



April 11, 2019

Mr. Gordon Box, LG  
Geotechnical Engineering Unit  
North Carolina Department of Transportation  
1020 Birch Ridge Drive  
Raleigh, NC 27610

**RE:           GEOENVIRONMENTAL PHASE II INVESTIGATION OF PARCEL 2  
4 Brothers Food Store #302, Beroth Oil Company  
800 S. State St., Yadkinville, North Carolina  
ESP Project No. GR22.309**

TIP Number:           U-5809  
WBS Number:         44382.1.1  
County:                YADKIN  
Description:           Construct median along US 601 (State Street) from US 421 to SR 1146  
                              (Lee Avenue) and add roundabouts at both ends of project

Dear Mr. Box:

ESP Associates, Inc. (ESP) is pleased to submit this report on our GeoEnvironmental Phase II Investigation of the subject parcel. This work was performed in accordance with your Request for Proposal (RFP) dated January 25, 2019 and our Cost Proposal dated February 1, 2019.

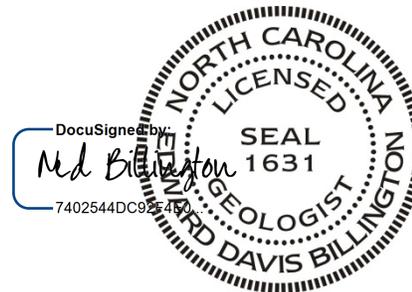
We appreciate the opportunity to assist you during this phase of the project. If you should have any questions concerning this report, or if we may be of further assistance, please contact us.

Sincerely,

ESP Associates, Inc.

A handwritten signature in blue ink that reads "Edward D. Billington".

Edward D. Billington, PG  
Senior Geologist/Geophysicist  
EDB/CJW



not considered Final unless all signatures are completed

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## **1.0 INTRODUCTION**

The North Carolina Department of Transportation (NCDOT) is planning to construct a median along US 601 (State Street) from US 421 to SR 1146 (Lee Avenue). Roundabouts will be added at both ends of the project. The NCDOT requested that ESP Associates, Inc. (ESP) perform a Phase II Investigation of the existing right-of-way (ROW) and proposed permanent drainage utility easement (PUE) of Parcel 2 to locate possible underground storage tanks (USTs), sample soil, and delineate potential contaminated soil. Parcel 2 is located at 800 South State Street in Yadkinville, North Carolina (Figure 1). The size of the study area was approximately 0.47 acres.

## **2.0 HISTORY**

This site is owned by Beroth Oil Company, Inc. and occupied by an active convenience store/gas station named 4 Brothers Food Store No. 302. There are 5 existing underground storage tanks (USTs) on the west side of the site. The facility ID is 00-0-0000005052. According to the NCDOT RFP, a possible UST fill port was noted previously in the vacant lot on the west side of the active gas station; this was not observed during ESP's field work. Groundwater incident # 5576 is associated with this site. The NCDEQ files for Parcel 2 include the results of a 1989 investigation which report BTEX and MTBE contamination plumes in the shallow groundwater on the site. Groundwater was 8.7 feet depth and 10.3 feet depth in the ROW area at the time of the specific report (1989).

## **3.0 SITE OBSERVATIONS**

During our February and March 2019 field work, the site was occupied by a convenience store/gas station (Figure 2). The ground in the study area was covered by asphalt pavement, concrete, and soil/grass. There were 5 active USTs on the west side of the site but outside of the proposed easement: 3 gasoline USTs (8,000 gallons each), one diesel UST (8,000 gallons), and one kerosene UST (6,000 gallons). ESP observed one abandoned monitoring well that had been grouted full on the east side of the site. There are two metal cover plates within the proposed easement on the north side of the site that appear to be associated with the active UST monitoring system. These are noted as monitoring wells on the final survey MicroStation file.

## **4.0 METHODS**

ESP performed a geophysical study of the area designated by the NCDOT on February 19, 2019. We performed direct-push drilling, hand augering and sampling of subsurface soils within the existing ROW and proposed easement on March 5, 2019. A photoionization detector (PID) was used to screen subsurface soils in the field and select soil samples to send for laboratory analysis.

## 4.1 Geophysics

ESP performed an electromagnetic induction metal detector study over the accessible areas of the site using a Geonics EM61 MK2 with a line spacing of about three feet (Figures 3 through 6). Location control for the EM61 data was provided in real-time using a differential global positioning system (DGPS). We also used the DGPS to obtain the approximate location of surficial site features for correlation with the EM61 data.

## 4.2 Borings

ESP performed direct-push drilling and hand augering activities within the existing ROW and proposed easement of Parcel 2 using a subcontractor, SAEDACCO of Fort Mill, South Carolina. Seven borings were drilled, designated B2-1 through B2-7 (Figure 7). The soil borings were advanced using a GeoProbe 7822DT drill rig. Continuous soil samples were obtained to a depth of approximately 10 feet using two 5-foot long Macro Cores®. Soil cores varied in recovery from 1.0 to 5 feet. A hand auger was used to obtain samples from the upper 5 feet when the Macro Core recovery was low. The sampling equipment was decontaminated prior to drilling and between borings by the driller using a Liquinox® detergent solution.

## 4.3 Soil Sample Protocol

Representative soil samples were taken from the Macro-Core tubes at approximate one-foot intervals by the ESP field representative while wearing nitrile disposable gloves. Each sample was placed in a sealed plastic bag and then kept in a warm vehicle approximately 10 minutes prior to measuring volatile organic compound (VOC) levels in the head space of the bag with the PID. The soil samples had PID readings of less than 10 parts per million (ppm) (Table 1).

Nine soil samples were selected for laboratory analysis, as listed in Table 2. For each selected sample, an approximate 10-gram soil sample was collected from the Macro-Core tube using a Terra Core Sampler and placed into a laboratory-supplied 40-milliliter volatile organic analysis (VOA) vial containing methanol. Once sealed, the vial was labeled with the sample identification number and then shaken vigorously for about one minute. The samples were packed on ice and sent via overnight delivery to RED Lab, LLC (RED Lab), located in Wilmington, North Carolina, following proper chain-of-custody procedures (Appendix C).

RED Lab used a QED Hydrocarbon Analyzer to quantitatively analyze the soil samples using the ultraviolet fluorescence (UVF) method for benzene, toluene, ethylbenzene, and xylene (BTEX); gasoline range organics (GRO); diesel range organics (DRO); total petroleum hydrocarbons (TPH); total aromatics; polycyclic aromatic hydrocarbons (PAHs); and benzo(a)pyrene (BaP).

## **4.4 Groundwater**

Groundwater was not encountered during the drilling investigation. Perched water was encountered at 5 feet depth in one boring on the east side of the site (B2-2).

## **5.0 RESULTS**

### **5.1 Geophysics**

The EM61 early time gate data show the response from both shallow and deeper metallic objects (Figure 3). The differential response reduces the effect of shallow anomalies and emphasizes anomalies from larger and more deeply buried metallic objects, such as USTs (Figure 4). The EM61 differential responses corresponded to known site features, such as buried utilities and metallic features on the ground surface. Based on the EM61 differential response, ground-penetrating radar (GPR) imaging was not required.

The EM61 early time gate response and differential response are shown on the NCDOT plan sheet on Figures 5 and 6, respectively.

### **5.2 Sample Data**

The soil sample UVF hydrocarbon analysis results for BTEX, GRO, and DRO are presented in Table 2. The RED Lab laboratory report, which also includes results for TPH, total aromatics, PAHs, and BaP, is provided in Appendix B. Values are provided in milligrams per kilogram (mg/kg or ppm).

### **5.3 Sample Observations**

The results of the laboratory testing indicate that BTEX and GRO were below the laboratory detection limits for the 9 samples tested. DRO was detected in 6 of 9 soil samples tested but was below the NCDEQ action level of 100 ppm.

## **6.0 CONCLUSIONS**

### **6.1 Interpretation of Results**

The results of the Phase II Investigation of Parcel 2 of NCDOT Project U-5809 indicate the presence of 5 active USTs outside of the existing ROW and proposed easement. The geophysical data did not indicate the presence of abandoned USTs in the study area. The results of the PID field screening and the UVF laboratory testing did not indicate the presence of petroleum hydrocarbon contamination above NCDEQ action levels in the soil in the upper 10 feet within the study area.

## **6.2 Geophysics**

The geophysical data did not indicate the presence of abandoned USTs in the study area.

## **6.3 Soil**

The results of the PID field screening and the UVF laboratory testing did not indicate the presence of petroleum hydrocarbon contamination above NCDEQ action levels in the soil in the upper 10 feet within the study area.

## **7.0 RECOMMENDATIONS**

No limitations on construction activities or special handling of excavated soil are recommended for Parcel 2. Groundwater was not encountered in the upper 10 feet in the study area. However, the groundwater level may fluctuate, based on the 1989 environmental investigation performed by others, and it is possible that contaminated groundwater could be encountered at the time of construction. If groundwater is encountered during construction, it should be handled and disposed of in accordance with NCDEQ regulations.

## **8.0 LIMITATIONS**

ESP's professional services have been performed, findings obtained, and recommendations prepared in accordance with customary principles and practices in the fields of environmental science and engineering. ESP is not responsible for the independent conclusions, opinions, or recommendations made by others based on the data presented in this report.

The passage of time may result in a change in the environmental characteristics at this site and surrounding properties. ESP does not warrant against future operations or conditions, or against operations or conditions present of a type or at a location not investigated. ESP does not assume responsibility for other environmental issues that may be associated with the subject site.

## **TABLES**

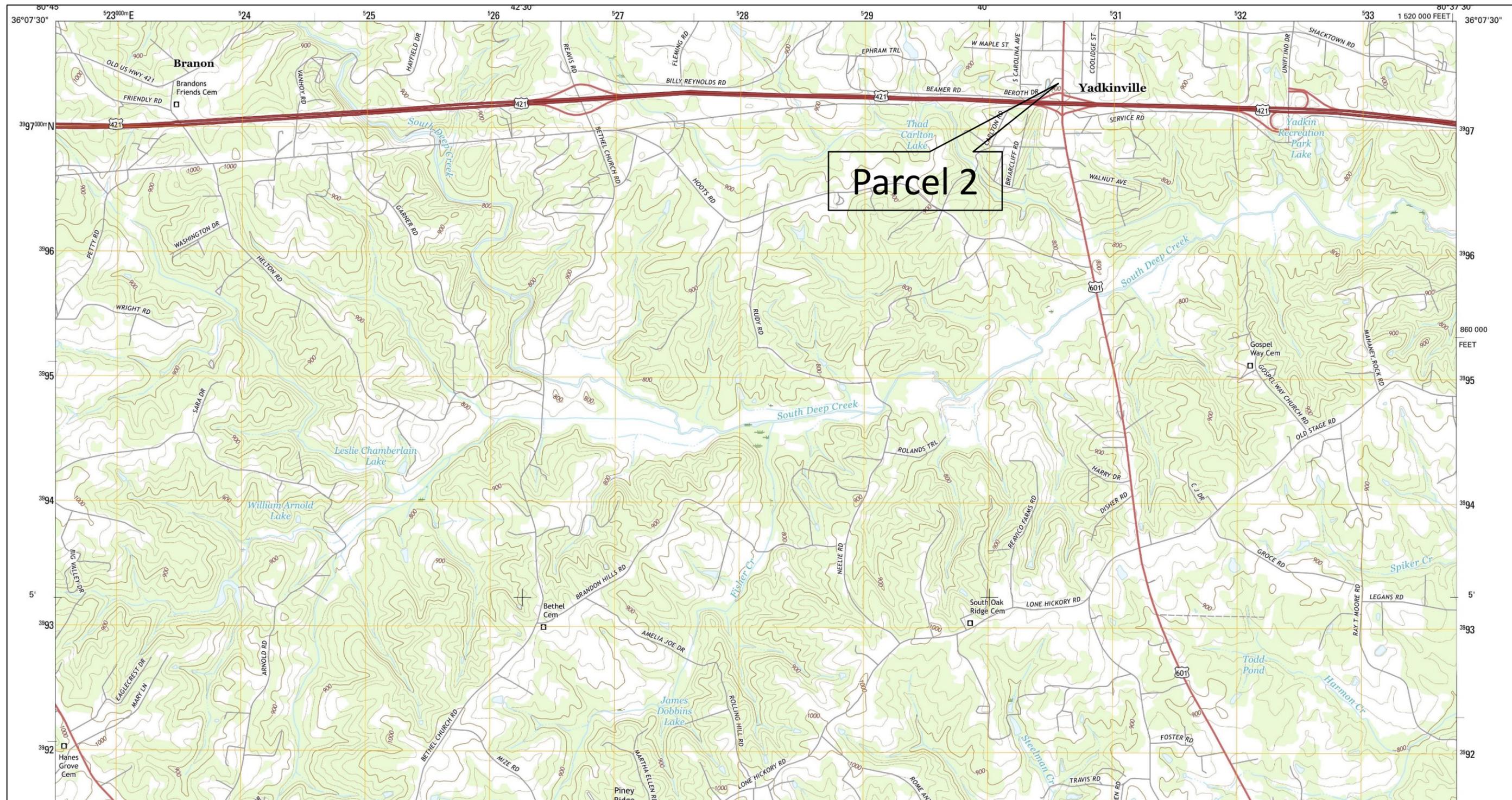
**TABLE 1**  
**SOIL SAMPLE PID READINGS**

<b>Boring</b>	<b>Sample Depth Range with PID &gt; 10 ppm (feet bgs)</b>	<b>Maximum PID Reading (ppm) and Sample Depth (feet bgs)</b>
B2-1	none	1.7 (7.0-7.5)
B2-2	none	5.3 (8.0-8.5)
B2-3	none	7.1 (8.0-8.5)
B2-4	none	4.1 (5.0-5.5)
B2-5	none	4.8 (9.0-9.5)
B2-6	none	4.5 (5.0-5.5)
B2-7	none	4.1 (9.0-9.5)

**TABLE 2**  
**SOIL SAMPLE UVF RESULTS SUMMARY**

<b>Boring</b>	<b>Sample ID (depth in feet bgs)</b>	<b>Date Collected</b>	<b>BTEX (C6-C9) (mg/kg)</b>	<b>GRO (C5-C10) (mg/kg)</b>	<b>DRO (C10-C35) (mg/kg)</b>
B2-1	S2	3/5/19	<0.64	<0.64	<0.26
B2-1	S7	3/5/19	<0.59	<0.59	<0.23
B2-2	S8	3/5/19	<0.5	<0.5	0.39
B2-3	S5	3/5/19	<0.48	<0.48	3.3
B2-4	S1	3/5/19	<0.59	<0.59	63.7
B2-5	S4	3/5/19	<0.59	<0.59	0.59
B2-5	S9	3/5/19	<0.56	<0.56	0.45
B2-6	S3	3/5/19	<0.57	<0.57	<0.23
B2-7	S3	3/5/19	<0.6	<0.6	0.83

## FIGURES



From: USGS US Topo 7.5 - minute map for LONE HICKORY, NC QUADRANGLE, NC, Date: 2016, Original Scale: 1:24,000

PROJECT NO.	GR22.309
SCALE	AS SHOWN
DATE	4/3/19
BY	EDB

**FIGURE 1 - PARCEL 2, BEROETH OIL CO. INC.**  
**SITE VICINITY MAP**  
**U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM**  
**US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS**  
**YADKIN COUNTY, NORTH CAROLINA**



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A. Photo from southwest corner of site, looking northeast.

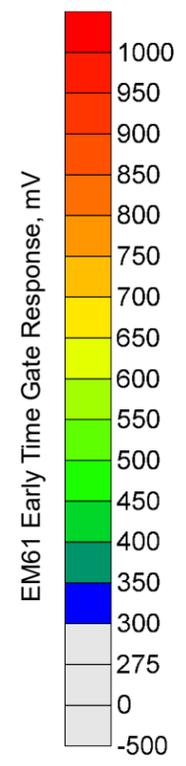
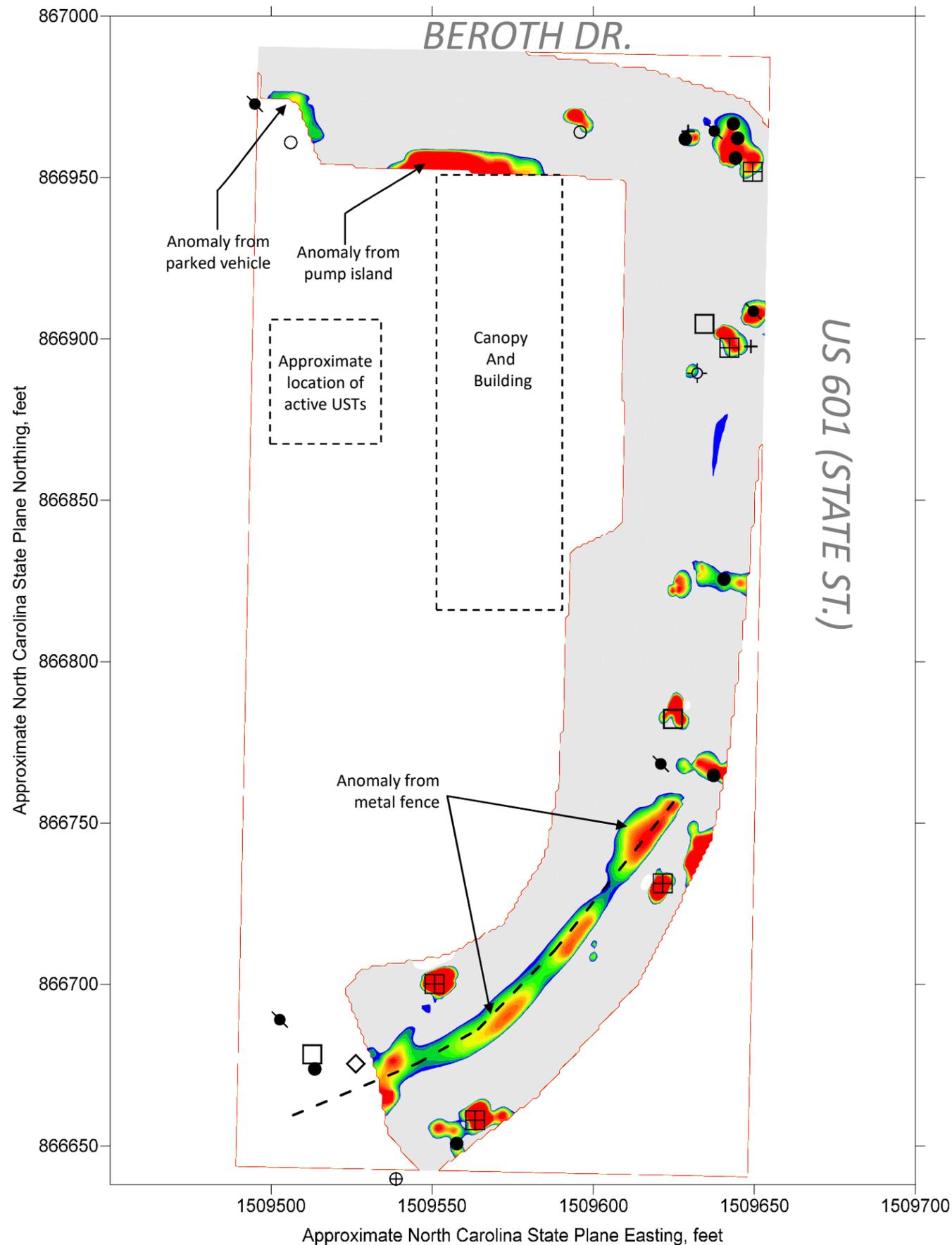


B. Photo from northeast corner of site, looking south.



C. Photo from northeast corner of site, looking west.

PROJECT NO. GR22.309	<b>FIGURE 1 - PARCEL 2, BERTH OIL CO. INC. SITE PHOTOGRAPHS</b>	<b>U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS YADKIN COUNTY, NORTH CAROLINA</b>		ESP Associates, Inc.
SCALE NTS				7011 Albert Pick Rd., Suite E
DATE 4/3/19				Greensboro, NC 27409
BY EDB				336.334.7724 <a href="http://www.espassociates.com">www.espassociates.com</a>



EXPLANATION	
◇	Miscellaneous metal object (pipe, debris, etc.)
□	Utility Box (water meter, electrical outlet, etc.)
⊞	Drop Inlet or Catch Basin
⊕	Manhole
●	Power pole
+	Guy wire anchor
●	Sign pole, other pole
○	UST System Monitoring
⊙	Monitoring well, abandoned
■	EM61 Data Collection Areas
▭	GPR Data Collection Areas
⊞	Approximate location of known UST

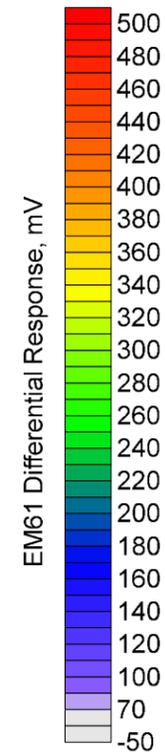
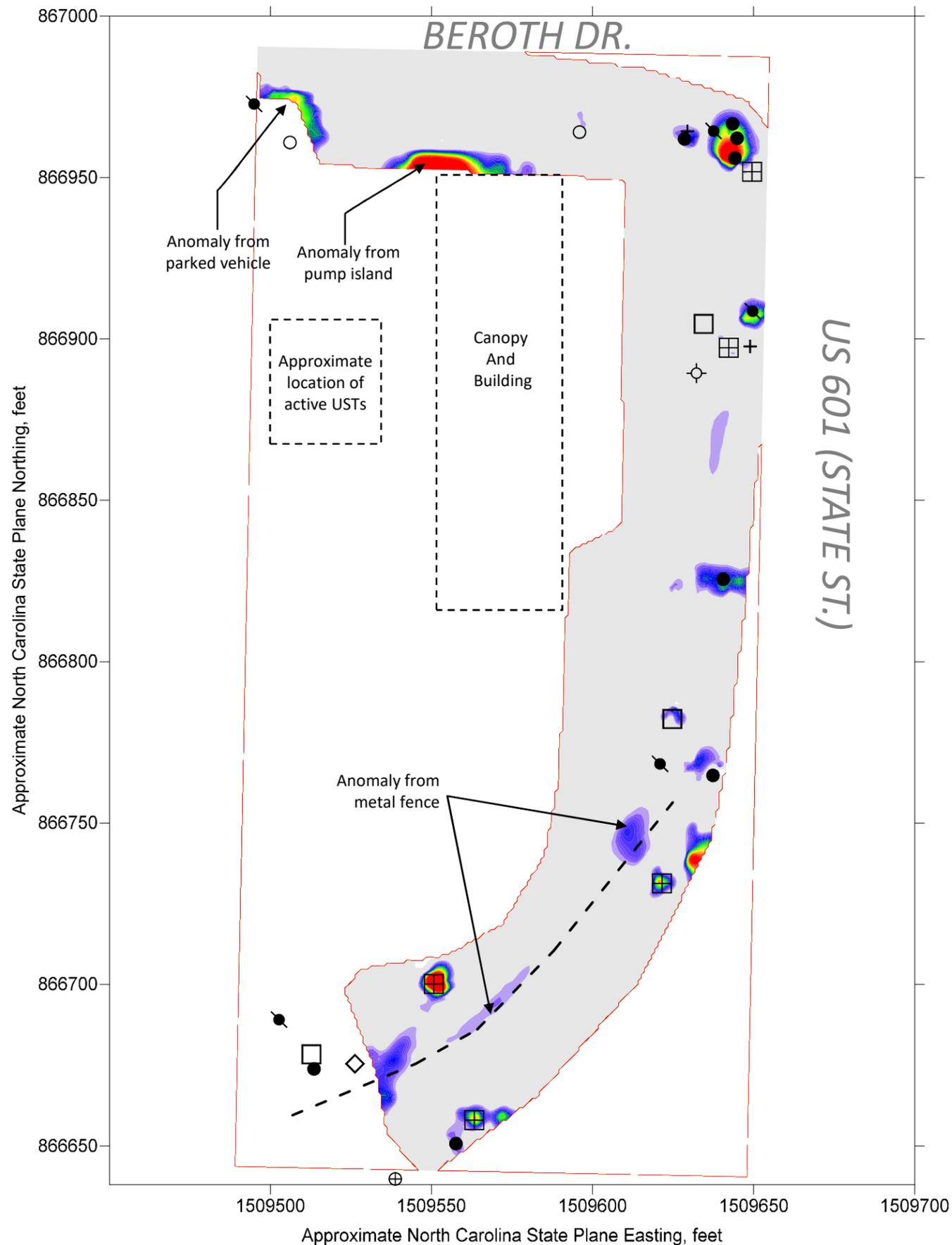
Note: Locations of data and features are approximate and were collected using a DGPS instrument. ESP make no guarantees as to the accuracy of these locations. Coordinates on the axes of the maps are approximate and provided for general reference only.

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SCALE	AS SHOWN
DATE	4/3/19
BY	EDB

**FIGURE 3 - PARCEL 2, BEROOTH OIL CO. INC.**  
**EM61 EARLY TIME GATE RESPONSE**  
**U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM**  
**US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS**  
**YADKIN COUNTY, NORTH CAROLINA**



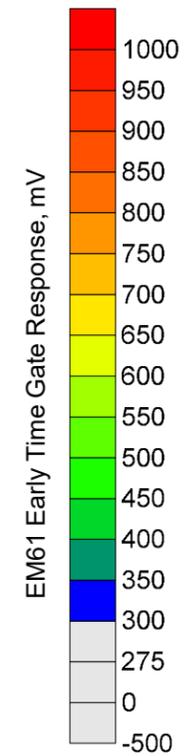
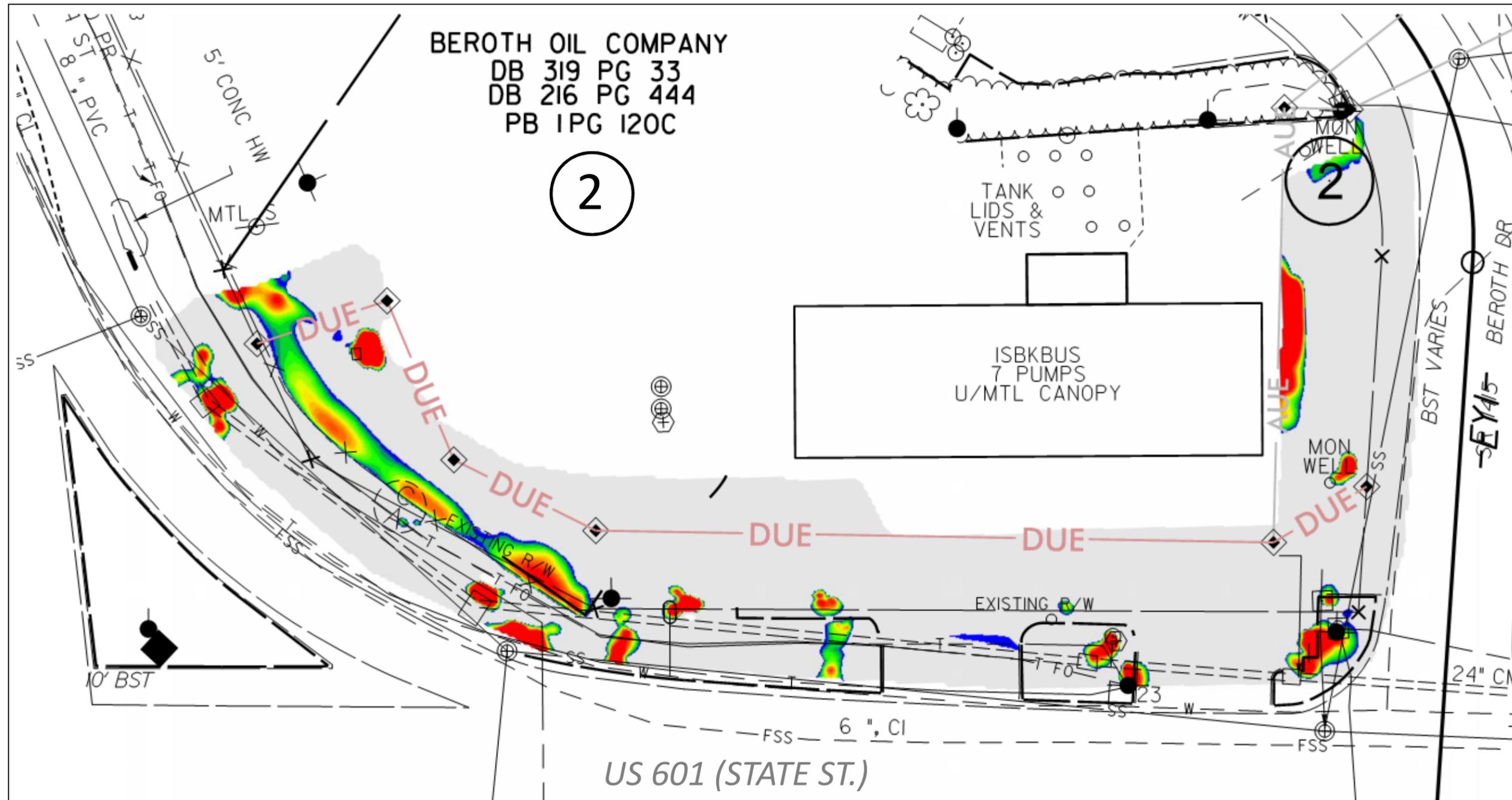
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EXPLANATION	
◇	Miscellaneous metal object (pipe, debris, etc.)
□	Utility Box (water meter, electrical outlet, etc.)
▣	Drop Inlet or Catch Basin
⊕	Manhole
●	Power pole
+	Guy wire anchor
●	Sign pole, other pole
○	UST System Monitoring
⊕	Monitoring well, abandoned
■	EM61 Data Collection Areas
▤	GPR Data Collection Areas
▣	Approximate location of known UST

Note: Locations of data and features are approximate and were collected using a DGPS instrument. ESP make no guarantees as to the accuracy of these locations. Coordinates on the axes of the maps are approximate and provided for general reference only.

PROJECT NO. GR22.309	<b>FIGURE 4 – PARCEL 2, BEROOTH OIL CO. INC.</b> <b>EM61 DIFFERENTIAL RESPONSE</b>  <b>U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM</b> <b>US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS</b> <b>YADKIN COUNTY, NORTH CAROLINA</b>		ESP Associates, Inc.
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DATE 4/3/19			Greensboro, NC 27409
BY EDB			336.334.7724
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List of NCDOT reference files

- U-5809\_Geo\_env\_ESP.dgn
- u5809\_ls\_fs.dgn
- U-5809\_hyd\_dm.dgn



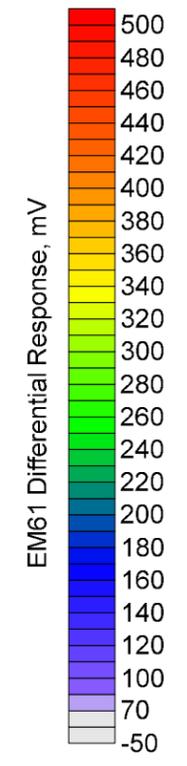
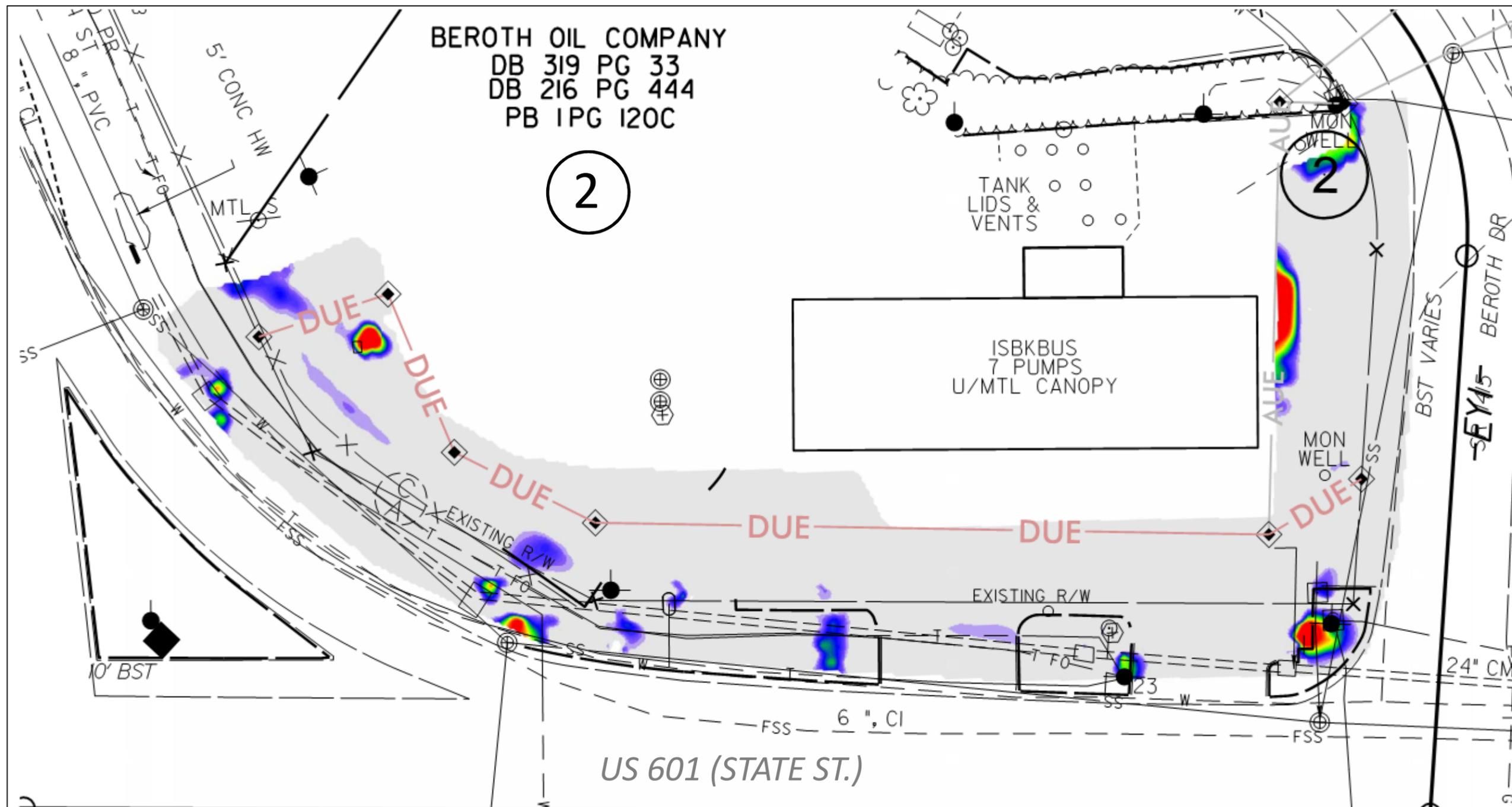
See Figure 9 for explanation of symbols and line types

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DATE	4/3/19
BY	EDB

**FIGURE 5 – PARCEL 2, BEROOTH OIL CO. INC.**  
**EM61 EARLY TIME GATE RESPONSE ON PLAN SHEET**  
 U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS YADKIN COUNTY, NORTH CAROLINA



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BEROTH OIL COMPANY  
 DB 319 PG 33  
 DB 216 PG 444  
 PB 1PG 120C

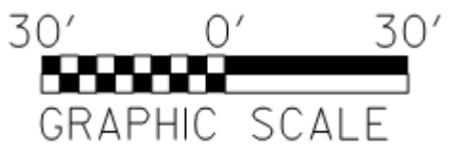
2

ISBKBUS  
 7 PUMPS  
 U/MTL CANOPY

US 601 (STATE ST.)

List of NCDOT reference files

- U-5809\_Geo\_env\_ESP.dgn
- u5809\_ls\_fs.dgn
- U-5809\_hyd\_dm.dgn



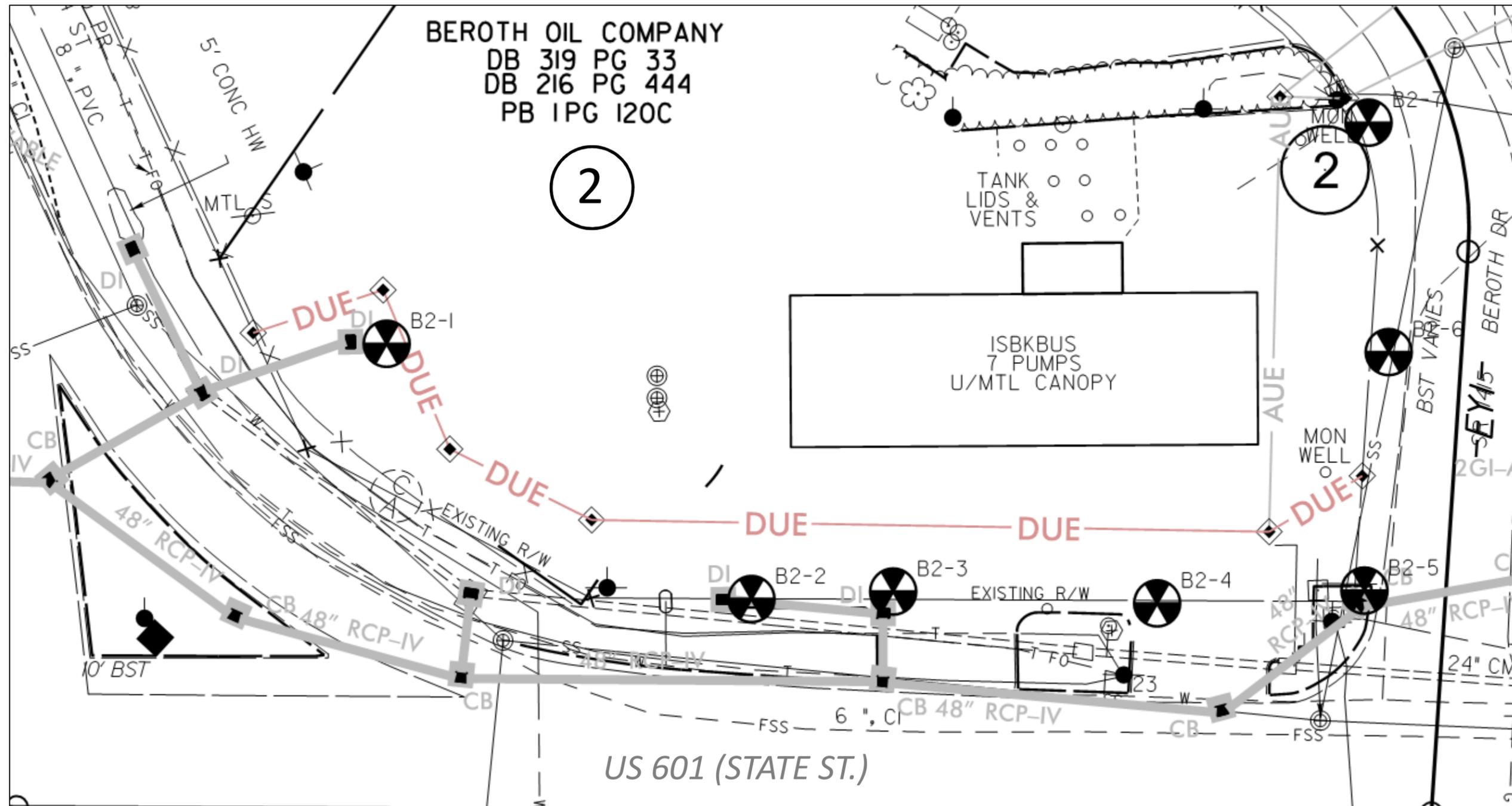
See Figure 9 for explanation of symbols and line types

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**FIGURE 6 – PARCEL 2, BEROOTH OIL CO. INC.**  
**EM61 DIFFERENTIAL RESPONSE ON PLAN SHEET**  
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 DB 216 PG 444  
 PB 1 PG 120C

2

2

ISBKBUS  
 7 PUMPS  
 U/MTL CANOPY

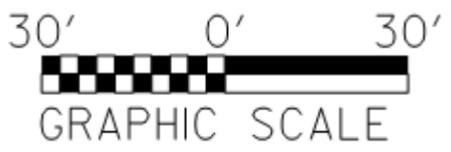
TANK  
 LIDS &  
 VENTS

US 601 (STATE ST.)

List of NCDOT reference files

- U-5809\_Geo\_env\_ESP.dgn
- u5809\_ls\_fs.dgn
- U-5809\_hyd\_dm.dgn

See Figure 9 for explanation of symbols and line types

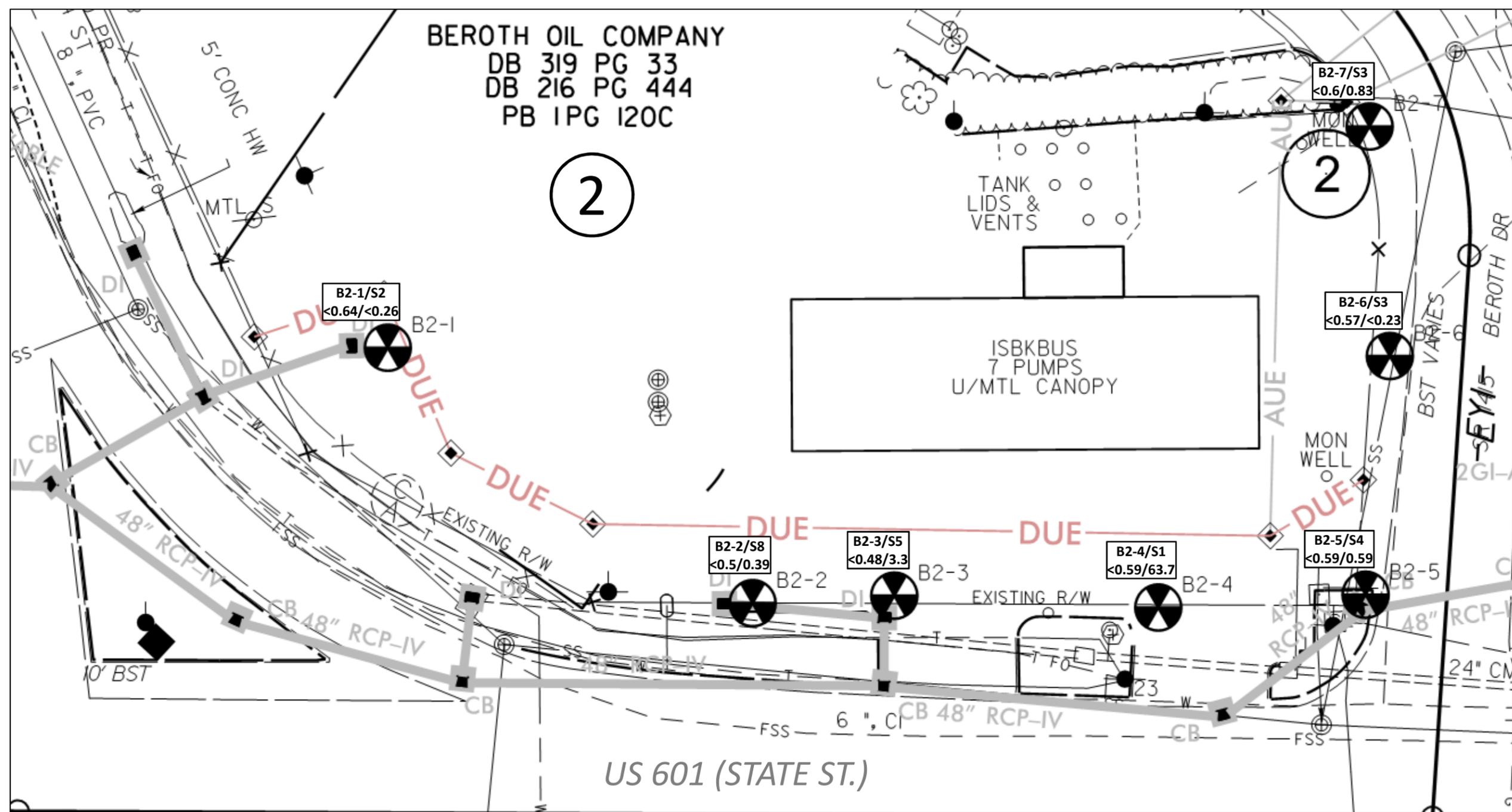


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**FIGURE 7 – PARCEL 2, BEROTH OIL CO. INC.**  
**BORING LOCATIONS ON PLAN SHEET**  
 U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM  
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 DB 319 PG 33  
 DB 216 PG 444  
 PB 1 PG 120C

2

2

ISBKBUS  
 7 PUMPS  
 U/MTL CANOPY

TANK  
 LIDS &  
 VENTS

B2-6/S3  
 <math><0.57/<0.23</math>

B2-1/S2  
 <math><0.64/<0.26</math>

B2-2/S8  
 <math><0.5/<0.39</math>

B2-3/S5  
 <math><0.48/<3.3</math>

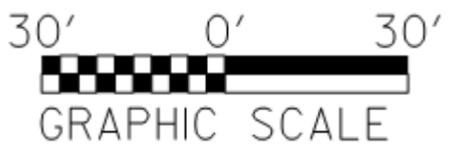
B2-4/S1  
 <math><0.59/<63.7</math>

B2-5/S4  
 <math><0.59/<0.59</math>

US 601 (STATE ST.)

- List of NCDOT reference files
- U-5809\_Geo\_env\_ESP.dgn
  - u5809\_ls\_fs.dgn
  - U-5809\_hyd\_dm.dgn

Explanation	
<b>Maximum Analytical Results per Boring</b>	
B2-1/S2 <math><0.64/<0.26</math>	Boring No./Sample No. GRO/DRO (mg/kg, ppm)



See Figure 9 for explanation of symbols and line types

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**FIGURE 8 – PARCEL 2, BEROTH OIL CO. INC.  
 SOIL ANALYTICAL RESULTS ON PLAN SHEET**

U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM  
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# STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS CONVENTIONAL PLAN SHEET SYMBOLS

*Note: Not to Scale      \*S.U.E. = Subsurface Utility Engineering*

### BOUNDARIES AND PROPERTY:

State Line	_____
County Line	_____
Township Line	_____
City Line	_____
Reservation Line	_____
Property Line	_____
Existing Iron Pin	○
Property Corner	⊠
Property Monument	⊠
Parcel/Sequence Number	⊕
Existing Fence Line	-x-x-x-
Proposed Woven Wire Fence	-o-o-o-
Proposed Chain Link Fence	-□-□-□-
Proposed Barbed Wire Fence	-◇-◇-◇-
Existing Wetland Boundary	-w-w-w-
Proposed Wetland Boundary	-w-w-w-
Existing Endangered Animal Boundary	-a-a-a-
Existing Endangered Plant Boundary	-p-p-p-
Existing Historic Property Boundary	-h-h-h-
Known Contamination Area: Soil	-s-s-s-
Potential Contamination Area: Soil	-s-s-s-
Known Contamination Area: Water	-w-w-w-
Potential Contamination Area: Water	-w-w-w-
Contaminated Site: Known or Potential	-s-s-

### BUILDINGS AND OTHER CULTURE:

Gas Pump Vent or U/G Tank Cap	○
Sign	⊕
Well	⊕
Small Mine	⊕
Foundation	⊠
Area Outline	⊠
Cemetery	⊠
Building	⊠
School	⊠
Church	⊠
Dam	⊠

### HYDROLOGY:

Stream or Body of Water	_____
Hydro, Pool or Reservoir	_____
Jurisdictional Stream	JS
Buffer Zone 1	BZ 1
Buffer Zone 2	BZ 2
Flow Arrow	→
Disappearing Stream	→
Spring	○
Wetland	_____
Proposed Lateral, Tail, Head Ditch	_____
False Sump	_____

### RAILROADS:

Standard Gauge	_____
RR Signal Milepost	○
Switch	⊠
RR Abandoned	_____
RR Dismantled	_____

### RIGHT OF WAY:

Baseline Control Point	◆
Existing Right of Way Marker	△
Existing Right of Way Line	_____
Proposed Right of Way Line	_____
Proposed Right of Way Line with Iron Pin and Cap Marker	_____
Proposed Right of Way Line with Concrete or Granite RW Marker	_____
Proposed Control of Access Line with Concrete CA Marker	_____
Existing Control of Access	_____
Proposed Control of Access	_____
Existing Easement Line	_____
Proposed Temporary Construction Easement	_____
Proposed Temporary Drainage Easement	TDE
Proposed Permanent Drainage Easement	PDE
Proposed Permanent Drainage / Utility Easement	DUE
Proposed Permanent Utility Easement	PUE
Proposed Temporary Utility Easement	TUE
Proposed Aerial Utility Easement	AUE
Proposed Permanent Easement with Iron Pin and Cap Marker	◆

### ROADS AND RELATED FEATURES:

Existing Edge of Pavement	_____
Existing Curb	_____
Proposed Slope Stakes Cut	_____
Proposed Slope Stakes Fill	_____
Proposed Curb Ramp	CR
Existing Metal Guardrail	_____
Proposed Guardrail	_____
Existing Cable Guiderail	_____
Proposed Cable Guiderail	_____
Equality Symbol	⊕
Pavement Removal	_____

### VEGETATION:

Single Tree	○
Single Shrub	○
Hedge	_____
Woods Line	_____

Orchard	_____
Vineyard	_____

### EXISTING STRUCTURES:

MAJOR:	
Bridge, Tunnel or Box Culvert	_____
Bridge Wing Wall, Head Wall and End Wall	_____
MINOR:	
Head and End Wall	_____
Pipe Culvert	_____
Footbridge	_____
Drainage Box: Catch Basin, DI or JB	_____
Paved Ditch Gutter	_____
Storm Sewer Manhole	_____
Storm Sewer	_____

### UTILITIES:

POWER:	
Existing Power Pole	_____
Proposed Power Pole	_____
Existing Joint Use Pole	_____
Proposed Joint Use Pole	_____
Power Manhole	_____
Power Line Tower	_____
Power Transformer	_____
U/G Power Cable Hand Hole	_____
H-Frame Pole	_____
U/G Power Line LOS B (S.U.E.*)	_____
U/G Power Line LOS C (S.U.E.*)	_____
U/G Power Line LOS D (S.U.E.*)	_____

### TELEPHONE:

Existing Telephone Pole	_____
Proposed Telephone Pole	_____
Telephone Manhole	_____
Telephone Pedestal	_____
Telephone Cell Tower	_____
U/G Telephone Cable Hand Hole	_____
U/G Telephone Cable LOS B (S.U.E.*)	_____
U/G Telephone Cable LOS C (S.U.E.*)	_____
U/G Telephone Cable LOS D (S.U.E.*)	_____
U/G Telephone Conduit LOS B (S.U.E.*)	_____
U/G Telephone Conduit LOS C (S.U.E.*)	_____
U/G Telephone Conduit LOS D (S.U.E.*)	_____
U/G Fiber Optics Cable LOS B (S.U.E.*)	_____
U/G Fiber Optics Cable LOS C (S.U.E.*)	_____
U/G Fiber Optics Cable LOS D (S.U.E.*)	_____

### WATER:

Water Manhole	_____
Water Meter	_____
Water Valve	_____
Water Hydrant	_____
U/G Water Line LOS B (S.U.E.*)	_____
U/G Water Line LOS C (S.U.E.*)	_____
U/G Water Line LOS D (S.U.E.*)	_____
Above Ground Water Line	A/G Water

### TV:

TV Pedestal	_____
TV Tower	_____
U/G TV Cable Hand Hole	_____
U/G TV Cable LOS B (S.U.E.*)	_____
U/G TV Cable LOS C (S.U.E.*)	_____
U/G TV Cable LOS D (S.U.E.*)	_____
U/G Fiber Optic Cable LOS B (S.U.E.*)	_____
U/G Fiber Optic Cable LOS C (S.U.E.*)	_____
U/G Fiber Optic Cable LOS D (S.U.E.*)	_____

### GAS:

Gas Valve	_____
Gas Meter	_____
U/G Gas Line LOS B (S.U.E.*)	_____
U/G Gas Line LOS C (S.U.E.*)	_____
U/G Gas Line LOS D (S.U.E.*)	_____
Above Ground Gas Line	A/G Gas

### SANITARY SEWER:

Sanitary Sewer Manhole	_____
Sanitary Sewer Cleanout	_____
U/G Sanitary Sewer Line	_____
Above Ground Sanitary Sewer	A/G Sanitary Sewer
SS Forced Main Line LOS B (S.U.E.*)	_____
SS Forced Main Line LOS C (S.U.E.*)	_____
SS Forced Main Line LOS D (S.U.E.*)	_____

### MISCELLANEOUS:

Utility Pole	_____
Utility Pole with Base	_____
Utility Located Object	_____
Utility Traffic Signal Box	_____
Utility Unknown U/G Line LOS B (S.U.E.*)	_____
U/G Tank; Water, Gas, Oil	_____
Underground Storage Tank, Approx. Loc.	_____
A/G Tank; Water, Gas, Oil	_____
Geoenvironmental Boring	_____
U/G Test Hole LOS A (S.U.E.*)	_____
Abandoned According to Utility Records	AATUR
End of Information	E.O.I.

PROJECT NO.	GR22.309
SCALE	N/A
DATE	4/3/19
BY	EDB

### FIGURE 9 – PARCEL 2, BERTH OIL CO. INC. LEGEND FOR PLAN SHEET FIGURES

**U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM  
US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS  
YADKIN COUNTY, NORTH CAROLINA**



ESP Associates, Inc.  
7011 Albert Pick Rd.,  
Suite E  
Greensboro, NC 27409  
336.334.7724  
www.espassociates.com

**APPENDIX A**  
**SOIL BORING LOGS**



# FIELD BORING LOG

BORING NO.

B2-1

PROJECT NAME: NCDOT U-5809 PSA PROJ. NO.: GR22.309

LOCATION: By storm drain at S. end of parcel on edge of asphalt

TYPE OF BORING: Direct Push DATE STARTED: 3/5/19 SHEET: 1 of 1

DRILLING FIRM: SAEDACCO DATE FINISHED: 3/5/19 TOTAL DEPTH: 10.0 ft

DRILLER: Brian Ewing SAMPLE METHOD: 5' Macro Core DEPTH TO GW: N/A ft

DRILL RIG: Geoprobe 7822DT LOGGED BY: E. Billington COMMENT: \_\_\_\_\_

DEPTH (ft)	SAMPLE NO.	SAMPLE DEPTH (ft)	PID READING (ppm)	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
				0.0 - 0.6, Dk grey gravel to sand (asphalt and road base)	Core 1 Rec 3.0'/5.0'
1	S-1	1.0-1.5	0.0	0.6 - 10.0, tan, brown, and white sandy silt	residual soil
2	S-2	2.0-2.5	0.0		
3	S-3	3.0-3.5			
4	S-4	4.0-4.5			
5	S-5	5.0-5.5	0.2		Core 2 Rec 3.3'/5.0'
6	S-6	6.0-6.5	1.2		
7	S-7	7.0-7.5	1.7		
8	S-8	8.0-8.5	1.5		
9	S-9	9.0-9.5			
10					
11					
12					
13					
14					
15					



# FIELD BORING LOG

BORING NO.

B2-2

PROJECT NAME: NCDOT U-5809 PSA PROJ. NO.: GR22.309

LOCATION: Grassy strip approx. 30' S of S. entrance on E side

TYPE OF BORING: Direct Push DATE STARTED: 3/5/19 SHEET: 1 of 1

DRILLING FIRM: SAEDACCO DATE FINISHED: 3/5/19 TOTAL DEPTH: 10.0 ft

DRILLER: Brian Ewing SAMPLE METHOD: 5' Macro Core DEPTH TO GW: N/A ft

DRILL RIG: Geoprobe 7822DT LOGGED BY: E. Billington COMMENT: \_\_\_\_\_

DEPTH (ft)	SAMPLE NO.	SAMPLE DEPTH (ft)	PID READING (ppm)	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
				0.0 - 0.1, Root mat 0.1 - 5.0, Brown, sandy silt, moist	Core 1 Rec 3.2'/5.0'
1	S-1	1.0-1.5	2.6	1.0, 3-inch seam of coarse sand	
2	S-2	2.0-2.5	2.6		
3	S-3	3.0-3.5	2.8		
4	S-4	4.0-4.5			
5	S-5	5.0-5.5		5.0 - 7.9, Light brown silty/clayey sand, wet	Core 2 Rec 3.3'/5.0' Perched water at 5'D
6	S-6	6.0-6.5			
7	S-7	7.0-7.5	3.2		
8	S-8	8.0-8.5	5.3	7.9 - 10.0, Light brown clayey sand	
9	S-9	9.0-9.5	2.9		
10					
11					
12					
13					
14					
15					



# FIELD BORING LOG

**BORING NO.****B2-3**PROJECT NAME: NCDOT U-5809 PSA PROJ. NO.: GR22.309LOCATION: on edge asphalt, S end of S entrance E sideTYPE OF BORING: Direct Push DATE STARTED: 3/5/19 SHEET: 1 of 1DRILLING FIRM: SAEDACCO DATE FINISHED: 3/5/19 TOTAL DEPTH: 10.0 ftDRILLER: Brian Ewing SAMPLE METHOD: 5' Macro Core DEPTH TO GW: N/A ftDRILL RIG: Geoprobe 7822DT, hand auger LOGGED BY: E. Billington COMMENT: \_\_\_\_\_

DEPTH (ft)	SAMPLE NO.	SAMPLE DEPTH (ft)	PID READING (ppm)	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
				0.0 - 1.1, Dark grey to grey-brown gravel to sand (asphalt and road base)	Core 1 Rec 2.0'/5.0'
1	S-1	1.0-1.5	3.4	1.1 - 2.0, Brown, sandy clay	due to low recovery offset and hand auger 1 - 5' D
2	S-2 HA	2.0-2.5	3.6	2.0 - 4.5, Brown sandy silt	
3	S-3 HA	3.0-3.5	3.3		Driller hit wood at 5.0' depth, offset boring
4	S-4 HA	4.0-4.5	2.8		
				4.5 - 10.0, Brown silty, sand, very moist	
5	S-5	5.0-5.5	4.5		Core 2 Rec 3.5'/5.0'
6	S-6	6.0-6.5	1.2		
7	S-7	7.0-7.5	6.6		
8	S-8	8.0-8.5	7.1		
9	S-9	9.0-9.5			
10					
11					
12					
13					
14					
15					



# FIELD BORING LOG

BORING NO.

B2-4

PROJECT NAME: NCDOT U-5809 PSA PROJ. NO.: GR22.309

LOCATION: S side, N entrance on E side of parcel, edge of asphalt

TYPE OF BORING: Direct Push DATE STARTED: 3/5/19 SHEET: 1 of 1

DRILLING FIRM: SAEDACCO DATE FINISHED: 3/5/19 TOTAL DEPTH: 10.0 ft

DRILLER: Brian Ewing SAMPLE METHOD: 5' Macro Core DEPTH TO GW: N/A ft

DRILL RIG: Geoprobe 7822DT, hand auger LOGGED BY: E. Billington COMMENT:

DEPTH (ft)	SAMPLE NO.	SAMPLE DEPTH (ft)	PID READING (ppm)	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
				0.0 - 0.4, Dk grey gravel to sand (asphalt and road base)	Core 1 Rec 1.5'/5.0'
1	S-1 HA	1.0-1.5	3.1	0.4 - 2.0 Brown, grey brown sandy silt	driller offset and hand augered 1-5'D
2	S-2 HA	2.0-2.5	2.4	2.0 - 8.0, Grey brown silty sand to clayey sand	
3	S-3 HA	3.0-3.5	3.1		
4	S-4 HA	4.0-4.5	3.1		
5	S-5 HA	5.0-5.5	4.1		Core 2 Rec 2.8'/5.0'
6	S-6	6.0-6.5			Recovery from bottom 7.2 - 10.0'
7	S-7	7.0-7.5	3.3		
8	S-8	8.0-8.5	2.8	8.0 - 10.0, grey brown clayey sand	
9	S-9	9.0-9.5	3.3		
10					
11					
12					
13					
14					
15					



# FIELD BORING LOG

**BORING NO.****B2-5**

PROJECT NAME: NCDOT U-5809 PSA PROJ. NO.: GR22.309  
 LOCATION: NE corner of parcel, grassy island  
 TYPE OF BORING: Direct Push DATE STARTED: 3/5/19 SHEET: 1 of 1  
 DRILLING FIRM: SAEDACCO DATE FINISHED: 3/5/19 TOTAL DEPTH: 10.0 ft  
 DRILLER: Brian Ewing SAMPLE METHOD: 5' Macro Core DEPTH TO GW: N/A ft  
 DRILL RIG: Geoprobe 7822DT, hand auger LOGGED BY: E. Billington COMMENT: \_\_\_\_\_

DEPTH (ft)	SAMPLE NO.	SAMPLE DEPTH (ft)	PID READING (ppm)	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
				0.0 - 0.1, Root mat 0.1 - 0.9 Dark grey, sandy gravel (old road base)	Core 1 Rec 2.2'/5.0'
1	S-1	1.0-1.5	1.6	0.9 - 7.0 Brown sandy silt	Hand augered 3-5'
2	S-2	2.0-2.5	1.5		
3	S-3 HA	3.0-3.5	2.3		
4	S-4 HA	4.0-4.5	3.1		
5	S-5 HA	5.0-5.5	2.5		Core 2 Rec 3.0'/5.0' Recovery 7-10'
6	S-6	6.0-6.5			
7	S-7	7.0-7.5	2.6	7.0 - 10.0, grey to brown clay, sand, moist	
8	S-8	8.0-8.5	2.5		
9	S-9	9.0-9.5	4.8		
10					
11					
12					
13					
14					
15					



# FIELD BORING LOG

BORING NO.

B2-6

PROJECT NAME: NCDOT U-5809 PSA PROJ. NO.: GR22.309

LOCATION: Middle N side parcel by road

TYPE OF BORING: Direct Push DATE STARTED: 3/5/19 SHEET: 1 of 1

DRILLING FIRM: SAEDACCO DATE FINISHED: 3/5/19 TOTAL DEPTH: 10.0 ft

DRILLER: Brian Ewing SAMPLE METHOD: 5' Macro Core DEPTH TO GW: N/A ft

DRILL RIG: Geoprobe 7822DT, hand auger LOGGED BY: E. Billington COMMENT: \_\_\_\_\_

DEPTH (ft)	SAMPLE NO.	SAMPLE DEPTH (ft)	PID READING (ppm)	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
				0.0 - 0.6, grey sand with gravel (asphalt)	Core 1 Rec 3.1'/5.0'
1	S-1	1.0-1.5	0.9	0.6 - 10.0 Grey-brown to brown sandy clay	
2	S-2	2.0-2.5	2.4		
3	S-3	3.0-3.5	3.3		
4	S-4	4.0-4.5			
5	S-5	5.0-5.5	4.5	5.0 - grading to tan	Core 2 Rec 5.0'/5.0'
6	S-6	6.0-6.5	2.0		
7	S-7	7.0-7.5	1.5		
8	S-8	8.0-8.5	1.9		
9	S-9	9.0-9.5	2.7		
10					
11					
12					
13					
14					
15					



# FIELD BORING LOG

BORING NO.

B2-7

PROJECT NAME: NCDOT U-5809 PSA PROJ. NO.: GR22.309

LOCATION: NW Corner of Parcel

TYPE OF BORING: Direct Push DATE STARTED: 3/5/19 SHEET: 1 of 1

DRILLING FIRM: SAEDACCO DATE FINISHED: 3/5/19 TOTAL DEPTH: 10.0 ft

DRILLER: Brian Ewing SAMPLE METHOD: 5' Macro Core DEPTH TO GW: N/A ft

DRILL RIG: Geoprobe 7822DT LOGGED BY: E. Billington COMMENT: \_\_\_\_\_

DEPTH (ft)	SAMPLE NO.	SAMPLE DEPTH (ft)	PID READING (ppm)	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
				0.0 - 0.7, grey sand with gravel (asphalt and road base)	Core 1 Rec 3.0'/5.0'
1	S-1	1.0-1.5	3.6	0.7 - 10.0 Red-brown to mottled brown, white and tan sandy silt	Residual
2	S-2	2.0-2.5	2.4		
3	S-3	3.0-3.5	3.8		
4	S-4	4.0-4.5			Core 2 Rec 4.0'/5.0'
5	S-5	5.0-5.5			Recovery from 6-10'
6	S-6	6.0-6.5			
7	S-7	7.0-7.5	3.0		
8	S-8	8.0-8.5	4.0		
9	S-9	9.0-9.5	4.1		
10					
11					
12					
13					
14					
15					

**APPENDIX B**

**RED LAB LABORATORY TESTING REPORT**



### Hydrocarbon Analysis Results

**Client:** ESP ASSOCIATES INC.  
**Address:** 7011 ALBERT PICK ROAD SUITE E  
 GREENSBORO, NC 27409

**Samples taken** Tuesday, March 5, 2019  
**Samples extracted** Tuesday, March 5, 2019  
**Samples analysed** Tuesday, March 12, 2019

**Contact:** NED BILLINGTON

**Operator** CAROLINE STEVENS

**Project:** GR22.309

**U00902**

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	
Soil	B2-1 S2	25.7	<0.64	<0.64	<0.26	0.02	0.02	0.002	<0.008	0	0	100	Residual HC
Soil	B2-1 S7	23.4	<0.59	<0.59	<0.23	<0.59	<0.01	<0.01	<0.007	0	0	0	PHC ND,(FCM)
Soil	B2-2 S8	20.2	<0.5	<0.5	0.39	0.39	0.37	0.04	<0.006	0	95.1	4.9	Residual PHC
Soil	B2-3 S5	19.3	<0.48	<0.48	3.3	3.3	2.2	0.05	<0.001	0	93.3	6.7	Bit.Road Tar 93.5%,(FCM)
Soil	B2-4 S1	23.6	<0.59	<0.59	63.7	63.7	34.6	0.95	0.009	0	93.1	6.9	Bit.Road Tar 95.3%,(FCM)
Soil	B2-5 S4	23.6	<0.59	<0.59	0.59	0.59	0.35	0.006	<0.007	0	91.1	8.9	V.Deg.PHC 88.3%,(FCM)
Soil	B2-5 S9	22.2	<0.56	<0.56	0.45	0.45	0.36	0.04	<0.007	0	97.2	2.8	PHC ND,(FCM)
Soil	B2-6 S3	22.6	<0.57	<0.57	<0.23	<0.57	<0.01	<0.01	<0.007	0	0	0	PHC ND,(FCM)
Soil	B2-7 S3	24.1	<0.6	<0.6	0.83	0.83	0.51	0.01	<0.001	0	95.6	4.4	Bit.Road Tar 90.3%,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK

96.2%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

**APPENDIX C**  
**CHAIN-OF-CUSTODY FORM**

Client Name: ESP Associates, Inc.  
 Address: 7011 Albert Pick Rd, Suite E  
Greensboro, NC 27409  
 Contact: Ned Billington  
 Contact Ref.: GR22.309  
 Email: nbillington@espassociates.com  
 Phone #: 336-420-5452  
 Collected by: same

# RED LAB™

**RAPID ENVIRONMENTAL DIAGNOSTICS**  
**CHAIN OF CUSTODY AND ANALYTICAL**  
**REQUEST FORM**

RED Lab, LLC  
 5598 Marvin K Moss Lane  
 MARBIONC Bldg, Suite 2003  
 Wilmington, NC 28409

Each sample will be analyzed for  
 BTEX, GRO, DRO, TPH, PAH total  
 aromatics and BaP

Sample Collection Date/Time	TAT Requested		Initials	Sample ID	Total Wt.	Tare Wt.	Sample Wt.
	24 Hour	48 Hour					
3/5/19			EDB	B2-1, S2	54.2	44.1	10.1
3/5/19				B2-1, S7	55.4	44.3	11.1
3/5/19				B2-2, S8	57.2	44.3	12.9
3/5/19				B2-3, S5	57.2	43.7	13.5
3/5/19				B2-4, S1	55.0	44.0	11.0
3/5/19				B2-5, S4	54.8	43.8	11.0
3/5/19				B2-5, S9	55.8	44.1	11.7
3/5/19				B2-6, S3	55.4	43.9	11.5
3/5/19				B2-7, S3	54.7	43.9	10.8
3/5/19				B5-1, S6	55.5	44.2	11.3
3/6/19				B5-2, S3	55.2	44.8	10.4
3/6/19				B5-3, S7	58.2	46.2	12.0
3/6/19				B5-4, S7	56.3	46.0	10.3
3/6/19				B6-1, S3	56.7	44.4	12.3
3/6/19				B6-2, S5	55.5	44.2	11.3
3/6/19				B6-2, S9	56.5	44.9	11.6
3/6/19				B6-4, S7	56.6	44.4	12.2
3/6/19				B6-3, S3	55.2	44.4	10.8
3/6/19				B6-2, S1	56.2	44.3	11.9

Comments: \_\_\_\_\_  
 Relinquished by: [Signature] Date/Time: 3/11/19  
 Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Accepted by: [Signature] Date/Time: 3/12/19 12p  
 Accepted by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

**RED Lab USE ONLY**

19



April 29, 2019

Mr. Gordon Box, LG  
Geotechnical Engineering Unit  
North Carolina Department of Transportation  
1020 Birch Ridge Drive  
Raleigh, NC 27610

**RE:           GEOENVIRONMENTAL PHASE II INVESTIGATION OF PARCEL 6  
Valero Gas Station, FAW JC  
801 S. State St., Yadkinville, North Carolina  
ESP Project No. GR22.309**

TIP Number:           U-5809  
WBS Number:         44382.1.1  
County:                YADKIN  
Description:           Construct median along US 601 (State Street) from US 421 to SR 1146  
                              (Lee Avenue) and add roundabouts at both ends of project

Dear Mr. Box:

ESP Associates, Inc. (ESP) is pleased to submit this report on our GeoEnvironmental Phase II Investigation of the subject parcel. This work was performed in accordance with your Request for Proposal dated January 25, 2019 and our Cost Proposal dated February 1, 2019.

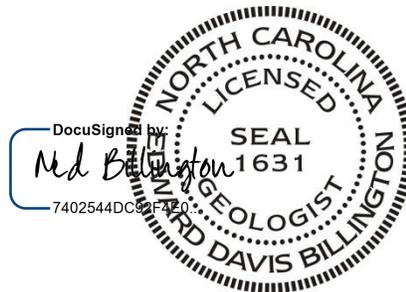
We appreciate the opportunity to assist you during this phase of the project. If you should have any questions concerning this report, or if we may be of further assistance, please contact us.

Sincerely,

ESP Associates, Inc.

A handwritten signature in blue ink that reads "Edward D. Billington".

Edward D. Billington, PG  
Senior Geologist/Geophysicist  
EDB/CJW



not considered Final unless all signatures are completed

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Figure 4	Parcel 6, FAW, JC, EM61 Differential Response
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Figure 6	Parcel 6, FAW, JC, EM61 Differential Response on Plan Sheet
Figure 7	Parcel 6, FAW, JC, Soil Analytical Results on Plan Sheet
Figure 8	Parcel 6, FAW, JC, Boring Locations on Plan Sheet
Figure 9	Parcel 6, FAW, JC, Legend for Plan Sheet Figures

## **TABLE OF CONTENTS (continued)**

### **APPENDICES**

Appendix A	Soil Boring Logs
Appendix B	RED Lab Laboratory Testing Report
Appendix C	Chain-of-Custody Form
Appendix D	March 2003 Phase II LSA Report (selected portions)

## **1.0 INTRODUCTION**

The North Carolina Department of Transportation (NCDOT) is planning to construct a median along US 601 (State Street) from US 421 to SR 1146 (Lee Avenue). Roundabouts will be added at both ends of the project. The NCDOT requested that ESP Associates, Inc. (ESP) perform a Phase II Investigation of the proposed right-of-way (ROW) and proposed easement of Parcel 6 to locate possible underground storage tanks (USTs), sample soil, and delineate potential contaminated soil. The study area of Parcel 6 is approximately 0.1 acre and located at 801 South State Street in Yadkinville, North Carolina.

## **2.0 HISTORY**

This site is occupied by an active convenience store/gas station that is named Fast Track No. 116 and is owned by FAW JC. According to the NCDEQ UST Section Registry there are 3 existing USTs on the south side of the convenience store. Several monitoring wells were identified during the Phase I site visit. Two 10,000-gallon USTs reportedly were removed from a tank pit in the northwest corner of the site in 1998. The NCDEQ files indicated that a groundwater incident (#3708) was associated with this site and was closed out in 2003. NCDEQ files indicated benzene and volatile petroleum hydrocarbons (VPH) contamination were present onsite and attributed this contamination to an offsite source. Groundwater was measured at 11.1 and 13.2 feet depth below ground surface within the proposed easement in March 2003. A copy of selected portions of the site's March 2003 Limited Site Assessment report is attached as Appendix D.

## **3.0 SITE OBSERVATIONS**

During our February and March 2019 field work, the site was occupied by a convenience store/gas station (Figure 2). The ground in the study area was covered by asphalt pavement, concrete, and grass. There were 3 active USTs on the south side of the existing building but outside of the proposed easement. None of the existing monitoring wells were within the proposed easement.

## **4.0 METHODS**

ESP performed a geophysical study of the area designated by the NCDOT on February 19 and 27, 2019. We performed direct-push drilling and sampling of subsurface soils within the proposed ROW/easement on March 6, 2019. A photoionization detector (PID) was used to screen subsurface soils in the field and select soil samples to send for laboratory analysis. Groundwater was not encountered during the drilling investigation.

### **4.1 Geophysics**

ESP performed a metal detector study over the accessible areas of the study area using a Geonics EM61 MK2 with a line spacing of about three feet (Figures 3 and 4). Location control was provided

in real-time using a differential global positioning system (DGPS). We collected ground-penetrating radar (GPR) data over selected EM61 anomalies using our Sensors and Software Noggin 250 GPR system. The GPR data were collected using a line spacing of one to two feet.

## **4.2 Borings**

ESP performed direct-push drilling activities within the proposed ROW/easement of Parcel 6 using a subcontractor, SAEDACCO of Fort Mill, South Carolina. Four borings were drilled, designated B6-1 through B6-4 (Figure 7). The soil borings were advanced using a GeoProbe 7822DT drill rig. Soil samples were obtained to a depth of approximately 10 feet using two 5-foot long Macro Cores®. Soil cores varied in recovery from 3.4 to 5 feet. The sampling equipment was decontaminated prior to drilling and between borings by the driller using a Liquinox® detergent solution.

## **4.3 Soil Sample Protocol**

Representative soil samples were taken from the Macro-Core tubes at approximate one-foot intervals by the ESP field geologist while wearing nitrile disposable gloves. Each sample was placed in a sealed plastic bag and then kept in a warm area for 5 to 10 minutes prior to measuring volatile organic compound (VOC) levels in the head space with the PID. The soil samples had PID readings of less than 10 parts per million (ppm), except for the samples from Boring B6-2, which had readings ranging from 9.4 to 46.8 ppm (Table 1 and Appendix A).

Six soil samples were selected for laboratory analysis, as listed in Table 2. For each selected sample, an approximate 10-gram soil sample was collected from the Macro-Core tube using a Terra Core Sampler and placed into a laboratory-supplied 40-milliliter volatile organic analysis (VOA) vial containing methanol. Once sealed, the vial was labeled with the sample identification number and then shaken vigorously for about one minute. The samples were packed on ice and sent via overnight delivery to RED Lab, LLC (RED Lab), located in Wilmington, North Carolina, following proper chain-of-custody procedures (Appendix C).

RED Lab used a QED Hydrocarbon Analyzer to quantitatively analyze the soil samples using the ultraviolet fluorescence (UVF) method for benzene, toluene, ethylbenzene, and xylene (BTEX); gasoline range organics (GRO); diesel range organics (DRO); total petroleum hydrocarbons (TPH); total aromatics; polycyclic aromatic hydrocarbons (PAHs); and benzo(a)pyrene (BaP).

## **4.4 Groundwater**

Groundwater was not encountered in the four borings drilled on the site.

## **5.0 RESULTS**

### **5.1 Geophysics**

The EM61 early time gate data show the response from both shallow and deeper metallic objects (Figure 3). The differential response reduces the effect of shallow anomalies and emphasizes anomalies from larger and more deeply buried metallic objects, such as USTs (Figure 4). The EM61 differential responses corresponded to known site features, such as storm drains, buried utilities, and reinforced concrete. GPR data were collected over selected EM61 anomalies. The GPR data did not indicate the presence of unknown USTs within the study area.

The EM61 early time gate response and differential response are shown on the plan sheet on Figures 5 and 6, respectively.

### **5.2 Sample Data**

The soil sample UVF hydrocarbon analysis results for BTEX, GRO, DRO, and PAHs are presented in Table 2. The RED Lab laboratory report, which includes results for TPH, total aromatics, and BaP, is provided in Appendix B. Values are provided in milligrams per kilogram (mg/kg or ppm).

### **5.3 Sample Observations**

The results of the laboratory testing indicated that BTEX and GRO were below the laboratory detection limits for the 6 samples tested. DRO were detected above the NCDEQ action level of 100 ppm with a concentration of 159.3 ppm in sample B6-2 S1 and above laboratory detection limits in 4 of the 5 other samples. PAHs were detected in 5 out of 6 soil samples tested with values ranging from 0.002 to 2.0 ppm. BaP was below the NCDEQ Maximum Soil Contamination Concentration (MSCC ) for soil-to-water of 0.096 ppm.

## **6.0 CONCLUSIONS**

### **6.1 Interpretation of Results**

The results of the Phase II Investigation for Parcel 6 of NCDOT Project U-5809 indicate the presence of 3 active USTs outside of the proposed easement and no abandoned USTs within the proposed easement. Petroleum hydrocarbon soil contamination was detected above the NCDEQ action level for DRO of 100 ppm in Boring B6-2, Sample S1 from a depth of 1.0 to 1.5 feet below ground surface. The RED Lab report classified the contaminant in B6-2 S1 as bituminous road tar 96.2%, suggesting the contaminant may have come from relic road bed material.

### **6.2 Geophysics**

The geophysical data did not indicate the presence of abandoned USTs in the study area.

### 6.3 Soil

The results of the laboratory UVF hydrocarbon analyses indicate the presence of contaminated soil below the NCDEQ action levels for DRO of 100 ppm, except in one sample from Boring B6-2 (Figure 8). Petroleum hydrocarbon soil contamination was detected above the NCDEQ action level for DRO of 100 ppm in Boring B6-2, Sample S1 from a depth of 1.0 to 1.5 feet below ground surface within the proposed easement.

### 6.4 Estimated Quantities

Assuming a contaminated soil thickness of 3.0 feet and a radius of 10 feet, the volume of contaminated soil within the proposed permanent drainage/utility easement (DUE) in the vicinity of Boring B6-2 is estimated as follows:

$$\pi * R^2 * 3.0 = 942 \text{ cubic feet} = 35 \text{ cubic yards}$$

## 7.0 RECOMMENDATIONS

ESP recommends that the soil removed from the site as part of NCDOT construction activities in the upper 3.0 feet in the vicinity of Boring B6-2 be screened for petroleum hydrocarbon contamination, properly handled, segregated, and disposed of in accordance with NCDEQ regulations.

Groundwater was not encountered in the upper 10 feet in the study area. However, the 2003 LSA report (Appendix D) indicates that benzene contamination is present in the groundwater. If groundwater is encountered during construction, it should be handled and disposed of in accordance with NCDEQ regulations.

## 8.0 LIMITATIONS

ESP's professional services have been performed, findings obtained, and recommendations prepared in accordance with customary principles and practices in the fields of environmental science and engineering. ESP is not responsible for the independent conclusions, opinions, or recommendations made by others based on the data presented in this report.

The passage of time may result in a change in the environmental characteristics at this site and surrounding properties. ESP does not warrant against future operations or conditions, or against operations or conditions present of a type or at a location not investigated. ESP does not assume responsibility for other environmental issues that may be associated with the subject site.

## **TABLES**

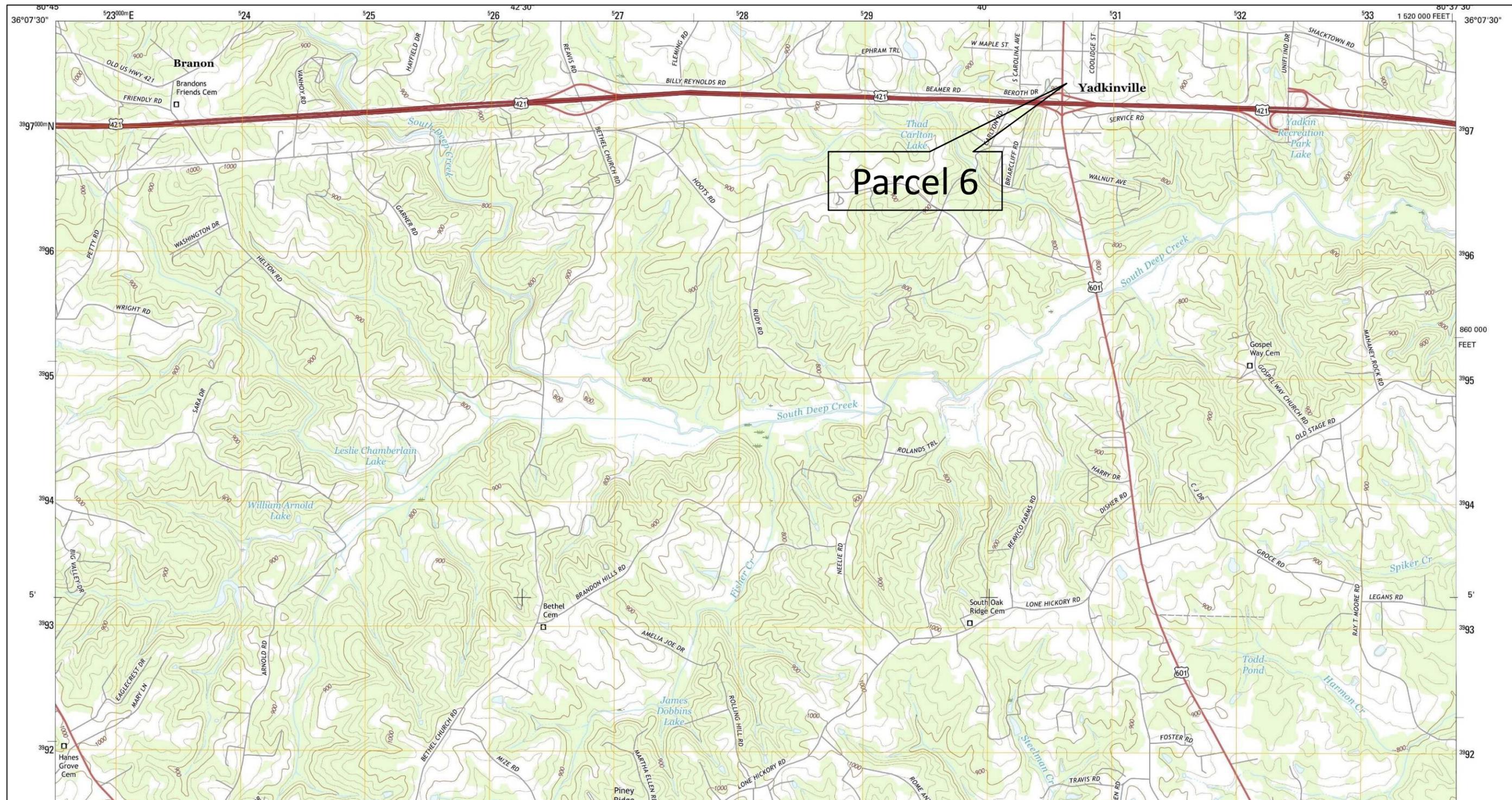
**TABLE 1**  
**SOIL SAMPLE PID READINGS**

<b>Boring</b>	<b>Sample Depth Range with PID &gt; 10 ppm (feet bgs)</b>	<b>Maximum PID Reading (ppm) and Sample Depth (feet bgs)</b>
B6-1	none	3.1 (3.0-3.5)
B6-2	1.0-1.5, 2.0-2.5, 5-5.0, 6.0-6.5, 8.0-8.5, 9.0-9.5	46.8 (9.0-9.5)
B6-3	none	4.4 (9.0-9.5)
B6-4	none	4.1 (7.0-7.5, 9.0-9.5)

**TABLE 2**  
**SOIL SAMPLE UVF RESULTS SUMMARY**

<b>Boring</b>	<b>Sample ID (depth in feet bgs)</b>	<b>Date Collected</b>	<b>BTEX (C6-C9) (mg/kg)</b>	<b>GRO (C5-C10) (mg/kg)</b>	<b>DRO (C10-C35) (mg/kg)</b>	<b>PAHs (mg/kg)</b>
B6-1	S3	3/5/19	<0.53	<0.53	10	0.13
B6-2	S1	3/5/19	<0.88	<0.88	<b>159.3</b>	2
B6-2	S5	3/5/19	<0.58	<0.58	2.2	0.03
B6-2	S9	3/5/19	<0.3	<0.3	0.87	0.02
B6-3	S3	3/5/19	<0.6	<0.6	0.07	0.002
B6-4	S7	3/5/19	<0.29	<0.29	<0.11	<0.006

## FIGURES



From: USGS US Topo 7.5 - minute map for LONE HICKORY, NC QUADRANGLE, NC, Date: 2016, Original Scale: 1:24,000

PROJECT NO.	GR22.309
SCALE	AS SHOWN
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BY	EDB

**FIGURE 1 - PARCEL 6, FAW, JC  
SITE VICINITY MAP**

**U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM  
US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS  
YADKIN COUNTY, NORTH CAROLINA**



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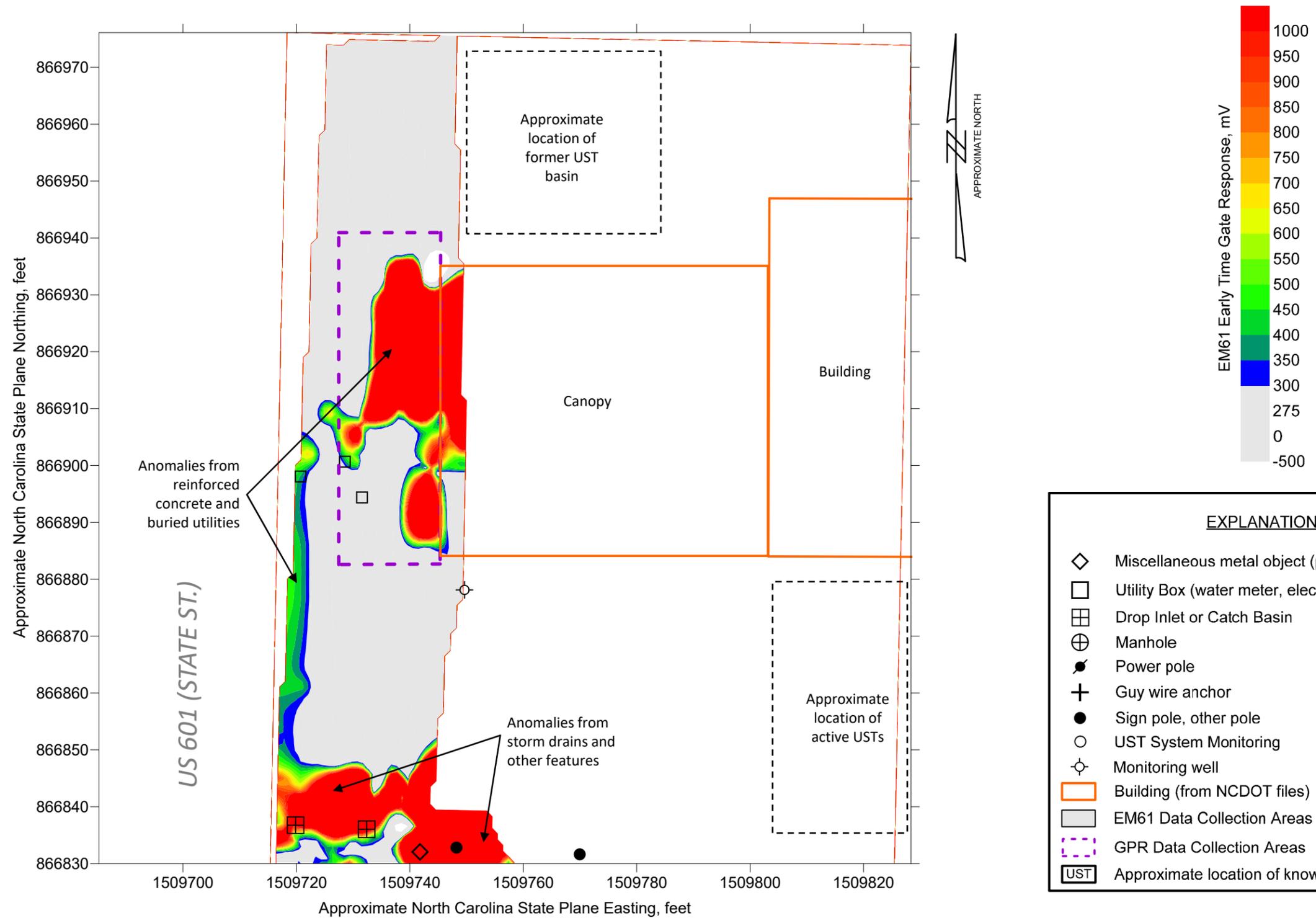


D. Photo of proposed easement area, looking north.



D. Photo of NCDOT easement markings on west side of western pump island.

PROJECT NO. GR22.309	<b>FIGURE 2 – PARCEL 6, FAW, JC SITE PHOTOGRAPHS</b>	<b>U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS YADKIN COUNTY, NORTH CAROLINA</b>	 ESP Associates, Inc. 7011 Albert Pick Rd., Suite E Greensboro, NC 27409 336.334.7724 www.espassociates.com
SCALE NTS			
DATE 4/11/19			
BY EDB			



EXPLANATION	
	Miscellaneous metal object (pipe, debris, etc.)
	Utility Box (water meter, electrical outlet, etc.)
	Drop Inlet or Catch Basin
	Manhole
	Power pole
	Guy wire anchor
	Sign pole, other pole
	UST System Monitoring
	Monitoring well
	Building (from NCDOT files)
	EM61 Data Collection Areas
	GPR Data Collection Areas
	Approximate location of known UST

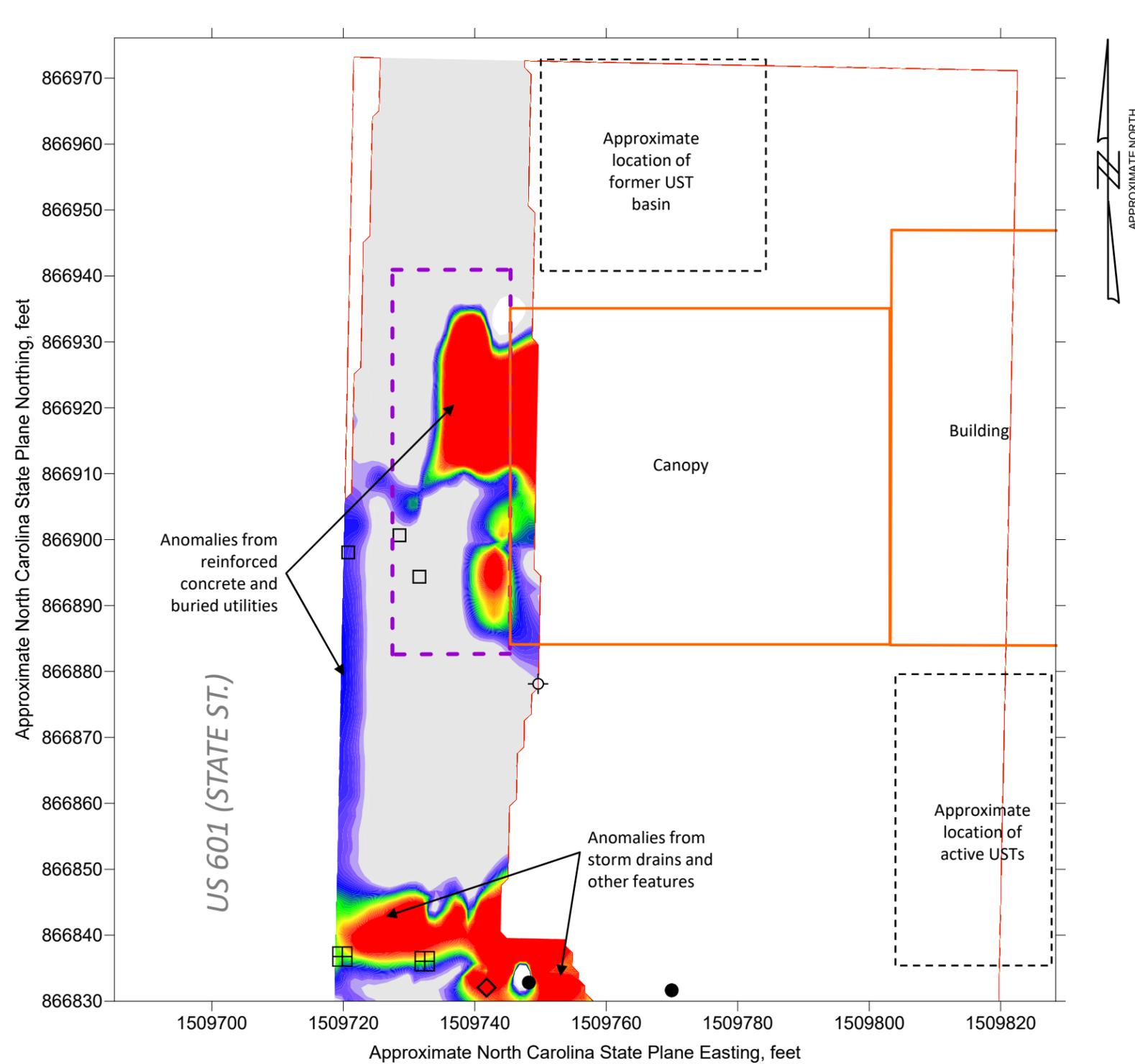
Note: Locations of data and features are approximate and were collected using a DGPS instrument. ESP makes no guarantees as to the accuracy of these locations. Coordinates on the axes of the maps are approximate and provided for general reference only.

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**FIGURE 3 - PARCEL 6, FAW, JC**  
**EM61 EARLY TIME GATE RESPONSE**  
**U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM**  
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EXPLANATION	
◇	Miscellaneous metal object (pipe, debris, etc.)
□	Utility Box (water meter, electrical outlet, etc.)
⊞	Drop Inlet or Catch Basin
⊕	Manhole
⚡	Power pole
+	Guy wire anchor
●	Sign pole, other pole
○	UST System Monitoring
⊙	Monitoring well
▭	Building (from NCDOT files)
▭	EM61 Data Collection Areas
▭	GPR Data Collection Areas
▭	Approximate location of known UST

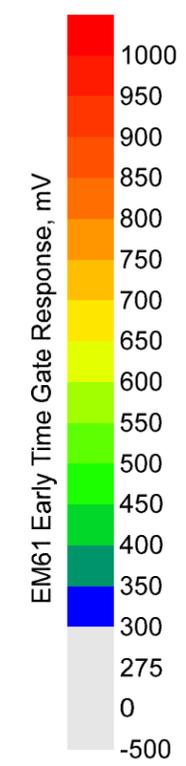
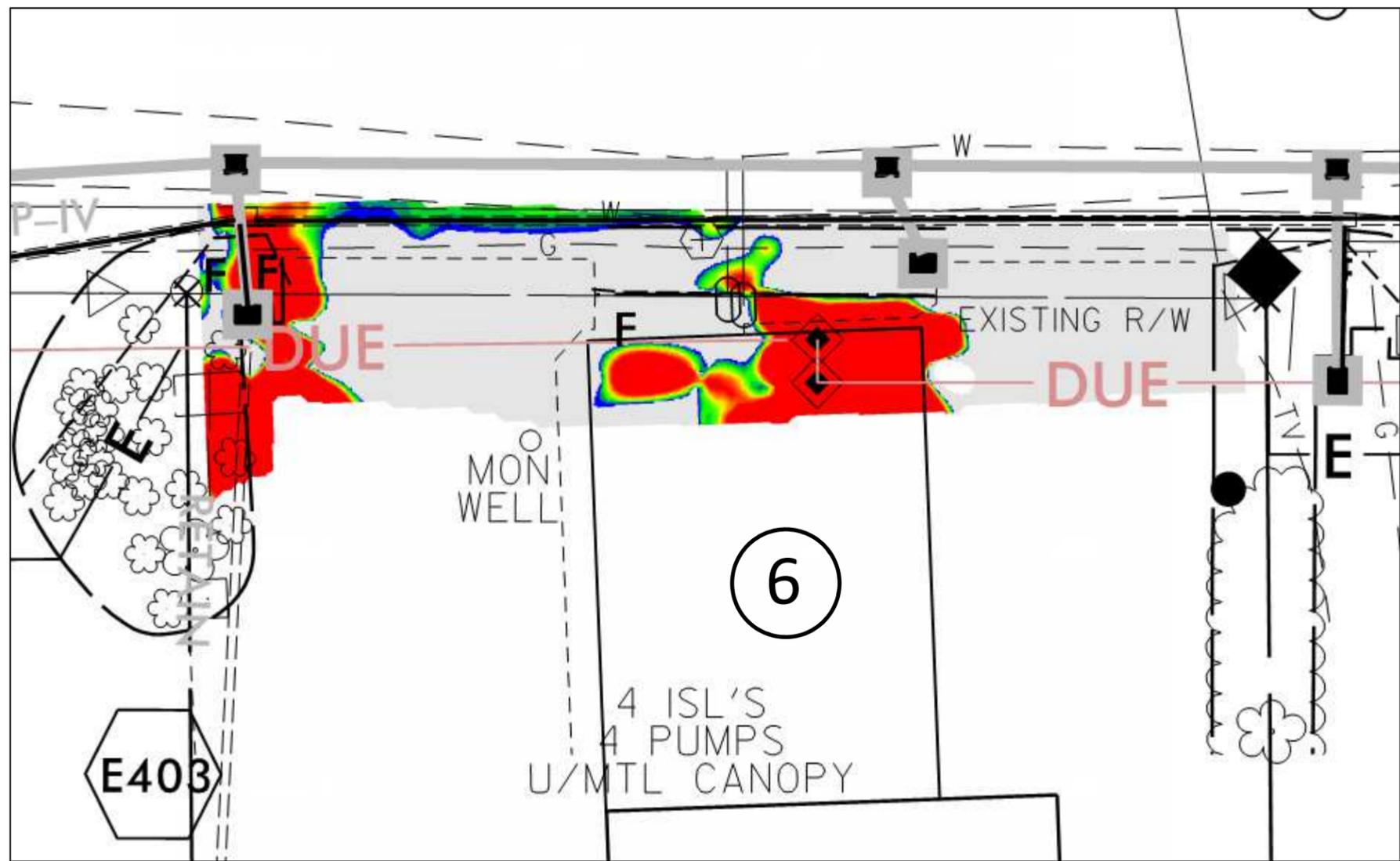
Note: Locations of data and features are approximate and were collected using a DGPS instrument. ESP makes no guarantees as to the accuracy of these locations. Coordinates on the axes of the maps are approximate and provided for general reference only.

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**FIGURE 4 - PARCEL 6, FAW, JC**  
**EM61 DIFFERENTIAL RESPONSE**  
**U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM**  
**US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS**  
**YADKIN COUNTY, NORTH CAROLINA**

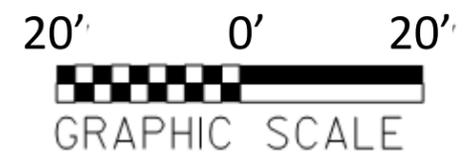


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List of NCDOT reference files

- U-5809\_Geo\_env\_ESP.dgn
- u5809\_ls\_fs.dgn
- U-5809\_hyd\_dm.dgn



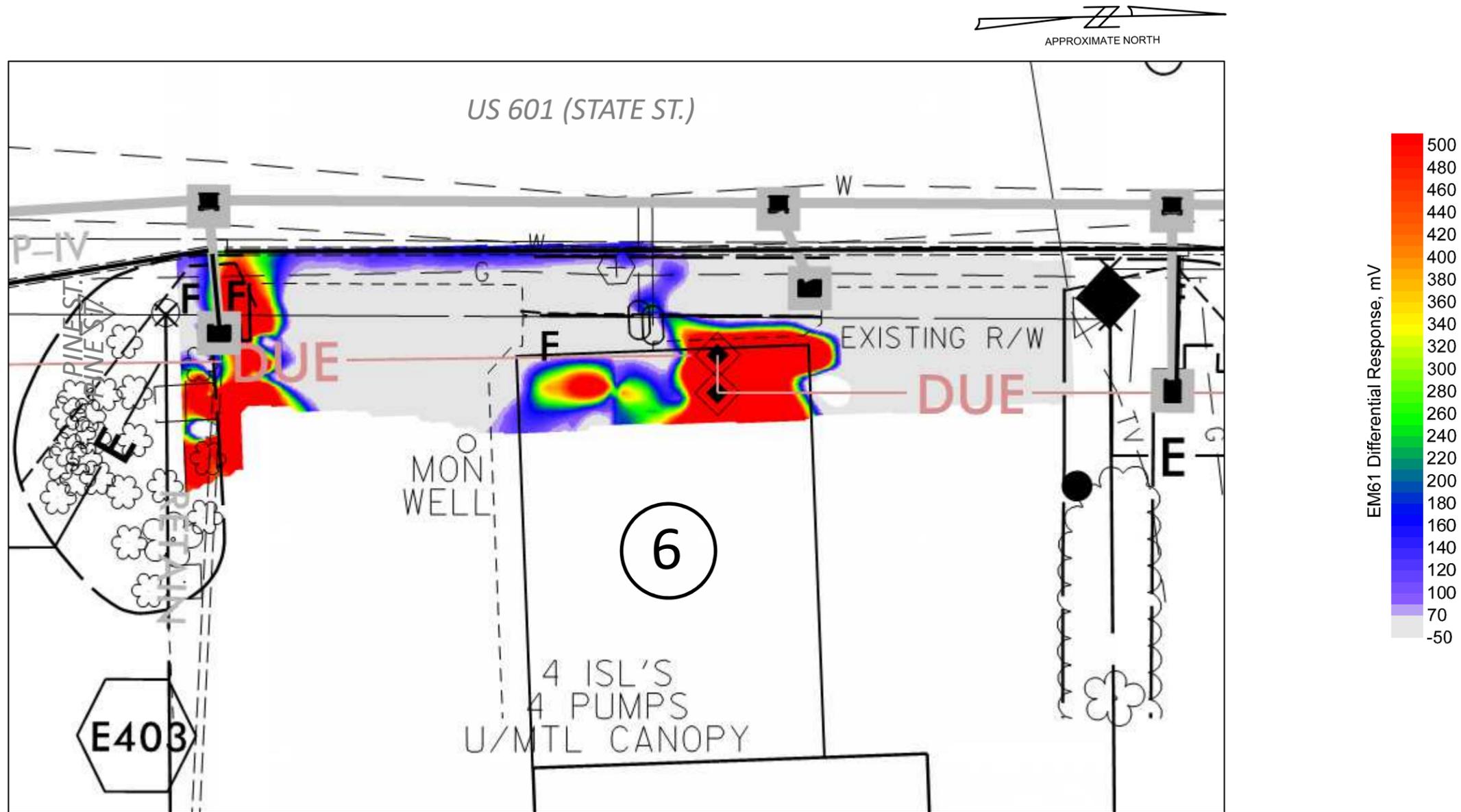
See Figure 9 for explanation of symbols and line types

PROJECT NO.	GR22.309
SCALE	1" = 20'
DATE	4/11/19
BY	EDB

**FIGURE 5 – PARCEL 6, FAW, JC**  
**EM61 EARLY TIME GATE RESPONSE ON PLAN SHEET**  
 U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS YADKIN COUNTY, NORTH CAROLINA



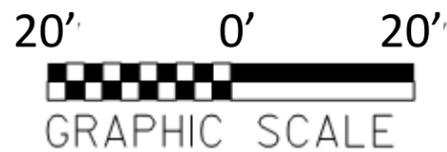
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List of NCDOT reference files

- U-5809\_Geo\_env\_ESP.dgn
- u5809\_ls\_fs.dgn
- U-5809\_hyd\_dm.dgn

See Figure 9 for explanation of symbols and line types

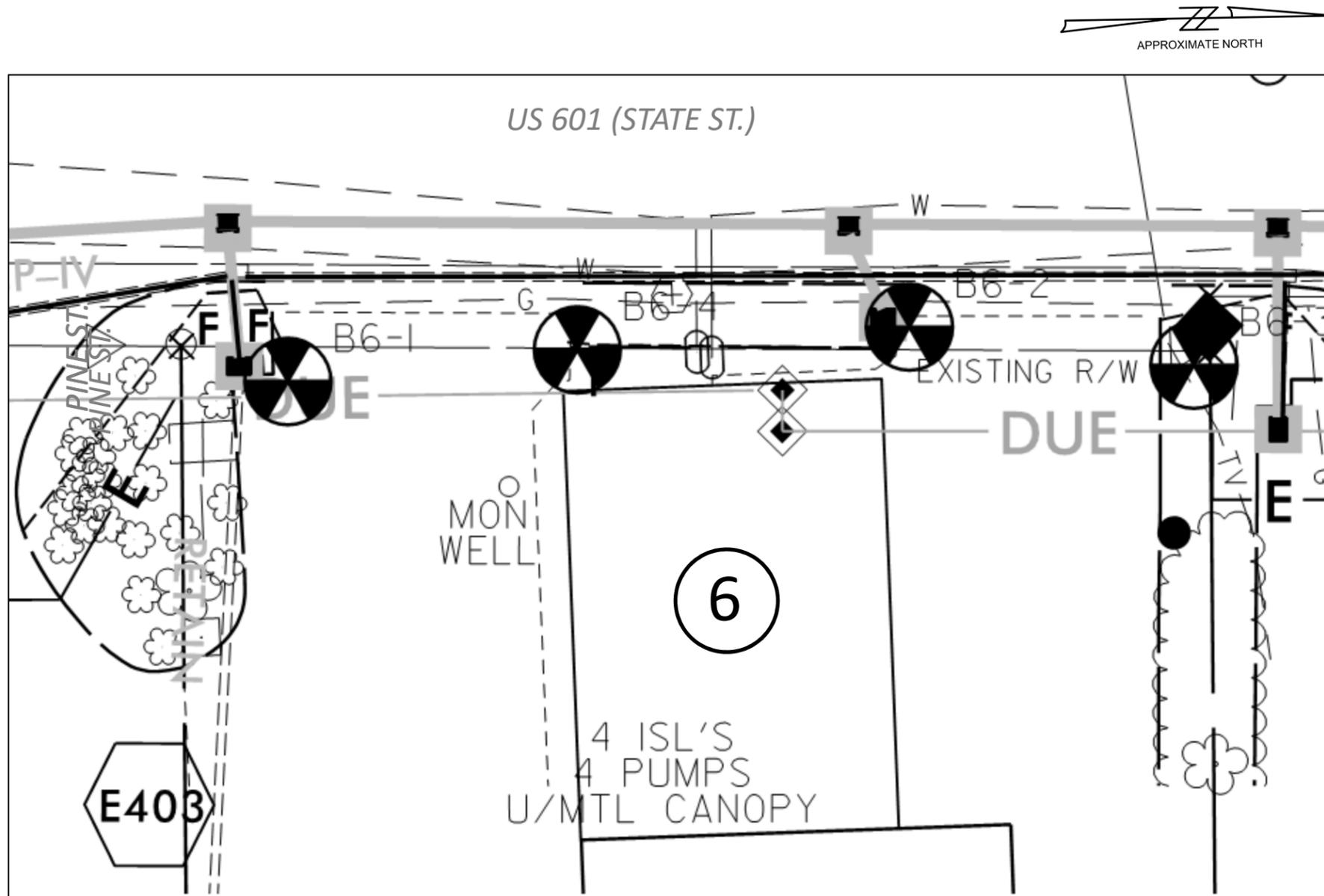


PROJECT NO.	GR22.309
SCALE	1" = 30'
DATE	4/11/19
BY	EDB

**FIGURE 6 – PARCEL 6, FAW, JC**  
**EM61 DIFFERENTIAL RESPONSE ON PLAN SHEET**  
 U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM  
 US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS  
 YADKIN COUNTY, NORTH CAROLINA



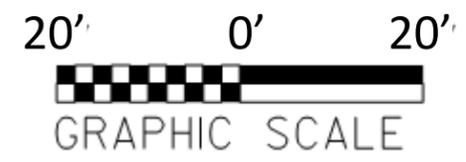
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List of NCDOT reference files

- U-5809\_Geo\_env\_ESP.dgn
- u5809\_ls\_fs.dgn
- U-5809\_hyd\_dm.dgn

See Figure 9 for explanation of symbols and line types

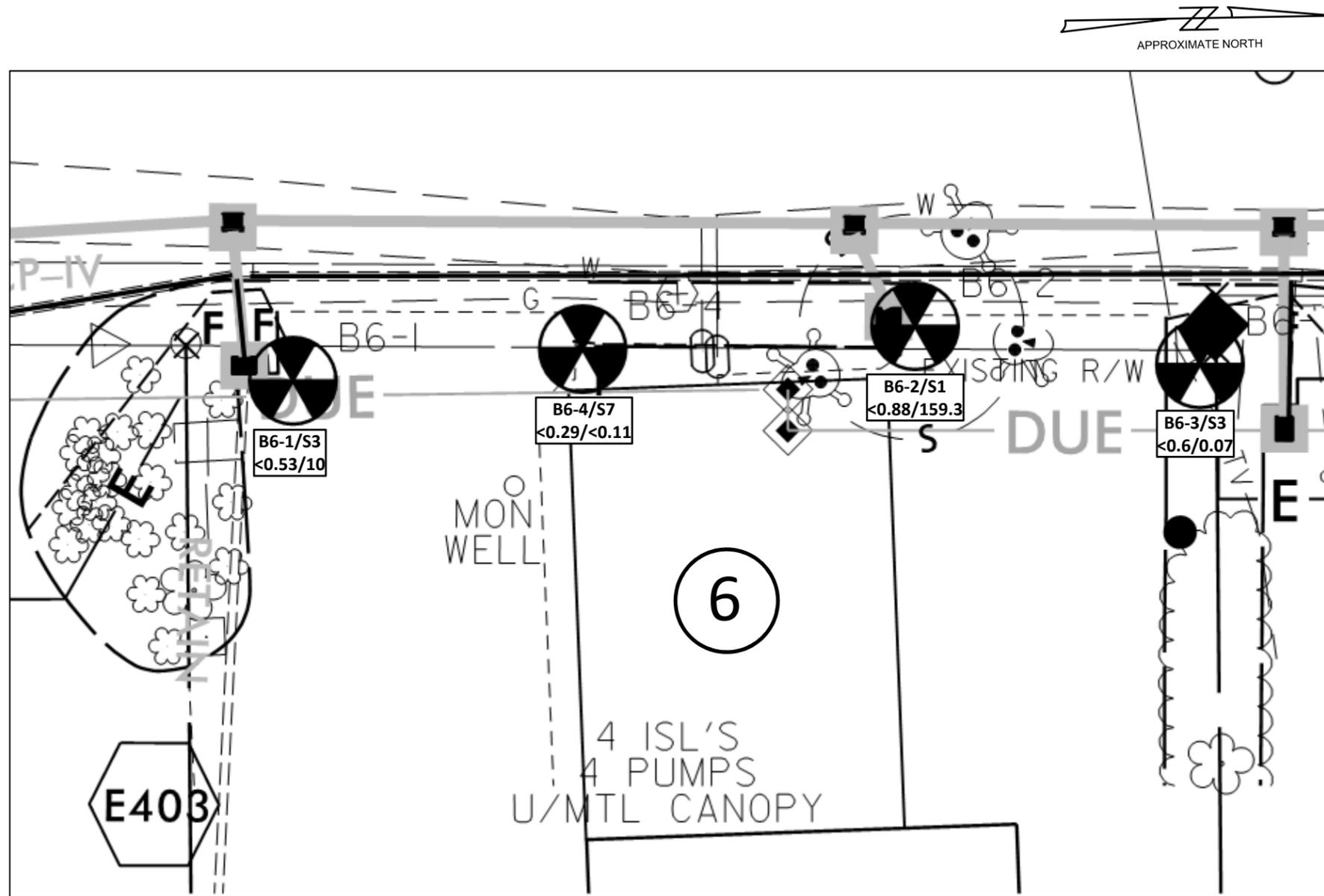


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SCALE	1" = 50'
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BY	EDB

**FIGURE 7 – PARCEL 6, FAW, JC**  
**BORING LOCATIONS ON PLAN SHEET**  
 U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM  
 US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS  
 YADKIN COUNTY, NORTH CAROLINA



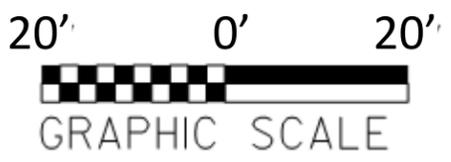
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Explanation	
<b>Maximum Analytical Results per Boring</b>	
<b>B6-1/S3</b>	<b>&lt;0.53/10</b>
	Boring No./Sample No.
	GRO/DRO (mg/kg, ppm)

List of NCDOT reference files

- U-5809\_Geo\_env\_ESP.dgn
- u5809\_ls\_fs.dgn
- U-5809\_hyd\_dm.dgn



See Figure 9 for explanation of symbols and line types

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SCALE	1" = 50'
DATE	4/11/19
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**FIGURE 8 – PARCEL 6, FAW, JC**  
**SOIL ANALYTICAL RESULTS ON PLAN SHEET**  
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# STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS CONVENTIONAL PLAN SHEET SYMBOLS

Note: Not to Scale \*S.U.E. = Subsurface Utility Engineering

## BOUNDARIES AND PROPERTY:

State Line	
County Line	
Township Line	
City Line	
Reservation Line	
Property Line	
Existing Iron Pin	
Property Corner	
Property Monument	
Parcel/Sequence Number	
Existing Fence Line	
Proposed Woven Wire Fence	
Proposed Chain Link Fence	
Proposed Barbed Wire Fence	
Existing Wetland Boundary	
Proposed Wetland Boundary	
Existing Endangered Animal Boundary	
Existing Endangered Plant Boundary	
Existing Historic Property Boundary	
Known Contamination Area: Soil	
Potential Contamination Area: Soil	
Known Contamination Area: Water	
Potential Contamination Area: Water	
Contaminated Site: Known or Potential	

## BUILDINGS AND OTHER CULTURE:

Gas Pump Vent or U/G Tank Cap	
Sign	
Well	
Small Mine	
Foundation	
Area Outline	
Cemetery	
Building	
School	
Church	
Dam	

## HYDROLOGY:

Stream or Body of Water	
Hydro, Pool or Reservoir	
Jurisdictional Stream	
Buffer Zone 1	
Buffer Zone 2	
Flow Arrow	
Disappearing Stream	
Spring	
Wetland	
Proposed Lateral, Tail, Head Ditch	
False Sump	

## RAILROADS:

Standard Gauge	
RR Signal Milepost	
Switch	
RR Abandoned	
RR Dismantled	

## RIGHT OF WAY:

Baseline Control Point	
Existing Right of Way Marker	
Existing Right of Way Line	
Proposed Right of Way Line	
Proposed Right of Way Line with Iron Pin and Cap Marker	
Proposed Right of Way Line with Concrete or Granite RW Marker	
Proposed Control of Access Line with Concrete CA Marker	
Existing Control of Access	
Proposed Control of Access	
Existing Easement Line	
Proposed Temporary Construction Easement	
Proposed Temporary Drainage Easement	
Proposed Permanent Drainage Easement	
Proposed Permanent Drainage / Utility Easement	
Proposed Permanent Utility Easement	
Proposed Temporary Utility Easement	
Proposed Aerial Utility Easement	
Proposed Permanent Easement with Iron Pin and Cap Marker	

## ROADS AND RELATED FEATURES:

Existing Edge of Pavement	
Existing Curb	
Proposed Slope Stakes Cut	
Proposed Slope Stakes Fill	
Proposed Curb Ramp	
Existing Metal Guardrail	
Proposed Guardrail	
Existing Cable Guiderail	
Proposed Cable Guiderail	
Equality Symbol	
Pavement Removal	

## VEGETATION:

Single Tree	
Single Shrub	
Hedge	
Woods Line	

Orchard	
Vineyard	

## EXISTING STRUCTURES:

MAJOR:	
Bridge, Tunnel or Box Culvert	
Bridge Wing Wall, Head Wall and End Wall	
MINOR:	
Head and End Wall	
Pipe Culvert	
Footbridge	
Drainage Box: Catch Basin, DI or JB	
Paved Ditch Gutter	
Storm Sewer Manhole	
Storm Sewer	

## UTILITIES:

POWER:	
Existing Power Pole	
Proposed Power Pole	
Existing Joint Use Pole	
Proposed Joint Use Pole	
Power Manhole	
Power Line Tower	
Power Transformer	
U/G Power Cable Hand Hole	
H-Frame Pole	
U/G Power Line LOS B (S.U.E.*)	
U/G Power Line LOS C (S.U.E.*)	
U/G Power Line LOS D (S.U.E.*)	

## TELEPHONE:

Existing Telephone Pole	
Proposed Telephone Pole	
Telephone Manhole	
Telephone Pedestal	
Telephone Cell Tower	
U/G Telephone Cable Hand Hole	
U/G Telephone Cable LOS B (S.U.E.*)	
U/G Telephone Cable LOS C (S.U.E.*)	
U/G Telephone Cable LOS D (S.U.E.*)	
U/G Telephone Conduit LOS B (S.U.E.*)	
U/G Telephone Conduit LOS C (S.U.E.*)	
U/G Telephone Conduit LOS D (S.U.E.*)	
U/G Fiber Optics Cable LOS B (S.U.E.*)	
U/G Fiber Optics Cable LOS C (S.U.E.*)	
U/G Fiber Optics Cable LOS D (S.U.E.*)	

## WATER:

Water Manhole	
Water Meter	
Water Valve	
Water Hydrant	
U/G Water Line LOS B (S.U.E.*)	
U/G Water Line LOS C (S.U.E.*)	
U/G Water Line LOS D (S.U.E.*)	
Above Ground Water Line	

## TV:

TV Pedestal	
TV Tower	
U/G TV Cable Hand Hole	
U/G TV Cable LOS B (S.U.E.*)	
U/G TV Cable LOS C (S.U.E.*)	
U/G TV Cable LOS D (S.U.E.*)	
U/G Fiber Optic Cable LOS B (S.U.E.*)	
U/G Fiber Optic Cable LOS C (S.U.E.*)	
U/G Fiber Optic Cable LOS D (S.U.E.*)	

## GAS:

Gas Valve	
Gas Meter	
U/G Gas Line LOS B (S.U.E.*)	
U/G Gas Line LOS C (S.U.E.*)	
U/G Gas Line LOS D (S.U.E.*)	
Above Ground Gas Line	

## SANITARY SEWER:

Sanitary Sewer Manhole	
Sanitary Sewer Cleanout	
U/G Sanitary Sewer Line	
Above Ground Sanitary Sewer	
SS Forced Main Line LOS B (S.U.E.*)	
SS Forced Main Line LOS C (S.U.E.*)	
SS Forced Main Line LOS D (S.U.E.*)	

## MISCELLANEOUS:

Utility Pole	
Utility Pole with Base	
Utility Located Object	
Utility Traffic Signal Box	
Utility Unknown U/G Line LOS B (S.U.E.*)	
U/G Tank; Water, Gas, Oil	
Underground Storage Tank, Approx. Loc.	
A/G Tank; Water, Gas, Oil	
Geoenvironmental Boring	
U/G Test Hole LOS A (S.U.E.*)	
Abandoned According to Utility Records	AATUR
End of Information	E.O.I.

PROJECT NO.	GR22.309
SCALE	N/A
DATE	4/11/19
BY	EDB

### FIGURE 9 – PARCEL 6, FAW, JC LEGEND FOR PLAN SHEET FIGURES

**U-5809, CONSTRUCT MEDIAN ALONG US 601 (STATE STREET) FROM  
US 421 TO SR 1146 (LEE AVENUE) AND ADD ROUNDABOUTS  
YADKIN COUNTY, NORTH CAROLINA**



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Greensboro, NC 27409  
336.334.7724  
www.espassociates.com

**APPENDIX A**  
**SOIL BORING LOGS**



# FIELD BORING LOG

BORING NO.

B6-1

PROJECT NAME: NCDOT U-5809 PSA PROJ. NO.: GR22.309  
 LOCATION: By storm drain, SW corner of parcel  
 TYPE OF BORING: Direct Push DATE STARTED: 3/6/19 SHEET: 1 of 1  
 DRILLING FIRM: SAEDACCO DATE FINISHED: 3/6/19 TOTAL DEPTH: 10.0 ft  
 DRILLER: Brian Ewing SAMPLE METHOD: 5' Macro Core DEPTH TO GW: N/A ft  
 DRILL RIG: Geoprobe 7822DT LOGGED BY: E. Billington COMMENT: \_\_\_\_\_

DEPTH (ft)	SAMPLE NO.	SAMPLE DEPTH (ft)	PID READING (ppm)	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
				0.0 -0.3, Black sand (asphalt)	Core 1 Rec 4.0'/5.0'
				0.3 - 7.4, Brown to orange brown sandy clay with clayey sand	
1	S-1	1.0-1.5	1.5		
2	S-2	2.0-2.5	2.7		
3	S-3	3.0-3.5	3.1		
4	S-4	4.0-4.5			
5	S-5	5.0-5.5	1.3		Core 2 Rec 4.2'/5.0'
6	S-6	6.0-6.5	1.6		
7	S-7	7.0-7.5	1.3		
				7.4 - 10.0, Molted grey, tan, and white sandy silt	
8	S-8	8.0-8.5	1.8		
9	S-9	9.0-9.5	2.0		
10					
11					
12					
13					
14					
15					



# FIELD BORING LOG

BORING NO.

B6-2

PROJECT NAME: NCDOT U-5809 PSA PROJ. NO.: GR22.309  
 LOCATION: By NW corner of canopy, edge of asphalt  
 TYPE OF BORING: Direct Push DATE STARTED: 3/6/19 SHEET: 1 of 1  
 DRILLING FIRM: SAEDACCO DATE FINISHED: 3/6/19 TOTAL DEPTH: 10.0 ft  
 DRILLER: Brian Ewing SAMPLE METHOD: 5' Macro Core DEPTH TO GW: N/A ft  
 DRILL RIG: Geoprobe 7822DT LOGGED BY: E. Billington COMMENT: \_\_\_\_\_

DEPTH (ft)	SAMPLE NO.	SAMPLE DEPTH (ft)	PID READING (ppm)	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
				0.0 -0.2, Asphalt	Core 1 Rec 3.4'/5.0'
				0.2 - 7.0, Very dark brown to dark brown clayey sand	
1	S-1	1.0-1.5	14.4		
2	S-2	2.0-2.5	10.7		
3	S-3	3.0-3.5	9.9		
4	S-4	4.0-4.5			
5	S-5	5.0-5.5	17.9		Core 2 Rec 5.0'/5.0'
6	S-6	6.0-6.5	11.2		
7	S-7	7.0-7.5	9.4	7.0 - 10.0, Greyish brown sandy silt	
8	S-8	8.0-8.5	13.9		
9	S-9	9.0-9.5	46.8		
10					
11					
12					
13					
14					
15					



# FIELD BORING LOG

BORING NO.

B6-3

PROJECT NAME: NCDOT U-5809 PSA PROJ. NO.: GR22.309  
 LOCATION: Grass strip, NW corner of parcel  
 TYPE OF BORING: Direct Push DATE STARTED: 3/6/19  
 DRILLING FIRM: SAEDACCO DATE FINISHED: 3/6/19  
 DRILLER: Brian Ewing SAMPLE METHOD: 5' Macro Core  
 DRILL RIG: Geoprobe 7822DT LOGGED BY: E. Billington

SHEET: 1 of 1  
 TOTAL DEPTH: 10.0 ft  
 DEPTH TO GW: N/A ft  
 COMMENT: \_\_\_\_\_

DEPTH (ft)	SAMPLE NO.	SAMPLE DEPTH (ft)	PID READING (ppm)	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
				0.0 -0.1, Root mat	Core 1 Rec 3.4'/5.0'
				0.1 - 2.6, Reddish-brown to brown sandy clay with seams of clayey sand	
1	S-1	1.0-1.5	1.8		
2	S-2	2.0-2.5	1.9		
				2.6 - 10.0, Molted brown, tan and white sandy silt	
3	S-3	3.0-3.5	2.7		
4	S-4	4.0-4.5			
5	S-5	5.0-5.5	3.9		Core 2 Rec 5.0'/5.0'
6	S-6	6.0-6.5	2.1		
7	S-7	7.0-7.5	2.3		
8	S-8	8.0-8.5	2.7		
9	S-9	9.0-9.5	4.4		
10					
11					
12					
13					
14					
15					



# FIELD BORING LOG

BORING NO.

B6-4

PROJECT NAME: NCDOT U-5809 PSA PROJ. NO.: GR22.309  
 LOCATION: SW corner of canopy, edge of asphalt  
 TYPE OF BORING: Direct Push DATE STARTED: 3/6/19  
 DRILLING FIRM: SAEDACCO DATE FINISHED: 3/6/19  
 DRILLER: Brian Ewing SAMPLE METHOD: 5' Macro Core  
 DRILL RIG: Geoprobe 7822DT LOGGED BY: E. Billington

SHEET: 1 of 1  
 TOTAL DEPTH: 10.0 ft  
 DEPTH TO GW: N/A ft  
 COMMENT: \_\_\_\_\_

DEPTH (ft)	SAMPLE NO.	SAMPLE DEPTH (ft)	PID READING (ppm)	FIELD CLASSIFICATION AND PHYSICAL DESCRIPTION	REMARKS
				0.0 -0.2, Black gravelly sand (asphalt)	Core 1 Rec 5.0'/5.0'
				0.2 - 1.7, Dark brown clayey sand	
1	S-1	1.0-1.5	1.4		
				1.7 - 7.1, Medium brown sandy clay	
2	S-2	2.0-2.5	1.3		
3	S-3	3.0-3.5	0.9		
4	S-4	4.0-4.5	1.0		
5	S-5	5.0-5.5	2.0		Core 2 Rec 5.0'/5.0'
6	S-6	6.0-6.5	1.8		
7	S-7	7.0-7.5	4.1	7.1 -9.2, Light brown to grey-brown clayey sand	
8	S-8	8.0-8.5	2.4		
9	S-9	9.0-9.5	4.1	9.2 - 10.0, Mottled grey and brown sandy silt	
10					
11					
12					
13					
14					
15					

**APPENDIX B**

**RED LAB LABORATORY TESTING REPORT**

**Hydrocarbon Analysis Results**

**Client:** ESP ASSOCIATES INC.  
**Address:** 7011 ALBERT PICK ROAD SUITE E  
 GREENSBORO, NC 27409

**Samples taken** Wednesday, March 6, 2019  
**Samples extracted** Wednesday, March 6, 2019  
**Samples analysed** Tuesday, March 12, 2019

**Contact:** NED BILLINGTON

**Operator** CAROLINE STEVENS

**Project:** GR22.309

U00902

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	
Soil	B6-1 S3	21.1	<0.53	<0.53	10	10	4.6	0.13	0.001	0	91.1	8.9	Bit.Road Tar 95.2%,(FCM)
Soil	B6-2 S5	23.0	<0.58	<0.58	2.2	2.2	0.87	0.03	<0.00	0	96.1	3.9	V.Deg.Diesel 53.9%,(FCM)
Soil	B6-2 S9	12.0	<0.3	<0.3	0.87	0.87	0.2	0.02	<0.004	0	99.4	0.6	Deg.Fuel 47.2%,(FCM)
Soil	B6-2 S1	35.3	<0.88	<0.88	159.3	159.3	74.9	2	0.009	0	94.5	5.5	Bit.Road Tar 96.2%,(FCM)
Soil	B6-3 S3	24.1	<0.6	<0.6	0.07	0.07	0.07	0.002	<0.007	0	64.1	35.9	Residual HC,(P)
Soil	B6-4 S7	11.5	<0.29	<0.29	<0.11	<0.29	<0.006	<0.006	<0.003	0	0	0	PHC ND,(FCM)

Initial Calibrator QC check **OK**

Final FCM QC Check **OK** 95.8%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

**APPENDIX C**  
**CHAIN-OF-CUSTODY FORM**

Client Name: ESP Associates, Inc.  
 Address: 7011 Albert Pick Rd, Suite E  
Greensboro, NC 27409  
 Contact: Ned Billington  
 Contact Ref.: GR22.309  
 Email: nbillington@espassociates.com  
 Phone #: 336-420-5452  
 Collected by: same

# RED LAB™

**RAPID ENVIRONMENTAL DIAGNOSTICS**  
**CHAIN OF CUSTODY AND ANALYTICAL**  
**REQUEST FORM**

RED Lab, LLC  
 5598 Marvin K Moss Lane  
 MARBIONC Bldg, Suite 2003  
 Wilmington, NC 28409

Each sample will be analyzed for  
 BTEX, GRO, DRO, TPH, PAH total  
 aromatics and BaP

Sample Collection Date/Time	TAT Requested		Initials	Sample ID	Total Wt.	Tare Wt.	Sample Wt.
	24 Hour	48 Hour					
3/5/19			EDB	B2-1, S2	54.2	44.1	10.1
3/5/19				B2-1, S7	55.4	44.3	11.1
3/5/19				B2-2, S8	57.2	44.3	12.9
3/5/19				B2-3, S5	57.2	43.7	13.5
3/5/19				B2-4, S1	55.0	44.0	11.0
3/5/19				B2-5, S4	54.8	43.8	11.0
3/5/19				B2-5, S9	55.8	44.1	11.7
3/5/19				B2-6, S3	55.4	43.9	11.5
3/5/19				B2-7, S3	54.7	43.9	10.8
3/5/19				B5-1, S6	55.5	44.2	11.3
3/6/19				B5-2, S3	55.2	44.8	10.4
3/6/19				B5-3, S7	58.2	46.2	12.0
3/6/19				B5-4, S9	56.3	46.0	10.3
3/6/19				B6-1, S3	56.7	44.4	12.3
3/6/19				B6-2, S5	55.5	44.2	11.3
3/6/19				B6-2, S9	56.5	44.9	11.6
3/6/19				B6-4, S7	56.6	44.4	12.2
3/6/19				B6-3, S3	55.2	44.4	10.8
3/6/19				B6-2, S1	56.2	44.3	11.9

Comments: \_\_\_\_\_

Relinquished by	Date/Time	Accepted by	Date/Time
<u>[Signature]</u>	<u>3/11/19</u>	<u>[Signature]</u>	<u>3/12/19 12p</u>
Relinquished by	Date/Time	Accepted by	Date/Time

**RED Lab USE ONLY**

19

**APPENDIX D**  
**MARCH 2003 PHASE II LSA REPORT (SELECTED PORTIONS)**

RECEIVED  
N.C. Dept. of ENR

MAR 27 2003

Winston-Salem  
Regional Office

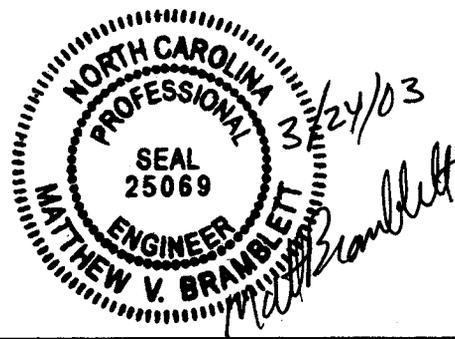
**Phase II Limited Site Assessment  
Former Pantry Store  
801 S. State Street  
Yadkinville, North Carolina**

**H&H Job No. YOC-003**

**March 25, 2003**



Hart & Hickman, PC  
501 Minuet Lane  
Suite 101  
Charlotte, NC 28217  
704.586.0007  
Fax 704.586.0373



## Phase II Limited Site Assessment Information

### Site Location:

Former Pantry Store  
801 S. State Street. (Hwy. 601)  
Yadkinville, North Carolina

### Site Owner:

Williams Family Partnership  
c/o Faw-Responsible Party  
P.O. Box 410  
Wilkesboro, NC 28697

### UST Owner & Operator:

YOCO, Inc.  
P.O. Box 78  
White Plains, North Carolina 27031  
(336) 789-5561

### General Site Information:

Facility ID Number: Not Available  
NC DENR Incident Number: 3708  
Site Priority Ranking: Not Assigned  
Land Use Category: Not Assigned  
Latitude/Longitude: N36° 07.225' W80° 39.607'  
Release Discovery Date: July 1988  
Estimated Quantity of Release: Unknown  
Cause/Source of Release: UST System  
Subject UST Information: Two Former 10,000-Gallon Gasoline USTs

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**Phase II Limited Site Assessment  
Former Pantry Store  
801 S. State Street (Hwy. 601)  
Yadkinville, North Carolina**

**H&H Job No. YOC-003**

**1.0 Executive Summary**

Hart & Hickman, PC (H&H) has completed a Phase II Limited Site Assessment (LSA) at the former Pantry store located at 801 S. State Street (Hwy. 601) in Yadkinville, Yadkin County, North Carolina. The property is currently occupied by Texaco Fast Track, a gas station/convenience store. This Phase II LSA addresses impacts related to a former underground storage tank (UST) basin, which contained two 10,000-gallon gasoline USTs. The subject USTs were removed by others on July 10, 1988. This report was prepared on behalf of YOCO, Inc.

Soil excavation activities were conducted following UST removal in 1988. The excavation was extended to the water table. The total amount of soil removed was reported to be approximately 100 cubic yards. Following the soil removal, gasoline-range total petroleum hydrocarbons (TPH; 1,200 mg/kg) were detected in soil near the water table beneath the former excavation.

Following the detection of TPH near the water table, three monitoring wells were installed and sampled. Ground water samples collected from two monitoring wells in 1989 indicated the presence of benzene at concentrations up to 1,230  $\mu\text{g/l}$  in source area monitoring well MW-1 and up to 631  $\mu\text{g/l}$  in downgradient monitoring well MW-2. Both of these concentrations exceed the North Carolina ground water standard of 1  $\mu\text{g/l}$  for benzene. Benzene was not detected in the ground water sample collected from "auger hole #1" (AH #1), which was situated cross-gradient of the former UST basin.

In response to the above information, the North Carolina Department of Environment and Natural Resources (DENR) issued a Notice of Regulatory Requirements (NORR) letter dated November 27, 2002. The NORR requested that it be demonstrated that impacted soils were removed to applicable

standards at the time of tank closure or that a LSA be completed. Because soil impacts were detected following tank closure excavation activities, H&H conducted a LSA.

In January 2003, H&H conducted Phase I LSA soil sampling, collected a ground water sample from existing monitoring well MW-1, and performed the land use and receptor survey. Benzene was detected in the ground water sample from MW-1 at a concentration of 44 µg/l. Since this benzene concentration exceeds the ground water standard for benzene by a factor of ten, H&H proceeded with a Phase II LSA in March 2003 in accordance with DENR guidelines.

### **Land Use/Risk Characterization**

As part of the LSA, H&H performed a land use and risk characterization survey. The site is located in a heavily commercialized corridor along S. State Street (Hwy 601) in the Town of Yadkinville. The property is used for a gas station/convenience store, and the site is zoned Highway Business. Based on the site zoning and use, the site appears to qualify for a commercial land use classification.

No active water supply wells were identified within 1,500 ft of the subject site. Municipal water is available to the site and surrounding areas. No surface water bodies were identified within 500 ft of the site. Ground water analytical results indicate that constituent concentrations are below DENR-defined Gross Contamination Levels (GCLs). Based on the above information, the site appears to qualify for a low risk classification.

### **LSA Results**

#### Soil Results

One soil boring (DPT-1) was advanced in the former UST basin to confirm the area where soil was previously removed to the water table. The soils encountered appeared to be backfill from the previous excavation. Therefore, an additional soil boring (DPT-2) was advanced adjacent to the former UST basin. Soil samples were collected in 5 ft intervals from boring DPT-2 above the water table and submitted for laboratory analyses for volatile organic compounds (VOCs), including isopropyl ether (IPE) and methyl tert-butyl ether (MTBE), and volatile petroleum hydrocarbons (VPH) by the Massachusetts Department of Environmental Protection (MADEP) Method. Soil

impacts were not detected above soil to ground water, residential, or commercial Maximum Soil Contaminant Concentrations (MSCCs).

### Ground Water Results

Ground water samples were collected from four permanent shallow monitoring wells and one deeper monitoring well. The shallow wells included MW-1 (source area), MW-3 (upgradient), and MW-2 and MW-4 (both downgradient). Target compounds were detected above North Carolina standards in each of the wells sampled. Target ground water constituent concentrations do not exceed GCLs. Data from the off-site upgradient monitoring well MW-3 and on-site deeper well MW-1D indicate that an off-site source is impacting the site. Off-site gas stations are located cross-gradient and cross-gradient to upgradient of the site.

### **Recommendations**

Based on the data collected, the site appears to qualify as a low risk commercial site. No soil impacts exceed MSCCs. Although ground water is impacted above ground water standards, impacts do not exceed GCLs, and ground water at the site has been impacted by an off-site source. No ground water remediation is required at low risk sites. As such, H&H recommends that DENR issue a risk-based no further action letter for the site.

## 2.0 Introduction and Site History

This Phase II LSA report documents assessment activities related to a previous release detected at a former gasoline UST basin at the former Pantry store located at 801 S. State Street (Hwy. 601) in Yadkinville, Yadkin County, North Carolina (Figure 1). The property is currently occupied by Texaco Fast Track, a gas station/convenience store. This Phase II LSA addresses impacts related to a former UST basin, which contained two 10,000-gallon gasoline USTs that were removed by others on July 10, 1988. This report was prepared on behalf of YOCO, Inc.

Soil excavation activities were conducted following UST removal in 1988. The excavation was extended to the water table. The total amount of soil removed was reported to be approximately 100 cubic yards. Following soil removal, gasoline-range TPH (1,200 mg/kg) were detected in soil near the water table beneath the former excavation.

Following the detection of TPH near the water table, three monitoring wells were installed and sampled. Ground water samples collected from two monitoring wells in 1989 indicated the presence of benzene at concentrations up to 1,230  $\mu\text{g/l}$  in source area monitoring well MW-1 and up to 631  $\mu\text{g/l}$  in downgradient monitoring well MW-2. Both of these concentrations exceed the North Carolina ground water standard of 1  $\mu\text{g/l}$  for benzene. Benzene was not detected in the ground water sample collected from AH #1, which was situated cross-gradient of the former UST basin. Monitoring wells MW-1 and MW-2 remain at the site, but AH#1 was not located.

In response to the above information, DENR issued a NORR letter dated November 27, 2002. The NORR requested that it be demonstrated that impacted soils were removed to applicable standards at the time of tank closure or that a LSA be completed. Because soil impacts were detected following tank closure excavation activities, H&H conducted a LSA.

### **3.0 Receptor Information and Risk Characterization**

A LSA Risk Classification and Land Use Form are provided in Appendix A. A discussion of potential receptors and land use is provided below.

#### **3.1 Receptor Information**

##### **3.1.1 Water Supply Survey**

H&H conducted a water supply well survey for the area within a 1,500-ft radius of the former UST basin. The survey was conducted by performing drive-by reconnaissance, contacting the Town of Yadkinville concerning municipal water availability, and door-to-door interviews with available property owners located within the survey area.

No active water supply wells were identified within 1,500 ft of the subject site. However, six out-of-service water supply wells were identified within 1,500 ft of the site (Figure 2). The Town of Yadkinville supplies water to all properties within the town limits, which includes the site and surrounding area. H&H observed evidence of municipal water availability (i.e., water meters and fire hydrants) in the entire survey area. According to Town of Yadkinville water department personnel, no water supply wells are to be used for any reason within the town limits, and municipal water must be used. Home owners/occupants in the area where water supply wells were observed confirmed that municipal water is used and that the observed water supply wells are not in service.

##### **3.1.2 Surface Water**

No surface water bodies were observed within 500 ft of the site. A pond is shown on the USGS topographic map of the site area approximately 500 ft west of the site; however, no pond was observed during site reconnaissance. Therefore, this pond was likely drained and/or filled.

### **3.1.3 Subsurface Structures**

Visual observations were made for potential subsurface conduits in the vicinity of the former UST basin area. No subsurface conduits were observed in the area of the former UST basin.

### **3.1.4 Municipal Water Source**

According to the Town of Yadkinville water department, the source of the Town of Yadkinville water is South Deep Creek which is located approximately 1 mile south of the site.

### **3.1.5 Property Owners and Land Use**

The site is located in a heavily commercialized corridor along S. State Street (Hwy 601) in the Town of Yadkinville. The property is used for a gas station/convenience store. Access to the site is not restricted; however, the area of the former UST basin is covered with an asphalt surface. According to the Yadkin County Tax Assessors office, the subject property is owned by the Williams Family Partnership.

The site and adjacent properties located to the north, south and west are zoned Highway Business. The properties located to the east of the site are zoned Residential (Figure 2). The closest house to the subject site is located approximately 350 ft to the east. Contiguous property owners and property uses are provided in Table 1.

## **3.2 Risk and Land Use Characterization**

The site is located in a heavily commercialized corridor along S. State Street (Hwy 601) in the Town of Yadkinville. The property is used for a gas station/convenience store, and the site is zoned Highway Business. Based on the site zoning and use, the site appears to qualify for a commercial land use classification.

No active water supply wells were identified within 1,500 ft of the subject site. Municipal water is available to the site and surrounding areas, and the Town of Yadkinville prohibits the use of water supply wells within the town limits. No surface water bodies were identified within 500 ft of the site. Ground water analytical results indicate that constituent concentrations are below GCLs (See Section 5.0). Based on the above information, the site appears to qualify for a low risk classification.

## 4.0 Geology and Hydrogeology

### 4.1 Regional Geology and Hydrogeology

According to the North Carolina Geological Survey 1985 Geologic Map of North Carolina, the site lies within the southern edge of the Sauratown Mountain Anticlinorium. The underlying bedrock of the Sauratown Mountain Anticlinorium is described as metagraywacke of Cambrian to Late Pre-Cambrian age containing quartz and microcline porphyroblasts.

In the site area, the bedrock is generally overlain by a mantle of weathered rock termed saprolite or residuum. The saprolite consists of unconsolidated clay, silt, and sand with lesser amounts of rock fragments. Due to the range of parent rock types and their variable susceptibility to weathering, the saprolite ranges widely in color, texture and thickness. Generally, the saprolite is thickest near interstream divides and thins toward streambeds. In profile, the saprolite normally grades from clayey soils near the land surface to highly weathered rock above competent bedrock.

The occurrence and movement of ground water is typically within two separate but interconnected water-bearing zones. A shallow water-bearing zone occurs within the saprolite, and a deeper water-bearing zone occurs within the underlying bedrock.

Ground water in the shallow saprolite zone occurs in the interstitial pore spaces between the grains comprising the saprolite soils. Ground water in this zone is typically under water table or unconfined conditions. Ground water movement is generally lateral from recharge areas to small streams that serve as localized discharge points.

Secondary joints, fractures, faults, and dikes within the bedrock control the occurrence and movement of ground water in the underlying water-bearing zone within the crystalline bedrock. On a regional scale, the direction of ground water flow is typically from uplands to major streams and ground water sinks. The saprolite has a higher porosity than the bedrock and serves as a reservoir that supplies water to a network of fractures in the bedrock.

## 4.2 Site Geology

As part of the LSA, H&H installed two soil borings (DPT-1 and DPT-2) by direct push technology (DPT) and three additional monitoring wells (MW-3, MW-4, and MW-1D). Soils observed during the advancement of the soil borings were primarily silty clay fill with some sandy silt lenses or layers. Soil cuttings from monitoring wells on the subject property generally consisted of clayey silt and silty clay underlain by sandy to clayey silts. Soils encountered in the boring for MW-3 located on the adjacent Burger King property consisted of sandy silts. Bedrock was encountered in the deep monitoring well boring at a depth of approximately 53 ft below grade. Boring logs and well construction records are provided in Appendix B.

## 4.3 Site Hydrogeology

H&H surveyed the top of casing (TOC) elevation for each of the monitoring wells using an arbitrary fixed reference point. Depth to water measurements from TOC were then collected for each well, and the corresponding water surface elevations were calculated. On March 9, 2003 the depth to ground water ranged from 11.65 ft below TOC in deep monitoring well MW-1D to 15.18 ft below TOC in MW-3 (Table 2).

Based on March 2003 ground water elevations, a shallow ground water potentiometric map was constructed (Figure 4). As shown in the figure, the flow direction is generally to the south. This flow direction is consistent with previous ground water flow information collected by others and with the surface topography of the area. Based on the higher ground water elevation in deep well MW-1D as compared to shallow ground water elevations in the area, there appears to be an upward hydraulic gradient in the area of the former UST basin.

## 5.0 Sampling Results

### 5.1 Sample Collection

On January 19, 2003 H&H installed two soil borings (DPT-1 and DPT-2) using a direct push technology (DPT) rig (Figure 3). During boring advancement, soil samples were collected using a DPT sampler equipped with dedicated liners. DPT-1 was installed in the approximate center of the former UST basin to confirm the previous removal of impacted soil. This boring was advanced to a depth of 15 ft below grade. The soils encountered in boring DPT-1 appeared to be composed of fill soils to a depth of 14 ft where the water table was encountered. Because this soil boring confirmed that soil was previously removed to the water table, no soil samples were collected for laboratory analyses from this boring.

DPT-2 was installed immediately adjacent to the former UST basin excavation area. Soil samples from DPT-2 also indicated the presence of fill soils; however, the soils were much more compact than soil encountered in DPT-1 in the former UST excavation. DPT-2 was advanced to approximately 15 ft below grade. In accordance with DENR guidance, soil samples were collected at approximate 5 ft intervals above the water table surface. Therefore, two soil samples were collected at depth intervals of 2.5 to 5 ft and 7.5 to 10 ft below grade. The samples were submitted to Test America, Inc., a North Carolina certified laboratory, for analyses of VOCs (including IPE and MTBE) by EPA Method 8260B and VPH by the MADEP Method.

A ground water sample was collected from existing source area monitoring well MW-1 in January 2003 and analyzed for VOCs (including IPE, MTBE and ethylene dibromide [EDB]) by EPA Method 6210D, VPH by the MADEP Method, and total lead by EPA Method 6010B using 3030C preparation. Prior to sample collection, the monitoring well was purged using a disposable polyethylene bailer until pH, conductivity, and temperature stabilized.

Based on ground water impacts detected in MW-1 more than 10 times ground water standards, H&H sampled existing well MW-2 and installed three additional well in March 2003. With these

wells, the Phase II LSA monitoring wells included MW-1 (source area), MW-3 (upgradient), MW-2 and MW-4 (both downgradient), and MW-1D (deep source area).

The monitoring wells were installed by Richard Simmons Drilling, Inc., a North Carolina certified well driller, using air rotary drilling techniques. Prior to installation of off-site monitoring well MW-3, H&H obtained an access agreement with Burger King Corporation and obtained a monitoring well construction permit (no. UST-MO040177) from DENR. Monitoring well MW-3 was completed to a depth of 25 ft below grade, and MW-4 was completed to a depth of 20 ft below grade. The shallow wells consist of 2-inch diameter PVC that includes a 15 ft screen interval placed to bracket the water table. The deeper well MW-1D is a Type III well with a 6-inch diameter PVC surface casing to a depth of 40 ft and a 2-inch diameter inner PVC casing and screen to a depth of 53 ft with a 5 ft bottom screen interval. A summary of well completion data is provided in Table 2.

Following well development and purging, ground water samples were collected from MW-2, MW-3, MW-4, and MW-1D on March 6 and 7, 2003. These ground water samples were submitted for analyses of VOCs including IPE and MTBE by EPA Method 6210D, EDB by EPA Method 504.1, VPH by the MADEP Method, and lead by EPA Method 6010B using 3030C preparation. In addition, monitoring well MW-1 was sampled on March 6, 2003 for EDB analyses by EPA Method 504.1.

Laboratory-supplied sample bottles were used for sample collection for both soil and ground water samples. A chain-of-custody record was completed for samples collected and included sample description, date collected, time collected, matrix, sample container information, and analyses required. The chain-of-custody was signed by H&H prior to placement in an iced cooler for shipment to the laboratory. Laboratory analytical data sheets are provided in Appendix C.

## 5.2 Soil Sampling Results

Analytical results from the two soil samples collected from soil boring DPT-2 indicate the presence of low concentrations of acetone (0.0421 mg/kg) in the shallow sample and carbon disulfide (up to 0.00233 mg/kg) in both samples (Table 3). These compounds were not detected in ground water

and may be laboratory contaminants. Nevertheless, these soil constituent concentrations do not exceed soil-to-ground water, residential, or commercial MSCCs. No other analyzed constituents were identified in soil above laboratory method detection limits.

### 5.3 Ground Water Sampling Results

The ground water analytical results indicate constituents exceeding North Carolina standards in each of the monitoring wells sampled (Table 4). Constituents identified in at least one monitoring well above standards included benzene (up to 119 µg/l), 1,2-dichloroethene (up to 5.3 µg/l), MTBE (up to 276 µg/l), VPH as C5-C8 aliphatics (up to 1,320 µg/l), and VPH as total C9-C22 aromatics (up to 294 µg/l). None of the ground water detections exceed DENR-defined GCLs. The ground water plume extent as estimated using benzene concentrations is depicted on Figure 5.

The highest benzene and VPH concentrations were detected in upgradient off-site monitoring well MW-3. Based on the detections in monitoring well MW-3, it appears that an off-site plume is impacting the subject property. Based on the potentiometric map, the most likely location for an off-site source would be located to the north or north-northwest of the subject property. Currently, there are two gas stations in the site area, an Amoco located approximately 100 ft to the west and a Phillips 66 gas station located approximately 250 ft to the northwest (Figure 2).

1,2-dichloroethane (DCA) was detected in UST area well MW-1 (5.3 µg/l) but was not detected in upgradient well MW-3. DCA was a constituent in older (leaded) gasoline. In addition, impacted source area soils were removed from the subject property UST basin. Based on the DCA detection and previous source area removal, a portion of the impacted ground water on the subject property may be from the former UST basin located on the subject property.

Ground water impacts were detected in the deeper monitoring well MW-1D. VOCs and VPH as C5-C8 aliphatics were detected in MW-1D. The only VOCs detected in MW-1D above standards are benzene and MTBE, which are considered to be relatively mobile gasoline constituents. The VOC concentrations in MW-1D are similar in magnitude to those detected in nearby source area

shallow well MW-1. The low level impacts detected in monitoring well MW-1 would not typically expected to cause similar concentrations 30 to 35 ft below the water table such as detected in MW-1D. Further, 1,2-DCA was not detected in monitoring well MW-1D. In addition, as mentioned in Section 4.3, there appears to be an upward hydraulic gradient near the source area. Based on these considerations, the impacts in MW-1D appear to be primarily related to the off-site source.

**Table 1**  
**Adjacent Property Owner Information**  
**Former Pantry Store**  
**Yadkinville, North Carolina**  
**H&H Job No. YOC-003**

Direction from Subject Site	Property Address	Parcel ID No.	Property Owner	Owners Address	Property Use
Site	801 S. State Street Yadkinville, NC 27055	58061267873	Williams Family Partnership	c/o Faw-Responsible Party P.O. Box 410 Wilkesboro, NC 28697	Site: Currently Texaco Fast Track
North	723 S. State Street Yadkinville, NC 27055	580612977079	Burger King Corporation	P.O. Box 020783 Miami, FL 33102	Burger King Restaurant
South	805 S. State Street Yadkinville, NC 27055	580612968676	Jefferson Ray Associates	c/o Lash & Associates P.O. Box 1600 Rowlette, TX 75030	Western Steer Restaurant
Northeast	Eisenhour Street Yadkinville, NC 27055	581609060809	Mr. Frank Obenshain	P.O. Box 1154 Yadkinville, NC 27055	Residence
East	730 Eisenhour Street Yadkinville, NC 27055	581609060800	Mr. Frank Obenshain	P.O. Box 1154 Yadkinville, NC 27055	Vacant/Undeveloped
West	800 S. State Street Yadkinville, NC 27055	58061294785	Beroth Oil Co.	P.O. Box 4089 Winston-Salem, NC 27115	Amoco Gas Station
Northwest	S. State Street Yadkinville, NC 27055	580612974097	Crystal Cleaners & Laundry	P.O. Box 969 Yadkinville, NC 27055	Crystal Cleaners & Laundry

Notes:  
See Figure 2 for map.  
Information based on Yadkin County Tax Assessors and Yadkin County GIS Mapping Department offices, Yadkinville, NC.

**Table 2**  
**Monitoring Well Data Summary**  
**Former Pantry Store**  
**Yadkinville, North Carolina**  
**H&H Job No. YOC-003**

Monitoring well ID	Well Diameter (inches)	TOC Elevation (ft)	Ground Elevation (ft)	Well Depth bgs (ft)	January 9, 2003		March 7, 2003	
					Water Table Depth from TOC (ft)	Water Table Elevation (ft)	Water Table Depth from TOC (ft)	Water Table Elevation (ft)
MW-1	2	101.67	100.59	24.2	14.85	86.82	14.25	87.42
MW-2	2	97.20	95.91	18.7	12.84	84.36	12.40	84.80
MW-3	2	104.01	104.36	25	NA	--	15.18	88.83
MW-4	2	98.09	98.40	20	NA	--	13.77	84.32
MW-1D*	2	99.46	99.70	53	NA	--	11.65	87.81

Notes:

TOC = Top of Casing

bgs = below ground surface

All elevations relative to arbitrary site location point established as 100 ft.

Monitoring wells MW-1 and MW-2 installed by others in late 1980s

Monitoring wells MW-3, MW-4 and MW-1D installed by H&H March 5 and 6, 2003

\* MW-1D also has an outer 6-inch diameter PVC surface casing to 40 ft.

**Table 3**  
**Soil Analytical Results**  
**Former Pantry Store**  
**Yadkinville, North Carolina**  
**H&H Job No. YOC-003**

Sample ID Depth (ft)	Units	DPT-2 2.5 - 5.0	DPT-2 7.5 - 10.0	North Carolina Standards		
				Commercial MSCC	Residential MSCC	Soil to GW MSCC
<i><u>VOCs (8260B/5035)</u></i>						
Acetone	mg/kg	0.0421	<0.0334	40,880	1,564	3
Carbon Disulfide	mg/kg	0.00173	0.00233	40,880	1,564	4
<i><u>VPH (MADEP)</u></i>						
VPH C5 - C8 Aliphatics	mg/kg	<6.97	<7.05	24,528	939	72
VPH C9 - C12 Aliphatics	mg/kg	<6.97	<7.05	NS	NS	NS
Total C9-C18 Aliphatics	mg/kg	ND	ND	245,280	9,386	3,255
VPH C9 - C10 Aromatics	mg/kg	<6.97	<7.05	NS	NS	NS
Total VPH C9 - C32 Aromatics	mg/kg	ND	ND	12,264	469	34

**Notes:**

No sample was collected from boring DPT-1  
 Bold indicates concentration exceeds one or more standards  
 Samples collected by H&H on January 9, 2003  
 EPA Method number follows parameter in parenthesis.  
 NS = Not Specified; ND = Not Detected  
 VPH = Volatile Petroleum Hydrocarbons  
 MADEP = Massachusetts Department of Environmental Protection  
 MSCC = Maximum Soil Contaminant Concentration

**Table 4**  
**Ground Water Analytical Results**  
**Former Pantry Store**  
**Yadkinville, North Carolina**  
**H&H Job No. YOC-003**

Sample Date:	Units	MW-1 1/9/03 & 3/6/03	MW-2 3/6/03	MW-3 3/6/03	MW-4 3/6/03	MW-1D 3/7/03	DENR GCLs	Ground Water Standard
<b><u>VOCs (6210D)</u></b>								
Benzene	µg/l	<b>44.0</b>	0.7	<b>119.0</b>	<b>19.8</b>	<b>33.4</b>	5,000	1
n-Butylbenzene	µg/l	0.8	<0.5	2.0	<0.5	<0.5	6,900	70
sec-Butylbenzene	µg/l	11.8	1.8	7.6	<0.5	7.0	8,500	70
t-Butylbenzene	µg/l	0.6	<0.5	<0.5	<0.5	0.7	15,000	70
1,2-Dichloroethane	µg/l	<b>5.3</b>	<b>1.3</b>	<0.5	<0.5	<0.5	380	0.38
Isopropylbenzene	µg/l	<b>89.0</b>	<0.5	15.8	<0.5	32.1	25,000	70
4-Isopropyltoluene	µg/l	<0.4	<0.5	0.6	<0.5	<0.5	NS	NS
Naphthalene	µg/l	3.2	<2.5	3.2	<2.5	<2.5	15,500	21
n-Propylbenzene	µg/l	0.7	<0.5	4.3	<0.5	1.2	30,000	70
Toluene	µg/l	0.7	<0.5	2.5	1.8	<0.5	257,500	1,000
1,1,2-Trichloroethane	µg/l	6.9	<0.5	<0.5	<0.5	<0.5	NS	NS
1,2,4-Trimethylbenzene	µg/l	0.9	<0.5	0.7	<0.5	<0.5	28,500	350
total Xylenes	µg/l	1.6	<0.5	1.5	16.1	<0.5	87,500	530
Methyl tert-butyl ether	µg/l	177	108.0	122.0	21.4	<b>276.0</b>	200,000	200
Isopropylether	µg/l	8.0	6.0	5.6	<0.5	11.9	70,000	70
<b><u>EDB (504.1)</u></b>	µg/l	<0.02	<0.02	<0.02	<0.02	<0.02	50	0.0040
<b><u>VPH (MADEP)</u></b>								
C5 - C8 Aliphatics	µg/l	392	201	<b>1,320</b>	<b>470.0</b>	<b>755.0</b>	NS	420
C9 - C12 Aliphatics	µg/l	<100	<100	<100	<100	<100	NS	NS
C9 - C10 Aromatics	µg/l	220	<100	294.0	<100	<100	NS	NS
Total C9 - C22 Aromatics	µg/l	<b>220</b>	<100	<b>294.0</b>	<100	<100	NS	210
Total C9 - C18 Aliphatics	µg/l	<100	<100	<100	<100	<100	NS	4,200
<b><u>Lead (3030C)</u></b>	µg/l	<3.0	12	<3.0	<3.0	<3.0	15,000	15

Notes:

Bold indicates concentration exceeds standard

MW-1 sample collected on 1/9/03 except EDB sample collected on 3/6/03

NS = Not Specified

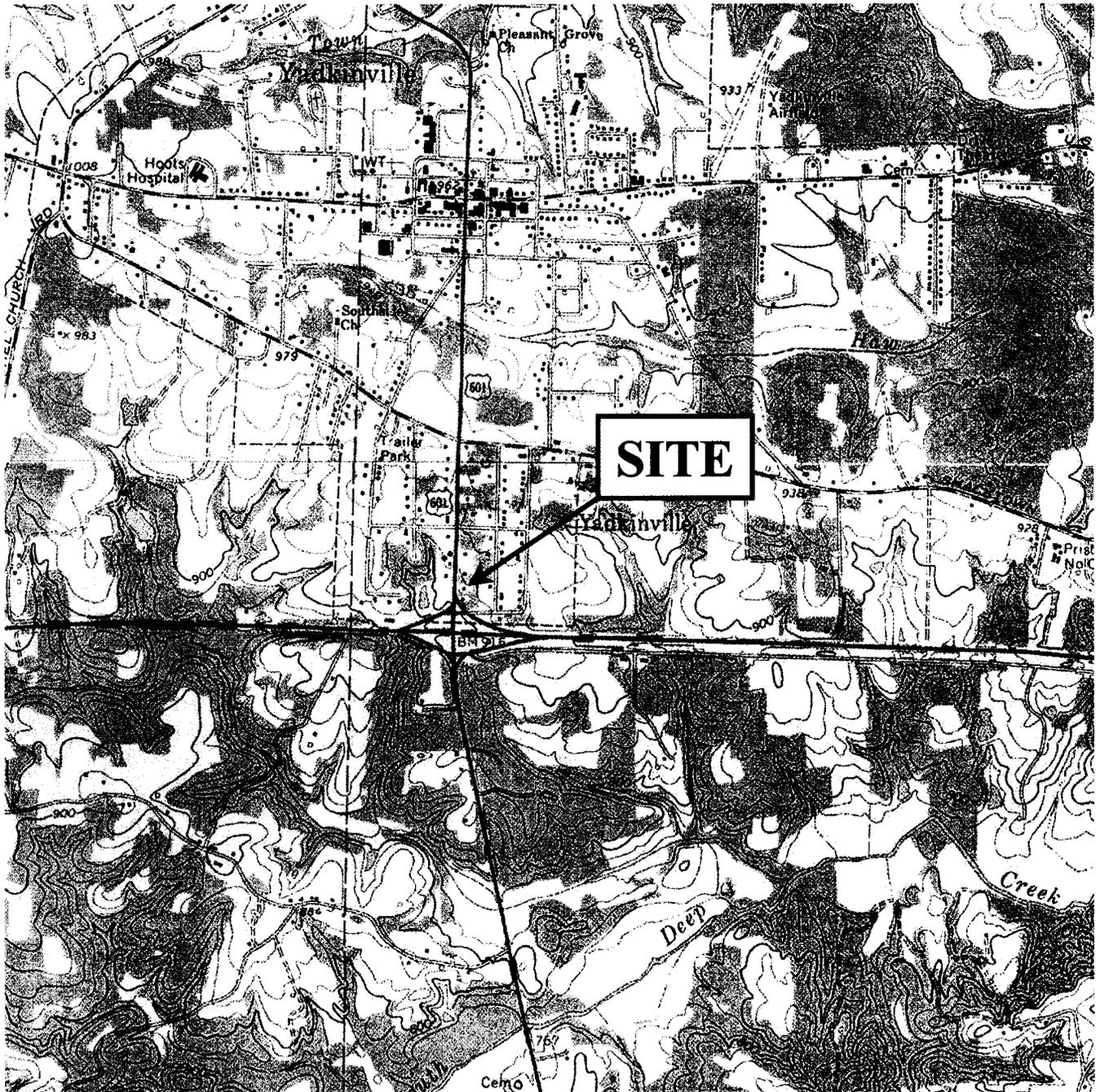
EDB = ethylene dibromide

VPH = Volatile Petroleum Hydrocarbons

MADEP = Massachusetts Department of Environmental Protection

GCLs = Gross Contamination Levels

DENR = Department of Environment and Natural Resources



U.S.G.S. QUADRANGLE MAP

YADKINVILLE, NC 1966  
LONE HICKORY, NC 1966

QUADRANGLE  
7.5 MINUTE SERIES (TOPOGRAPHIC)

TITLE		SITE LOCATION MAP	
PROJECT		FORMER PANTRY STORE YADKINVILLE, NORTH CAROLINA	
 <b>Hart &amp; Hickman</b> 501 Minuet Lane-Suite 101 Charlotte, North Carolina 28217 A Professional Corporation (704)-586-0007 (704)-586-0373 fax			
DATE:	1-13-03	REVISION NO:	0
JOB NO:	YOC-003	FIGURE NO:	1



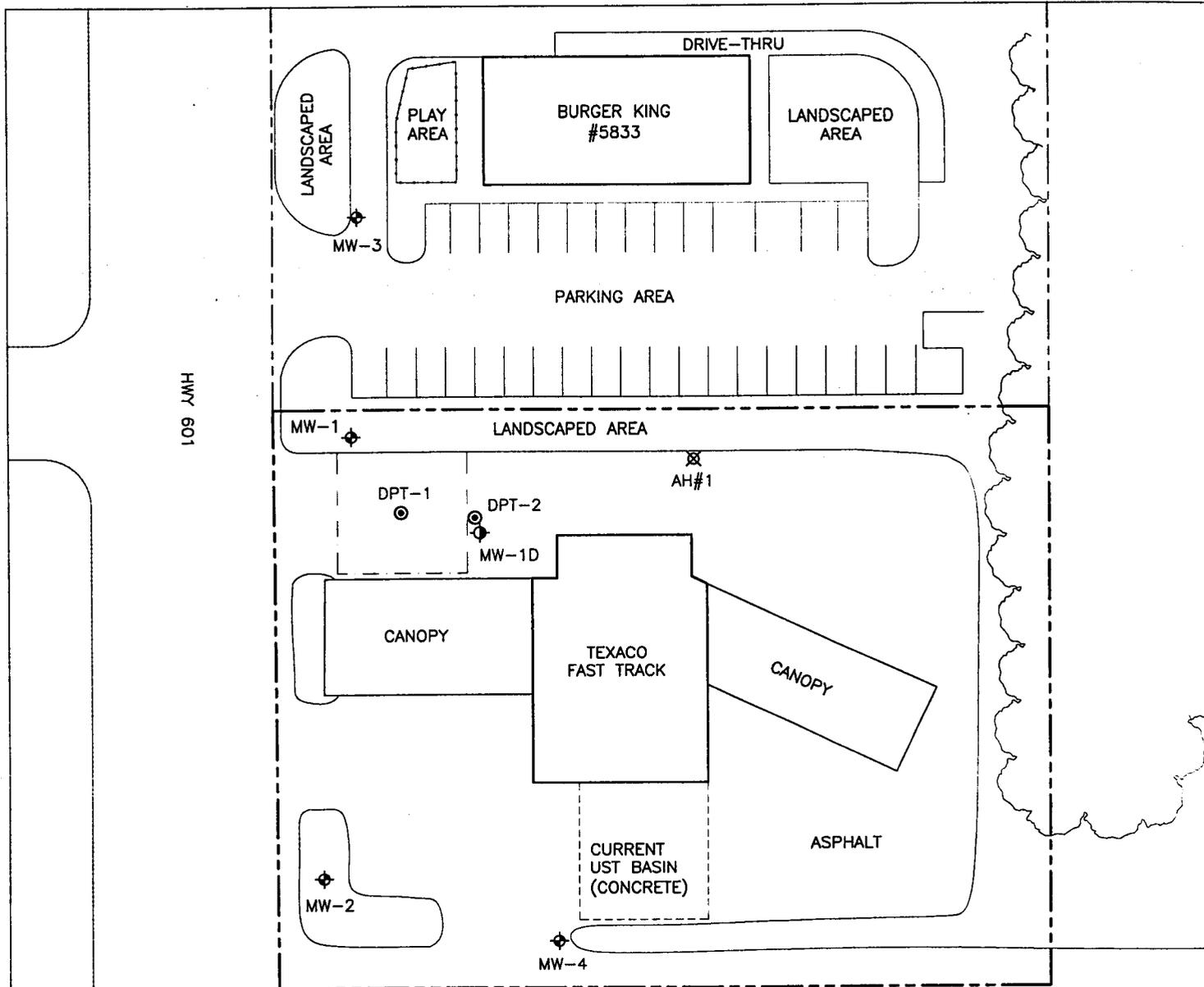
**LEGEND**

- SUBJECT PROPERTY BOUNDARY
- APPROXIMATE FORMER UST BASIN
- OUT-OF-SERVICE WATER SUPPLY WELL
- AREA ZONED HIGHWAY BUSINESS
- AREA ZONED MANUFACTURING
- AREA ZONED RESIDENTIAL
- EXISTING GAS STATION
- EXISTING DRY CLEANER

- \* (Symbol: asterisk)
- (Symbol: circle with dot)
- (Symbol: stippled square)
- (Symbol: solid black square)
- (Symbol: solid black square)
- GS (Symbol: solid black square)
- DC (Symbol: solid black square)



TITLE		SITE AREA MAP	
PROJECT		FORMER PANTRY STORE YADKINVILLE, NORTH CAROLINA	
DATE: 3-1-03		REVISION NO. 0	
JOB NO: YOC-003		FIGURE NO. 2	
 <b>Hart &amp; Hickman</b> A Professional Corporation <small>501 Minuet Lane Suite 101          Charlotte, North Carolina          (704)586-0007 (704)586-0373-fax</small>			

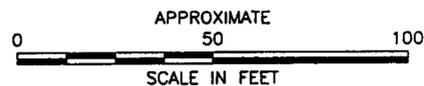


109 HWY

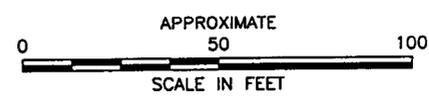
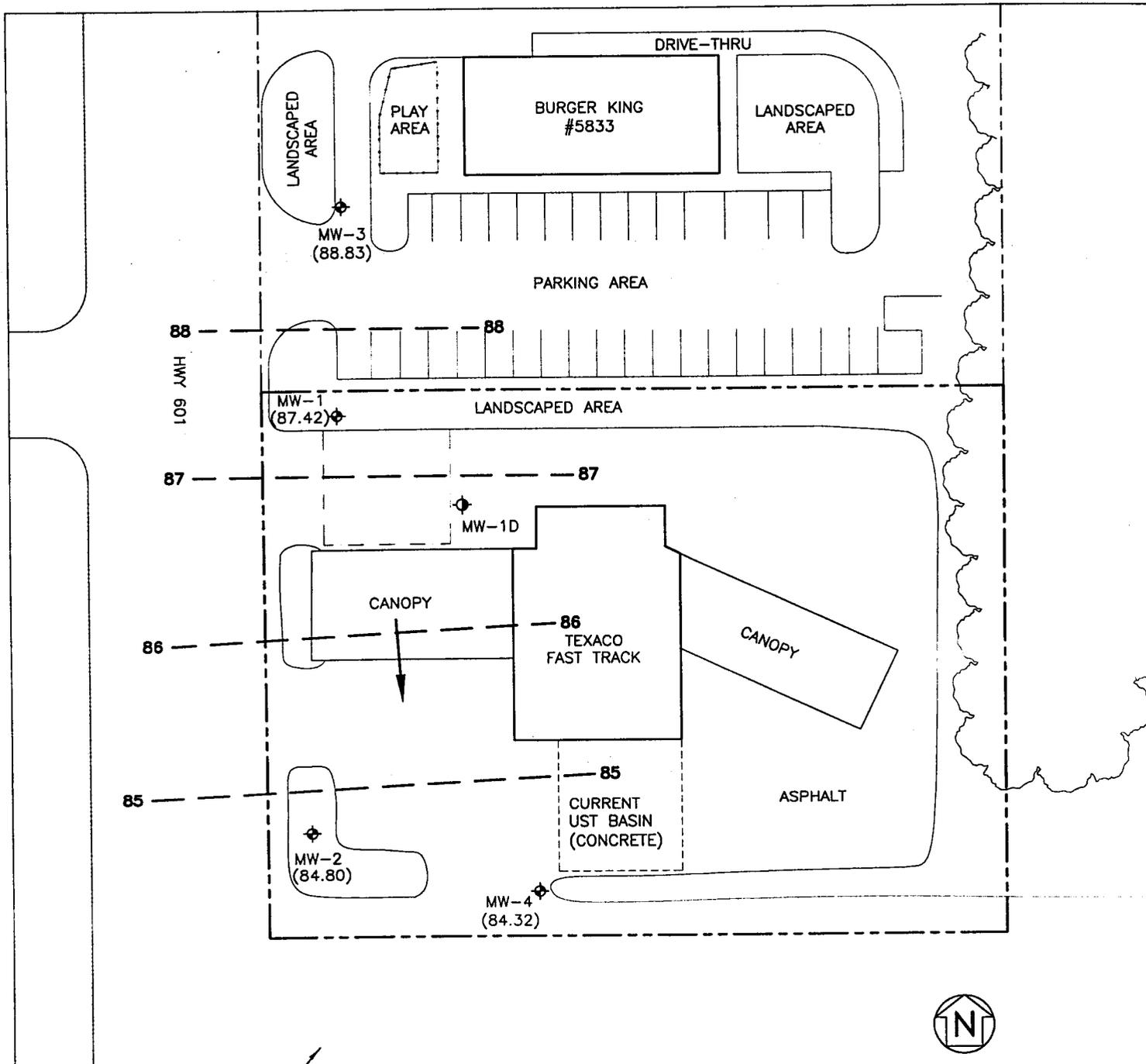
**LEGEND**

- PROPERTY LINE
- ~ TREE LINE
- ◆ SHALLOW (TYPE II) MONITORING WELL
- ◆ DEEP (TYPE III) MONITORING WELL
- ⊙ SOIL BORING
- ⊗ FORMER MONITORING WELL
- FORMER UST BASIN AND PREVIOUS SOIL EXCAVATION

NOTE:  
BURGER KING SITE MAP TAKEN FROM AS-BUILT SURVEY REVISED  
JUNE 6, 1995 AND PROVIDED BY BURGER KING CORPORATION



TITLE <b>SITE PLAN AND SAMPLING LOCATIONS</b>	
PROJECT <b>FORMER PANTRY STORE YADKINVILLE, NORTH CAROLINA</b>	
 <b>Hart &amp; Hickman</b> A Professional Corporation <small>501 Minuet Lane Suite 101 Charlotte, North Carolina (704)586-0007 (704)586-0373-fax</small>	
DATE: 3-10-03	REVISION NO. 0
JOB NO: YOC-003	FIGURE NO. 3



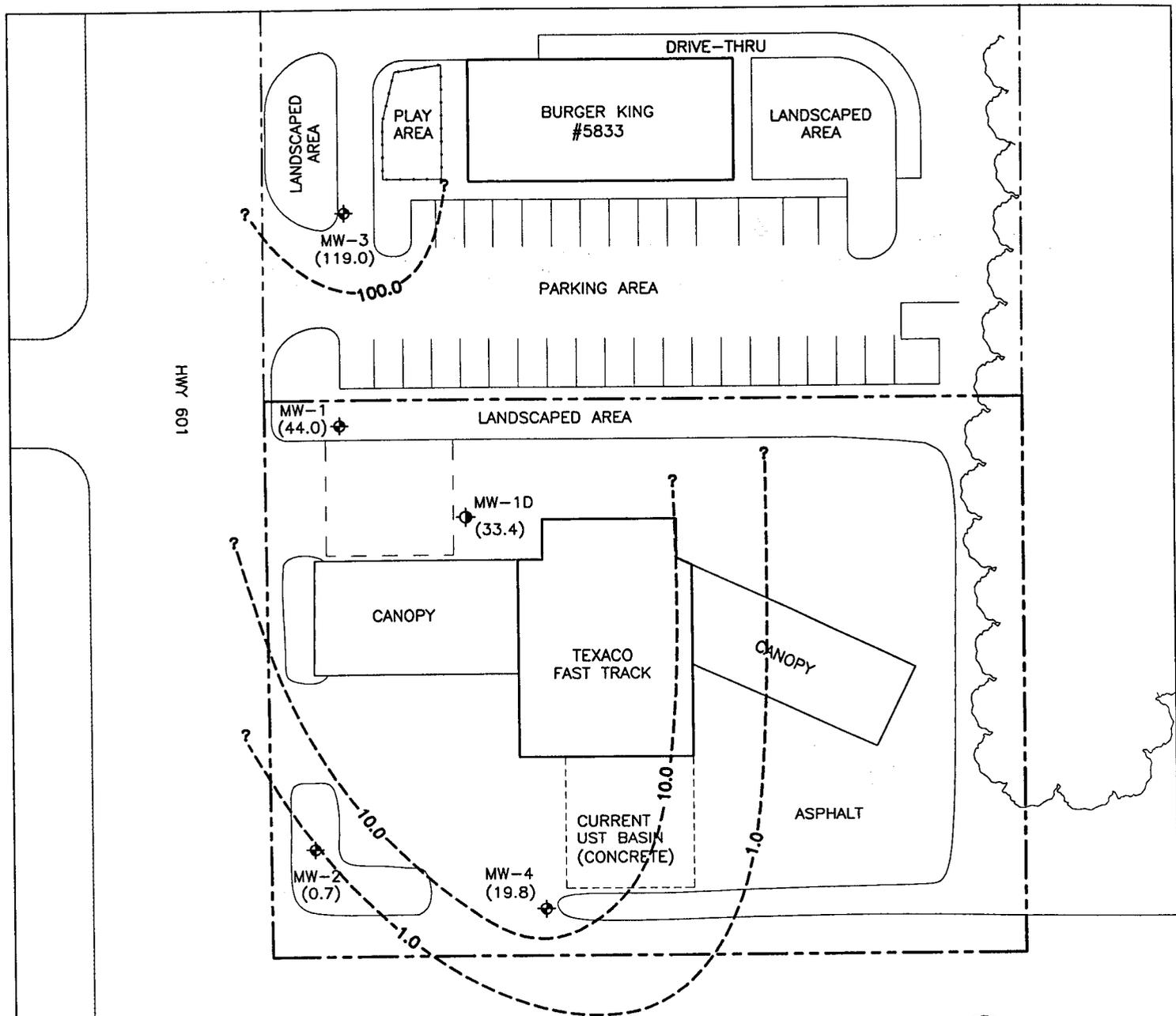
- PROPERTY LINE
- ~ TREE LINE
- ◆ SHALLOW (TYPE II) MONITORING WELL
- ◆ DEEP (TYPE III) MONITORING WELL
- (87.42) SHALLOW GROUND WATER ELEVATION (FT) (MARCH 2003)
- 88 — ESTIMATED SHALLOW GROUND WATER CONTOUR (FT)
- ➔ ESTIMATED SHALLOW GROUND WATER FLOW DIRECTION
- [ ] FORMER UST BASIN AND PREVIOUS SOIL EXCAVATION

WESTERN STEER  
PARKING

TITLE		SHALLOW GROUND WATER POTENTIOMETRIC MAP	
PROJECT		FORMER PANTRY STORE YADKINVILLE, NORTH CAROLINA	
 <b>Hart &amp; Hickman</b> A Professional Corporation		501 Minuet Lane Suite 101 Charlotte, North Carolina (704)586-0007 (704)586-0373-fax	
DATE: 3-10-03	REVISION NO. 0		
JOB NO: YOC-003	FIGURE NO. 4		

NOTE:  
BURGER KING SITE MAP TAKEN FROM AS-BUILT SURVEY REVISED JUNE 6, 1995 AND PROVIDED BY BURGER KING CORPORATION

S:\AAA-Master Projects\York Oil\YOC-03\Figures\FIG-4.dwg, 1:50



HWY 601

WESTERN STEER  
PARKING



APPROXIMATE  
0 50 100  
SCALE IN FEET

- PROPERTY LINE
- ~ TREE LINE
- ⊕ SHALLOW (TYPE II) MONITORING WELL
- ⊕ DEEP (TYPE III) MONITORING WELL
- (44.0) BENZENE CONCENTRATION (µg/l) (JANUARY/MARCH 2003)
- FORMER UST BASIN AND PREVIOUS SOIL EXCAVATION
- - - 1.0 - - - ESTIMATED BENZENE ISOCONCENTRATION CONTOUR (µg/l)

NOTE:  
BURGER KING SITE MAP TAKEN FROM AS-BUILT SURVEY REVISED JUNE 6, 1995 AND PROVIDED BY BURGER KING CORPORATION

TITLE <b>BENZENE CONCENTRATIONS IN GROUND WATER</b>	
PROJECT <b>FORMER PANTRY STORE YADKINVILLE, NORTH CAROLINA</b>	
 <b>Hart &amp; Hickman</b> A Professional Corporation	
<small>501 Minuet Lane Suite 101 Charlotte, North Carolina (704)586-0007 (704)586-0373-fax</small>	
DATE: 3-17-03	REVISION NO. 0
JOB NO: YOC-003	FIGURE NO. 5

S:\AAA-Master Projects\York ORNYOC-03\Figures\FIG-5.dwg, 150