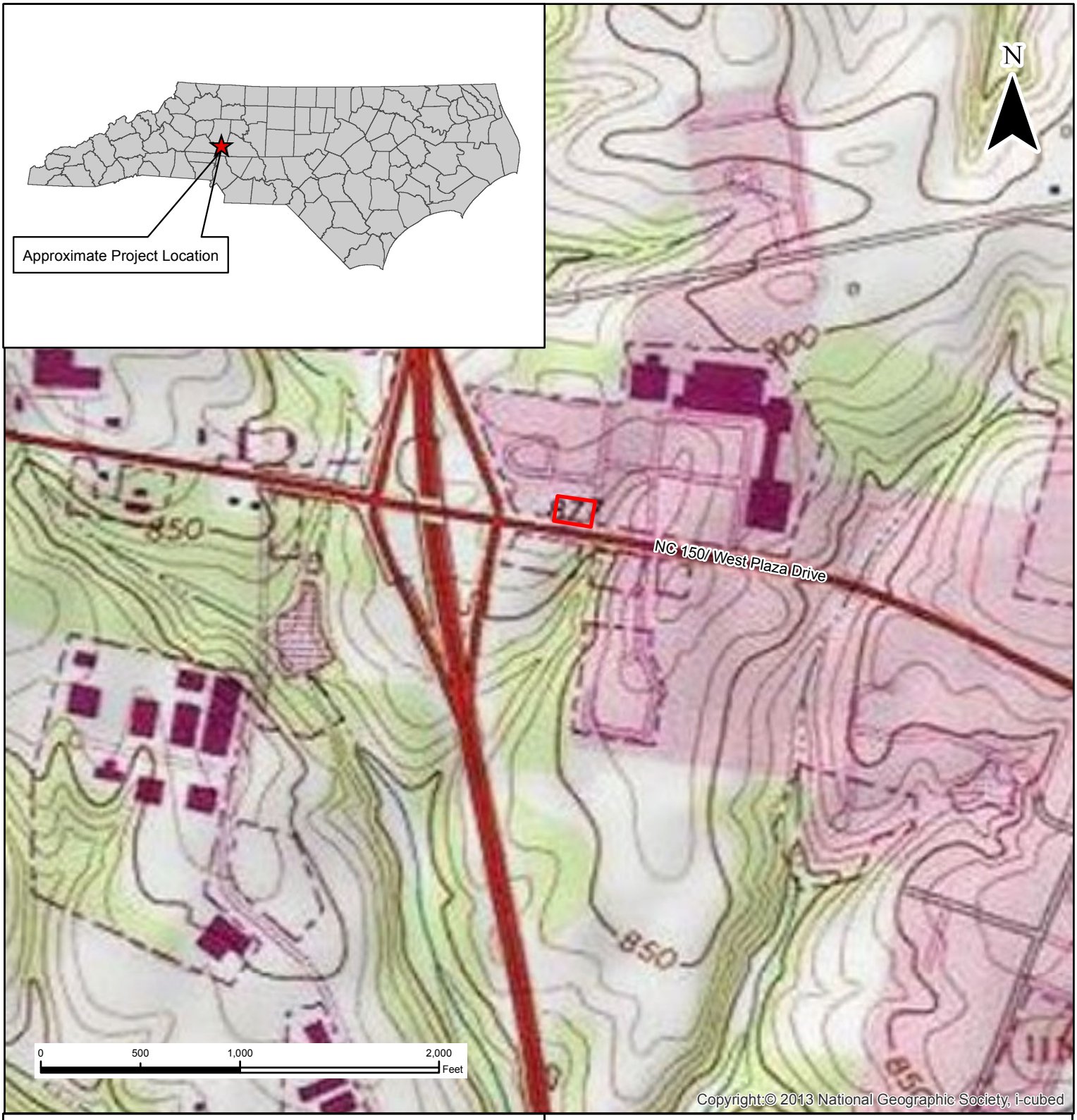
Table 2
UVF Petroleum Soil Results, 11/15/2018
R-2307B, Parcel 209, John R. Graham Jr.-Iredell County
Mooresville, North Carolina

Sample ID Number	Sample Depth (ft bgs)	BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PAHs (mg/kg)
NC State Action Level	**NA**	**NA**	**50**	**100**	**NA**
B209B1-2-4	2-4	<0.63	<0.63	0.63	<0.2
B209B2-2-4	2-4	<0.47	<0.47	<0.47	<0.15
P209B3-2-4	2-4	<0.4	<0.4	2.1	<0.13
P209B4-2-4	2-4	<0.53	<0.53	5.1	<0.17
P209B5-2-4	2-4	<0.47	<0.47	7.1	0.33
P209B6-2-4	2-4	<0.49	<0.49	<0.49	<0.16

NOTES:
(mg/kg) = Millograms per kilogram
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
BTEX = Benzene, Toluene, Ethylbenzene and Xylenes
PAHs = Polycyclic Aromatic Hydrocarbon
ft bgs = feet below ground surface
NA= Not applicable

Prepared By/Date DRH 12/10/18
Checked By/Date RFS 12/12/18

FIGURES



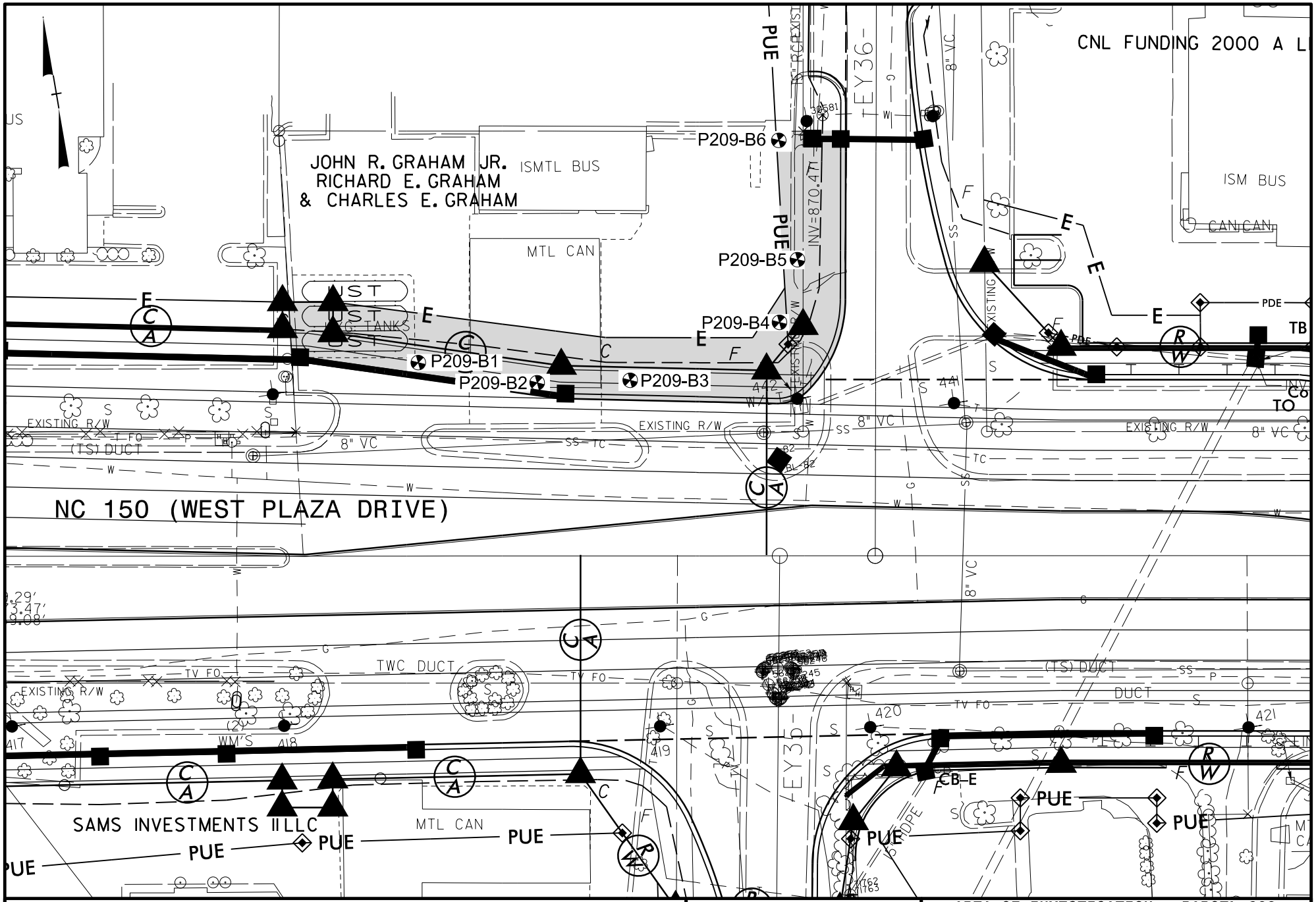
wood.

VICINITY MAP

Parcel 209
John R. Graham Jr., et. Al.
388 NC 150 (West Plaza Drive)
Mooresville, North Carolina

Site Boundary

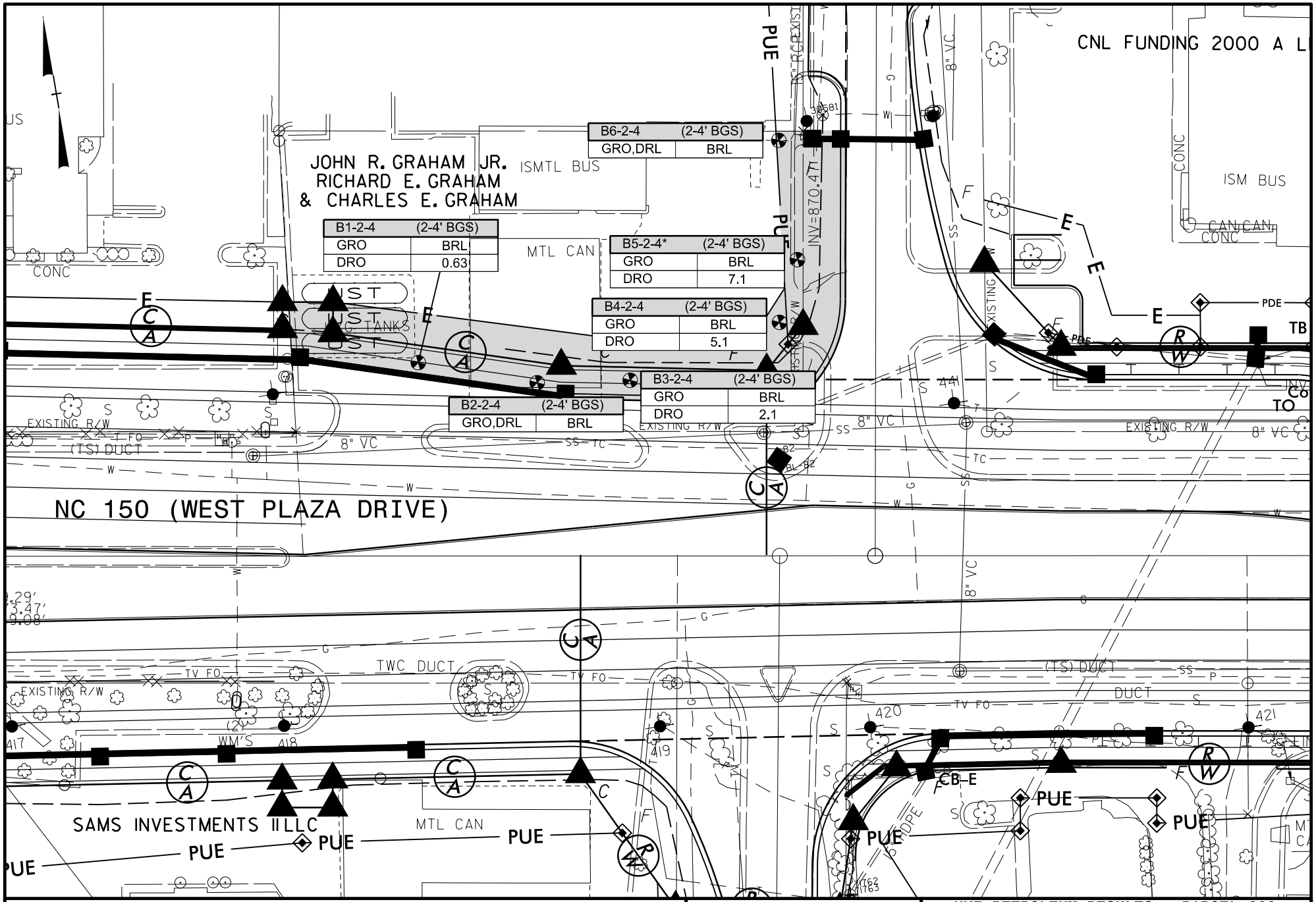
Prepared By: LMM Date: 1/23/2019	Checked By: AJF Date: 1/23/2019	Project No.: 188322307	Figure No.: 1



wood.

AREA OF INVESTIGATION - PARCEL 209
JOHN R. GRAHAM JR., R-2307B
388 NC 150 (WEST PLAZA DRIVE)
MOORESVILLE, NC 28117

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LPL	1/24/19	HPC	1/24/19	188322307	2



AREA OF INVESTIGATION
BORING LOCATION
GRO = GASOLINE RANGE ORGANICS
DRO = DIESEL RANGE ORGANICS
BRL = BELOW REPORTING LIMITS
* PAH EXCEEDS LIMITS. SEE TABLE 2 FOR ADDITIONAL INFORMATION

25' 0' 25' 50'
12.5'
(ENGLISH)

wood.

UVF PETROLEUM RESULTS - PARCEL 209
JOHN R. GRAHAM JR., R-2307B
388 NC 150 (WEST PLAZA DRIVE)
MOORESVILLE, NC 28117

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LPL	1/24/19	HPC	1/24/19	188322307	3

APPENDIX A
HISTORICAL REPORTS AND DOCUMENTS

UST CLOSURE ASSESSMENT

Formerly Part of Port City Exxon

NC Highway 150 & I-77
Mooresville, North Carolina

March 30, 1999

prepared for:

James Ramey
P.O. Box 629
Mooresville, NC 28115

prepared by:

PETROLEUM ENVIRONMENTAL
CONSULTANTS, INC.
3801 Statesville Avenue
Charlotte, NC 28206

NORTH CAROLINA LICENSED SEAL 1446 GEOLOGIST JIAN KUANG

Jian Kuang, P.G.
Project Geologist
Signature

Jim Kelly
Site Inspector/Project Manager
Signature

UNDERGROUND STORAGE TANK CLOSURE REPORT

I. General Information

A. Ownership of UST(s)

1. Name of UST owner: James Ramey

2. Owner address and telephone number:

P.O. Box 629
Mooresville, NC 28115

B. Facility Information

1. Facility name: Port City Exxon, Formerly part of

2. Facility ID #: 0-017519

3. Facility address, telephone number and county:

NC Highway 150 & I-77
Mooresville, NC 28115
Phone: N/A
Iredell County

C. Contacts

1. Name, address, telephone number and job title of primary contact person:

James Ramey
P.O. Box 629
Mooresville, NC 28115
(704) 664-2561

2. Name, address and telephone number of closure contractor:

Piedmont Grading & Wrecking Company Inc.
3652 Beatties Ford Road, Charlotte, NC 28216. (704) 392-8188

3. Name, address and telephone number of primary consultant:

Petroleum Environmental Consultants, Inc. (PEC)
P.O. Box 26413, Charlotte, NC 28221. (704) 335-8801

4. Name, address, telephone number, and State certification number of laboratory:

TestAmerica, Inc. (Formerly Hydrologic, Inc.), 1491 Twilight Trail,
Frankfort, KY 40601
1-800-728-2251. Certification # 399

D. UST Information

Tank #	Installation date	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
1	1/1/65	1,000	48" x 10'	Used Oil	-

The approximate layout of the former site UST system is shown in Figure 2. The used oil tank was originally part of the Port City Exxon. The property was divided and the service station was sold in 1989.

E. Site Characteristics

1. Describe any past releases at this site: No known releases

2. Is the facility active or inactive at this time? If the facility is inactive note the last time the USTs were in operation: Inactive 1990

3. Describe surrounding property use (for example, residential, commercial, farming, etc.)
Commercial

4. Describe site geology/hydrogeology
The site is located on the Charlotte Belt of the Piedmont Geologic Province. The local formation is characterized by metamorphosed granitic rock of late Proterozoic to late Cambrian age. In many areas these rocks have been chemically weathered to form a thick, clay soil mantle underlain by a considerable thickness of soft, weathered bedrock termed saprolite which was encountered in the UST basin excavation.

Public water and public sewer are available in this general area.

Closure Procedures

A. Describe preparations: A Notice of Intent: UST Permanent Closure was filed with the Mooresville Regional Office of the NCDENR-DWQ. A notice was given to the Mooresville Fire Department. The tank was removed on March 10, 1999.

B. Note the amount of residual material pumped from the tank(s): N/A

C. Describe the storage, sampling and disposal of the residual material: N/A

D. Excavation

1. *Describe excavation procedures noting the condition of the soils and the dimensions of the excavation in relation to the tanks, piping and/or pumps:*

Tank removal activities followed proper procedures and were completed without incident. A visual inspection of the tank indicated it was steel tank in good physical condition. As the UST basin backfill materials were excavated from the top and sides of the tank, no product staining was observed. Photoionization detector (PID) measurements of soil samples collected from the tank basin did not produce elevated readings. No free product was encountered during the UST closure activity.

2. *Note the depth of tank burial(s) (from land surface to top of tank):*

Approximately 2 feet.

3. *Quantity of soil removed:* Only enough to remove the tank.

4. *Describe soil type(s):* Predominantly reddish silty clay.

5. *Type and source of backfill used:* The UST basin was fill with the original backfill material and pit gravel.

E. Contaminated Soil

1. *Describe how it was determined to what extent to excavate the soil:* N/A

2. *Describe method of temporary storage, sampling and treatment/disposal of soil:* N/A

III. Site investigation

A. Provide information on field screening and observations, include methods used to calibrate field screening instrument(s):

PID measurements of soil samples collected from the tank basin floor and basin sidewalls did not indicate a release of petroleum product.

The PID was calibrated in order to detect concentrations of organic vapors in parts per million (ppm). First, a zero grade gas was used as a background setting for ambient airborne vapors (zero point), a 100 ppm concentration of isobutylene was then used to set the sensitivity reading scale. Approximately 100 grams of soil were placed in a 'Ziplock' freezer bag, allowing a remaining 1.5" to 2" headspace; the bag is then sealed. Potential volatile constituents within the sample were then allowed to volatilize for about 10 to 15 minutes. A PEC geologist, while wearing clean vinyl gloves, inserted the probe of the PID through the 'Ziplock' bag and obtained an instrument measurement of the headspace vapor concentration. This procedure is performed two to three times for a given sample in order to establish repeatability of the screening results.

B. Describe soil sampling points and sampling procedures used, including:

- Location of samples
Two (2) native soil samples were collected from beneath the UST.
UST basin samples were collected using a backhoe bucket.

- Type of samples (from excavation, stockpiled soil, etc.)
Soil samples were collected from the tank basin floor for confirmatory analyses.

- Sample collection procedures (grab, hand auger, etc.)

Sampling Protocol Using A Backhoe Bucket:
Native grab soil samples from the excavated basin are retrieved with a trackhoe bucket. Caution is used to sample only native soils (as opposed to backfill materials) which are not in direct contact with the surface of the bucket. Each sample is collected by hand using disposable latex gloves which are discarded after each sampling event.

- Depth of soil samples Tank basin soil samples were collected beneath the tank at a depth of 7 feet below grade.

- Whether samples were taken from side or floor of an excavation:
Samples were collected from the floor of the excavation for confirmatory analyses.

- Sample identification Soil sample UST-1 was collected from the north end and UST-2 was collected from the south end of the tank basin.

- Sample analyses All soil samples were analyzed for Oil and Grease using EPA Method 9071 and volatile organics using EPA Method 8021.

C. Describe groundwater or surface water sampling procedures used: Not Applicable.

D. Quality control measures

- Describe sample handling procedures including sample preservation and transportation Soil samples were placed in clean laboratory-supplied glass containers and capped with Teflon-lined lids, labeled, then placed on ice in an insulated cooler. The samples were then submitted under chain-of-custody control to the subcontract laboratory.

- Describe decontamination procedures used Latex gloves are worn by the sampler and discarded after each sampling event.

- *Describe time and date samples were collected and date submitted to lab* - Soil samples were collected on March 10, 1999 at 10:50 and 11:10 AM. Sample data are presented in Table 1, including soil sample collection time, date and delivery date.

- *Describe samples collected for quality control purposes (e.g. duplicates, field blanks, trip blanks, etc). Include methods used to obtain these samples and analytical parameters.* N/A

- *Discuss how results of quality control samples may have affected your interpretation of soil, groundwater or surface water sample results.* N/A.

E. Investigation results

- *Describe results of Site Sensitivity Evaluation (SSE), (if SSE was not conducted, explain why not)*
No SSE was performed.

- *Describe methods of analyses used (include U.S. EPA method number):*
Soil samples were analyzed for Oil and Grease using EPA Method 9071 and volatile organics using EPA Method 8021.

- *Describe analytical results for samples; discuss in relation to site specific cleanup level or action level, as appropriate:*
Analytical reports indicated levels of 33.8 and 20.5 parts per million (ppm) of Oil and Grease. These levels are well below DWQ soil action levels. Low levels of trichloroethene (0.0068 ppm) and methylene chloride (0.0068 ppm) were detected by EPA Method 8021. The detected methylene chloride is possible laboratory contamination. Laboratory reports are presented in Appendix E.

IV. Conclusions and Recommendations

Include probable sources of contamination, further investigation or remediation tasks, or whether no further action is required.

Based on field observations and analytical results no significant release of petroleum resulted from the operation of the used oil tank.

No further action is recommended.

V. Signature of Professional Engineer or Licensed Geologist

Licensed Geologist License #: 1466

Jian Kuang, P.G.

Corporate Geologist's License #; C-115

Petroleum Environmental Consultants, Inc.

VI. Enclosures

A. Figures

1. Area Map

2. Site and Soil Sampling Location Map with Analytical Data

B. Table

1. Field screening and analytical results/sample identifications, depths and analyses

C. Appendices

Appendix A: Notification of intent to close (GW/UST-3)

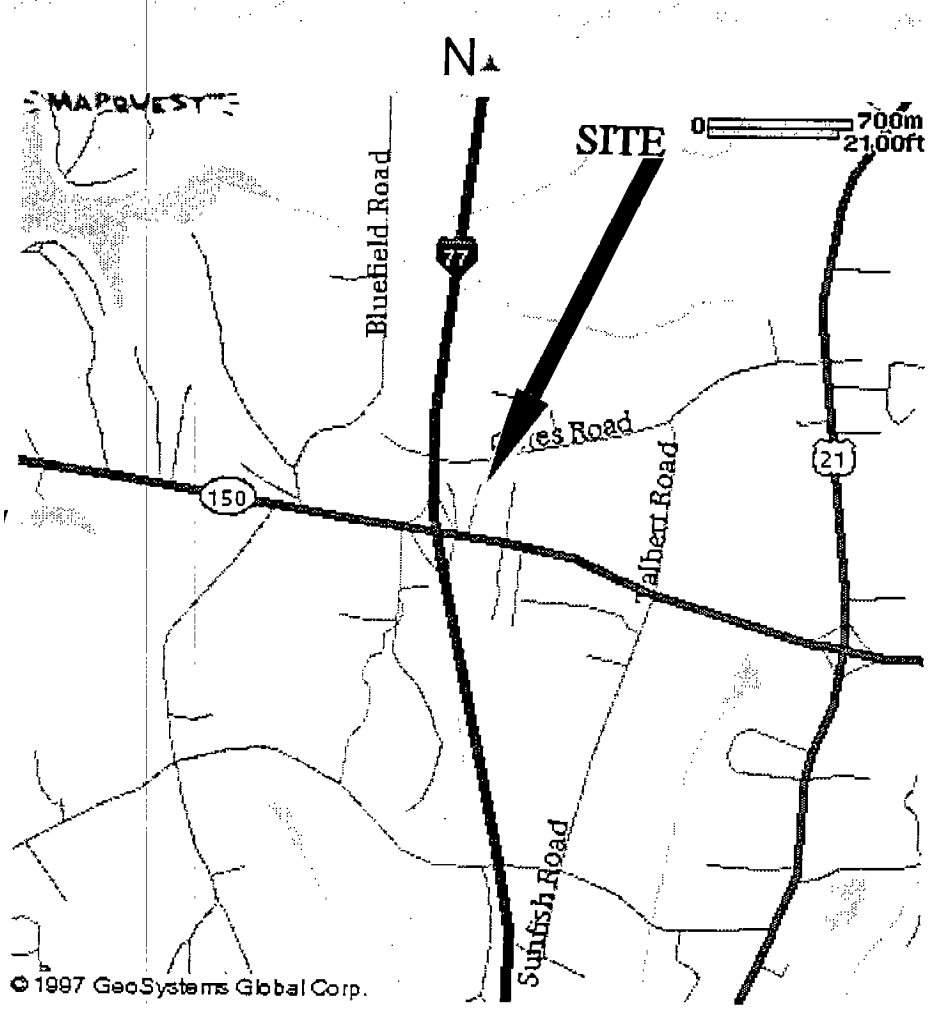
Appendix B: Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

Appendix C: Certificate of tank disposal

Appendix D: Complete chain-of-custody records

Appendix E: Copy of all laboratory analytical records

Appendix F: Geologic logs for excavation pit



	Petroleum Environmental Consultants, Incorporated Charlotte, North Carolina	PEC 775
Formerly part of Port City Exxon NC Highway 150 & I-77 Mooresville, NC	Figure 1. General Site Location Map Area Street Map 1997 GoeSystems Global Corp.	

TABLE 1

Soil Vapor Screening and Analytical Results

Formerly part of Port City Exxon
NC Highway 150 & I-77
Mooresville, NC

PEC 775

Sampling Information				PID (ppm)	Sample Submitting Date	Analytical (ppm)	
Sample ID	Depth (ft)	Date	Time			Method 9071	Method 8021
UST-1	7	3/10/99	10:50	0	3/10/99	33.8	ND *1
UST-2	7	3/10/99	11:10	0	3/10/99	20.5	ND *2

PID - Photoionization Detector
ppm - Parts per million (mg/kg)
ND - Not detected

*1 - Trichloroethene - 0.0068 ppm

*2 - Methylene Chloride - 0.0068 B (Possible laboratory contaminant)

APPENDIX B

SITE INVESTIGATION REPORT FOR PERMANENT CLOSURE

OR CHANGE-IN-SERVICE OF UST (GW/UST-2)

GW/UST-2 Site Investigation Report For Permanent Closure or Change-in-Service of U.S.T.

FOR TANKS IN **NC**

Return Completed Form To:
The appropriate DEM Regional Office according to the county of the facility's location. [SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only
I.D. Number _____
Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Owner Name: James Ramey
(Corporation, Individual, Public Agency, or Other Entity)
Street Address: P.O. Box 629
County: Iredell
City: Mooresville State: NC Zip Code: 28115
Telephone Number: (704) 664-2561
(Area Code)

II. Location of Tank(s)

Facility Name: Formerly part of Port City Exx
(or Company)
Facility ID # (if available): 0-017519
Street Address (or State Road): NC Highway 150 & I-77
County: Iredell City: Mooresville Zip Code: 28115
Telephone Number: ( )
(Area Code)

III. Contact Person

Name: James Ramey Job Title: Owner Tel. No.: 704/664-2561
Closure Contractor: Piedmont Grading Address: Charlotte, NC Tel. No.: 704/3928188
Primary Consultant: Petroleum Environmental Address: Charlotte, NC Tel. No.: 704/335-8801
Lab: Test/America Address: Charlotte, NC Tel. No.: 704/392-1164

IV. U.S.T. Information

Tank No.	Size in Gallons	Tank Dimensions	Last Contents
1	1,000	48" x 10'	Used Oil

V. Excavation Condition

Water in Excavation		Free Product		Notable Odor or Visible Soil Contamination	
Yes	No	Yes	No	Yes	No
	xx		xx	xx	

VI. Additional Information Required

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DEM in the written report and sketch.

NOTE: The site assessment portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After Jan.1, 1994, all closure site assessment reports must be signed and sealed by a P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning-in-place)

- [x] Contact local fire marshal.
- [x] Notify DEM Regional Office before abandonment.
- [x] Drain & flush piping into tank.
- [x] Remove all product and residuals from tank.
- [x] Excavate down to tank.
- [x] Clean and inspect tank.
- [x] Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
- [x] Cap or plug all lines except the vent and fill lines.
- [ ] Purge tank of all product & flammable vapors.
- [ ] Cut one or more large holes in the tanks.
- [x] Backfill the area.

Date Tank(s) Permanently closed: 3/10/99
Date of Change-in-Service: _____

ABANDONMENT IN PLACE

- [ ] Fill tank until material overflows tank opening.
- [ ] Plug or cap all openings.
- [ ] Disconnect and cap or remove vent line.
- [ ] Solid inert material used - specify: _____

REMOVAL

- [ ] Create vent hole.
- [ ] Label tank.
- [ ] Dispose of tank in approved manner.

Final tank destination: _____

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative	Signature	Date Signed
James Ramey	James C Ramey	4-12-99

APPENDIX C

CERTIFICATE OF TANK DISPOSAL

PETROLEUM STORAGE TANKS

BILL OF SALE

TANK OWNER: James Terry Ramey

ADDRESS: P.O. Box 629

Mooresville, N.C. 28115

TANK LOCATION: Mooresville Exxon

ADDRESS: I-77 & NC 150 P.O. Box 629

Mooresville, N.C.

TANK TAKEN TO: Piedmont Land Fill

ADDRESS: Everette Heidl Road

Huntersville, N.C.

TANK SIZE (GALLONS) 1,000

LAST CONTENTS: GAS___ DIESEL___ FUEL OIL___ OTHER Motor Oil Storage

* *

THIS TANK HAS

CONTAINED Old Burned Motor Oil

NOT VAPOR FREE

NOT SUITABLE FOR STORAGE OF FOOD OR LIQUIDS

FOR HUMAN OR ANIMAL CONSUMPTION

* *

We Piedmont Landfill as the new owner of the above describe tank acknowledge that we assume all liability related to this tank.

James C Ramey
Sellers Signature

Buyers Signature

PETROLEUM ENVIRONMENTAL CONSULTANTS, INCORPORATED
P.O. BOX 26413 CHARLOTTE, N.C. 28221
704-335-8801 FAX: 704-342-1672

July 8, 1999

JUL 09 1999

Mr. Brad C. Newton, P.G.
NC DENR-DWQ MRO Groundwater Section
919 North Main Street
Charlotte, North Carolina 28115

RE: UST Closure Assessment
Port City Exxon, Iredell County

Dear Mr. Newton:

Per your correspondence of May 28, 1999 to Mr. James Ramey, the NCDWQ requested additional sampling/analyses to complete the UST Closure Assessment Report. Per our phone conversation, you stated that the previous analyses by EPA Method 8021 would be acceptable in place of EPA Method 5030. You requested sampling and analyses by EPA Method 3550.

On June 11, 1999, Petroleum Environmental Consultants, Inc. (PEC) installed one hand augered soil boring in the center of the former tank basin. The boring was advanced to a depth of seven (7) feet below grade. A soil sample was collected, placed in a clean laboratory-supplied glass container and capped with Teflon-lined lid, labeled, then placed on ice in an insulated cooler. The sample was then submitted under chain-of-custody control to the subcontract laboratory.

The sample, UST-1, was analyzed using EPA Method 3550 with 8015 prep. The laboratory analytical report indicates a non-detect result (below the laboratory method detection limit of 12.3 mg/kg). The laboratory report along with the closure report are enclosed.

Should you have any questions or need additional information, please do not hesitate to contact us at (704) 335-8801.

Sincerely,
PETROLEUM ENVIRONMENTAL CONSULTANTS, INC.

Jim Kelly
Project Manager

cc. Mr. James Ramey

SPECIALIZED ASSAYS, INC.
2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

TESTAMERICA 5826
CAROLINA BUSINESS CENTER
85 SOUTH, BLDG 2949, STE E
CHARLOTTE, NC 28208

Lab Number: 99-A86104
Sample ID: UST-1
Sample Type: Soil
Site ID:

Project: FEC 779
Project Name:
Sampler: JIM KELLY

Date Collected: 6/14/99
Time Collected: 9:15
Date Received: 6/11/99
Time Received: 8:30

Analyte	Result	Units	Report Limit	Run Limit	Dil Factor	Date	Time	Analyst	Method	Batch
ORGANIC PARAMETERS										
TPH (Diesel Range)	ND	mg/kg	12.3	9.00	1	6/19/99	10:40	K.Phelps	8015B/3550	7929
GENERAL CHEMISTRY PARAMETERS										
% Dry Weight	81.	%			1	6/22/99	10:23	M. Cauthen	CLP	3586

ND = Not detected at the report limit.

Sample Extraction Data

Parameter	Wt/Vol Extracted	Extract Vol	Date	Analyst	Method
EPH/DRO	25.0 gm	1.0 ml	6/17/99	M. Cauthen	3550

Surrogate	% Recovery	Target Range
Surr-o-Terphenyl	95.	50. - 150.

All samples have been corrected for dry weight.

SPECIALIZED ASSAYS, INC.
2960 Foster Creighton Dr.
P.O. Box 40566
Nashville, TN 37204-0566
Phone 1-615-726-0177

ANALYTICAL REPORT

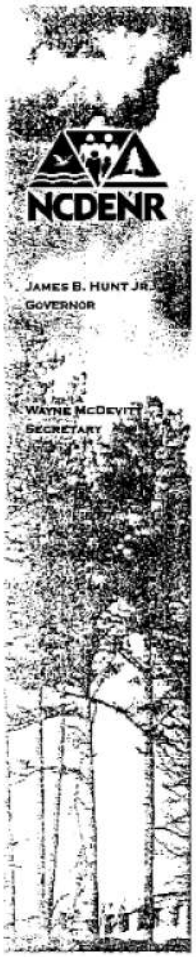
Laboratory Number: 99-AB6104
Sample ID: UST-1

Page 2

Report Approved By: Russell Morgan Report Date: 6/23/99

Theodore J. Duello, Ph.D., Lab Director
Michael H. Dunn, M.S., Technical Director
Johnny A. Mitchell, Dir. Technical Services
Eric Smith, Assistant Technical Director
Russell Morgan, Technical Services

Laboratory Certification Number: 387



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NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES
MOORESVILLE REGIONAL OFFICE

DIVISION OF WASTE MANAGEMENT
July 12, 1999

James Ramey
P.O. Box 629
Mooresville, North Carolina 28115

RE: Soil Sample Results from
Underground Storage Tank Closure
Port City Exxon
Iredell County, N.C.

Dear Mr. Ramey:

The Underground Storage Tank Section of the Division of Waste Management at the Mooresville Regional Office has received the laboratory analyses from soil samples collected during the closure of one underground storage tank at the subject site. The report arrived on July 9, 1999. Based on the reported results, no further action is required at this time.

Should you have any questions, please do not hesitate to call me.

Sincerely,

Brad C. Newton

Brad C. Newton, P.G.
Hydrogeological Technician II

cc: Fay Sweat - UST Section, Raleigh

919 NORTH MAIN STREET, MOORESVILLE, NORTH CAROLINA 28115
PHONE 704-663-1699 FAX 704-663-6040

APPENDIX B
PHOTOGRAPH LOG

PHOTO 1:

View of gas pump islands, facing north.

Photo taken 9/21/18.

PHOTO 2:

View of overhead powerlines, facing southeast.

PHOTO 3:

View of south end of parcel, overhead power lines, facing west. Current active UST basin west of metal canopy, is within area of investigation.

APPENDIX C
BORING LOGS

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**B-1**	BORING DEPTH (ft) **10**	NUMBER OF PAGES **1**
PROJECT #	**188322307**	PROJECT NAME	**NCDOT Mooresville-Parcel 209**
DATE DRILLED	**11/15/2018**	WEATHER CONDITIONS	**Cloudy 40˚F**
DRILLING SUB-CONTRACTOR	**IET**	DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0		
10	0.0	Red Orange Sandy SILT	
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**B-2**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 209**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red, Gray Silt CLAY	
4	0.1		Sample taken at 2-4'
6	0.0		
8	0.0	Red Orange, Silty CLAY	
10	0.0		
		Partially Weathered Rock	
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

SOIL BORING FIELD WORKSHEET

BORING #	**B-3**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**188322307**			PROJECT NAME	**NCDOT Mooresville-Parcel 209**
DATE DRILLED	**11/15/2018**			WEATHER CONDITIONS	**Cloudy 40˚F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red, Gray Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0	Red Silty CLAY	
10	0.0	Red Orange Sandy SILT w/Clay	
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**B-4**	BORING DEPTH (ft) **10**	NUMBER OF PAGES **1**
PROJECT #	**188322307**	PROJECT NAME	**NCDOT Mooresville-Parcel 209**
DATE DRILLED	**11/15/2018**	WEATHER CONDITIONS	**Cloudy 40˚F**
DRILLING SUB-CONTRACTOR	**IET**	DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red, White, Orange Sandy SILT	
4	0.0		Sample taken at 2-4'
6	0.0	Red, Gray Silt CLAY	
8	0.0		
10	0.0	Red Silty CLAY	
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**B-5**	BORING DEPTH (ft) **10**	NUMBER OF PAGES **1**
PROJECT #	**188322307**	PROJECT NAME	**NCDOT Mooresville-Parcel 209**
DATE DRILLED	**11/15/2018**	WEATHER CONDITIONS	**Cloudy 40˚F**
DRILLING SUB-CONTRACTOR	**IET**	DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red Silty CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0		
10	0.0		
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**B-6**	BORING DEPTH (ft) **10**	NUMBER OF PAGES **1**
PROJECT #	**188322307**	PROJECT NAME	**NCDOT Mooresville-Parcel 209**
DATE DRILLED	**11/15/2018**	WEATHER CONDITIONS	**Cloudy 40˚F**
DRILLING SUB-CONTRACTOR	**IET**	DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
2	0.0	Red, Orange Sandy CLAY	
4	0.0		Sample taken at 2-4'
6	0.0		
8	0.0	Red Silty CLAY	
10	0.0	Red Orange Sandy SILT	
		*Boring terminated at 10'	

Log Completed By: **DRH**

Page: **1**

APPENDIX D
GEOPHYSICAL REPORT

GEL Solutions

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

www.gel-solutions.com

November 2, 2018

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

Re: Report for Geophysical Survey to Identify Underground Storage Tanks
And Underground Utilities
Parcel #209
388 NC 150 (West Plaza Drive)
Mooresville, North Carolina 28117

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 October 15, 2018 through October 25, 2018.

1.0 Summary of Results

One subsurface anomaly was identified in the geophysical data. Figure 1 depicts the approximate location and size of the anomaly as well as the known metallic surface objects present at the time of the investigation. The anomaly was denoted as "Known UST" 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 radio-frequency electromagnetic (EM), 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 underground utilities and USTs at the site. A brief description of each technology is presented in the following paragraphs.

Radio-Frequency Electromagnetic

Radio-Frequency Electromagnetic (EM) utility locating equipment consists of a transmitter and a dual-function receiver. The receiver can be operated in a "passive" mode or in an "active" mode. The two modes of operation provide various levels of detection capabilities depending on the specific target or application.

The EM system is operated in the "active" mode by either inducting or conducting a signal into the underground utility to be traced. A transmitter is placed over and in line with a suspected buried utility. The transmitter induces a signal, which propagates along the buried utility. As the receiver is moved back and forth across the suspected path of the utility, the trace signal induces a signal into the receiver's coil sensor. A visual and audio response indicates when the receiver is directly over the buried utility.

Another means of detecting in the "active" mode utilizes a method to "conduct" a signal within the buried utility. To accomplish this, a cable from the transmitter is clamped onto an exposed section of the buried utility and a signal propagates along the buried line. This technique minimizes any interference caused by parasitic emissions from adjacent cables in congested areas. When the system is utilized in the "passive" mode, the receiver is responding to a 60 Hertz cycle current energized by underground utilities.

Interference can and may occur when buried utilities intersect or are adjacent to each other. This effect referred to as "bleed-off" may provide a false response to the identification of the tracked utility. "Bleed-off" is caused by utilities that may be energized in the "active" or "passive" mode.

Ground Penetrating Radar Methodology

A RAMAC digital radar control system configured with a 450-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 October 15 through October 25, 2018 at the 11 DOT parcels located in the immediate vicinity of Highway 150 in Mooresville, NC. Interpretation of the GPR data was conducted in the field and any potential anomalies were marked in the field. GPR data processing typically included band pass filtering, background removal, horizontal smoothing, and gain adjustments. TDEM was also used to scan the project site. Any electromagnetic anomalies detected during field activities that were indicative of buried metallic objects were also marked in the field.

One subsurface geophysical anomaly was detected during the investigation of Parcel #209 as depicted in Figure 1. The anomaly was indicative of a "Known UST" 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 anomaly 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.”

The locations of underground utilities were designated using EM and GPR equipment, and their locations were marked with paint on the land surface, and additionally shown in Figure 1. Positioning data was obtained using a Trimble R10 GPS antenna.

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,

William R. Adgate
Senior Project Manager

Enclosures
fc: 209.AMEC01118.Report.pdf

Site Photos

Photo 1: Looking south from northeast corner

Photo 2: Looking west from southeast corner

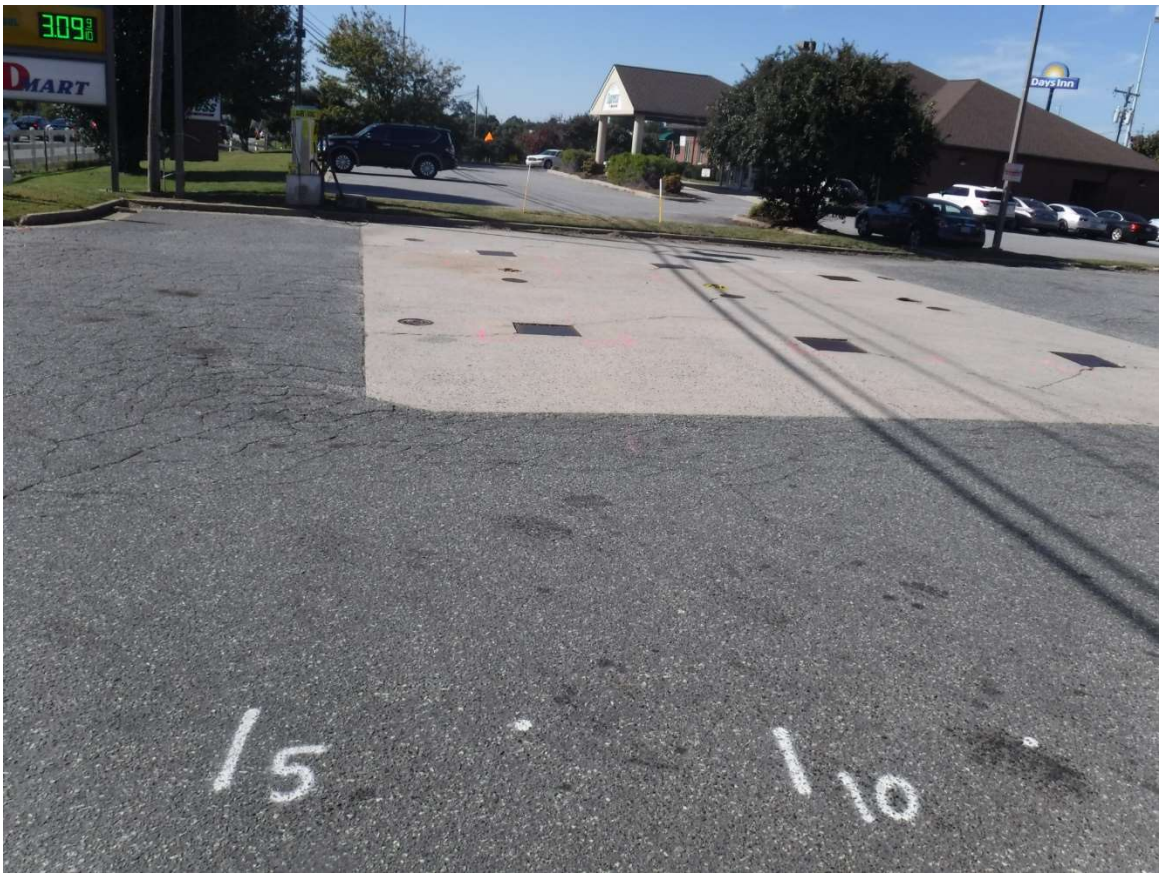
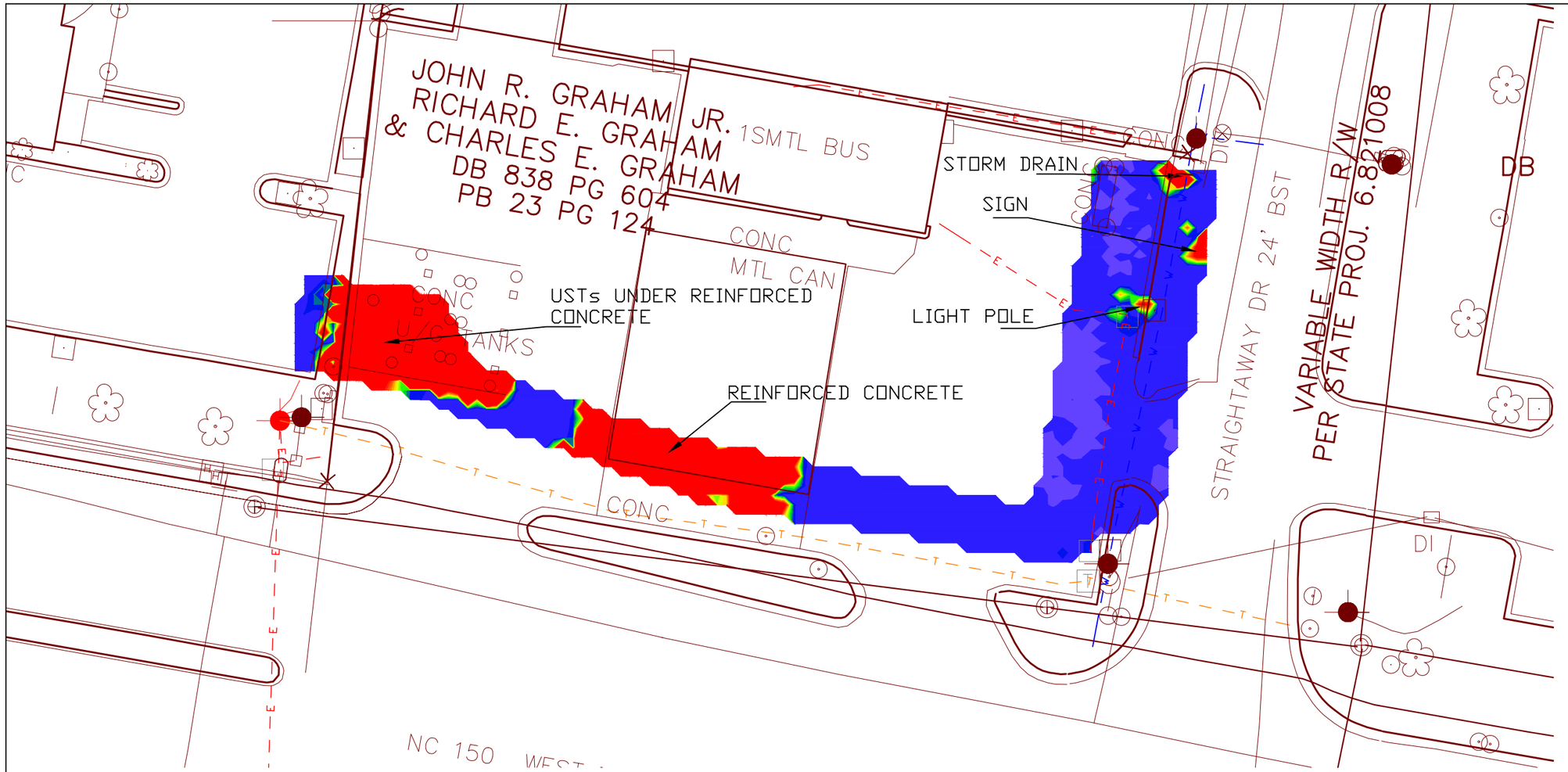


Photo 3: Showing known USTs



LEGEND

UK — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND UNKNOWN UTILITY LINE	G — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND GAS LINE
W — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND WATER LINE	T — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND COMMUNICATIONS LINE
E — APPROXIMATE LOCATION OF SUSPECTED UNDERGROUND ELECTRICAL POWER LINE	LIMITED ACCESSIBILITY

GRAPHIC SCALE

0' 15' 30' 60' 120'

(IN FEET)
1 inch = 30 ft.

NOTES

1) UNDERGROUND FEATURES WERE LOCATED USING VISUAL EVIDENCE, GROUND PENETRATING RADAR (GPR), AND TIME DOMAIN ELECTROMAGNETIC (TDEM) METHODS. OTHER BURIED UTILITIES AND STRUCTURES 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 UTILITIES AND STRUCTURES MAY ONLY BE POSSIBLE WITH VACUUM OR OTHER EXCAVATION METHODS.
2) FIELD SURVEY CONDUCTED ON 10.15.2018 - 10.24.2018.
3) GEOPHYISICAL DATA GENERATED USING MALA GEOSCIENCE GPR SYSTEM CONFIGURED WITH A 450MHZ 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.

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PROJECT: AMEC01118

GEOPHYSICAL INVESTIGATION FOR USTs
PARCEL #209
388 NC 150 (WEST PLAZA DRIVE)
MOORESVILLE, NORTH CAROLINA

RESULTS OF GEOPHYSICAL INVESTIGATION

FIGURE 1

DATE: 10/30/18

DRAWN BY: JAT APPRV. BY: WRA

APPENDIX E
RESULTS FROM ONSITE UVF SOIL ANALYSES

QED

AQROS

Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd
Charlotte, NC 28208

Samples taken Thursday, November 15, 2018
Samples extracted Thursday, November 15, 2018
Samples analysed Friday, November 16, 2018

Contact: Helen Corley

Operator Derick Haydin

Project: NCDOT Mooresville - Parcel 209

U00904

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	B209B1-2-4	25.2	<0.63	<0.63	0.63	0.63	0.45	<0.2	<0.025	0	88.3	11.7	Deg Fuel 93.6%,(FCM)
s	B209B2-2-4	18.8	<0.47	<0.47	<0.47	<0.47	<0.09	<0.15	<0.019	0	100	0	Residual HC
s	P209B3-2-4	15.9	<0.4	<0.4	2.1	2.1	1	<0.13	<0.016	0	74	26	V.Deg.PHC 93.2%,(FCM),(P)
s	P209B4-2-4	21.1	<0.53	<0.53	5.1	5.1	2.4	<0.17	<0.021	0	75.1	24.9	V.Deg.PHC 95.3%,(FCM),(P)
s	P209B5-2-4	18.8	<0.47	<0.47	7.1	7.1	5.9	0.33	<0.019	0	88.7	11.3	Deg Fuel 89.9%,(FCM)
s	P209B6-2-4	19.5	<0.49	<0.49	<0.49	<0.49	<0.1	<0.16	<0.02	0	0	0	PHC not detected

Initial Calibrator QC check OK Final FCM QC Check OK 103.8 %

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.

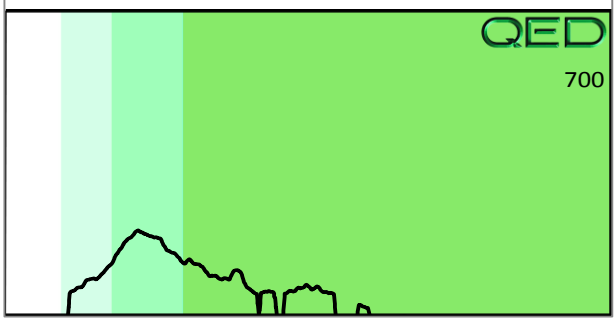
% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only. **Data generated by HC-1 Analyser**

QED Hydrocarbon Fingerprints

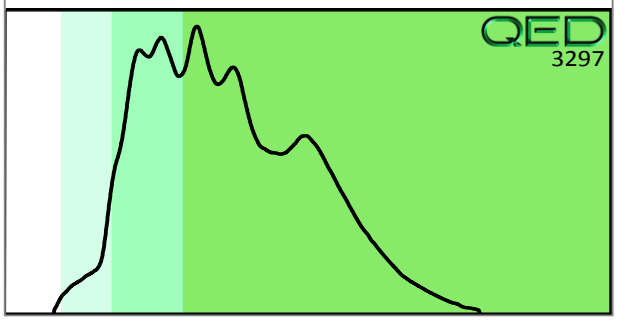
Project: NCDOT Mooresville - Parcel 209 ##################

B209B1-2-4 : Deg Fuel 93.6%,(FCM)

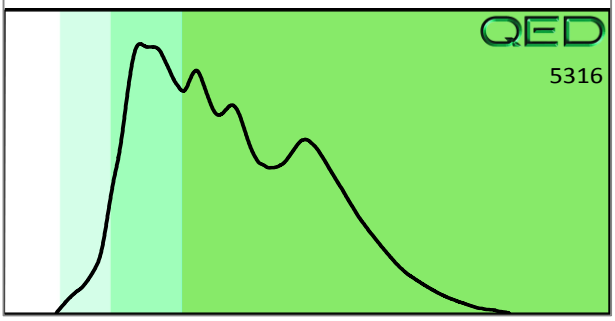
B209B2-2-4 : Residual HC



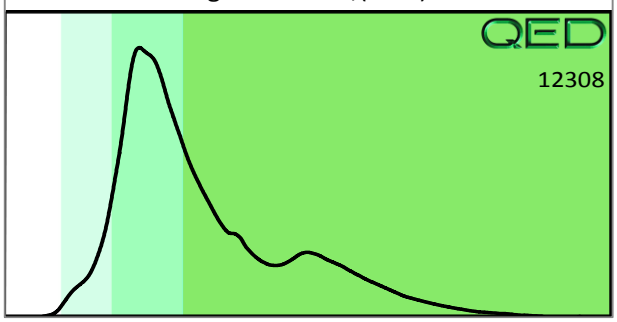
P209B3-2-4 : V.Deg.PHC 93.2%,(FCM),(P)



P209B4-2-4 : V.Deg.PHC 95.3%,(FCM),(P)



P209B5-2-4 : Deg Fuel 89.9%,(FCM)



P209B6-2-4 : PHC not detected