GEOENVIRONMENTAL PHASE II INVESTIGATION

TIP NUMBER B-5985

Parcel #005 – Charles & Billy Strickland
203 West 2nd Street
PIN 939165786200
Lumberton, Robeson County, North Carolina
WR Project No. 02191306.11

NCDEQ UST Section Information
Facility ID: N/A
Facility Name: N/A
Facility Owner: N/A

Prepared for:

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

Report Prepared By:

WithersRavenel, Inc.
115 MacKenan Drive
Cary, North Carolina 27511
(919) 469-3340
North Carolina Firm License No. C-0832

December 6, 2021

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December 6, 2021

Craig E. Haden
NC Department of Transportation
1589 Mail Service Center
Raleigh, NC 27699-1589

Reference: **GeoEnvironmental Phase II Investigation**
TIP Number B-5985
WBS Number 47749.1.1
Parcel #005, Charles & Billy Strickland
203 West 2nd Street
Lumberton, Robeson County, North Carolina
WR Project No. 02191306.11

Dear Mr. Haden:

WithersRavenel, Inc. (WR) is pleased to submit this report describing limited GeoEnvironmental Phase II Investigation activities for the above referenced property. The enclosed report summarizes the results of subsurface geophysical and soil sampling assessment activities completed in November of 2021 with the purpose of assessing the above referenced property by the North Carolina Department of Transportation Geotechnical Engineering Unit (NCDOT GEU).

The investigation was conducted in accordance with NCDOT's Request for Technical and Cost Proposal dated October 6, 2021; WR's Proposal dated October 18, 2021; and Limited Services Contract #7000020477 between the NCDOT and WithersRavenel, dated April 15, 2020.

Please do not hesitate to contact us with any questions or comments regarding this report.

Sincerely,
WithersRavenel

DocuSigned by:
Benja Whitley
146C3C179A8A468...
Dec 7, 2021

Benjamin Whitley, PE
Senior Project Manager, Environmental

R.S. (Butch) Lawter, Jr., PE
Vice President – Environmental Services

NORTH CAROLINA PROFESSIONAL SEAL 038743 ENGINEER BENJAMIN A. WHITLEY

115 MacKenan Drive | Cary, NC 27511
t: 919.469.3340 | f: 919.467.6008 | www.withersravenel.com | License No. C-0832
Cary | Greensboro | Pittsboro | Raleigh | Wilmington

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TABLE OF CONTENTS

1. INTRODUCTION

WithersRavenel, Inc. (WR) is pleased to submit this investigation report describing GeoEnvironmental Phase II Investigation activities completed at the Charles and Billy Strickland property (Parcel #005) located at 203 West 2nd Street, Lumberton, NC (the Site). **Sheet 1** depicts the site location on a USGS topographic map. These assessment activities were completed at the request of NCDOT in support of replacing Bridge #770125 over the Lumber River on NC 41/72 and Bridge #770175 over the Lumber River on SR 1600.

The Site is an automotive repair and inspection facility with no registered underground storage tanks (USTs). One surficial release was reportedly remediated in 2008 following the spill of waste oil on the southern (rear) portion of the site. The proposed NCDOT right-of-way expansion will be on the northern portion of the site, which is the highest topographic point of the property and is generally improved upon with asphalt paved parking and driveway areas.

1.1. Scope of Services

WR conducted a geophysical survey in an effort to locate possible UST system components and other subsurface features within the proposed NCDOT right-of-way. WR subcontracted Geo Solutions Limited, Inc. (Geo Solutions), who utilized multi-frequency electromagnetic (EM) and ground penetrating radar (GPR) methods to perform the geophysical survey. The results of the geophysical survey are discussed further in Section 2.1 of this report.

Subsequent to the geophysical survey, WR subcontracted a GeoProbe direct push drill rig and advanced four shallow soil borings at various locations at the subject site. Soil samples were collected and screened for volatile organic vapors using a field-calibrated Photoionization Detector (PID). WR collected one soil sample from the interval in each boring that exhibited the highest PID reading, or from the interval at the bottom of the boring. Soil samples were collected and transported to RedLab, a North Carolina certified laboratory, for analysis of Total Petroleum Hydrocarbons by ultraviolet fluorescence (UVF) methods. The findings of the soil investigation are discussed further in Section 2.2 of this report.

2. ASSESSMENT ACTIVITIES

2.1. Geophysical Survey

On November 3, 2021, WR visited the site to conduct a geophysical survey in an effort to locate possible UST system components and other subsurface features. WR subcontracted Geo Solutions, who utilized multi-frequency electromagnetic and ground penetrating radar methods to perform the geophysical survey. The electromagnetic (EM) evaluation was performed using a Geophex Model GEM-2 profiler. The EM data was collected with a hand-held logger and location information was recorded using a sub-meter global positioning system (GPS) unit. Geo Solutions also completed a GPR evaluation using a GSSI SIT 4000 connected to a 400 MHz antenna. The spacing of survey transects were three feet or less across the site during both methods.

Geo Solutions reported an elevated EM response adjacent to the building on the eastern portion of the site. Geo Solutions indicated the response was typical of reinforced concrete. GPR methods were limited in this area due to this reinforced concrete. During the GPR survey, an anomalous area was detected on the western portion of the site adjacent to West 2nd Street; however, the GPR response was not characteristic of a UST. As there was no EM response, Geo Solutions attributed this anomaly to conductive soil or fill, which was later confirmed by drilling and soil sample collection.

Geo Solutions' findings are presented in their *Technical Report – Geophysical Evaluation*, included in **Appendix A**.

2.2. Soil Investigation

WR returned to the site on November 16, 2021 with subcontract driller Carolina Probing Services (dba Regional Probing Services) to conduct the proposed soil investigation at the Site. Regional Probing utilized a direct-push drill rig (GeoProbe) to advance four soil borings within the proposed NCDOT right-of-way at various locations at the Site, including the following areas:

- Three borings (B-1 through B-3) adjacent to the northern, eastern and western sides of the concrete slab on the eastern portion of the site. Due to the proximity of the building to this slab, a boring was unable to be advanced on the southern side of the slab; and,
- One boring (B-4) within the anomaly identified on the western portion of the site.

The proposed termination depth of each boring was 10 feet below ground surface (bgs). The proposed termination depth was achieved at each boring location. No obstructions or drill refusal was encountered.

Soils were generally observed to consist of moist, tan-gray-brown silty fine-to-medium sands and sandy clays from ground surface to boring termination. In addition, brick and stone was observed in Boring B-4 from ground surface to approximately two feet bgs. The presence of brick and stone is likely the cause of the anomaly identified during the GPR survey. Silty sands that appeared to be native in consistency were observed beneath this layer of brick and stone. Additional details for each boring can be found in Boring Logs located in **Appendix B** of this report.

Soil samples were collected at approximate two-foot intervals and screened for volatile organic vapors using a field-calibrated Photoionization Detector (PID). PID readings ranged from 0.4 ppm

(in Boring B-3) to 1.4 ppm (in Boring B-2). WR collected one soil sample from the interval in each boring that exhibited the highest PID reading. WR notes that a soil sample was not collected from B-4 since this area did not appear to be the location of a former UST and elevated PID readings were not recorded.

The selected soil samples were collected in laboratory-provided containers, placed on ice, and transported under proper chain-of-custody procedures to RedLab, a North Carolina certified laboratory, for analysis of Total Petroleum Hydrocarbons (TPH) by ultraviolet fluorescence (UVF) methods. A summary of the PID readings and the corresponding TPH laboratory results can be found in the attached **Table 1**.

Saturated soils were encountered in Borings B-1, B-3, and B-4 between nine and 10 feet bgs, suggesting this depth was near the groundwater table.

Following completion of sampling, each boring was properly backfilled by filling the bore hole with cuttings and/or chip bentonite. Each boring was then finished at ground surface with grout.

3. LABORATORY ANALYTICAL RESULTS

3.1. Analytical Results

Laboratory analytical results for the soil samples collected on November 16, 2021, indicated the presence of TPH above laboratory method detection limits for the three samples submitted for analysis. The NCDEQ UST Section Action Limits [50 mg/kg for Gasoline Range Organics (GRO) and 100 mg/kg for Diesel Range Organics (DRO)] were not exceeded in these soil samples. UVF fingerprinting generally identified these detections as road tar, degraded petroleum hydrocarbons and degraded fuel. Table 1 provides a summary of PID results with UVF TPH laboratory concentrations for comparisons. The full laboratory results and chain of custody are also attached in **Appendix C** of this report.

3.2. Contaminated Soil Quantity Estimation

Since no TPH Action Limits were exceeded in the soil samples submitted for analysis, no soils appear to be present at the locations sampled that would require special handling or disposal.

4. CONCLUSIONS

WR has completed a GeoEnvironmental Phase II Investigation at the B-5985 Parcel #005 Charles & Billy Strickland site. The findings of this investigation indicate the presence of a reinforced concrete slab beneath the asphalt pavement on the eastern portion of the proposed right-of-way. In addition, a small area of urban fill was detected (approximately 10 feet x 10 feet) on the western portion of the site. Soil samples submitted for analysis indicated concentrations of TPH GRO and DRO above laboratory MDL, but below NCDEQ UST Section Action Limits.

According to NCDOT's slope stake plans, grading for the proposed project will include minor amounts of fill soils to establish the proposed grade. No below grade features appear to be proposed (such as stormwater drainage devices). Therefore, it is not likely that contaminated soil will be encountered during site grading activities. However, if contaminated soils are encountered,

WR recommends managing and disposing of these soils in accordance with federal, state, and local guidelines.

Please contact us if you have any questions or comments regarding this report.

Sincerely,
WithersRavenel

Benjamin Whitley, PE
Senior Project Manager, Environmental

R.S. (Butch) Lawter, Jr., PE
Vice President – Environmental Services

FIGURES

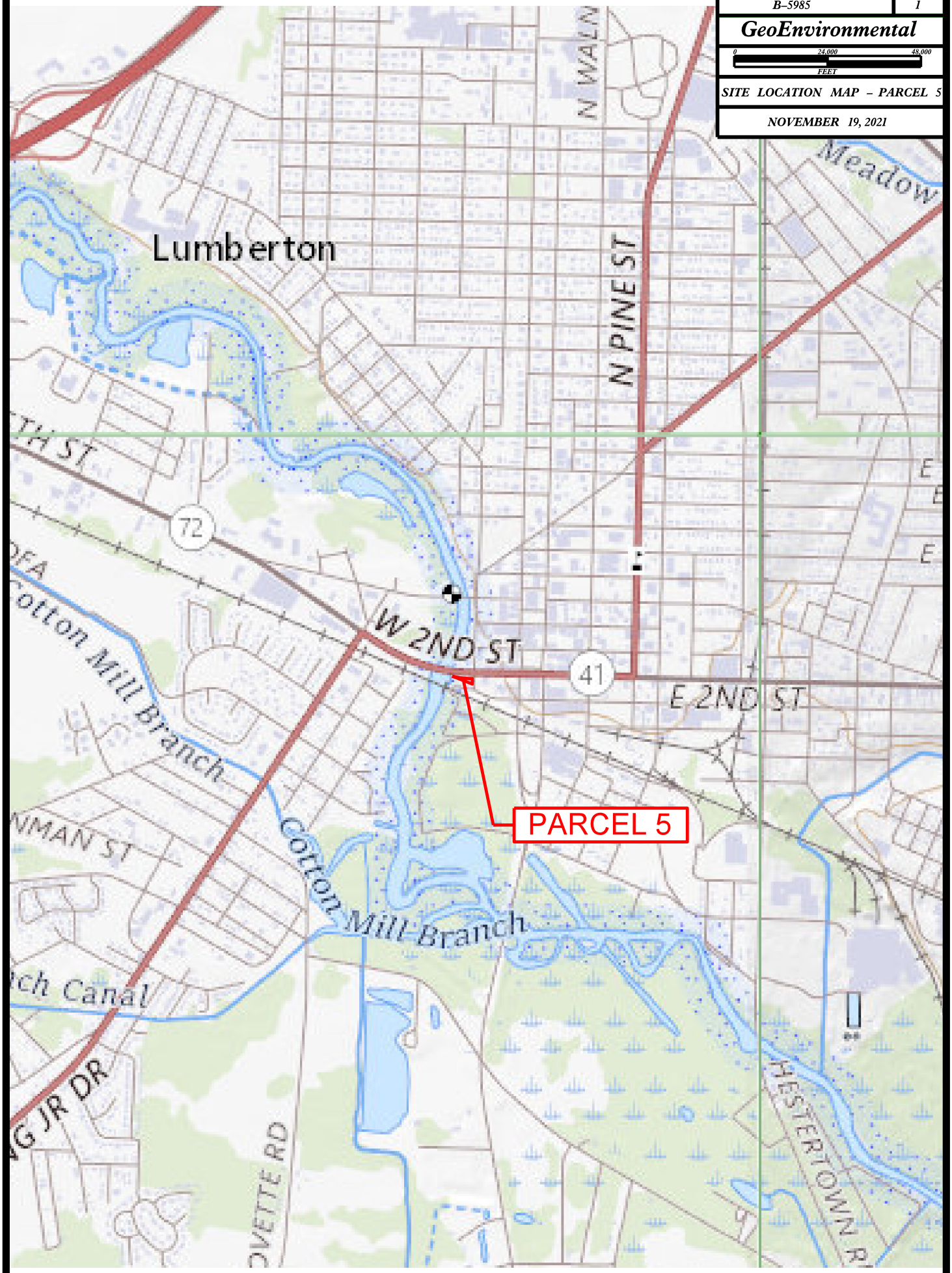
PROJECT REFERENCE NO.	SHEET
B–5985	1

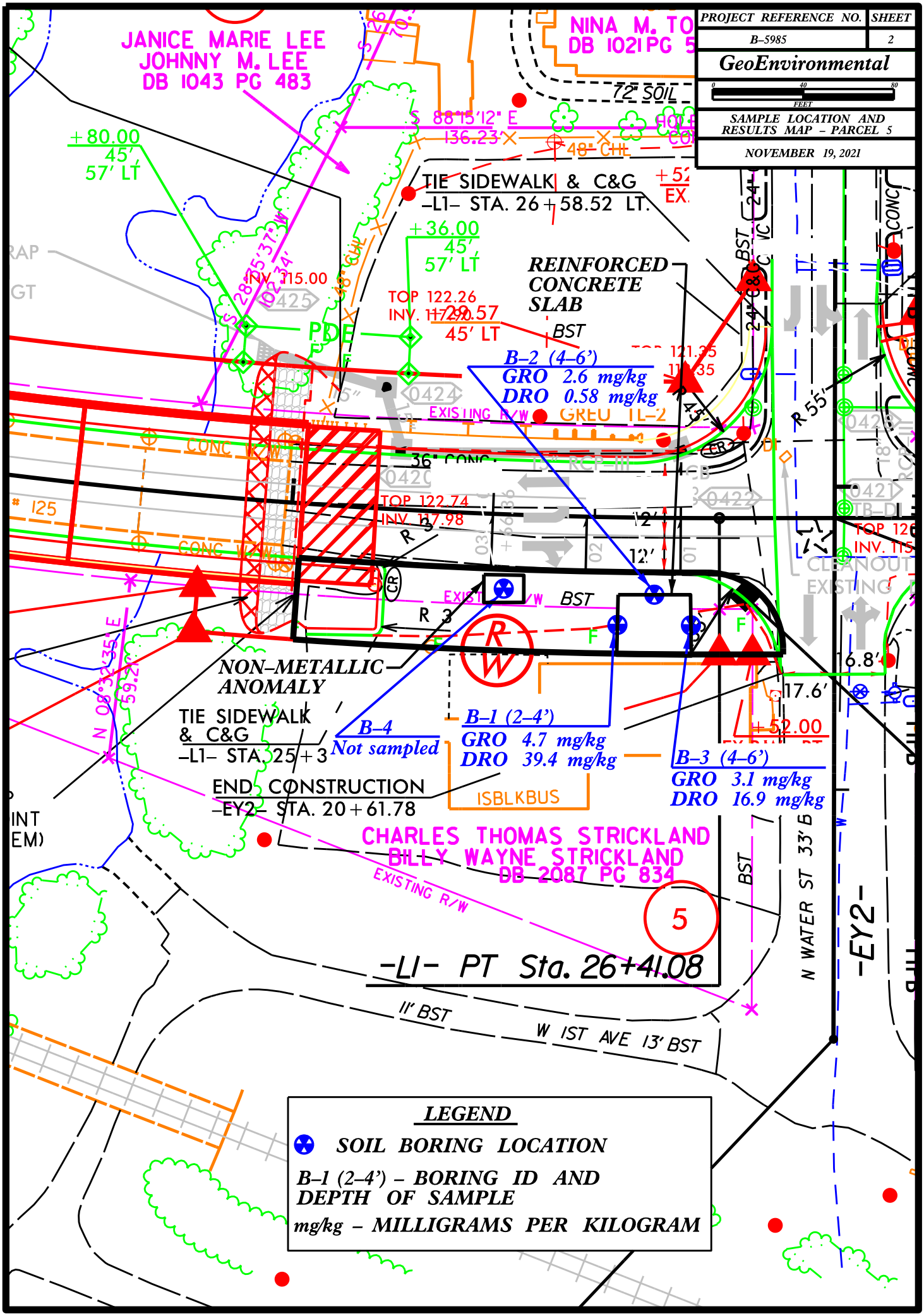
GeoEnvironmental

0 24,000 48,000
FEET

SITE LOCATION MAP – PARCEL 5

NOVEMBER 19, 2021




PROJECT REFERENCE NO.
B-5985
SHEET
2
GeoEnvironmental
0 40 80
FEET
SAMPLE LOCATION AND RESULTS MAP - PARCEL 5
NOVEMBER 19, 2021
JANICE MARIE LEE
JOHNNY M. LEE
DB 1043 PG 483
NINA M. TO
DB 1021 PG 5
72" SOIL
S 88°15'12" E
136.23'
48" CMP
+80.00
45'
57' LT
TIE SIDEWALK & C&G
-L1- STA. 26+58.52 LT.
+36.00
45'
57' LT
REINFORCED CONCRETE SLAB
BST
INV. 115.00
TOP 122.26
INV. 117.57
45' LT
B-2 (4-6')
GRO 2.6 mg/kg
DRO 0.58 mg/kg
EXISTING R/W
GREU 1L-2
CONC R/W
36" CONC
TOP 122.74
INV. 117.98
NON-METALLIC ANOMALY
TIE SIDEWALK & C&G
-L1- STA. 25+3
END CONSTRUCTION
-EY2- STA. 20+61.78
B-4
Not sampled
B-1 (2-4')
GRO 4.7 mg/kg
DRO 39.4 mg/kg
B-3 (4-6')
GRO 3.1 mg/kg
DRO 16.9 mg/kg
ISBLKBUS
CHARLES THOMAS STRICKLAND
BILLY WAYNE STRICKLAND
DB 2087 PG 834
EXISTING R/W
5
-L1- PT Sta. 26+41.08
11' BST
W 1ST AVE 13' BST
N WATER ST 33' B
-EY2-
CLEANOUT EXISTING
+52.00
17.6'
6.8'
LEGEND
SOIL BORING LOCATION
B-1 (2-4') - BORING ID AND DEPTH OF SAMPLE
mg/kg - MILLIGRAMS PER KILOGRAM

TABLES

TABLE 1
PID RESULTS AND SAMPLE SUMMARY TABLE

NCDOT B-5985
PARCEL #005 - Charles & Billy Strickland
LUMBERTON, NC
WR PROJECT NO. 02191306.11

BORING	B-1			B-2			B-3			B-4		
DEPTH (feet)	PID	GRO	DRO	PID	GRO	DRO	PID	GRO	DRO	PID	GRO	DRO
0-2	0.5	-	-	0.8	-	-	0.4	-	-	0.6	-	-
2-4	0.9 *	4.7	39.4	1.0	-	-	1.0	-	-	0.5	-	-
4-6	0.8	-	-	1.4 *	2.6	0.58	1.1 *	3.1	16.9	0.5	-	-
6-8	0.8	-	-	1.1	-	-	0.9	-	-	0.6	-	-
8-10	0.7	-	-	0.8	-	-	0.6	-	-	0.5	-	-

NCDEQ UST Section Action Limits: 50 mg/kg GRO
100 mg/kg DRO

PID - Photoionization Detector Reading (in ppm)
GRO / DRO - Gasoline and Diesel Range Organics (in mg/kg)
NR - Not Recorded
'-' - Not Analyzed
'*' - Interval Selected for Laboratory Analysis
Detections in **BOLD** indicate exceedance of NCDEQ UST Section Action Limit

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APPENDIX A

TECHNICAL REPORT – GEOPHYSICAL EVALUATION

Technical Report

Geophysical Evaluation

NCDOT U-5985 – Lumberton, NC

Prepared For:

WithersRavenel

Prepared By:

Geo Solutions Limited, Inc.

November 22, 2021

Geo Solutions Ltd.
P.O. Box 293
Conway, NC 27820
(252) 578-3233

November 22, 2021

Benjamin Whitley, PE
WithersRavenel
115 MacKenan Drive
Cary, NC 27511

Re: **Geophysical Evaluation – NCDOT U-5985 – Lumberton, NC**

File: Report

Dear Mr. Whitley:

Geo Solutions Limited, Inc. (Geo Solutions) is pleased to submit this report to WithersRavenel of a geophysical evaluation in support of an environmental site assessment of a North Carolina Department of Transportation (NCDOT) right of way (ROW) located at the intersection of N. Water Street and W. 2nd Street in Lumberton, North Carolina.

Background

WithersRavenel is completing an environmental site assessment of the NCDOT ROW at the intersection of N. Water Street and W. 2nd Street in Lumberton, North Carolina. The NCDOT is planning to widen the roadway at the intersection of N. Water Street and W. 2nd Street in Lumberton. Two of the adjacent properties were formally occupied by fuel service stations and are currently occupied by auto repair shops. WithersRavenel identified these two adjacent properties as possible sites of former underground storage tanks (USTs). As such, WithersRavenel contracted Geo Solutions to complete a geophysical evaluation of these adjacent properties within the proposed ROW. The objective of the geophysical evaluation was to detect and map any UST or other buried structure that may impact the NCDOT widening project. Figure 1 below is a site map with the geophysical evaluation

boundaries delineated. The southern area along W. 2nd Street is referred to as Parcel 005 and the northern area along N. Water Street as Parcel 006.

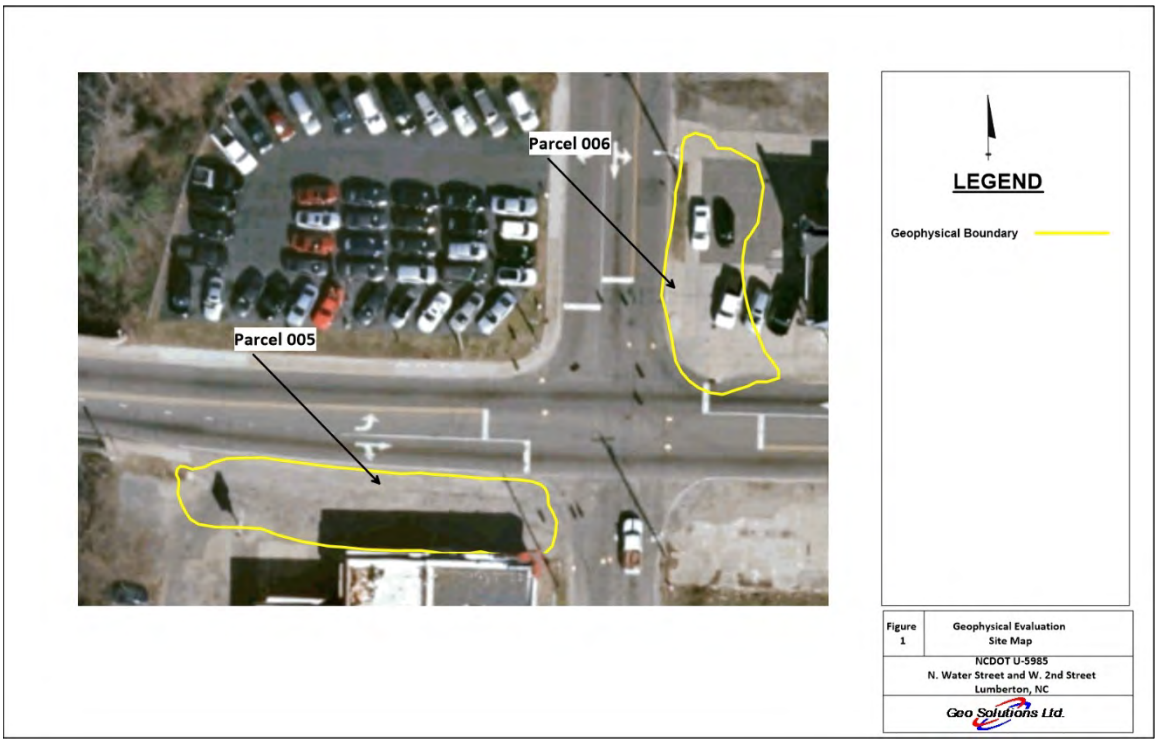


Figure 1. Site map of the area of NCDOT intersection widening project with the geophysical evaluation boundaries delineated in yellow.

Technical Approach

Geo Solutions completed the evaluation utilizing two geophysical methods to investigate the two adjacent properties along N. Water Street and W. 2nd Street in Lumberton, North Carolina. The field work for this project was completed on November 03rd, 2021.

Multifrequency Electromagnetic (EM) Evaluation

A high resolution electromagnetic (EM) evaluation was completed using a Geophex Model GEM-2 multifrequency electromagnetic profiler which collects at a rate of 30 times per second. The EM data was collected on a hand-held data logger that communicated with the GEM-2 unit via Bluetooth. The GEM-2 was connected to a Hemisphere Model A-325 GPS

unit which is augmented by the Wide Area Augmentation System (WAAS) and is capable of submeter accuracy. The EM profile spacing was approximately 3 feet or less. The EM method is useful at evaluating the shallow subsurface for both metallic and non-metallic conductive materials such as USTs and variations in soil conductivity which may be related to former land use.

Ground-penetrating Radar (GPR) Evaluation

Geo Solutions completed a ground penetrating radar (GPR) evaluation over the two sites. Here, a GSSI SIR 4000 connected to a 400 MHz antenna mounted on a three-wheel cart was utilized. Parallel profiles spaced 3 feet or less were collected. The GPR records were post processed with GSSI Radan 7 software.

Results

Multifrequency Electromagnetic Evaluation

Geo Solutions completed an EM evaluation of the site with parallel profiles spaced approximately 3 feet apart over both sites (Figure 2). Once adequate survey coverage was achieved, the EM field data were post-processed to produce a comma separated variable (CSV) file that was then transferred to a laptop computer. These data were then processed using software developed by Geophex to calculate the apparent conductivity and in-phase values for each EM frequency collected (1470Hz, 4110 Hz, 9810 Hz, 32,190 Hz, 60000 Hz, and 90030 Hz). Typically, the in-phase data (sometimes referred to as the metal detection mode) is more representative of buried metallic materials whereas the apparent conductivity is more representative of non-metallic conductive buried materials. The apparent conductivity response can also be elevated in the presence of large metal features. By evaluating both the in-phase and apparent conductivity responses, the horizontal extents of conductive and metallic materials can be characterized. All the frequencies were evaluated and the 9,810 Hz data was chosen to create figures for this report as it provided the best contrast to background site conditions. Shown on Figure 3 and Figure 4 are the

EM in-phase and apparent conductivity maps respectively with explanations for the anomalous conditions observed in the EM data. Here, anomalous conditions are shown as orange to red and blue hues where the background site conditions are shown as light yellow and green hues. At the location of Parcel 005 along W. 2nd Street there was an elevated EM response in both in-phase and apparent conductivity near the center of the area of evaluation. The high variability from positive to negative responses shown as red and blue hues are typical for reinforced concrete. The in-phase and apparent conductivity response across the remainder of the site was very weak with no detections of large metal structures such as USTs. At the location of Parcel 006 along N. Water Street there was a very strong elevated in-phase and apparent conductivity response shown as red hues on Figures 3 and 4. This is consistent with the EM response to a large buried metallic structure such as a UST. There was an elevated EM response at the northern end of Parcel 006. This EM response is consistent with a small area of reinforced concrete. The southern half of Parcel 006 had an elevated in-phase and apparent conductivity response as well. The high variability from positive to negative responses shown as red and blue hues are typical for reinforced concrete. There was also a storm drain and sanitary sewer manhole in this area.

Ground-penetrating Radar (GPR) Evaluation

Figure 5 is a map documenting the results of the GPR evaluation. At Parcel 005 along W. 2nd Street, a suspected reinforced concrete slab was detected below the asphalt surface. GPR penetration was limited in this area due to the suspected metallic wire mesh. This was in the same area as the suspected reinforced concrete detected during the EM evaluation. There was an anomaly detected at the west end of the area of evaluation. Figure 6 is a cross section of this subsurface feature. This is not likely a metallic structure due to the lack of EM response in this area. This GPR anomaly is not characteristic of a metallic UST. The anomaly is likely related to conductive soil or fill in this area. These subsurface detections were identified in the field with pink ground marking paint (Appendix A. Photographic log).

At Parcel 006 along N. Water Street, four (4) probable USTs were detected with GPR in the area of the strong EM response. These probable USTs are shown on Figure 5 as yellow

rectangles. Most of these probable USTs appear to be outside the planned NCDOT ROW. The approximate sizes of each probable UST identified can be found in Table 1 below.

Tank ID	Length (ft)	Width (ft)
Probable UST 1	24	5
Probable UST 2	24	5
Probable UST 3	24	5
Probable UST 4	12	5

Table 1. Approximate dimensions of the four probable USTs detected based on the GPR evaluation.

Each of the probable USTs were identified in the field with yellow ground parking paint (Appendix A, Photographic Log). Figure 7 displays cross sectional images of the probable USTs. The depth to the top of the probable USTs is approximately 3 feet below land surface (bls). The fill port is visible at the land surface on probable UST 4.

Conclusions

- Geo Solutions completed a detailed EM and GPR evaluation over two areas near the intersection of W. 2nd Street and N. Water Street in Lumberton, North Carolina where the NCDOT plans to widen the roadway.

- A suspected reinforced concrete slab and a suspected non-metallic GPR anomaly were detected at Parcel 005 along W. 2nd Street.

- Four (4) probable USTs were detected at Parcel 006. One of the probable USTs has a fill port visible at the surface. Most of these probable USTs appear to be outside the NCDOT ROW.

- Two areas of suspected reinforced concrete slabs are present at Parcel 006 along with subsurface stormwater and sanitary sewer piping.

Limitations

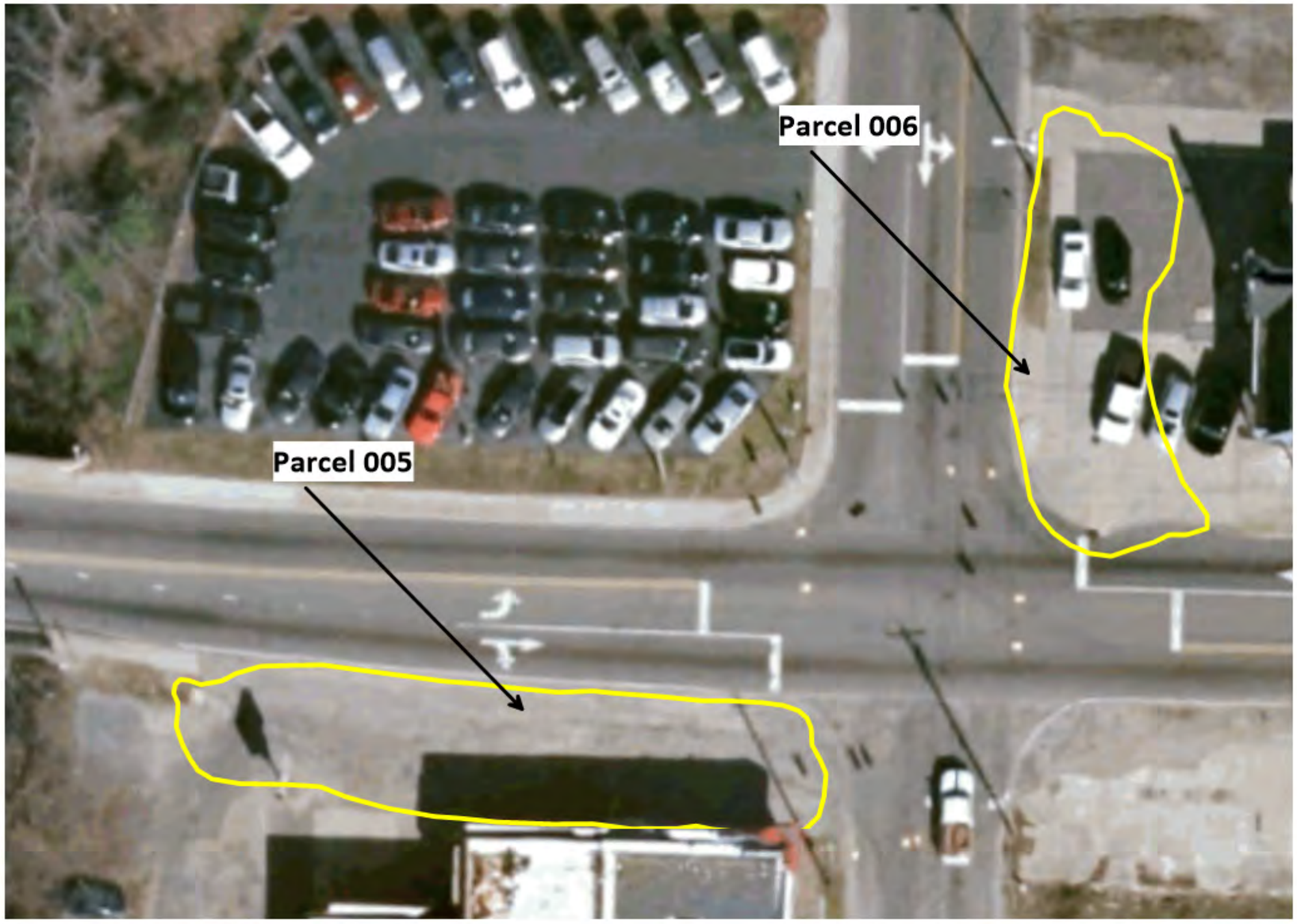
The detection of subsurface objects is dependent upon parameters that include size, physical composition, and depth of burial. The combination of these parameters may produce a response that is below the detection threshold for a given geophysical method. The presence of reinforced concrete limits GPR and EM detections of subsurface structures below the slabs.

Please don't hesitate to call if you have any questions concerning this report. We appreciate the opportunity to have worked with you on this project.

Very truly yours,

GEO SOLUTIONS LIMITED, INC.

John DeLoatch, PG
Project Manager



LEGEND

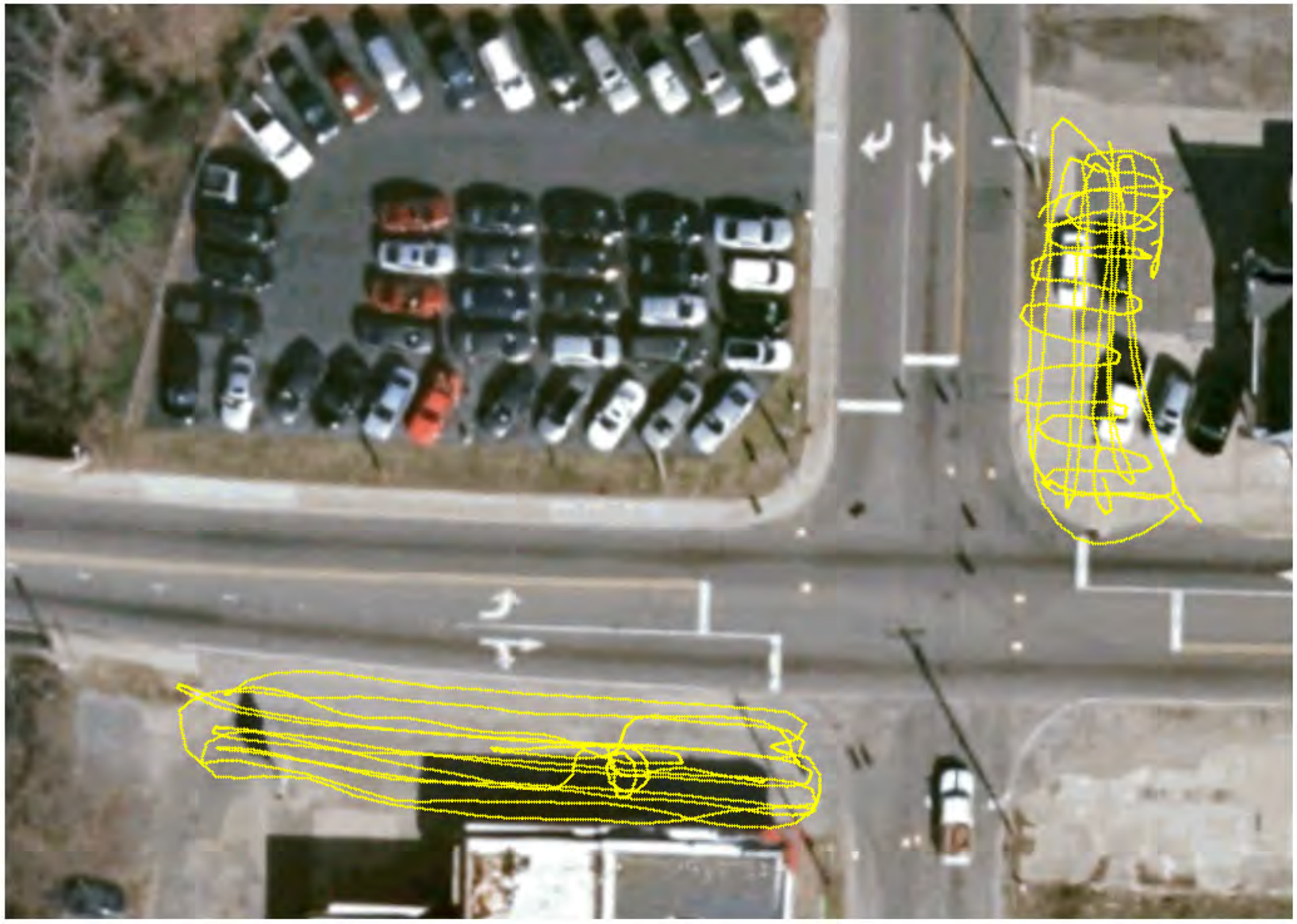
Geophysical Boundary

Map Scale (ft)

0 25 50

1" = 25'

Figure 1	Geophysical Evaluation Site Map
NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



LEGEND

Indicates Location of EM Data Point

Map Scale (ft)

0 25 50

1" = 25'

Figure 2	Geophysical Evaluation EM Profile Location Map

NCDOT U-5985
N. Water Street and W. 2nd Street
Lumberton, NC

Geo Solutions Ltd.

LEGEND

9810 Hz In-phase (PPM)

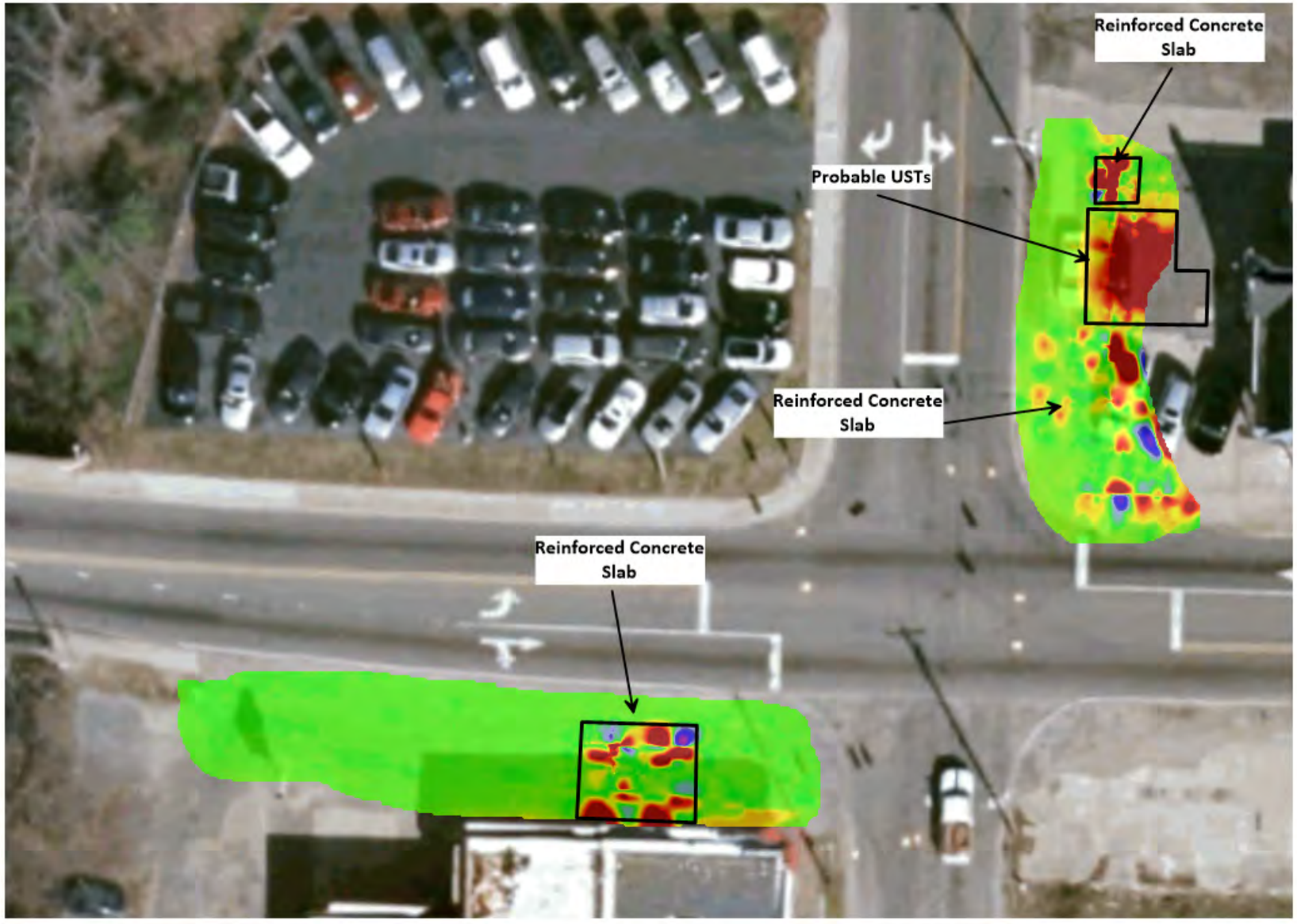
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
-6000
-7000
-8000

Map Scale (ft)

0 25 50

1" = 25'

Figure 3	Geophysical Evaluation EM In-phase (Metal Detection) Results Map
NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



LEGEND

9810 Hz Apparent Conductivity (mS/m)

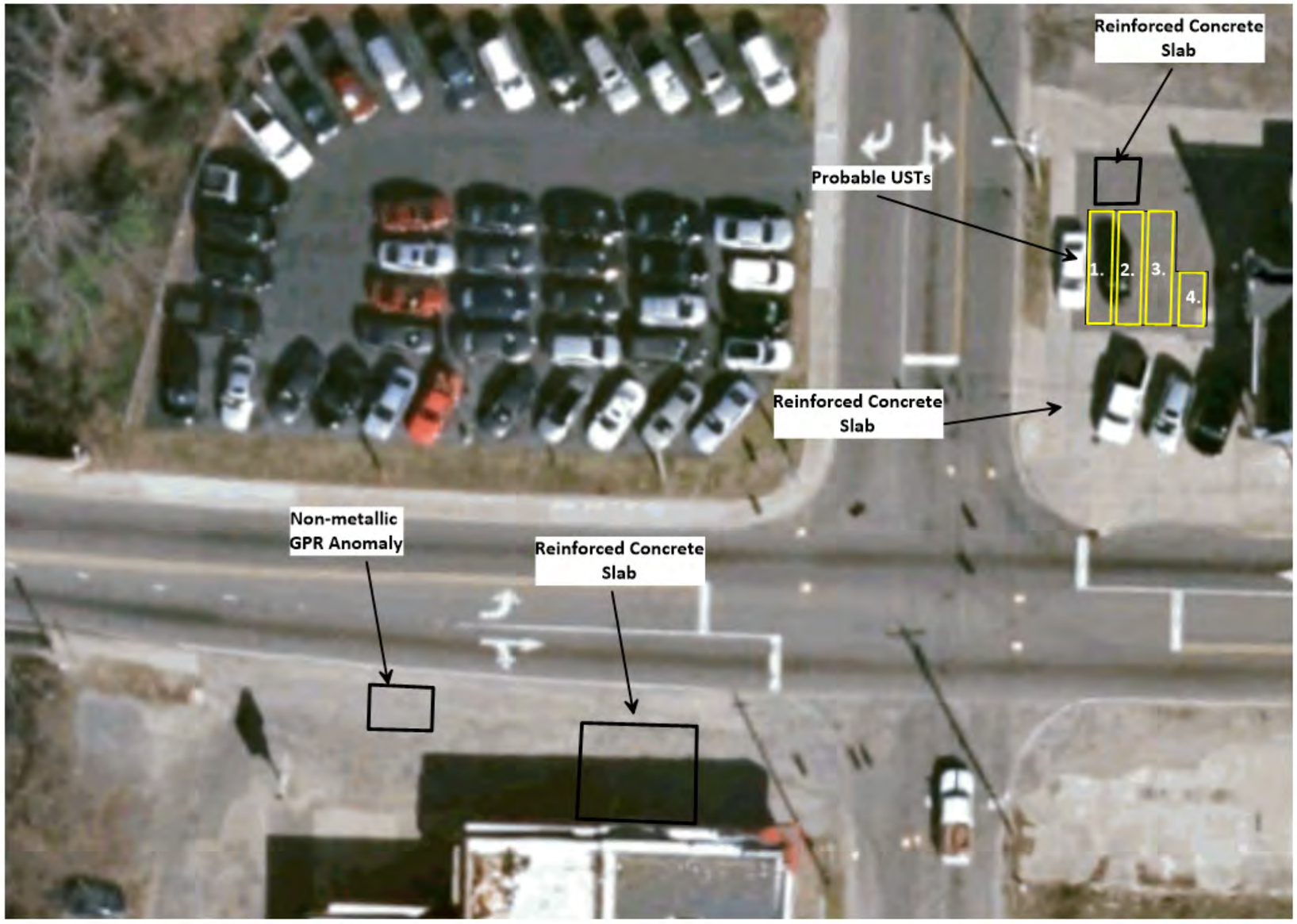
1000
875
750
625
500
375
250
125
0
-125
-250
-375
-500
-625
-750
-875
-1000

Map Scale (ft)

0 25 50

1" = 25'

Figure 4	Geophysical Evaluation EM Apparent Conductivity Results Map
NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



LEGEND

Boundary of Subsurface Detection

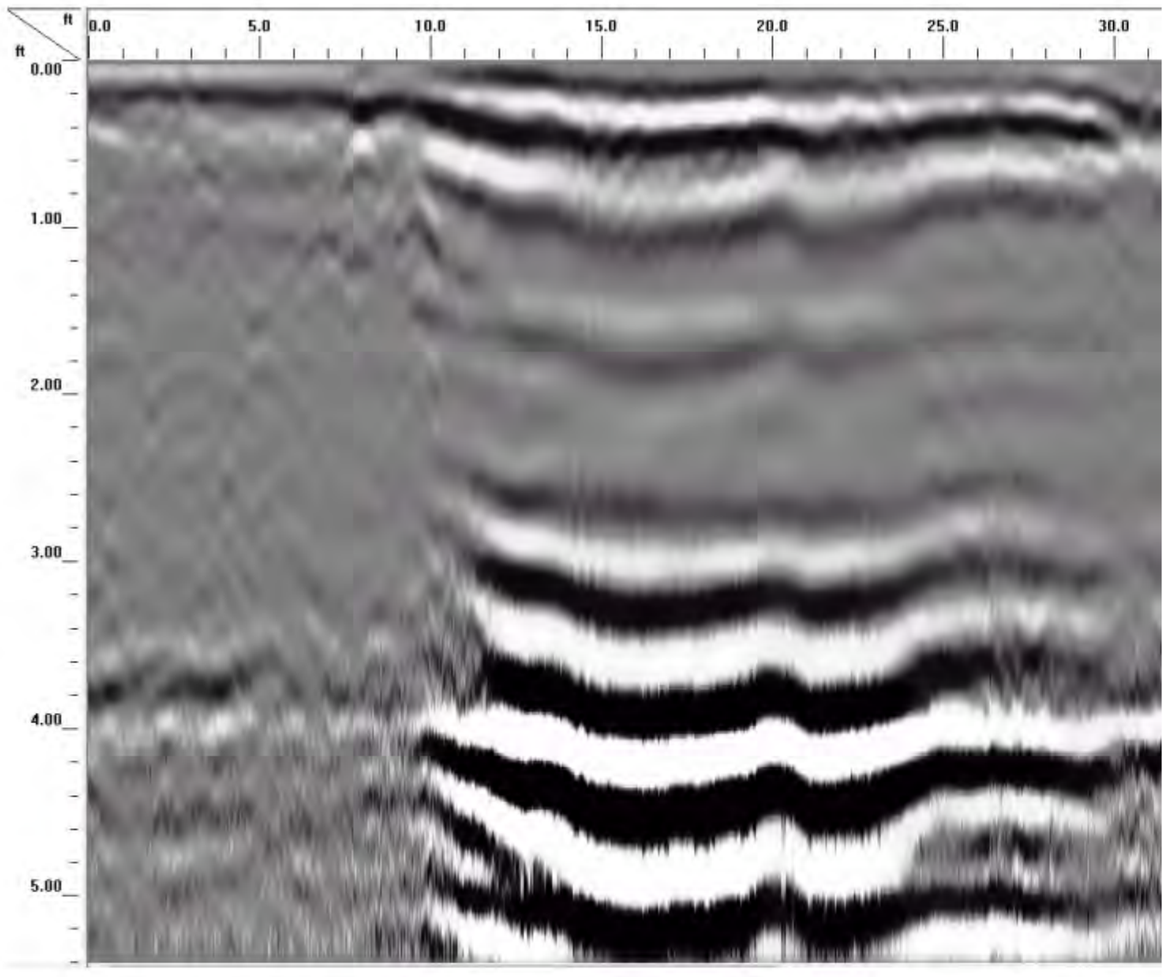
Probable UST

Map Scale (ft)

0 25 50

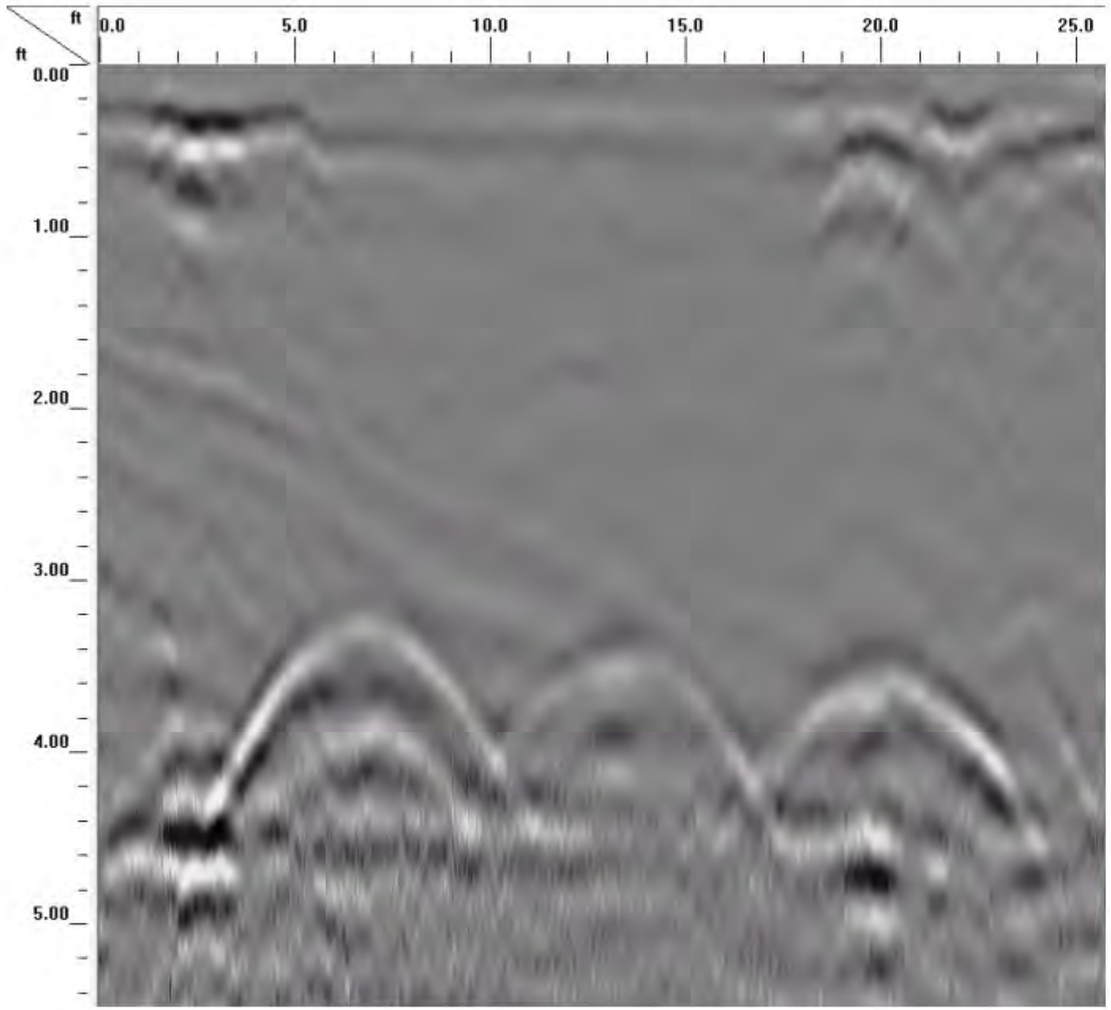
1" = 25'

Figure 5	Geophysical Evaluation Ground-penetrating Radar Results Map
NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	

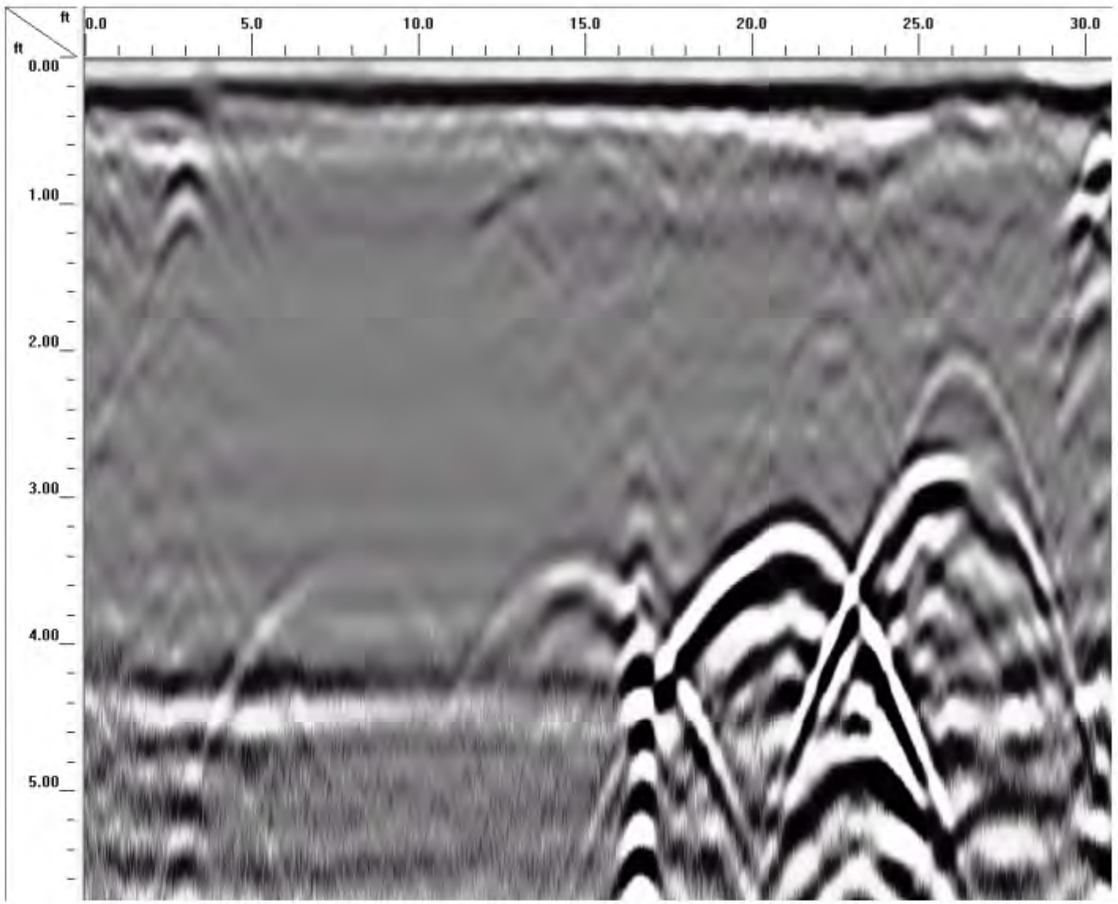


Profile 1. Transect collected across non-metallic conductive anomaly.

Figure 6	Ground-penetrating Radar Evaluation Cross Section of anomaly.
NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



Profile 1. Transect collected across the north end of the probable USTs 1-3.



Profile 2. Transect collected across the south end of the probable USTs 1-4.

Figure 7	Ground-penetrating Radar Evaluation Cross Sections of Probable USTs.
	NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC
	Geo Solutions Ltd.

Appendix A. Photograph Log – NCDOT U-5985 – Lumberton, NC

Photograph 1. Parcel 005 non-metallic GPR anomaly.

Photograph 2. Parcel 005 area of suspected reinforced concrete slab.

Photograph 3. Parcel 006 four (4) probable USTs.

Photograph 4. Parcel 006 fill port on probable UST 4.

Photograph 5. Parcel 006 area of reinforced concrete, subsurface piping, storm drain, and manhole.

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APPENDIX B

BORING LOGS

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SOIL BORING LOG

Boring #	B-1	**Job Name**	NCDOT B-5985, Parcel 005	**Project #**	2191306.11
Date	11/16/2021	**Site Loc.**	Lumberton, NC	**Gnd EL**	NA
WR Rep	B. Whitley	**Driller**	Regional Probing (GeoProbe)	**GW EL**	NA

Depth in Feet		Soil Description	Total VOCs (in ppm)	
From	To		Sample Interval	PID/FID
0.0	0.17	Asphalt (1")	NR	
0.17	1.0	Moist, tan-brown, sandy CLAY	0-2	0.5
1.0	6.0	Moist, tan-brown, silty fine-to-medium SAND	2-4	0.9 *
			4-6	0.8
6.0	7.0	Moist, tan-orange-gray, sandy CLAY	6-8	0.8
7.0	9.0	Moist, tan, fine-to-medium SAND	8-10	0.7
9.0	10.0	Wet, dark gray-brown, silty fine-to-medium SAND		
		Boring terminated at 10' bgs		*submitted for analysis

NR=No reading
NA=Not Applicable
BGS=Below ground surface
TOC=Top of Casing
El=Elevation
ppm=parts per million
GW=Ground Water
USCS=Unified Soil Classification System
GW=Ground Water

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SOIL BORING LOG

Boring #	B-2	**Job Name**	NCDOT B-5985, Parcel 005	**Project #**	2191306.11
Date	11/16/2021	**Site Loc.**	Lumberton, NC	**Gnd EL**	NA
WR Rep	B. Whitley	**Driller**	Regional Probing (GeoProbe)	**GW EL**	NA

Depth in Feet		Soil Description	Total VOCs (in ppm)	
From	To		Sample Interval	PID/FID
0.0	0.17	Asphalt	NR	
0.17	4.0	Moist, tan-gray, silty fine-to-medium SAND	0-2	0.8
			2-4	1.0
4.0	9.0	Moist, tan-white, silty fine-to-medium SAND	4-6	1.4 *
			6-8	1.1
			8-10	0.8
9.0	10.0	Moist, dark gray, silty fine-to-medium SAND		
		Boring terminated at 10' bgs		*submitted for analysis

NR=No reading
NA=Not Applicable
BGS=Below ground surface
TOC=Top of Casing
El=Elevation
ppm=parts per million
GW=Ground Water
USCS=Unified Soil Classification System
GW=Ground Water

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SOIL BORING LOG

Boring #	B-3	**Job Name**	NCDOT B-5985, Parcel 005	**Project #**	2191306.11
Date	11/16/2021	**Site Loc.**	Lumberton, NC	**Gnd EL**	NA
WR Rep	B. Whitley	**Driller**	Regional Probing (GeoProbe)	**GW EL**	NA

Depth in Feet		Soil Description	Total VOCs (in ppm)	
From	To		Sample Interval	PID/FID
0.0	0.17	Asphalt (1")	NR	
0.17	9.0	Moist, gray-brown, silty fine-to-medium SAND	0-2	0.4
			2-4	1.0
			4-6	1.1 *
			6-8	0.9
			8-10	0.6
9.0	10.0	Moist-wet, dark brown, sandy CLAY		
		Boring terminated at 10' bgs		*submitted for analysis

NR=No reading
NA=Not Applicable
BGS=Below ground surface
TOC=Top of Casing
El=Elevation
ppm=parts per million
GW=Ground Water
USCS=Unified Soil Classification System
GW=Ground Water

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SOIL BORING LOG

Boring #	B-4	**Job Name**	NCDOT B-5985, Parcel 005	**Project #**	2191306.11
Date	11/16/2021	**Site Loc.**	Lumberton, NC	**Gnd EL**	NA
WR Rep	B. Whitley	**Driller**	Regional Probing (GeoProbe)	**GW EL**	NA

Depth in Feet		Soil Description	Total VOCs (in ppm)	
From	To		Sample Interval	PID/FID
0.0	0.17	Asphalt (1")	NR	
0.17	2.0	Urban fill - Moist silty sand with bricks, stone	0-2	0.6
2.0	9.0	Moist, tan-gray-white, fine-to-medium SAND	2-4	0.5
			4-6	0.5
			6-8	0.6
			8-10	0.5
9.0	10.0	Moist-wet, gray-black, fine-to-medium SAND		
		Boring terminated at 10' bgs No sample submitted for laboratory analysis		

NR=No reading
NA=Not Applicable
BGS=Below ground surface
TOC=Top of Casing
El=Elevation
ppm=parts per million
GW=Ground Water
USCS=Unified Soil Classification System
GW=Ground Water

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APPENDIX C

REDLAB ANALYTICAL REPORTS AND CHAIN OF CUSTODY

QED

REDLAB RAPID ENVIRONMENTAL DIAGNOSTICS

QROS

Hydrocarbon Analysis Results

Client: WITHERS RAVENEL
Address 115 MACKENAN DR
CARY, NC

Contact: BEN WHITLEY

Project: B-5985

Samples taken Tuesday, November 16, 2021
Samples extracted Tuesday, November 16, 2021
Samples analysed Wednesday, November 17, 2021

Operator HARRY WOOTEN

F03640

Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	Ratios			HC Fingerprint Match
										% light	% mid	% heavy	
s	005 B-1 (2-4')	34.4	<0.86	4.7	39.4	44.1	19	2.1	0.053	23.7	66.7	9.6	Road Tar 81.6%,(FCM)
s	005 B-2 (4-6')	19.3	<0.48	2.6	0.58	3.18	0.3	<0.15	<0.019	91.1	6.6	2.2	Deg.PHC 90.4%,(FCM)
s	005 B-3 (4-6')	33.3	<0.83	3.1	16.9	20	11	0.57	<0.033	29.3	60.7	10.1	Deg Fuel 92.1%,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 103.6 %

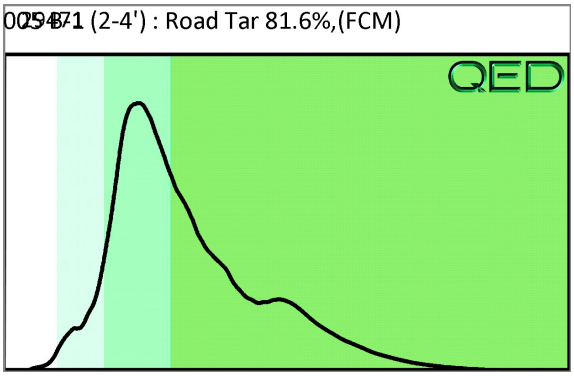
Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content

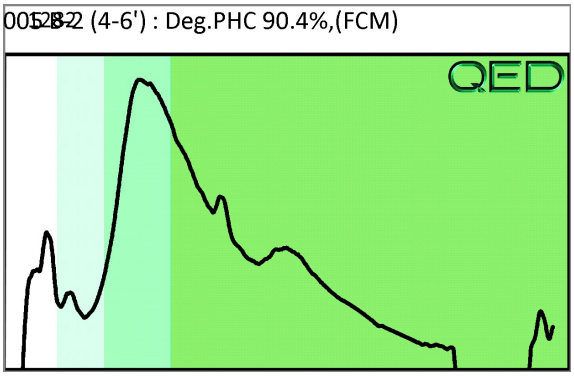
Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library

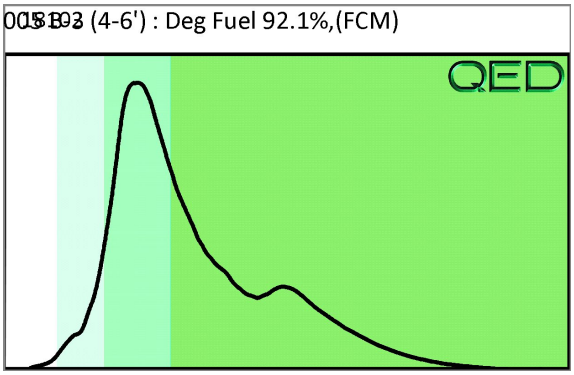
(SBS) or (LBS) = Site Specific or Library Background Subtraction applied to result : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate present

QED Hydrocarbon Fingerprints

Project: B-5985 ##################







Client Name:	WR
Address:	115 Mackenan Dr. Cary NC
Contact:	Ben Whitley
Project Ref.:	B-5985
Email:	bwhitley@withersravenel.com
Phone #:	984-400-3040
Collected by:	B. Whitley

REDLAB™
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 UVF sample will be analyzed for total BTEX, GRO, DRO, TPH, PAH total aromatics and BaP. Standard GC Analyses are for BTEX and Chlorinated Solvents: VC, 1,1 DCE, 1,2 cis DCE, 1,2 trans DCE, TCE, and PCE. Specify target analytes in the space provided below.

Sample Collection Date/Time	TAT Requested 24 Hour	TAT Requested 48 Hour	Analysis Type UVF	Analysis Type GC	Initials	Sample ID	Total Wt.	Tare Wt.	Sample Wt.
11/16/2021 1000		X	X		BAW	006 B-1 (8-10)'	~~50.1~~ ~~49.2~~	40.0	10.1
11/16/21 1004		X	X		BAW	006 B-2 (6-8)'	~~48.9~~ 50.8	40.0	10.8
11/16/21 1125		X	X		BAW	005 B-1 (2-4)'	49.3	40.0	9.3
11/16/21 1130		X	X		BAW	005 B-2 (4-6)'	48.9	40.1	8.8
11/16/21 1135		X	X		BAW	005 B-3 (4-6)'	49.7	40.1	9.6

COMMENTS/REQUESTS: please report 006 and 005 samples in separate spreadsheets

TARGET GC/UVF ANALYTES:

Relinquished by		Accepted by	Date/Time
B. Whitley - WR		FEDEX	11/16/21 1220
Relinquished by		Accepted by	Date/Time
		Claire Nalcamerman	11/17/2021 10:50 AM

RED Lab USE ONLY

(5)

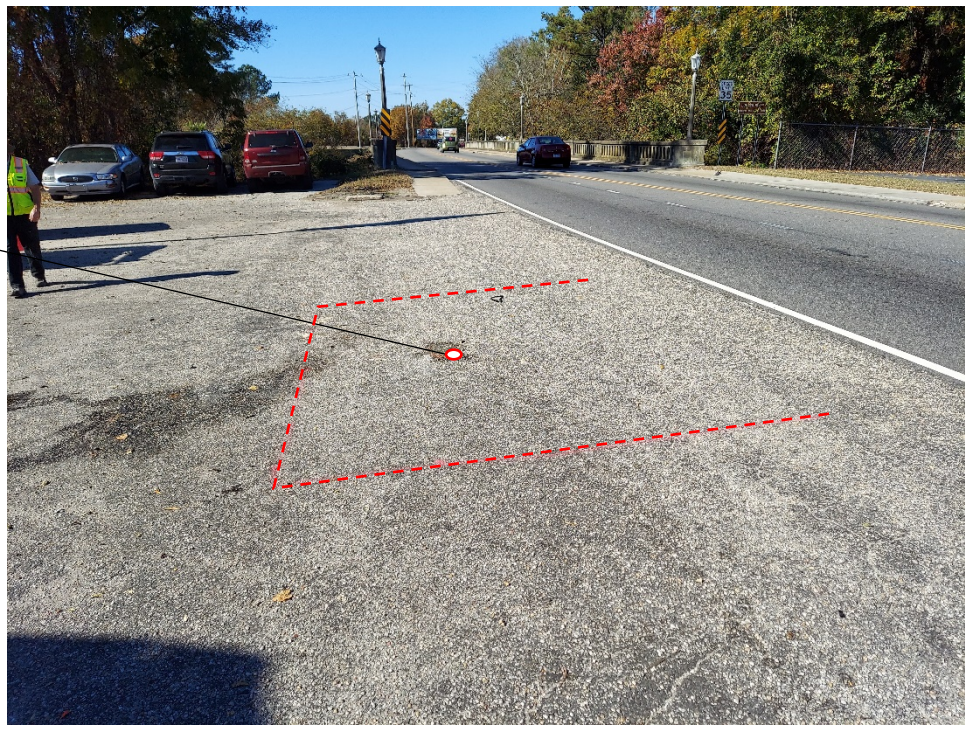
Ref. No 11-2021

APPENDIX D

PHOTOGRAPHIC LOG

Photo No. 1  	View of Borings B-1 through B-3 surrounding the concrete slab, facing east (taken 11-16-2021)
Photo No. 2  	View of Borings B-1 through B-3 surrounding the concrete slab, facing west (taken 11-3-2021)

Photo No. 3



View of Boring B-4 advanced within the GPR anomaly on the western portion of the site, facing west

(taken 11-16-2021)

Photo No. 4

View of Boring B-4 advanced within the GPR anomaly on the western portion of the site, facing west

(taken 11-3-2021)

WithersRavenel
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January 19, 2022

Craig E. Haden
NC Department of Transportation
1589 Mail Service Center
Raleigh, NC 27699-1589

Reference: **GeoEnvironmental Investigation Summary Letter**
TIP Number B-5985
WBS Number 47749.1.1
Parcel #006, Taylor Insurance Agency, Inc.
No Physical Address
PIN 939175070700
Lumberton, Robeson County, North Carolina
WR Project No. 02191306.11

Dear Mr. Haden:

WithersRavenel, Inc. (WR) is pleased to submit this summary letter describing limited GeoEnvironmental Investigation activities for the above referenced property. The investigation was conducted in accordance with verbal and email correspondence between Mr. Haden of NCDOT and WR on December 8, 2021; WR's Proposal dated December 10, 2021; and Limited Services Contract #7000020477 between the NCDOT and WithersRavenel, dated April 15, 2020. These assessment activities were completed at the request of NCDOT in support of replacing Bridge #770125 over the Lumber River on NC 41/72 and Bridge #770175 over the Lumber River on SR 1600.

The project site is located in Lumberton at Parcel #006 (no current street address), identified by Robeson County PIN number 939175070700 (hereafter referred to as the site). The project limits have been defined as additional proposed right-of-way at Parcel #006 at the southeastern corner of the intersection of W. 2nd Street (NC 41/72) and N. Water Street. The additional right of way (ROW) is required for the installation of a signal pole at the intersection.

Parcel #006 consists of a 0.64-acre parcel of commercial land that is currently improved upon with an abandoned one-story retail building, and the footprint of a former structure that was demolished. Concrete pavement is located in the area of the proposed ROW. In addition, the remnant of a former dispenser island is located on the northwestern portion of the site in the vicinity of the proposed ROW.

WR visited the site on December 21, 2021, in an effort to locate possible UST system components and other subsurface features within the proposed NCDOT right-of-way. WR subcontracted Geo Solutions Limited, Inc. (Geo Solutions), who utilized multi-frequency electromagnetic (EM) and ground penetrating radar (GPR) methods to perform the geophysical survey. The EM evaluation

was performed using a Geophex Model GEM-2 profiler. The EM data was collected with a hand-held logger and location information was recorded using a sub-meter global positioning system (GPS) unit. Geo Solutions also completed a GPR evaluation using a GSSI SIR 4000 connected to a 400 MHz antenna. The spacing of survey transects were three feet or less across the site during both methods.

Based upon the results of the EM and GPR surveys, three (3) probable USTs were identified along the southern proposed ROW line. The three USTs are estimated to be approximately five (5) feet in length and four (4) feet in diameter. Fill ports were observed at the southern end of the probable USTs.

The following table describes the USTs located during the geophysical survey:

UST ID	Confidence Level	Location	Contents	Dimensions L x Dia.
UST 1	Probable	NE corner of site, near N. Water St.	Unknown	5' x 4'
UST 2	Probable	NE corner of site, near N. Water St.	Unknown	5' x 4'
UST 3	Probable	NE corner of site, near N. Water St.	Unknown	5' x 4'

Geo Solutions' findings are presented in their *Technical Report – Geophysical Evaluation*, attached to this letter. The locations of the USTs relative to the proposed ROW line can be seen in Figures 3 through 5, and photographs of the USTs are provided in Appendix A. of Geo Solutions' report.

Please contact us if you have any questions or comments regarding this report.

Sincerely,
WithersRavenel

DocuSigned by:
146C3C179A8A468...
01/31/2022

Benjamin Whitley, PE
Senior Project Manager – Environmental

R.S. (Butch) Lawter, Jr., PE
Vice President – Environmental Services

Attached: *Technical Report – Geophysical Evaluation*, Geo Solutions Limited, Inc.,

Technical Report

Geophysical Evaluation

NCDOT U-5985 – Lumberton, NC

Prepared For:

WithersRavenel

Prepared By:

Geo Solutions Limited, Inc.

January 11, 2022

Geo Solutions Ltd.
P.O. Box 293
Conway, NC 27820
(252) 578-3233

Revised January 11, 2022

Benjamin Whitley, PE
WithersRavenel
115 MacKenan Drive
Cary, NC 27511

Re: **Geophysical Evaluation – NCDOT U-5985 – Lumberton, NC**

File: Report

Dear Mr. Whitley:

Geo Solutions Limited, Inc. (Geo Solutions) is pleased to submit this report to WithersRavenel of a geophysical evaluation in support of an environmental site assessment of a North Carolina Department of Transportation (NCDOT) right of way (ROW) located at the southeast corner of the intersection of N. Water Street and W. 2nd Street in Lumberton, North Carolina.

Background

WithersRavenel is completing an environmental site assessment of the NCDOT ROW at the intersection of N. Water Street and W. 2nd Street in Lumberton, North Carolina. The NCDOT is planning to widen this intersection. WithersRavenel recently contracted Geo Solutions to complete a geophysical evaluation of Parcels 005 and 006 which were formally occupied by fuel service stations and are currently occupied by auto repair shops. Here, several probable underground Storage Tanks (USTs) were detected near the NCDOT ROW. Subsequently, the NCDOT requested that WithersRavenel evaluate the southeast corner of the intersection for the potential presence of USTs. As such, WithersRavenel again contracted Geo Solutions to complete a geophysical evaluation of this area. The

objective of the geophysical evaluation was to detect and map any potential USTs or other buried structure that may impact the NCDOT widening project. Figure 1 below is a site map with the geophysical evaluation boundary delineated.

Figure 1. Site map of the area of the southeast corner of the NCDOT intersection widening project with the geophysical evaluation boundary delineated in magenta.

Technical Approach

Geo Solutions completed the evaluation utilizing two geophysical methods to investigate the southeast corner of the intersection of N. Water Street and W. 2nd Street in Lumberton, North Carolina.

Multifrequency Electromagnetic (EM) Evaluation

A high resolution electromagnetic (EM) evaluation was completed using a Geophex Model GEM-2 multifrequency electromagnetic profiler which collects at a rate of 30 times per second. The EM data was collected on a hand-held data logger that communicated with the

GEM-2 unit via Bluetooth. The GEM-2 was connected to a Hemisphere Model A-325 GPS unit which is augmented by the Wide Area Augmentation System (WAAS) and is capable of submeter accuracy. The EM profile spacing was approximately 3 feet or less. The EM method is useful at evaluating the shallow subsurface for both metallic and non-metallic conductive materials such as USTs and variations in soil conductivity which may be related to former land use.

Ground-penetrating Radar (GPR) Evaluation

Geo Solutions completed a ground penetrating radar (GPR) evaluation over the two sites. Here, a GSSI SIR 4000 connected to a 400 MHz antenna mounted on a three-wheel cart was utilized. Parallel profiles spaced 3 feet or less were collected over the area of evaluation. Anomalous areas detected during the EM evaluation were scanned in greater detail. The GPR records were post processed with GSSI Radan 7 software.

Results

Multifrequency Electromagnetic Evaluation

Geo Solutions completed an EM evaluation of the site with parallel profiles spaced approximately 3 feet apart (Figure 2). Once adequate survey coverage was achieved, the EM field data were post-processed to produce a comma separated variable (CSV) file that was then transferred to a laptop computer. These data were then processed using software developed by Geophex to calculate the apparent conductivity and in-phase values for each EM frequency collected (1470Hz, 4110 Hz, 9810 Hz, 32,190 Hz, 60000 Hz, and 90030 Hz). Typically, the in-phase data (sometimes referred to as the metal detection mode) is more representative of buried metallic materials whereas the apparent conductivity is more representative of non-metallic conductive buried materials. The apparent conductivity response can also be elevated in the presence of large metal features. By evaluating both the in-phase and apparent conductivity responses, the horizontal extents of conductive and metallic materials can be characterized. All the frequencies were evaluated and the 9,810

Hz data was chosen to create figures for this report as it provided the best contrast to background site conditions and was the frequency selected to display in the report of the earlier evaluation. Shown on Figure 3 and Figure 4 are the EM in-phase (metal detection) and apparent conductivity maps respectively with explanations for the anomalous conditions observed in the EM data. Here, anomalous conditions are shown as orange to red hues. The in-phase (metal detection) and apparent conductivity responses were indicative of the presence of probable USTs at the southern side of the area of evaluation at the NCDOT ROW. Shown on Figure 4 is an area of elevated apparent conductivity within the NCDOT ROW near the northwest side of the area of evaluation. This EM response is not characteristic of a UST moreover, there was no in-phase (metal detection) response in this area. This may be related to conductive soil characteristics such as fill in this area.

Ground-penetrating Radar (GPR) Evaluation

Figure 5 is a map documenting the results of the GPR evaluation. The anomalous area detected during the EM evaluation was further evaluated with GPR. Here, three (3) probable USTs were detected. Fill ports were visible at the surface on the southern end of the probable USTs. The probable USTs were identified in the field with orange ground-marking paint (Appendix A. Photographic Log). The dimensions of the each of the probable USTs were approximately 5'X4'. The distance to the closest UST from N. Water Street is approximately 14' and the distance from W. 2nd Street is approximately 28'. This is shown on Figure 5. Parallel GPR profiles were collected over the entire area of evaluation. A suspected unknown utility was detected near the northwest corner of the area of evaluation. This subsurface feature was identified in the field with white ground-marking paint. The location of this subsurface feature is also displayed on Figure 5. It is unknown if this suspected utility is related to the probable USTs. Shown on Figure 6 are cross sectional images of the probable USTs from the GPR data. The locations from which these GPR cross sections were collected are displayed on Figure 5. The top of the probable USTs were found to be between 2' and 2.5' below the land surface (bls). Figure 7 is a map

with the geophysical results overlaid on the NCDOT design plan. This figure displays the results of both the EM and GPR evaluations.

Conclusions

- Geo Solutions completed a detailed EM and GPR evaluation over the southeast corner of the intersection of N. Water Street and W. 2nd Street in Lumberton, North Carolina where the NCDOT plans to widen the roadway.

- Three (3) probable USTs were detected. The probable USTs have fill ports visible at the surface. These probable USTs appear to be within the NCDOT ROW.

- A suspected unknown utility was detected at the northwest corner of the area of evaluation. This is likely within the NCDOT ROW. It is unknown if this suspected utility is related to the probable USTs.

- An area of elevated EM apparent conductivity was detected near the northwest corner of the area of evaluation. This EM response is not characteristic of a UST.

Limitations

The detection of subsurface objects is dependent upon parameters that include size, physical composition, and depth of burial. The combination of these parameters may produce a response that is below the detection threshold for a given geophysical method.

Please don't hesitate to call if you have any questions concerning this report. We appreciate the opportunity to have worked with you on this project.

Very truly yours,

GEO SOLUTIONS LIMITED, INC.

John DeLoatch, PG
Project Manager

LEGEND

Geophysical Boundary

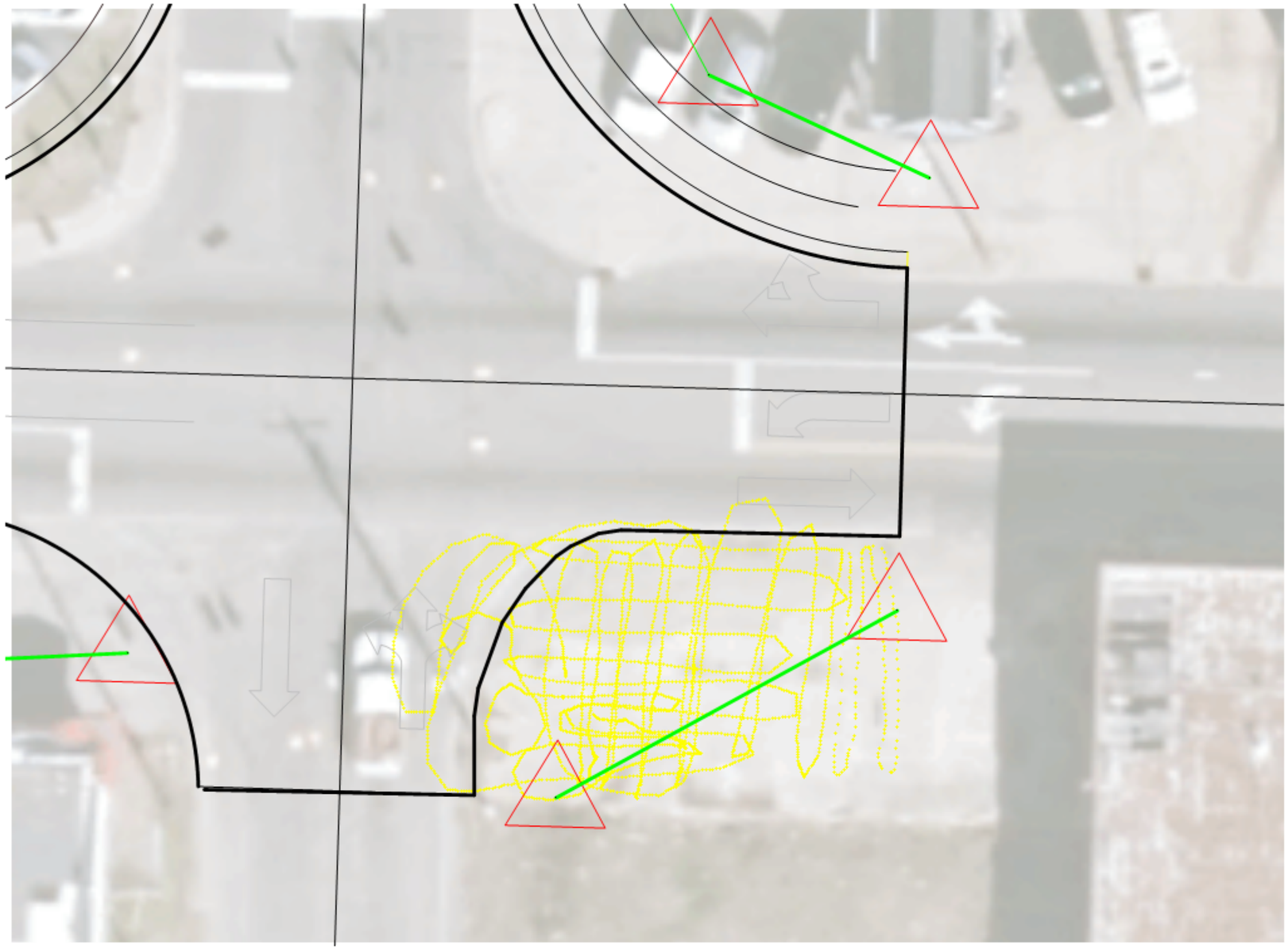
Proposed ROW

Map Scale (ft)

0 15 30

1" = 15'

Figure 1	Geophysical Evaluation Site Map
NCDOT U-5985 SE Corner of N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



LEGEND

Indicates Location of EM Data Point

Proposed ROW

Map Scale (ft)

0 15 30

1" = 15'

Figure 2	Geophysical Evaluation EM Profile Location Map
NCDOT U-5985 SE Corner of N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	

LEGEND

9810 Hz In-phase (PPM)

100000
7200
6200
5200
4200

Proposed ROW

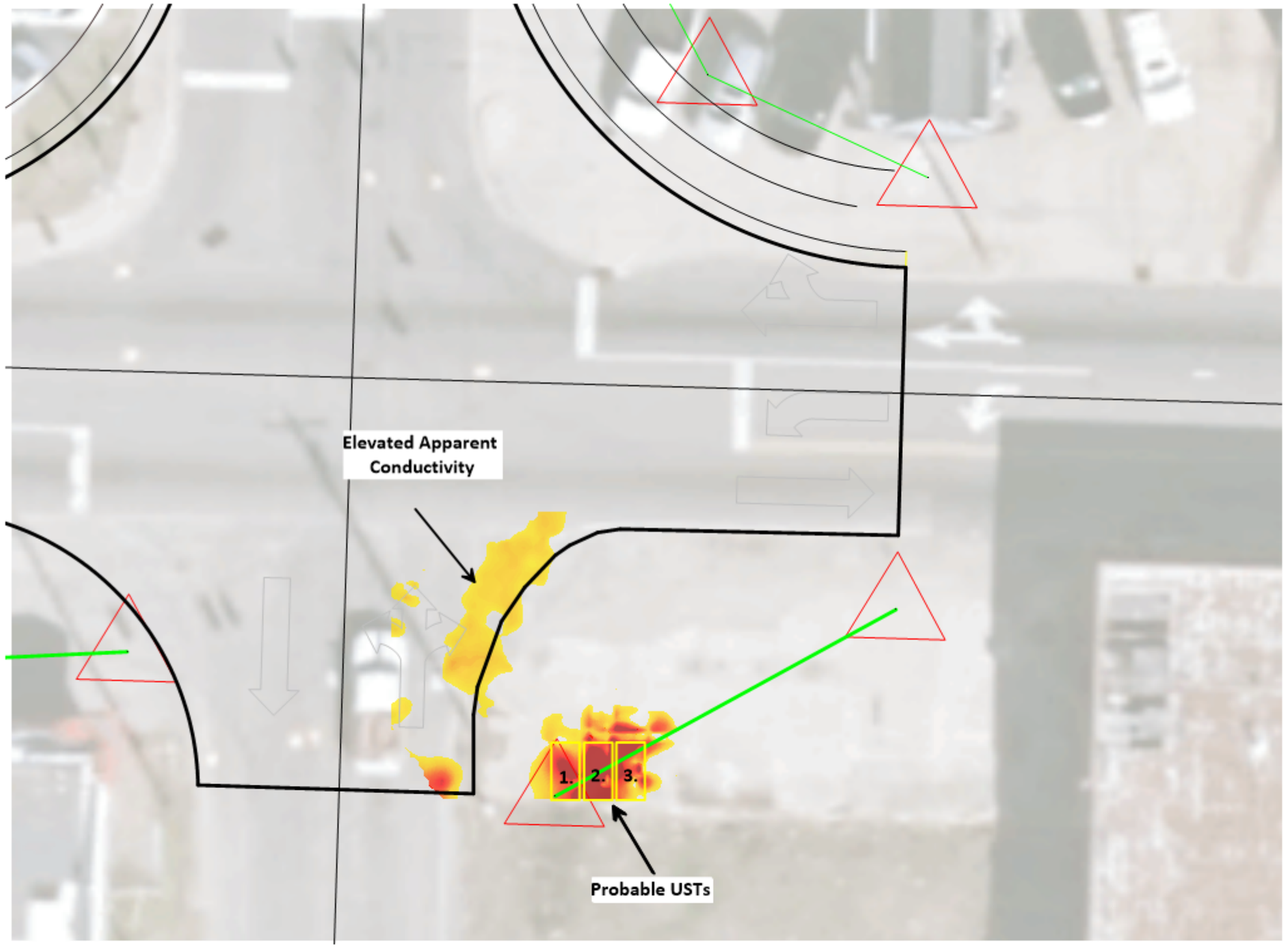
Probable UST

Map Scale (ft)

0 15 30

1" = 15'

Figure 3	Geophysical Evaluation EM In-phase (Metal Detection) Results Map
NCDOT U-5985 SE Corner of N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



LEGEND

9810 Hz Apparent Conductivity (mS/m)

1000
360
310
260
210
160

Proposed ROW

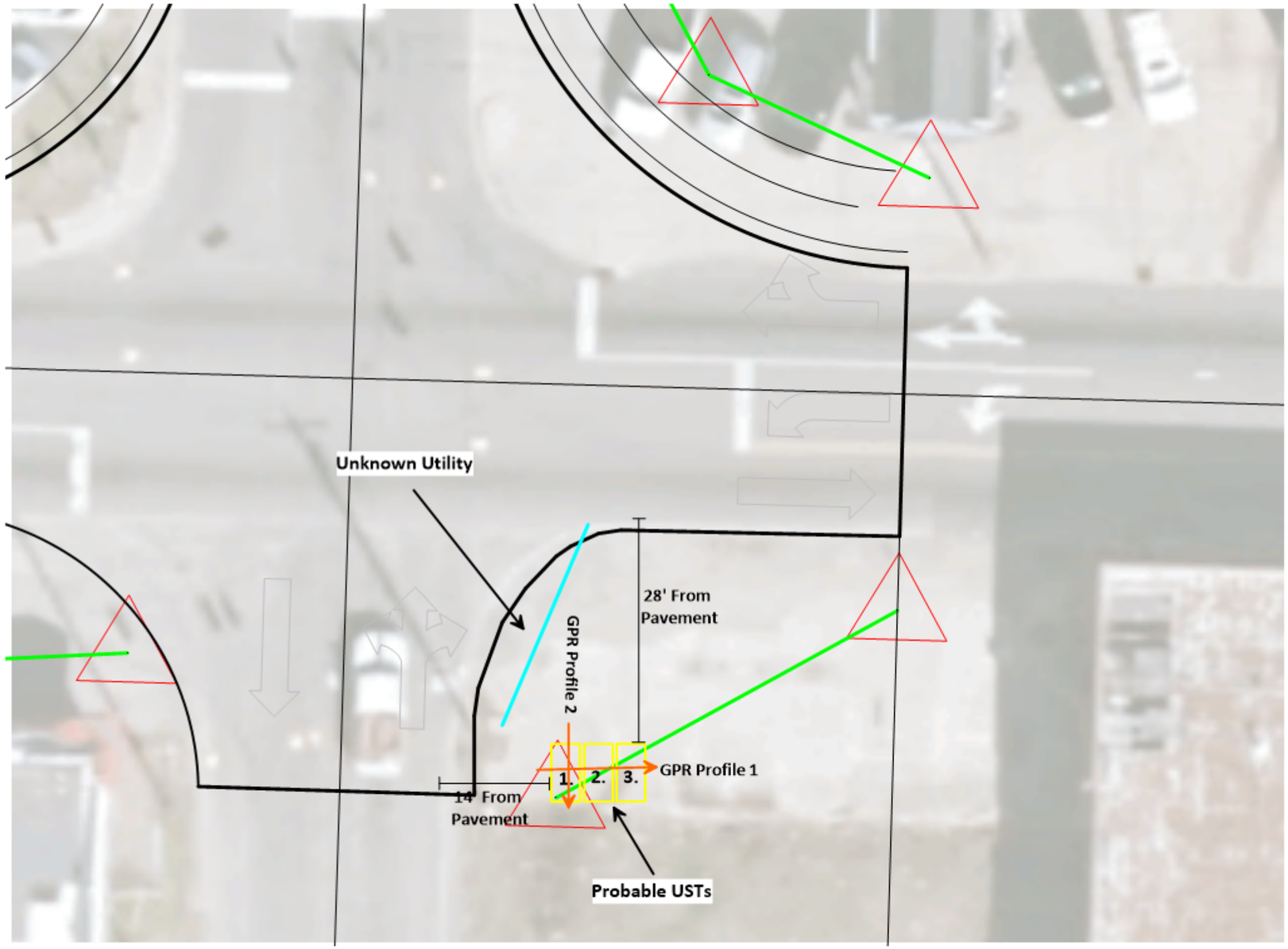
Probable UST

Map Scale (ft)

0 15 30

1" = 15'

Figure 4	Geophysical Evaluation EM Apparent Conductivity Results Map
NCDOT U-5985 SE Corner of N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



LEGEND

Probable UST

Unknown Utility

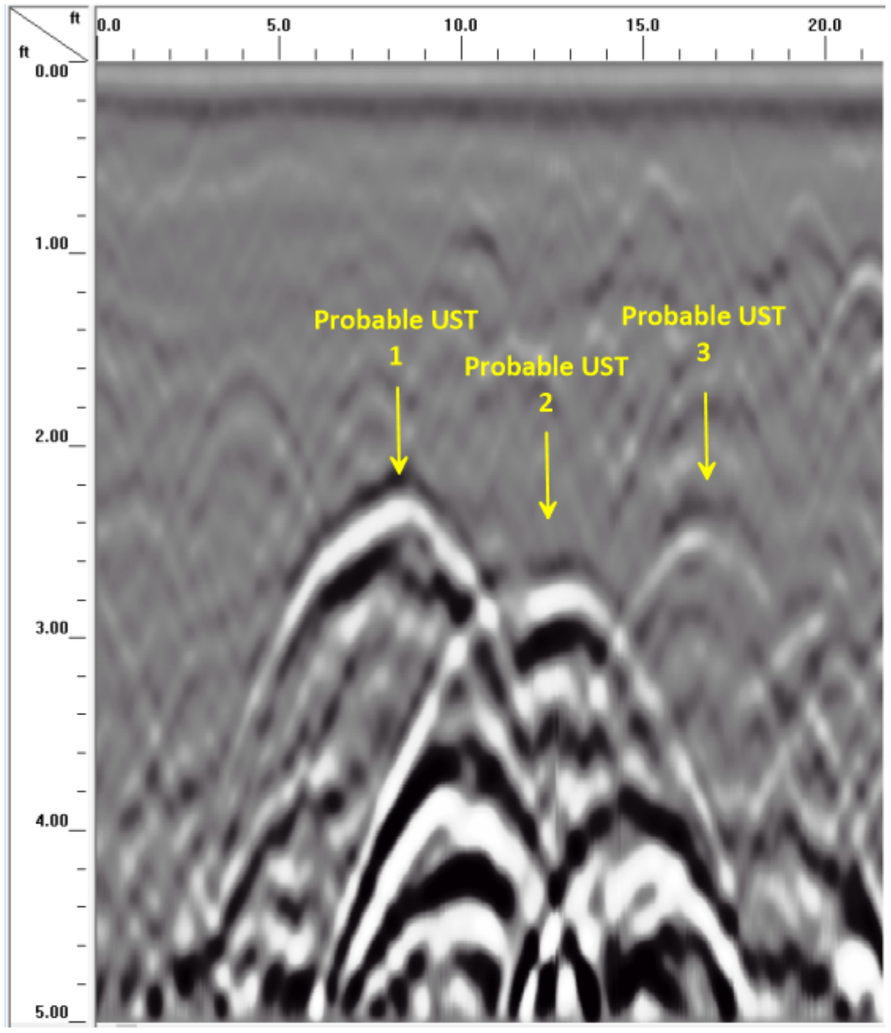
Proposed ROW

Map Scale (ft)

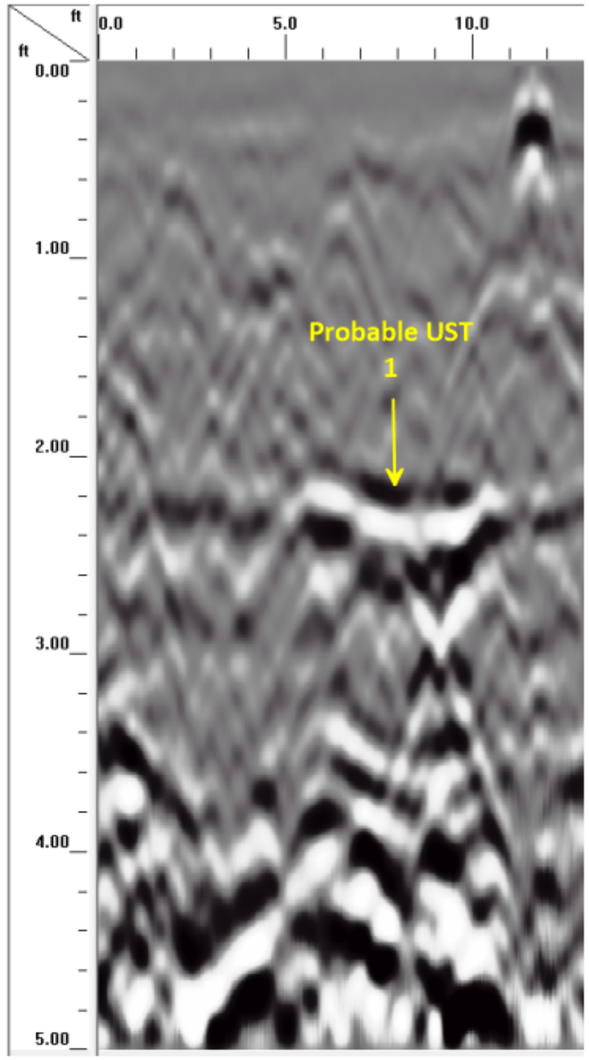
0 15 30

1" = 15'

Figure 5	Geophysical Evaluation Ground-penetrating Radar Results Map
NCDOT U-5985 SE Corner of N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	

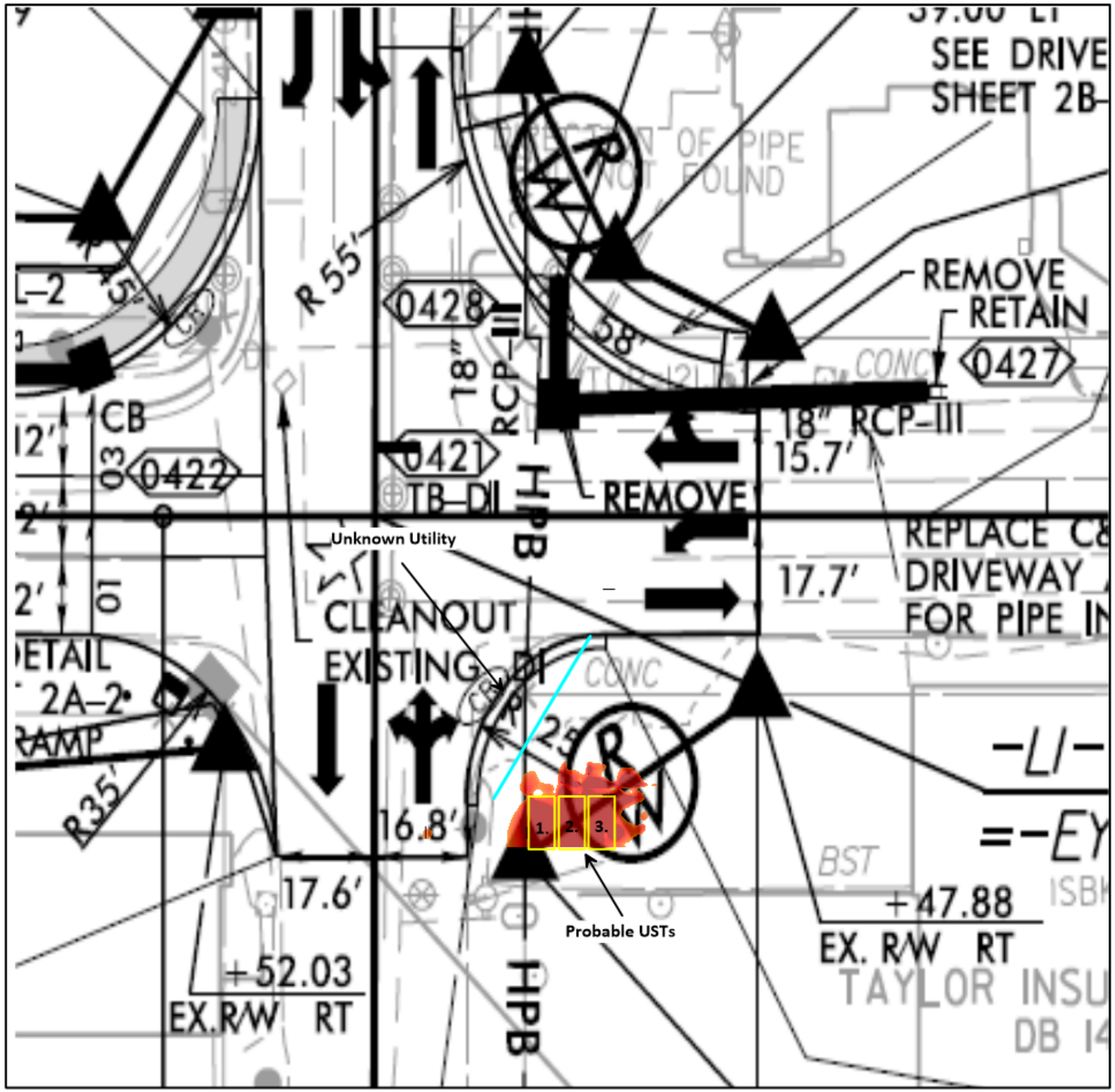


Profile 1. Transect collected across the axis of the three probable USTs.



Profile 2. Transect collected along the axis of Probable UST 1.

Figure 6	Ground-penetrating Radar Evaluation Cross Sections of Probable USTs.
NCDOT U-5985 SE Corner of N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



LEGEND

Probable UST

Unknown Utility

Proposed ROW

Map Scale (ft)

0 15 30

1" = 15'

Figure 7	Geophysical Evaluation Geophysical Results Map overlaid on NCDOT Design Plan
NCDOT U-5985 SE Corner of N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	

Appendix A. Photograph Log – NCDOT U-5985 – Lumberton, NC

Photograph 1. Probable USTs identified with orange ground-marking paint.

Photograph 2. Fill port visible at the surface.

Photograph 3. Suspected unknown utility identified with white ground-marking paint.

GEOENVIRONMENTAL PHASE II INVESTIGATION

TIP NUMBER B-5985

Parcel #006 – Lee Investments of Lumberton NC LLC
126 West 2nd Street
PIN 939175094600
Lumberton, Robeson County, North Carolina
WR Project No. 02191306.11

NCDEQ UST Section Information
Facility ID: N/A
Facility Name: Lee's Service Center
Facility Owner: Lee Investments of Lumberton NC LLC

Prepared for:

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

Report Prepared By:

WithersRavenel, Inc.
115 MacKenan Drive
Cary, North Carolina 27511
(919) 469-3340
North Carolina Firm License No. C-0832

December 6, 2021

WithersRavenel
Our People. Your Success.

December 6, 2021

Craig E. Haden
NC Department of Transportation
1589 Mail Service Center
Raleigh, NC 27699-1589

Reference: **GeoEnvironmental Phase II Investigation**
TIP Number B-5985
WBS Number 47749.1.1
Parcel #006, Lee Investments of Lumberton NC LLC
126 West 2nd Street
Lumberton, Robeson County, North Carolina
WR Project No. 02191306.11

Dear Mr. Haden:

WithersRavenel, Inc. (WR) is pleased to submit this report describing limited GeoEnvironmental Phase II Investigation activities for the above referenced property. The enclosed report summarizes the results of subsurface geophysical and soil sampling assessment activities completed in November of 2021 with the purpose of assessing the above referenced property by the North Carolina Department of Transportation Geotechnical Engineering Unit (NCDOT GEU).

The investigation was conducted in accordance with NCDOT's Request for Technical and Cost Proposal dated October 6, 2021; WR's Proposal dated October 18, 2021; and Limited Services Contract #7000020477 between the NCDOT and WithersRavenel, dated April 15, 2020.

Please do not hesitate to contact us with any questions or comments regarding this report.

Sincerely,
WithersRavenel

DocuSigned by:
Benjamin Whitley
146C3C179A8A468...
Dec 7, 2021

Benjamin Whitley, PE
Senior Project Manager, Environmental

R.S. (Butch) Lawter, Jr., PE
Vice President – Environmental Services

NORTH CAROLINA PROFESSIONAL SEAL 038743 ENGINEER BENJAMIN A. WHITLEY

115 MacKenan Drive | Cary, NC 27511
t: 919.469.3340 | f: 919.467.6008 | www.withersravenel.com | License No. C-0832
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TABLE OF CONTENTS

1. INTRODUCTION

WithersRavenel, Inc. (WR) is pleased to submit this investigation report describing GeoEnvironmental Phase II Investigation activities completed at the Lee Investments of Lumberton NC LLC property (Parcel #006) located at 126 West 2nd Street, Lumberton, NC (the Site). **Sheet 1** depicts the site location on a USGS topographic map. These assessment activities were completed at the request of NCDOT in support of replacing Bridge #770125 over the Lumber River on NC 41/72 and Bridge #770175 over the Lumber River on SR 1600.

The Site currently operates as a pre-owned automotive sales facility. The Site was formerly a filling station, and no underground storage tanks (USTs) appear to be formally registered with the North Carolina Department of Environmental Quality (NCDEQ) UST Section. However, according to NCDEQ UST Section incident files, four USTs were in operation at the site from approximately 1935 to 1988, which were abandoned in place in December 1988. A site check was performed in August 2016 adjacent to the UST basin and dispenser island. Soil contamination was detected above UST Section Action Limits. In addition, two permanent monitoring wells (MW-1 and MW-2) were installed near the UST basin and fuel island. Groundwater contamination was detected above 15A NCAC 2L Groundwater Quality Standards. The site was assigned UST Number FA-7723 and Incident Number 42003. Based on the findings of a subsequent Limited Site Assessment, a Notice of Residual Petroleum was filed with the Robeson County Register of Deeds, and NCDEQ issued a No Further Action letter on May 31, 2019.

The UST basin is located on the western portion of the site between North Water Street and the former filling station building. The site is generally covered by concrete pavement.

1.1. Scope of Services

WR conducted a geophysical survey in an effort to locate possible UST system components and other subsurface features within the proposed NCDOT right-of-way. WR subcontracted Geo Solutions Limited, Inc. (Geo Solutions), who utilized multi-frequency electromagnetic (EM) and ground penetrating radar (GPR) methods to perform the geophysical survey. The results of the geophysical survey are discussed further in Section 2.1 of this report.

Subsequent to the geophysical survey, WR subcontracted a GeoProbe direct push drill rig and advanced two shallow soil borings at various locations at the subject site. Soil samples were collected and screened for volatile organic vapors using a field-calibrated Photoionization Detector (PID). WR collected one soil sample from the interval in each boring that exhibited the highest PID reading, or from the interval at the bottom of the boring. Soil samples were collected and transported to RedLab, a North Carolina certified laboratory, for analysis of Total Petroleum Hydrocarbons by ultraviolet fluorescence (UVF) methods. The findings of the soil investigation are discussed further in Section 2.2 of this report.

2. ASSESSMENT ACTIVITIES

2.1. Geophysical Survey

On November 3, 2021, WR visited the site to conduct a geophysical survey in an effort to locate possible UST system components and other subsurface features. WR subcontracted Geo Solutions, who utilized multi-frequency electromagnetic and ground penetrating radar methods to perform the geophysical survey. The electromagnetic (EM) evaluation was performed using a Geophex Model GEM-2 profiler. The EM data was collected with a hand-held logger and location information was recorded using a sub-meter global positioning system (GPS) unit. Geo Solutions also completed a GPR evaluation using a GSSI SIT 4000 connected to a 400 MHz antenna. The spacing of survey transects were three feet or less across the site during both methods.

Geo Solutions reported very strong elevated EM responses, consistent with metallic USTs between North Water Street and the western elevation of the building. The southern portion of the site exhibited an EM response indicative of reinforced concrete. During the subsequent GPR survey, four probable USTs were detected in the area of the strong EM response. These USTs appear to be located beyond the proposed NCDOT right-of-way.

The following table describes the USTs located during the geophysical survey:

UST ID	Confidence Level	Location	Contents	Dimensions L x Dia.
UST 1	Probable	West of structure	Unknown	24’ x 5’
UST 2	Probable	West of structure	Unknown	24’ x 5’
UST 3	Probable	West of structure	Unknown	24’ x 5’
UST 4	Probable	West of structure	Unknown	12’ x 5’

As previously mentioned, these USTs were reportedly abandoned in place in 1988. Geo Solutions’ findings are presented in their *Technical Report – Geophysical Evaluation*, included in **Appendix A**.

2.2. Soil Investigation

WR returned to the site on November 16, 2021 with subcontract driller Carolina Probing Services (dba Regional Probing Services) to conduct the proposed soil investigation at the Site. Regional Probing utilized a direct-push drill rig (GeoProbe) to advance two soil borings within the proposed NCDOT right-of-way (B-1 and B-2).

The proposed termination depth of each boring was 10 feet below ground surface (bgs). The proposed termination depth was achieved at each boring location. No obstructions or drill refusal was encountered.

Soils were generally observed to consist of moist, tan-gray-brown silty fine-to-medium sands from ground surface to boring termination. Additional details for each boring can be found in Boring Logs located in **Appendix B** of this report.

Soil samples were collected at approximate two-foot intervals and screened for volatile organic vapors using a field-calibrated Photoionization Detector (PID). PID readings generally ranged from

1.5 ppm to 2.6 ppm (in Boring B-2). However, an elevated PID reading of 63.3 ppm was recorded in Boring B-1 from eight to ten feet bgs. Strong petroleum odors were also noted in this interval.

WR collected one soil sample from the interval in each boring that exhibited the highest PID reading. WR notes that a soil sample was not collected from the interval in boring B-2 that exhibited the elevated PID reading (eight to ten feet bgs), since groundwater was apparent at this depth. Therefore, the interval in B-2 with the second highest PID reading (six to eight feet bgs) was submitted for laboratory analysis.

The selected soil samples were collected in laboratory-provided containers, placed on ice, and transported under proper chain-of-custody procedures to RedLab, a North Carolina certified laboratory, for analysis of Total Petroleum Hydrocarbons (TPH) by ultraviolet fluorescence (UVF) methods. A summary of the PID readings and the corresponding TPH laboratory results can be found in the attached **Table 1**.

Following completion of sampling, each boring was properly backfilled by filling the bore hole with cuttings and/or chip bentonite. Each boring was then finished at ground surface with grout.

3. LABORATORY ANALYTICAL RESULTS

3.1. Analytical Results

Laboratory analytical results for the soil samples collected on November 16, 2021, indicated the presence of TPH above laboratory method detection limits for the two samples submitted for analysis. The NCDEQ UST Section Action Limits [50 mg/kg for Gasoline Range Organics (GRO) and 100 mg/kg for Diesel Range Organics (DRO)] were not exceeded in these soil samples. UVF fingerprinting generally identified these detections as degraded petroleum hydrocarbons. Table 1 provides a summary of PID results with UVF TPH laboratory concentrations for comparisons. The full laboratory results and chain of custody are also attached in **Appendix C** of this report.

3.2. Contaminated Soil Quantity Estimation

Since no TPH Action Limits were exceeded in the soil samples submitted for analysis, no soils appear to be present above the water table at the locations sampled that would require special handling or disposal.

4. CONCLUSIONS

WR has completed a GeoEnvironmental Phase II Investigation at the B-5985 Parcel #006 Lee Investments of Lumberton NC LLC site. The findings of this investigation indicate the presence of four probably USTs at the site; however, these USTs appear to be located beyond the proposed NCDOT right-of-way. Soil samples submitted for analysis indicated concentrations of TPH GRO and DRO above laboratory MDL, but below NCDEQ UST Section Action Limits.

According to NCDOT's slope stake plans, grading for the proposed project will include minor grading associated with the realignment of curbing and sidewalk. In addition, portions of an existing subsurface storm drain system will be removed and replaced. Based on the results of this investigation, it is not likely that contaminated soil will be encountered during these construction

activities. However, if contaminated soils are encountered, WR recommends managing and disposing of these soils in accordance with federal, state, and local guidelines.

Please contact us if you have any questions or comments regarding this report.

Sincerely,
WithersRavenel

Benjamin Whitley, PE
Senior Project Manager, Environmental

R.S. (Butch) Lawter, Jr., PE
Vice President – Environmental Services

FIGURES

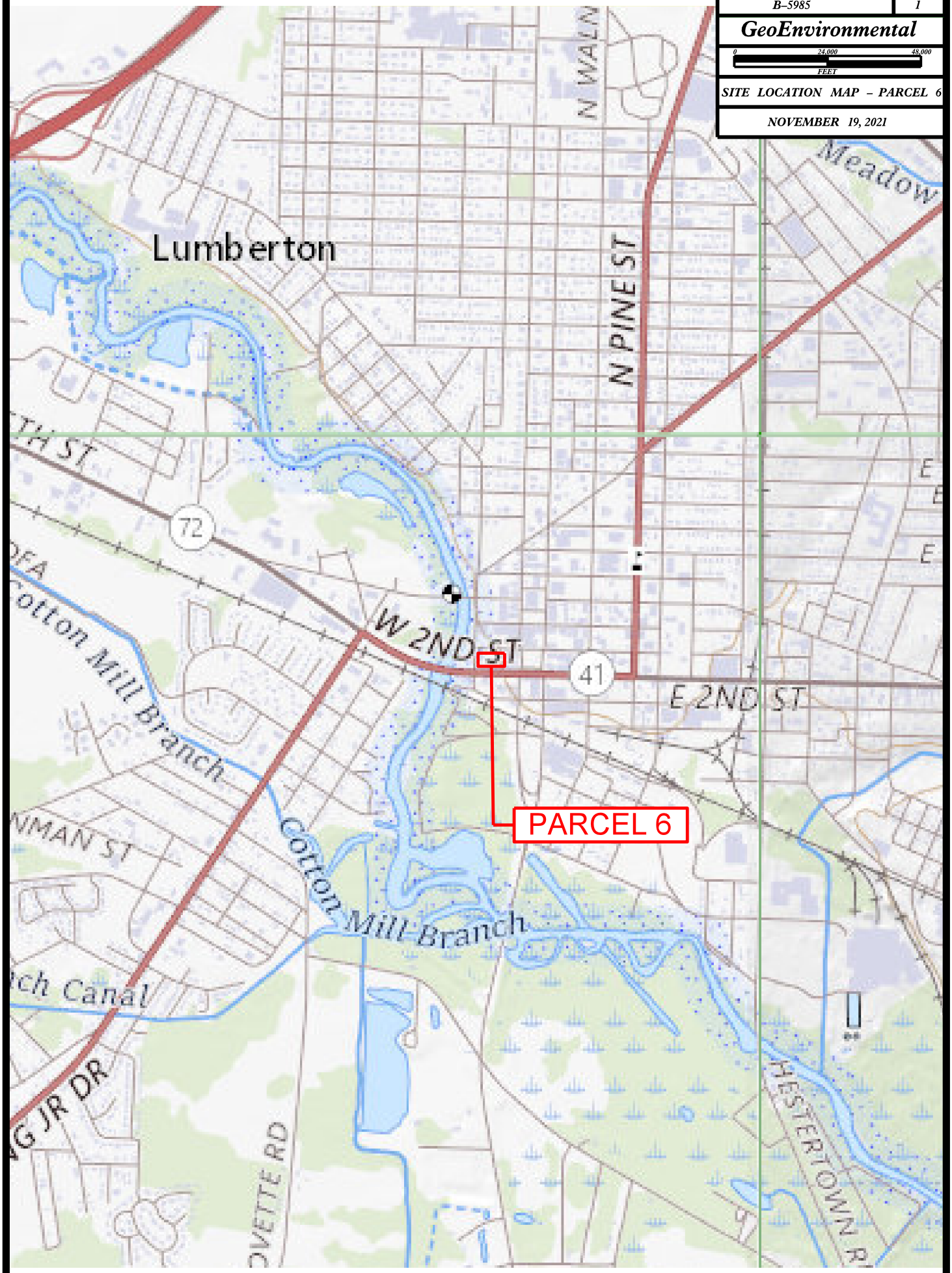
PROJECT REFERENCE NO.	SHEET
B–5985	1

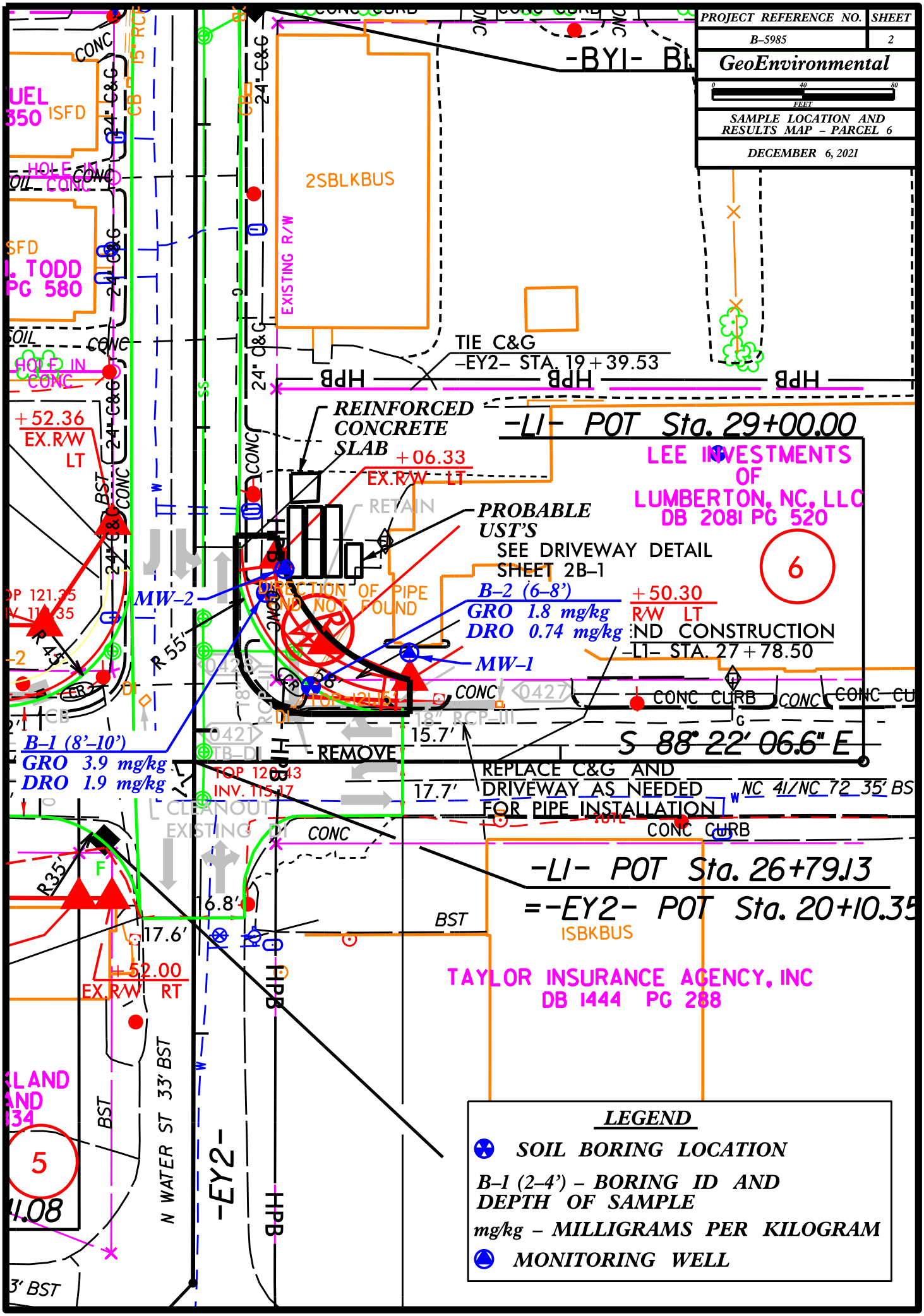
GeoEnvironmental

0 24,000 48,000
FEET

SITE LOCATION MAP – PARCEL 6

NOVEMBER 19, 2021




PROJECT REFERENCE NO.
B-5985
SHEET
2
GeoEnvironmental
0
40
80
FEET
SAMPLE LOCATION AND RESULTS MAP – PARCEL 6
DECEMBER 6, 2021
-BYI- BL
2SBLKBUS
EXISTING R/W
TIE C&G
-EY2- STA. 19+39.53
-LI- POT Sta. 29+00.00
LEE INVESTMENTS OF LUMBERTON, NC, LLC
DB 2081 PG 520
6
REINFORCED CONCRETE SLAB
+06.33
EX.R/W LT
PROBABLE UST'S
SEE DRIVEWAY DETAIL SHEET 2B-1
+52.36
EX.R/W LT
+50.30
R/W LT
MW-2
B-2 (6-8')
GRO 1.8 mg/kg
DRO 0.74 mg/kG
MW-1
B-1 (8'-10')
GRO 3.9 mg/kg
DRO 1.9 mg/kg
REMOVE
REPLACE C&G AND DRIVEWAY AS NEEDED FOR PIPE INSTALLATION
S 88° 22' 06.6" E
-LI- POT Sta. 26+79.13
=-EY2- POT Sta. 20+10.35
ISBKBUS
TAYLOR INSURANCE AGENCY, INC
DB 1444 PG 288
+52.00
EX.R/W RT
5
N WATER ST 33' BST
-EY2-
LEGEND
SOIL BORING LOCATION
B-1 (2-4') – BORING ID AND DEPTH OF SAMPLE
mg/kg – MILLIGRAMS PER KILOGRAM
MONITORING WELL

TABLES

TABLE 1
PID RESULTS AND SAMPLE SUMMARY TABLE

NCDOT B-5985
PARCEL #006 - Lee Investments of Lumberton NC LLC
LUMBERTON, NC
WR PROJECT NO. 02191306.11

BORING	B-1			B-2		
DEPTH (feet)	PID	GRO	DRO	PID	GRO	DRO
0-2	2.3	-	-	1.5	-	
2-4	2.2	-	-	1.6	-	-
4-6	1.9	-	-	2.2	-	-
6-8	2.5 *	3.9	1.9	1.7	-	-
8-10	63.3	-	-	2.6 *	1.8	0.74

NCDEQ UST Section Action Limits: 50 mg/kg GRO
100 mg/kg DRO

PID - Photoionization Detector Reading (in ppm)
GRO / DRO - Gasoline and Diesel Range Organics (in mg/kg)
NR - Not Recorded
'-' - Not Analyzed
'*' - Interval Selected for Laboratory Analysis
Detections in **BOLD** indicate exceedance of NCDEQ UST Section Action Limit

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APPENDIX A

TECHNICAL REPORT – GEOPHYSICAL EVALUATION

Technical Report

Geophysical Evaluation

NCDOT U-5985 – Lumberton, NC

Prepared For:

WithersRavenel

Prepared By:

Geo Solutions Limited, Inc.

November 22, 2021

Geo Solutions Ltd.
P.O. Box 293
Conway, NC 27820
(252) 578-3233

November 22, 2021

Benjamin Whitley, PE
WithersRavenel
115 MacKenan Drive
Cary, NC 27511

Re: **Geophysical Evaluation – NCDOT U-5985 – Lumberton, NC**

File: Report

Dear Mr. Whitley:

Geo Solutions Limited, Inc. (Geo Solutions) is pleased to submit this report to WithersRavenel of a geophysical evaluation in support of an environmental site assessment of a North Carolina Department of Transportation (NCDOT) right of way (ROW) located at the intersection of N. Water Street and W. 2nd Street in Lumberton, North Carolina.

Background

WithersRavenel is completing an environmental site assessment of the NCDOT ROW at the intersection of N. Water Street and W. 2nd Street in Lumberton, North Carolina. The NCDOT is planning to widen the roadway at the intersection of N. Water Street and W. 2nd Street in Lumberton. Two of the adjacent properties were formally occupied by fuel service stations and are currently occupied by auto repair shops. WithersRavenel identified these two adjacent properties as possible sites of former underground storage tanks (USTs). As such, WithersRavenel contracted Geo Solutions to complete a geophysical evaluation of these adjacent properties within the proposed ROW. The objective of the geophysical evaluation was to detect and map any UST or other buried structure that may impact the NCDOT widening project. Figure 1 below is a site map with the geophysical evaluation

boundaries delineated. The southern area along W. 2nd Street is referred to as Parcel 005 and the northern area along N. Water Street as Parcel 006.

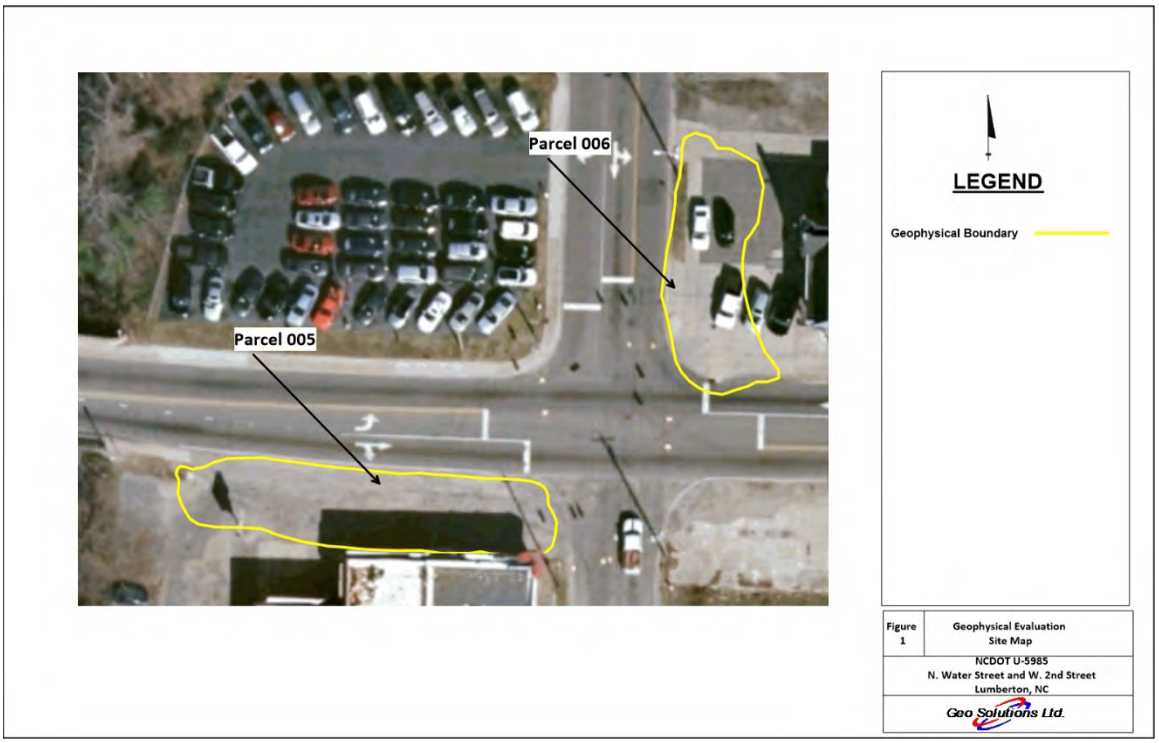


Figure 1. Site map of the area of NCDOT intersection widening project with the geophysical evaluation boundaries delineated in yellow.

Technical Approach

Geo Solutions completed the evaluation utilizing two geophysical methods to investigate the two adjacent properties along N. Water Street and W. 2nd Street in Lumberton, North Carolina. The field work for this project was completed on November 03rd, 2021.

Multifrequency Electromagnetic (EM) Evaluation

A high resolution electromagnetic (EM) evaluation was completed using a Geophex Model GEM-2 multifrequency electromagnetic profiler which collects at a rate of 30 times per second. The EM data was collected on a hand-held data logger that communicated with the GEM-2 unit via Bluetooth. The GEM-2 was connected to a Hemisphere Model A-325 GPS

unit which is augmented by the Wide Area Augmentation System (WAAS) and is capable of submeter accuracy. The EM profile spacing was approximately 3 feet or less. The EM method is useful at evaluating the shallow subsurface for both metallic and non-metallic conductive materials such as USTs and variations in soil conductivity which may be related to former land use.

Ground-penetrating Radar (GPR) Evaluation

Geo Solutions completed a ground penetrating radar (GPR) evaluation over the two sites. Here, a GSSI SIR 4000 connected to a 400 MHz antenna mounted on a three-wheel cart was utilized. Parallel profiles spaced 3 feet or less were collected. The GPR records were post processed with GSSI Radan 7 software.

Results

Multifrequency Electromagnetic Evaluation

Geo Solutions completed an EM evaluation of the site with parallel profiles spaced approximately 3 feet apart over both sites (Figure 2). Once adequate survey coverage was achieved, the EM field data were post-processed to produce a comma separated variable (CSV) file that was then transferred to a laptop computer. These data were then processed using software developed by Geophex to calculate the apparent conductivity and in-phase values for each EM frequency collected (1470Hz, 4110 Hz, 9810 Hz, 32,190 Hz, 60000 Hz, and 90030 Hz). Typically, the in-phase data (sometimes referred to as the metal detection mode) is more representative of buried metallic materials whereas the apparent conductivity is more representative of non-metallic conductive buried materials. The apparent conductivity response can also be elevated in the presence of large metal features. By evaluating both the in-phase and apparent conductivity responses, the horizontal extents of conductive and metallic materials can be characterized. All the frequencies were evaluated and the 9,810 Hz data was chosen to create figures for this report as it provided the best contrast to background site conditions. Shown on Figure 3 and Figure 4 are the

EM in-phase and apparent conductivity maps respectively with explanations for the anomalous conditions observed in the EM data. Here, anomalous conditions are shown as orange to red and blue hues where the background site conditions are shown as light yellow and green hues. At the location of Parcel 005 along W. 2nd Street there was an elevated EM response in both in-phase and apparent conductivity near the center of the area of evaluation. The high variability from positive to negative responses shown as red and blue hues are typical for reinforced concrete. The in-phase and apparent conductivity response across the remainder of the site was very weak with no detections of large metal structures such as USTs. At the location of Parcel 006 along N. Water Street there was a very strong elevated in-phase and apparent conductivity response shown as red hues on Figures 3 and 4. This is consistent with the EM response to a large buried metallic structure such as a UST. There was an elevated EM response at the northern end of Parcel 006. This EM response is consistent with a small area of reinforced concrete. The southern half of Parcel 006 had an elevated in-phase and apparent conductivity response as well. The high variability from positive to negative responses shown as red and blue hues are typical for reinforced concrete. There was also a storm drain and sanitary sewer manhole in this area.

Ground-penetrating Radar (GPR) Evaluation

Figure 5 is a map documenting the results of the GPR evaluation. At Parcel 005 along W. 2nd Street, a suspected reinforced concrete slab was detected below the asphalt surface. GPR penetration was limited in this area due to the suspected metallic wire mesh. This was in the same area as the suspected reinforced concrete detected during the EM evaluation. There was an anomaly detected at the west end of the area of evaluation. Figure 6 is a cross section of this subsurface feature. This is not likely a metallic structure due to the lack of EM response in this area. This GPR anomaly is not characteristic of a metallic UST. The anomaly is likely related to conductive soil or fill in this area. These subsurface detections were identified in the field with pink ground marking paint (Appendix A. Photographic log).

At Parcel 006 along N. Water Street, four (4) probable USTs were detected with GPR in the area of the strong EM response. These probable USTs are shown on Figure 5 as yellow

rectangles. Most of these probable USTs appear to be outside the planned NCDOT ROW. The approximate sizes of each probable UST identified can be found in Table 1 below.

Tank ID	Length (ft)	Width (ft)
Probable UST 1	24	5
Probable UST 2	24	5
Probable UST 3	24	5
Probable UST 4	12	5

Table 1. Approximate dimensions of the four probable USTs detected based on the GPR evaluation.

Each of the probable USTs were identified in the field with yellow ground parking paint (Appendix A, Photographic Log). Figure 7 displays cross sectional images of the probable USTs. The depth to the top of the probable USTs is approximately 3 feet below land surface (bls). The fill port is visible at the land surface on probable UST 4.

Conclusions

- Geo Solutions completed a detailed EM and GPR evaluation over two areas near the intersection of W. 2nd Street and N. Water Street in Lumberton, North Carolina where the NCDOT plans to widen the roadway.

- A suspected reinforced concrete slab and a suspected non-metallic GPR anomaly were detected at Parcel 005 along W. 2nd Street.

- Four (4) probable USTs were detected at Parcel 006. One of the probable USTs has a fill port visible at the surface. Most of these probable USTs appear to be outside the NCDOT ROW.

- Two areas of suspected reinforced concrete slabs are present at Parcel 006 along with subsurface stormwater and sanitary sewer piping.

Limitations

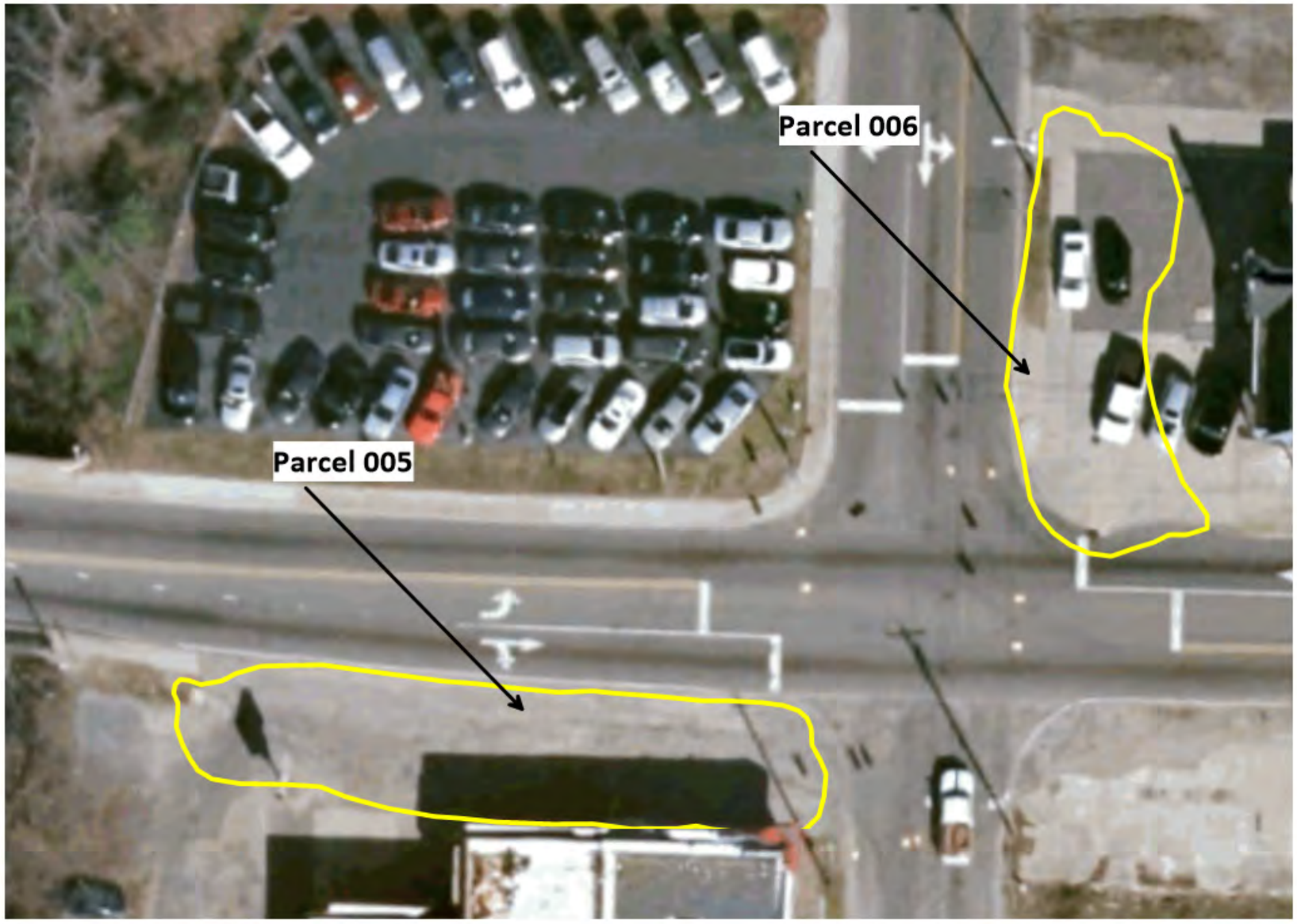
The detection of subsurface objects is dependent upon parameters that include size, physical composition, and depth of burial. The combination of these parameters may produce a response that is below the detection threshold for a given geophysical method. The presence of reinforced concrete limits GPR and EM detections of subsurface structures below the slabs.

Please don't hesitate to call if you have any questions concerning this report. We appreciate the opportunity to have worked with you on this project.

Very truly yours,

GEO SOLUTIONS LIMITED, INC.

John DeLoatch, PG
Project Manager



LEGEND

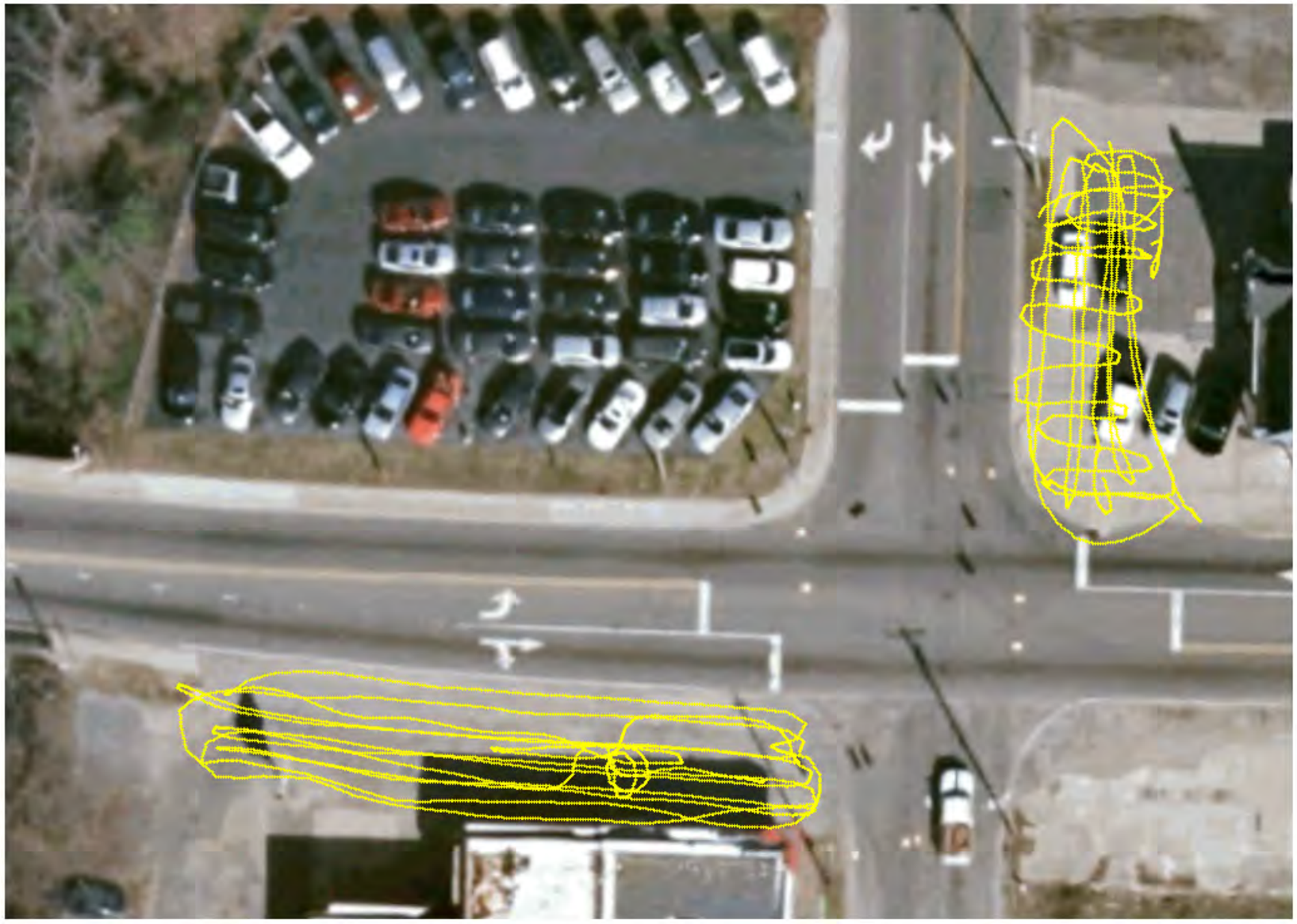
Geophysical Boundary

Map Scale (ft)

0 25 50

1" = 25'

Figure 1	Geophysical Evaluation Site Map
NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



LEGEND

Indicates Location of EM Data Point

Map Scale (ft)

0 25 50

1" = 25'

Figure 2	Geophysical Evaluation EM Profile Location Map

NCDOT U-5985
N. Water Street and W. 2nd Street
Lumberton, NC

Geo Solutions Ltd.

LEGEND

9810 Hz In-phase (PPM)

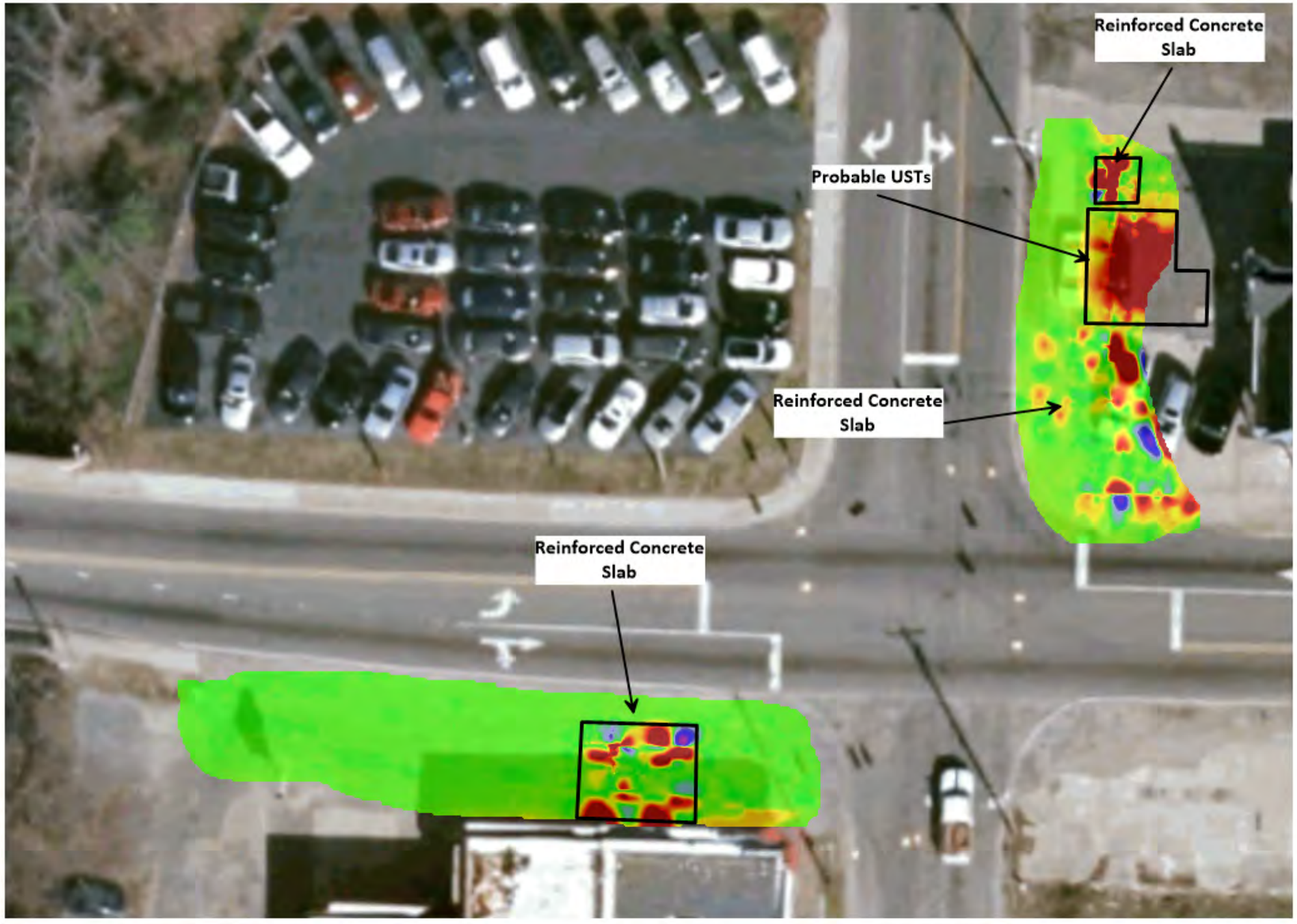
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
-6000
-7000
-8000

Map Scale (ft)

0 25 50

1" = 25'

Figure 3	Geophysical Evaluation EM In-phase (Metal Detection) Results Map
NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



LEGEND

9810 Hz Apparent Conductivity (mS/m)

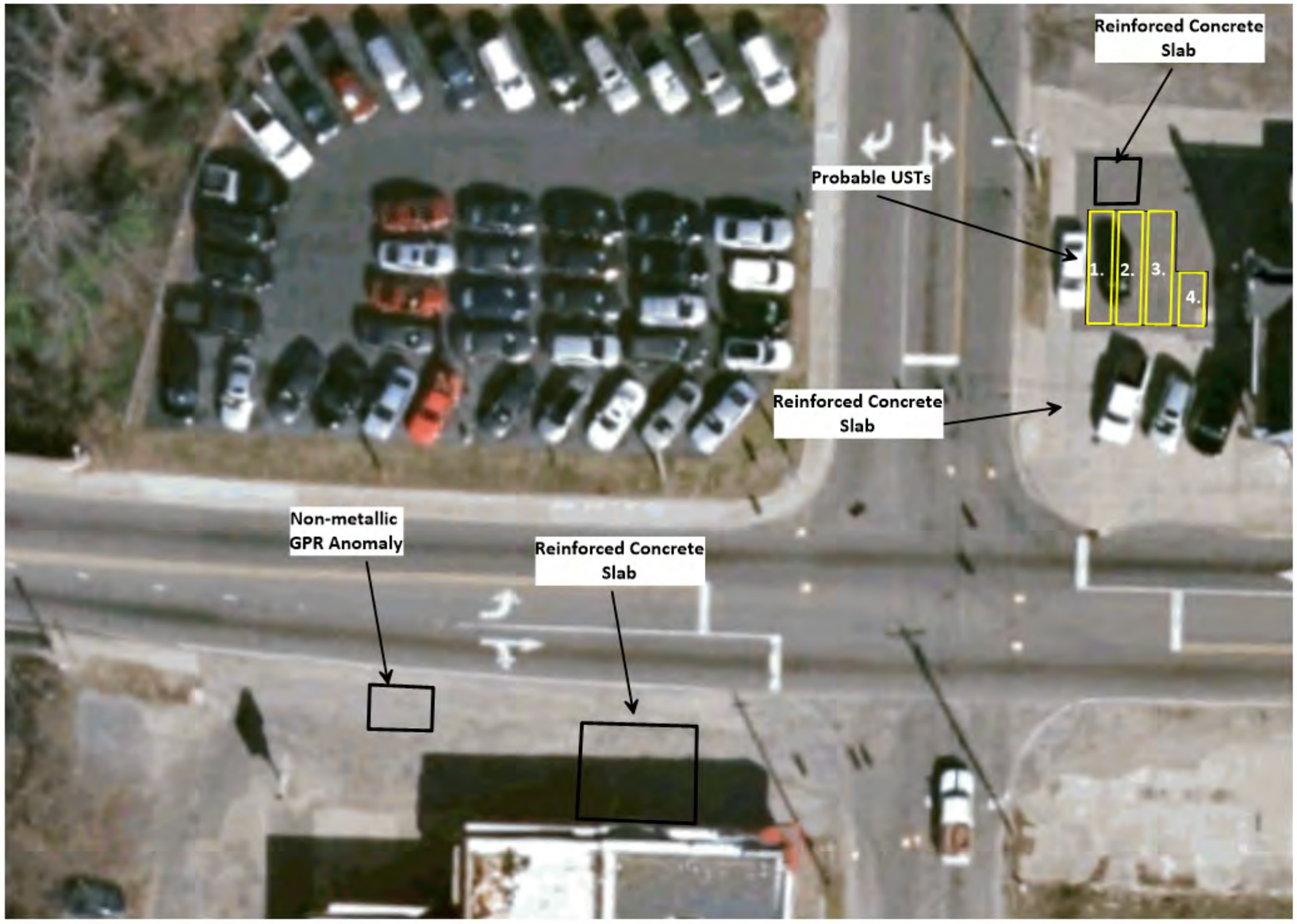
1000
875
750
625
500
375
250
125
0
-125
-250
-375
-500
-625
-750
-875
-1000

Map Scale (ft)

0 25 50

1" = 25'

Figure 4	Geophysical Evaluation EM Apparent Conductivity Results Map
NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



LEGEND

Boundary of Subsurface Detection

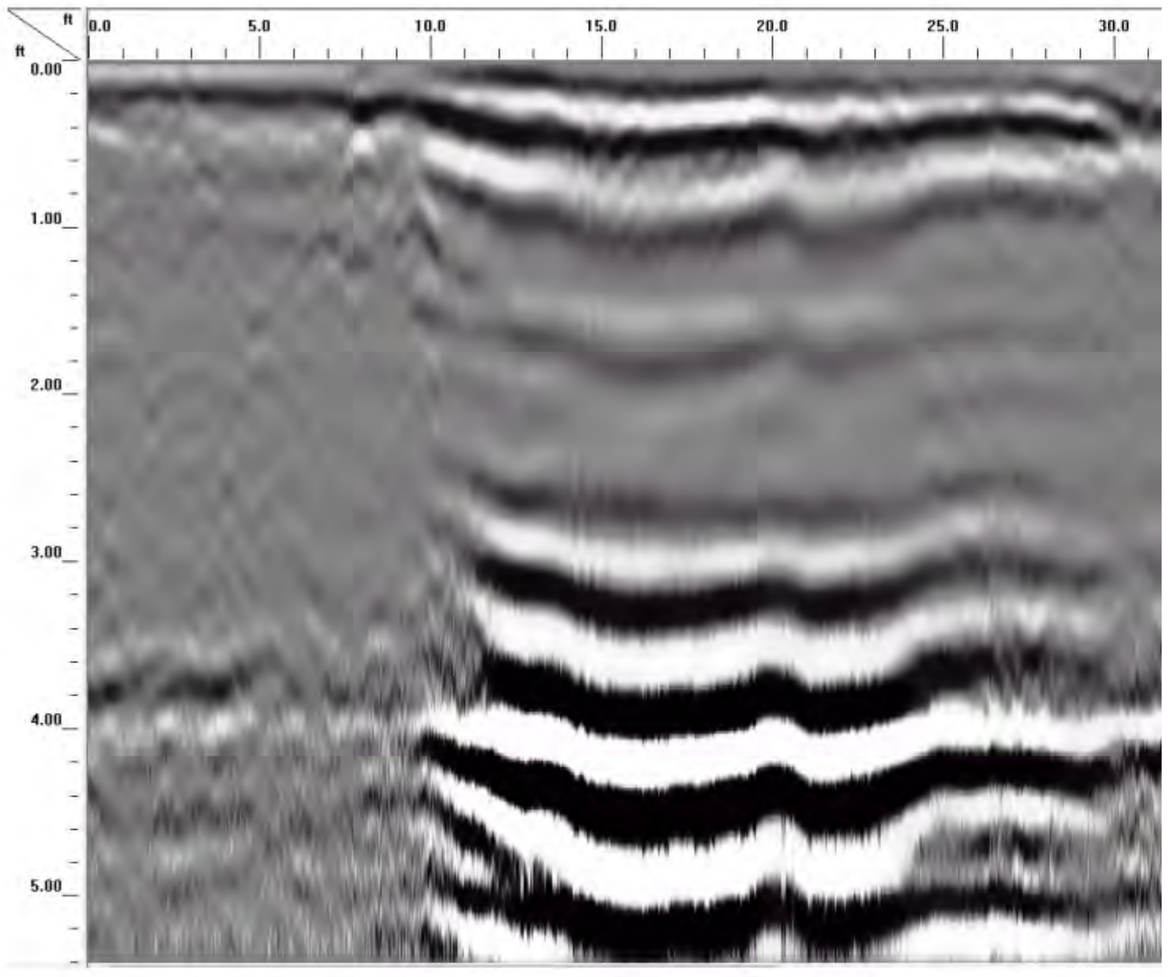
Probable UST

Map Scale (ft)

0 25 50

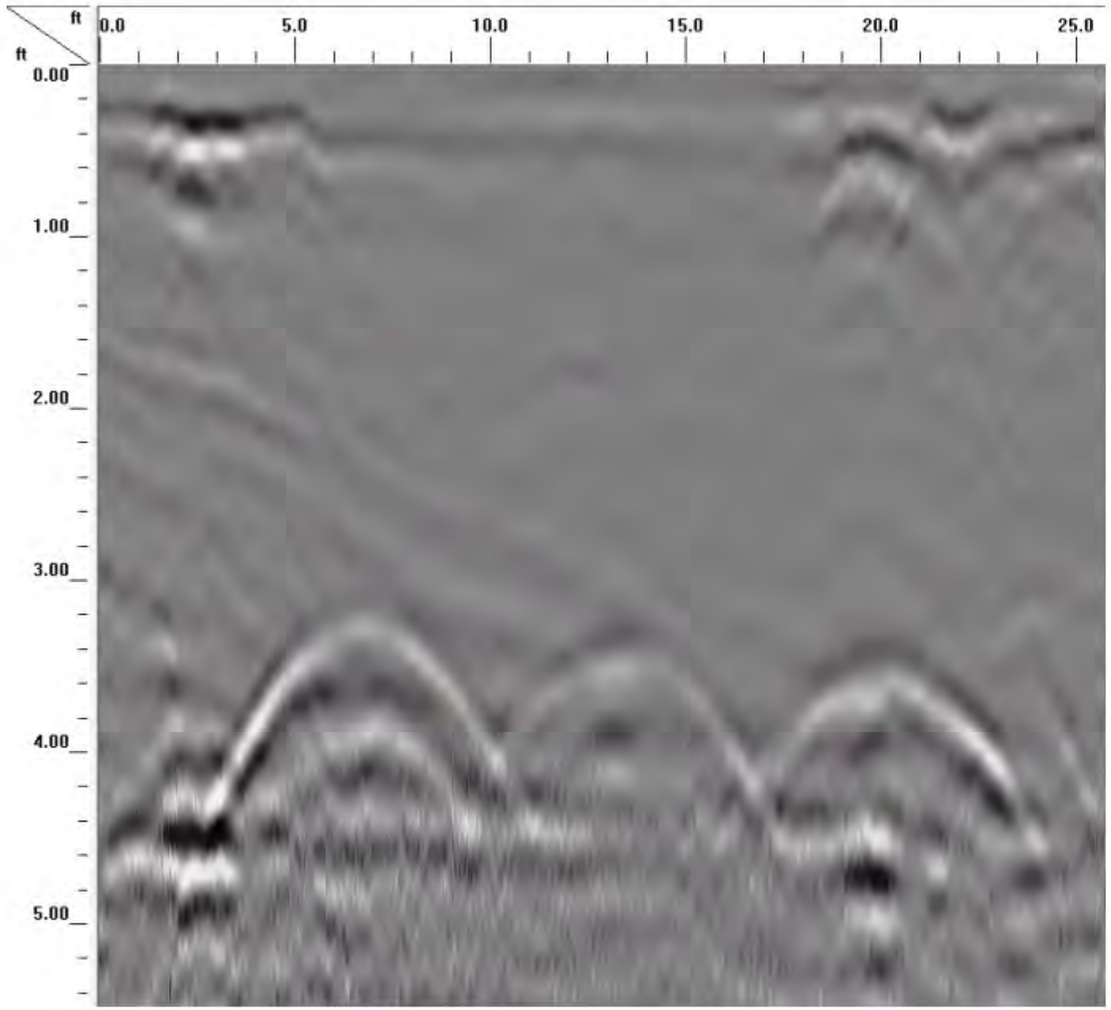
1" = 25'

Figure 5	Geophysical Evaluation Ground-penetrating Radar Results Map
NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	

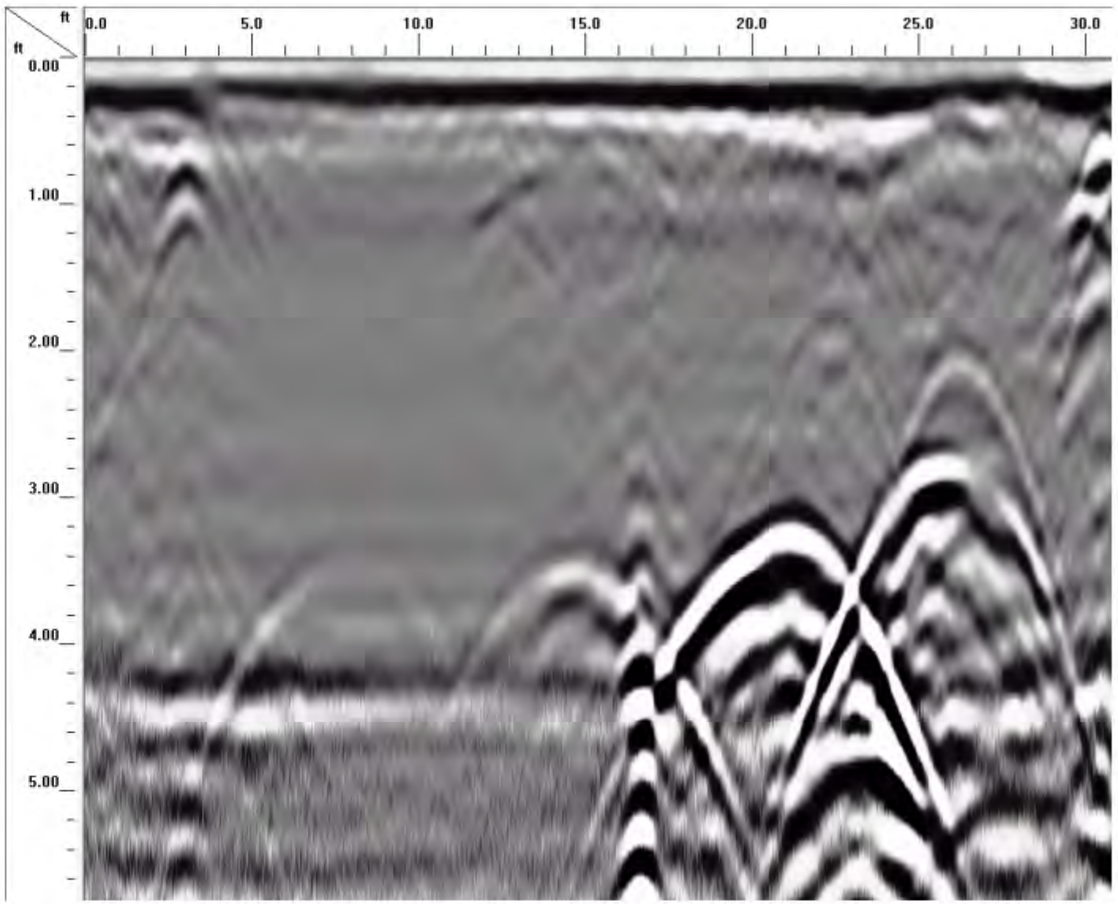


Profile 1. Transect collected across non-metallic conductive anomaly.

Figure 6	Ground-penetrating Radar Evaluation Cross Section of anomaly.
NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC	
Geo Solutions Ltd.	



Profile 1. Transect collected across the north end of the probable USTs 1-3.



Profile 2. Transect collected across the south end of the probable USTs 1-4.

Figure 7	Ground-penetrating Radar Evaluation Cross Sections of Probable USTs.
	NCDOT U-5985 N. Water Street and W. 2nd Street Lumberton, NC
	Geo Solutions Ltd.

Appendix A. Photograph Log – NCDOT U-5985 – Lumberton, NC

Photograph 1. Parcel 005 non-metallic GPR anomaly.

Photograph 2. Parcel 005 area of suspected reinforced concrete slab.

Photograph 3. Parcel 006 four (4) probable USTs.

Photograph 4. Parcel 006 fill port on probable UST 4.

Photograph 5. Parcel 006 area of reinforced concrete, subsurface piping, storm drain, and manhole.

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APPENDIX B

BORING LOGS

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SOIL BORING LOG

Boring #	B-1	**Job Name**	NCDOT B-5985, Parcel 006	**Project #**	2191306.11
Date	11/16/2021	**Site Loc.**	Lumberton, NC	**Gnd EL**	NA
WR Rep	B. Whitley	**Driller**	Regional Probing (GeoProbe)	**GW EL**	NA

Depth in Feet		Soil Description	Total VOCs (in ppm)	
From	To		Sample Interval	PID/FID
0.0	0.25	Concrete (3")	NR	
0.25	1.0	Moist, tan-brown, sandy CLAY	0-2	1.5
1.0	6.0	Moist, tan-brown, silty fine-to-medium SAND	2-4	1.6
			4-6	2.2
6.0	7.0	Moist, tan-orange-gray, sandy CLAY	6-8	1.7
7.0	9.0	Moist, tan, fine-to-medium SAND	8-10	2.6 *
9.0	10.0	Wet, dark gray-brown, silty fine-to-medium SAND		
		Boring terminated at 10' bgs		*submitted for analysis

NR=No reading
NA=Not Applicable
BGS=Below ground surface
TOC=Top of Casing
El=Elevation
ppm=parts per million
GW=Ground Water
USCS=Unified Soil Classification System
GW=Ground Water

115 MacKenan Drive Cary, North Carolina 27511 tel:919.469.3340 fax:919.467.6008 www.withersravenel.com

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SOIL BORING LOG

Boring #	B-2	**Job Name**	NCDOT B-5985, Parcel 006	**Project #**	2191306.11
Date	11/16/2021	**Site Loc.**	Lumberton, NC	**Gnd EL**	NA
WR Rep	B. Whitley	**Driller**	Regional Probing (GeoProbe)	**GW EL**	NA

Depth in Feet		Soil Description	Total VOCs (in ppm)	
From	To		Sample Interval	PID/FID
0.0	0.25	Concrete (3")	NR	
0.25	8.0	Moist, tan-dark tan, silty fine-to-medium SAND	0-2	2.3
			2-4	2.2
			4-6	1.9
			6-8	2.5 *
8.0	10.0	Wet, dark gray, fine-to-medium SAND (strong petroleum odors)	8-10	63.3
		Boring terminated at 10' bgs		*submitted for analysis

NR=No reading
NA=Not Applicable
BGS=Below ground surface
TOC=Top of Casing
El=Elevation
ppm=parts per million
GW=Ground Water
USCS=Unified Soil Classification System
GW=Ground Water

115 MacKenan Drive Cary, North Carolina 27511 tel:919.469.3340 fax:919.467.6008 www.withersravenel.com

WithersRavenel
Our People. Your Success.

APPENDIX C

REDLAB ANALYTICAL REPORTS AND CHAIN OF CUSTODY

QED

REDLAB RAPID ENVIRONMENTAL DIAGNOSTICS

QROS

Hydrocarbon Analysis Results

Client: WITHERS RAVENEL
Address 115 MACKENAN DR
CARY, NC

Samples taken Tuesday, November 16, 2021
Samples extracted Tuesday, November 16, 2021
Samples analysed Wednesday, November 17, 2021

Contact: BEN WHITLEY

Operator HARRY WOOTEN

Project: B-5985

F03640

Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	Ratios			HC Fingerprint Match
										% light	% mid	% heavy	
s	006 B-1 (8-10')	31.7	<0.79	3.9	1.9	5.8	1.1	<0.25	<0.032	80.8	14	5.2	Deg.PHC 71.7%,(FCM)
s	006 B-2 (6-8')	29.6	<0.74	1.8	0.74	2.54	0.73	<0.24	<0.03	86.7	8.9	4.4	V.Deg.PHC 75.9%,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 103.6 %

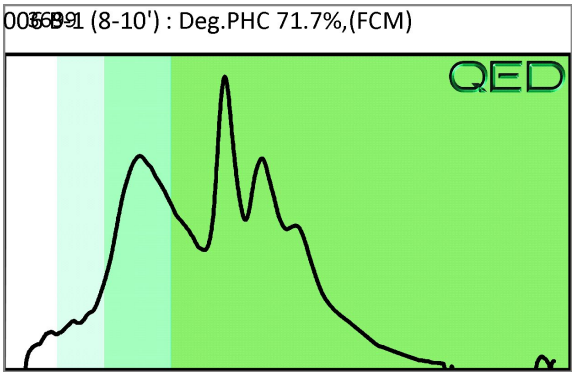
Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content

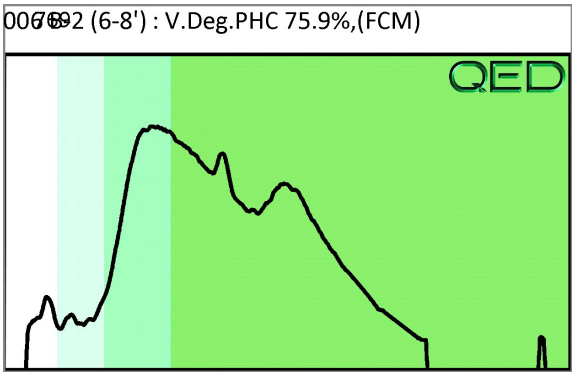
Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library

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

QED Hydrocarbon Fingerprints

Project: B-5985 ##################





Client Name:	WR
Address:	115 Mackenan Dr. Cary NC
Contact:	Ben Whitley
Project Ref.:	B-5985
Email:	bwhitley@withersravenel.com
Phone #:	984-400-3040
Collected by:	B. Whitley

REDLAB™
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 UVF sample will be analyzed for total BTEX, GRO, DRO, TPH, PAH total aromatics and BaP. Standard GC Analyses are for BTEX and Chlorinated Solvents: VC, 1,1 DCE, 1,2 cis DCE, 1,2 trans DCE, TCE, and PCE. Specify target analytes in the space provided below.

Sample Collection Date/Time	TAT Requested 24 Hour	TAT Requested 48 Hour	Analysis Type UVF	Analysis Type GC	Initials	Sample ID	Total Wt.	Tare Wt.	Sample Wt.
11/16/2021 1000		X	X		BAW	006 B-1 (8-10)'	~~50.1~~ ~~49.2~~	40.0	10.1
11/16/21 1004		X	X		BAW	006 B-2 (6-8)'	~~48.9~~ 50.8	40.0	10.8
11/16/21 1125		X	X		BAW	005 B-1 (2-4)'	49.3	40.0	9.3
11/16/21 1130		X	X		BAW	005 B-2 (4-6)'	48.9	40.1	8.8
11/16/21 1135		X	X		BAW	005 B-3 (4-6)'	49.7	40.1	9.6

COMMENTS/REQUESTS: please report 006 and 005 samples in separate spreadsheets

TARGET GC/UVF ANALYTES:

Relinquished by		Accepted by	Date/Time
B. Whitley - WR		FEDEX	11/16/21 1220
Relinquished by		Accepted by	Date/Time
		Claire Nalcamerman	11/17/2021 10:50 AM

RED Lab USE ONLY

(5)

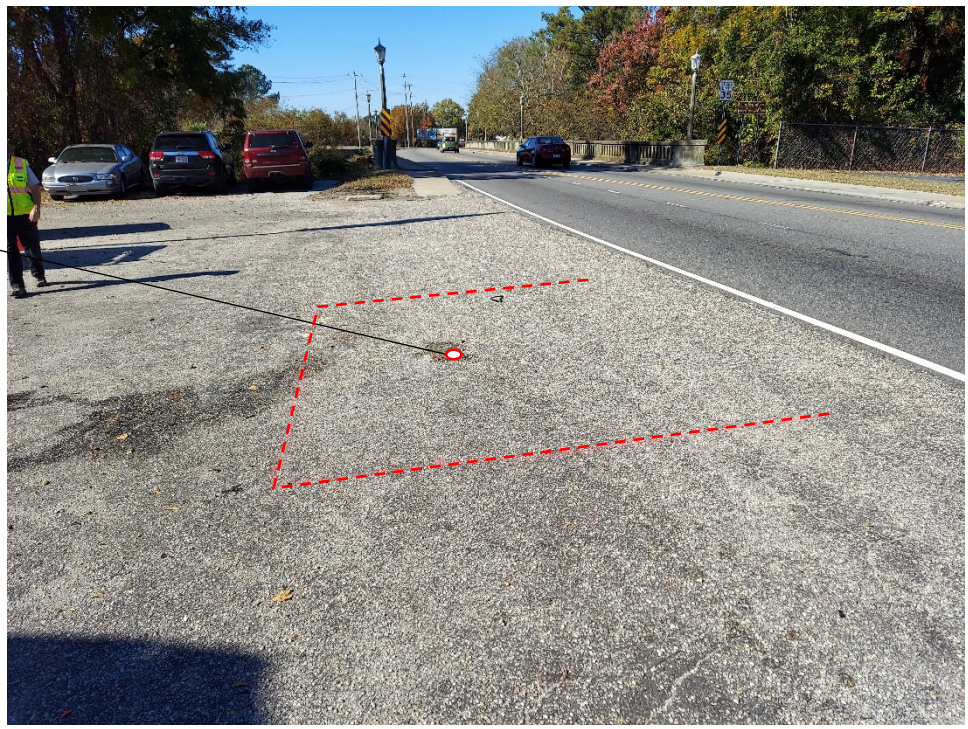
Ref. No 11-2021

APPENDIX D

PHOTOGRAPHIC LOG

Photo No. 1  	View of Borings B-1 through B-3 surrounding the concrete slab, facing east (taken 11-16-2021)
Photo No. 2  	View of Borings B-1 through B-3 surrounding the concrete slab, facing west (taken 11-3-2021)

Photo No. 3



View of Boring B-4 advanced within the GPR anomaly on the western portion of the site, facing west

(taken 11-16-2021)

Photo No. 4

View of Boring B-4 advanced within the GPR anomaly on the western portion of the site, facing west

(taken 11-3-2021)

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

August 15, 2018

MEMORANDUM TO: Greg S. Purvis, PE
Project Manager
Wetherill Engineering

FROM: Craig Haden
GeoEnvironmental Project Manager
GeoEnvironmental Section
Geotechnical Engineering Unit

DocuSigned by:
Craig Haden
AE4AE3FF131F404...

TIP NO: B-5985
WBS: 47749.1.1
COUNTY: ROBESON
DIVISION 6
DESCRIPTION: Replace Bridge # 770125 over Lumber River on NC 41/NC 72 & Replace Bridge # 770175 over Lumber River on SR 1600

SUBJECT: **GeoEnvironmental Planning Report**

The GeoEnvironmental Section of the Geotechnical Engineering Unit performed a Phase I field investigation on July 12, 2018 for the above referenced project to identify geoenvironmental sites of concern. The purpose of this report is to document sites of concern within the project study area that are or may be contaminated. These sites of concern should be included in the environmental planning document in an effort to assist the project stakeholders in reducing or avoiding impacts to these sites. Sites of concern may include, but are not limited to, underground storage tank (UST) sites, dry cleaning facilities, hazardous waste sites, regulated landfills and unregulated dumpsites.

Findings

Twenty Three (23) sites of concern were identified within the proposed study area. We anticipate low monetary and scheduling impacts resulting from these sites. See the following table and figure for details.

Please note that discovery of additional sites not recorded by regulatory agencies and not reasonably discernible during the project reconnaissance may occur. The GeoEnvironmental Section should be notified immediately after discovery of such sites so their potential impact(s) may be assessed.

If there are questions regarding the geoenvironmental issues, please contact me, at 919-707-6871.

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH, NC 27699-1589

Telephone: (919) 707-6850
Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
1020 BIRCH RIDGE DRIVE
RALEIGH, NC 27610

cc:
John Pilipchuk, LG, PE, State Geotechnical Engineer
Brian Hanks, PE, State Structures Engineer
Dale Burton, PE, PLS, State Locations and Surveys Engineer
Carl Barclay, PE, State Utilities Manager
Tierre Peterson, PE, Team Leader-PEF Coordination-Structures Management Unit
Rusty Marsh, PE, Division Construction Engineer
Steve D. Kendall, PE, Division Project Development Engineer
Raphael A. Marshall, Division Right of Way Agent
Chris Kreider, PE, Geotechnical Regional Manager
Neil Roberson, LG, Regional Geological Engineer
Steve Grimes, ROW Unit, Negotiations, State Negotiator
hydraulics_notify@ncdot.gov
row-notify@ncdot.gov
roadwaydesign@ncdot.gov
File

(01) Property Name:
Cox Family Automotive
603 W 5th St
Lumberton, NC 28358

Property Owner:
Samuel Cox
PO Box 1948
Lumberton , NC 28359

Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

(Photo from Google street view) Anticipated Impacts: Low

This site is a currently a used car dealership. It is located on the south side of W 5th St at the fork of W 5th St and W 2nd St. It is the former location of Lumberton Nissan Inc. The facility is not listed in the UST section registry and there are no known incidents associated with it. There are several service bays located on back potion of the building.

(02) Property Name:
Ronnie's Tint & Auto
595 W 5th St
Lumberton, NC 28358

Property Owner:
Huggins Family Properties LLC
300 Connemara Dr.
Cary , NC 27519

Facility ID: Unknown
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

This facility currently operates as an auto detail and body shop. It is located in the fork of W 2nd St & W 5th St. The current business (See Site # 3 red brick building) occupies both building on 2 separate parcels. The white brick building is the old gas station where the auto detailing is conducted. There is an outline of an old pump island on the western end of the property and 2 possible UST fill ports. The facility was not identified in the UST registry and there are no known incidents associated with it.

(03) Property Name:
Former Heafner Tire Co
575 W 5th St
Lumberton, NC 28358

Property Owner:
Jerry Michael Townsend
504 Londonderry Dr.
Lumberton , NC 28360

Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

Former Hefner Tire Company. Currently part of Ronnie's Tint and Auto (site # 2 White Brick Building). The red brick building is the former Hefner Tire Co, The paint and body shop operates out of this location. This building is located in the fork of W 2nd St and W 5th St directly behind the former gas station. The address is not listed in the UST section registry and there are no know incidents associated with the site.

(04) Property Name:
Robeson Co. Church & Community Center
600 W 5th St
Lumberton, NC 28358

Property Owner:
Robeson Co. Church & Community Center
600 W 5th St
Lumberton , NC 28358

Facility ID: 00-0-0000018764
Incident Type/Number: N/A

UST Owner:
Lumberton Ford Lincoln Mercury
600 W 5th St
Lumberton, NC 28358

Anticipated Impacts: Low

This facility currently operates as a church and community center. It is located on the north side of W 5th St at the intersection with W 2nd St. It is the former location of Lumberton Ford Lincoln Mercury. According to the UST section registry one 500 gallon UST was removed in 1988. There are no known incidents associated with this site.

(05) Property Name:
One Stop Auto Repair & Sales
511 W 2nd St
Lumberton, NC 28358

Property Owner:
John & Leslie Thompson
PO Box 1446
Lumberton , NC 28359

Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

This site operates as an Auto repair and used car dealer. It is located on the south side of W 2nd St approximately 520 feet northwest of NC 41. This business is on two different parcels with different property owners. The western parking lot is on the property owned by the Thompson and the buildings and eastern portion of the parking lot is on the same parcel as the strip mall. The address is not listed in the UST section registry and there are no known incidents associated with it. No Evidence of USTs or monitoring wells were observed during the site investigation.

(06) Property Name:
China King
501 W 2nd St
Lumberton, NC 28358

Property Owner:
Zheng Zheng Xian
510 Cherry Ln
Lumberton , NC 28358

Facility ID: 00-0-0000019090
Incident Type/Number: 21930

UST Owner:
LI'L Thrift Food Marts Inc.
1007 Arsenal Ave
Fayetteville, NC 28305

Anticipated Impacts: Low

This facility currently operates as a Chinese Restaurant. It is the former location of Short Stop 65. It is located in the southwest quadrant of NC 41 and W 2nd St. According to the UST registry two USTs were removed from the Address 502 W 2nd St in 1999. Incident 21930 is associated with the site and is still active. The former pump island outline was visible during the site investigation and several monitor wells were observed.

(07) Property Name:
West Side Barber Shop
301 W 5th St
Lumberton, NC 28358

Property Owner:
Woodberry & Joan Bowen
5101 White Oak Drive
Lumberton , NC 28358

Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

There are several businesses in this strip. It is located on south side of W 5th St in the triangle between W 5th St, MLK Jr. Dr. and Lincoln St. The facility is not listed in the UST section registry and there are no known incidents associated with it. No evidence of USTs or monitoring wells were observed during the site investigation. The design and location of the building suggest it may have operated as an auto repair shop or a convenience store/gas station at one time.

(08) Property Name:
Strick's Tire & Auto
203 W 2nd St
Lumberton, NC 28358

Property Owner:
Charles T. & Billy W. Strickland
203 W 2nd St
Lumberton , NC 28358

Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

This facility currently operates as an auto repair shop. It is located in the southwest quadrant of W 2nd St and Water St. The facility is not listed in the UST section registry and there are no known incidents associated with it. No evidence of USTs or monitoring wells were observed during the site investigation. One used oil AST was observed in the back of the building.

(09) Property Name:
Vacant Lot
SE Corner of W 2nd St & Water St
Lumberton, NC 28358

Property Owner:
Taylor Insurance Agency Inc.
111 E 3rd St
Lumberton , NC 28358

Facility ID: Unknown
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

This site is currently a vacant lot with a concrete foundation. It is located on the southeast quadrant of W 2nd St and Water St. A possible pump island outline was observed during the site investigation. There is no other evidence of USTs and no monitoring wells were observed. The facility is not listed in the UST registry and there are no known incidents associated with it.

(10) Property Name:
Lee's Auto Sales
126 W 2nd St
Lumberton, NC 28358

Facility ID: Unknown
Incident Type/Number: 42003

Property Owner:
Lee Investments of Lumberton
126 W 2nd St
Lumberton , NC 28358

UST Owner:
Robert Holloway
3002 N. Floyd Ave
Lumberton, NC 28358

Anticipated Impacts: Low

This former gas station currently operates as a used car dealer & auto repair shop. It is located in the northeast quadrant of W 2nd St and Water St. The facility is not listed in the UST section registry. Incident 42003 is associated with this facility and is still active. The incident database indicates that four regulated USTs were abandoned in place in 1988. Notice of regulatory requirements (NORR) sent 8/16. A possible fill port was observed near the Southwest corner of the building. Several monitoring wells were observed and appeared to be active.

(11) Property Name:
Loco Prices Auto Sales
103 W 2nd St
Lumberton, NC 28358

Property Owner:
Taylor Insurance Agency Inc.
111 E 3rd St
Lumberton , NC 28358

Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

This facility currently operates as a used car dealer and repair shop. It is located on the south side of W 2nd St approximately 180 feet west of Elm St. The facility is not listed in the UST section registry and there are no known incidents associated with it. There is no evidence of USTs and no monitoring wells were observed during the site investigation.

(12) Property Name:
William Taylor Auto Sales
101 W 2nd St
Lumberton, NC 28358

Property Owner:
Taylor Insurance Agency Inc.
111 E 3rd St
Lumberton , NC 28358

Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

This facility currently operates as a used car dealer and repair shop. It is located on in the southwest quadrant of W 2nd St and Elm St. The facility is not listed in the UST section registry and there are no known incidents associated with it. There is no evidence of USTs and no monitoring wells were observed during the site investigation.

(13) Property Name:
Former Lumberton Fire Station
104 Elm St
Lumberton, NC 28358

Property Owner:
Burgess Group Consolidated LLC
605 Warsaw Rd
Clinton, NC 28358

Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

This facility is the old Lumberton Fire Station. It is located southwest quadrant of 2nd St and Elm St. The facility is not listed in the UST registry and there are no known incidents associated with it. Two unknown valves or possible fill ports were observed in the side walk near the intersection. No other evidence of USTs and no monitoring wells were observed.

(14) Property Name:
City of Lumberton Parking Lot
SE Corner of 2nd & Chestnut
Lumberton, NC 28358

Facility ID: 00-0-0000030076
Incident Type/Number: 6455, 29131

Property Owner:
City of Lumberton
PO Box 1388
Lumberton , NC 28359

UST Owner:
City of Lumberton
PO Box 1388 Attn: Julie Bullock
Lumberton, NC 28359

Anticipated Impacts: Low

This parking lot is the former location of Lloyd's Texaco. According to the UST section registry three USTs were removed in 1990, one UST removed in 1998 and three USTs removed in 2004. There are two incidents associated with this facility. Incident 6455 was closed out in 1998, Incident 29131 closed out in 2004 with notice of Residual Petroleum. UST closure not properly followed by City. Over excavation limited due to natural gas line and sidewalk along 2nd St. No monitoring wells were observed during site investigation.

(15) Property Name:
Miracle Supply Inc.
211-213 E 2nd St
Lumberton, NC 28358

Property Owner:
Marylin Britt
4100 Cricklewood Dr
Lumberton , NC 28358

Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

This facility currently operates as a Janitorial wholesale Supply Co. It is located on the north side of E 2nd St approximately 180 feet east of Chestnut St. The facility is not listed in the UST section registry and there are no known incidents associated with it. During the site investigation a possible old pump island outline was observed in front of the building. There is no other evidence of USTs and no monitoring were observed.

(16) Property Name:
Pawn South
215 E 2nd St
Lumberton, NC 28358

Property Owner:
Southeast Properties of Columbus LLC
433 S. Madison St
Whiteville, NC 28472

Facility ID: 00-0-0000027000
Incident Type/Number: N/A

UST Owner:
Mac's of Lumberton Auto Parts
215 E 2nd St
Lumberton, NC 28359

Anticipated Impacts: Low

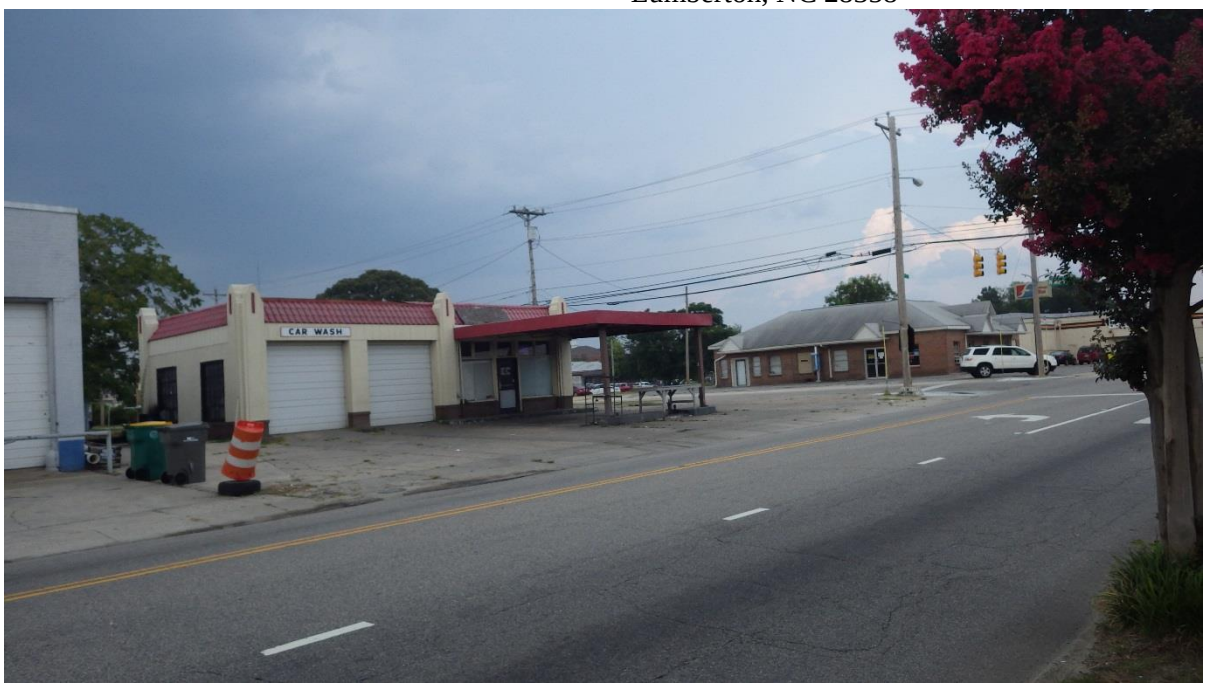
This facility currently operates as a pawn Shop. It is the former location of Mac's of Lumberton Auto Parts. It is located on the north side of E 2nd St approximately 150 feet west of Walnut St. According to the UST section registry three USTs were removed. The closure date in the registry is incorrect. A possible old pump island outline was observed during the site investigation. No other evidence of USTs and no monitoring wells were observed.

(17) Property Name:
Ride Kleen Detail Shop
221 E 2nd St
Lumberton, NC 28358

Facility ID: 00-0-0000019563
Incident Type/Number: 29008

Property Owner:
John Cox
804 Carthage Rd
Lumberton , NC 28358

UST Owner:
R. D. Capps
507 E 15th St
Lumberton, NC 28358



Anticipated Impacts: Low

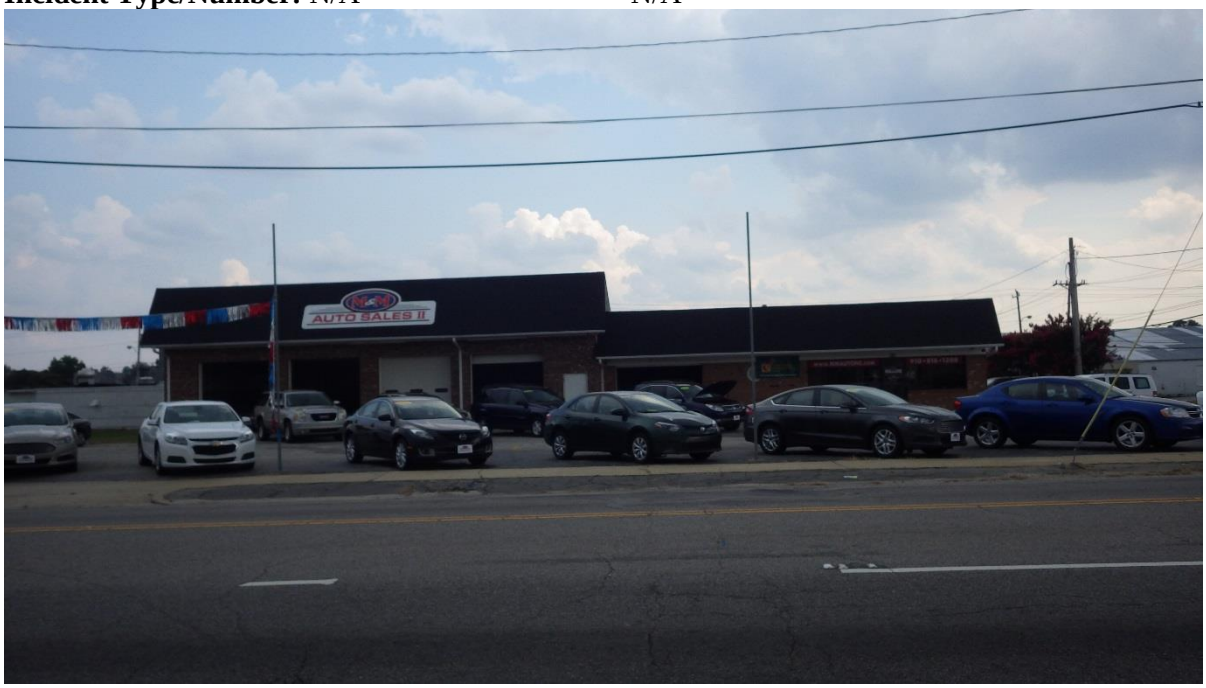
This facility currently operates as an auto detail shop. It is the former location of Davis Exxon. It is located in the northwest quadrant of E 2nd St and Walnut St. According to the UST section registry five USTs were removed in 1998. Incident 29008 is associated with this facility and is still active. NORR Sent to property owner 2002. The former pump island is still in place with the pumps removed. No Evidence of USTs and no monitoring wells were observed.

(18) Property Name:
M&M Auto Sales II
302 E 2nd St
Lumberton, NC 28358

Property Owner:
Padrick & Moore Investments LLC
2595 E 5th St
Lumberton , NC 28358

Facility ID: Unknown
Incident Type/Number: N/A

UST Owner:
N/A



Anticipated Impacts: Low

This facility currently operates as a used car dealer and repair shop. It is located in the southeast quadrant of E 2nd St and Walnut St. The facility is not listed on the UST section registry and there are no known incidents associated with it. No USTs or monitoring wells were observed during the site investigation.

(19) Property Name:
Greyhound/ Trailways Bus Station
301 E 2nd St
Lumberton, NC 28358

Property Owner:
AC Properties of Lumberton LLC
5203 Live Oak Ln
Lumberton , NC 28358

Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

This facility currently operates as the Greyhound/Trailways bus station. It is located in the northeast quadrant of E 2nd St and Walnut St. The facility is not listed in the UST section registry and there are no known incidents associated with it. No USTs or monitoring wells were observed during the site investigation.

(20) Property Name:
Performance By Mark
309 E 2nd St
Lumberton, NC 28358

Property Owner:
Mark Deal
34 Longleaf Dr
Lumberton , NC 28358

Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

This facility currently operates as a motorcycle accessories and repair shop. It is located on north side of E 2nd St approximately 200 feet east of Walnut St. The facility is not listed in the UST section registry and there are no known incidents associated with it. No evidence of USTs and no monitoring wells were observed during the site investigation.

(21) Property Name:
Campbell's Used Cars
209 N. Pine St
Lumberton, NC 28358

Property Owner:
Campbell's Used Cars Inc.
209 N Pine St
Lumberton , NC 28358

Facility ID: 00-0-0000018368
Incident Type/Number: N/A

UST Owner:
Planters Oil Co Inc.
140 Donald Ross Dr.
Pinehurst , NC 28374

Anticipated Impacts: Low

This facility currently operates as a used car dealer and repair shop. It is the former location of Hudson Garage. It is located in the northwest quadrant of E 2nd St and Pine St. According to the UST section registry four USTs were removed in 1988. There are no known incidents associated with it. The property was redeveloped between 2010 and 2013.

(22) Property Name:
Biggs Property
SE Corner of Walnut & 3rd St
306 3rd ST
Lumberton, NC 28358

Facility ID: 00-0-0000000312
Incident Type/Number: N/A

Property Owner:
K M Biggs Inc.
PO Box 967
Lumberton , NC 28359

UST Owner:
T R Driscoll Inc.
11000 Starlite Dr.
Lumberton, NC 28358

Anticipated Impacts: Low

This site is a vacant lot. It is located in the southeast quadrant of N Walnut St and E 3rd St. According to the UST section register one UST was removed in 1974. Two Possible UST fill ports were observed on the southern end of the property approximately 118 feet east of N Walnut St and 120 feet south of E 3rd St. No monitoring wells were observed. There are no known incidents associated with this site.

(23) Property Name:
Southeastern Upholstery
209 N Walnut St
Lumberton, NC 28358

Property Owner:
Southeast Properties of Columbus LLC
433 S. Madison St
Whiteville, NC 28472

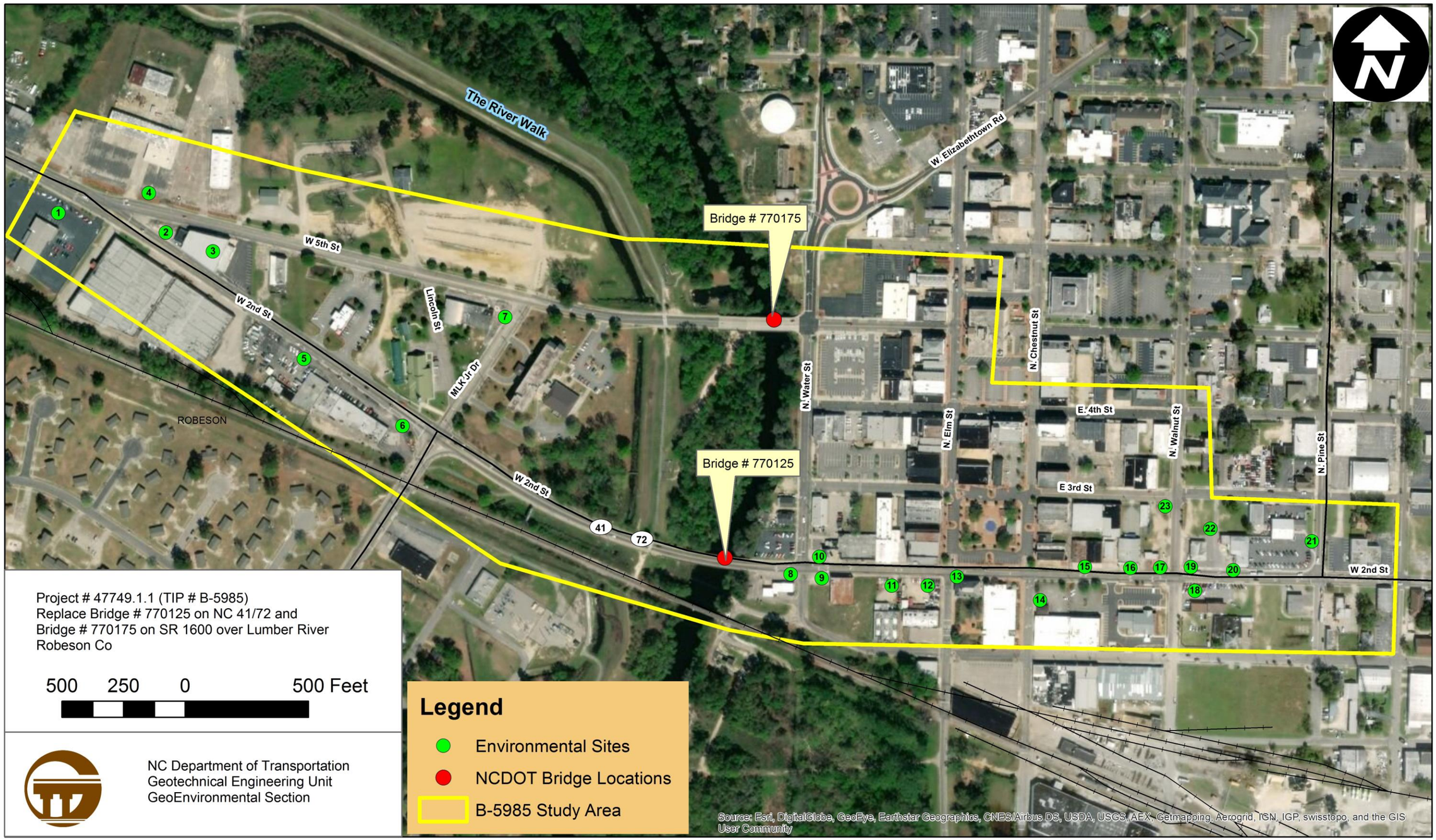
Facility ID: N/A
Incident Type/Number: N/A

UST Owner:
N/A

Anticipated Impacts: Low

This facility operated as an upholstery shop. It is located in the southwest quadrant of N Walnut St and E 3rd St. The facility appeared to be vacant at the time of the site investigation. The facility is not listed in the UST section registry and there are no known incidents associated with it.

Appendix A
Location of GeoEnvironmental Sites of Concern



PROJECT SPECIAL PROVISIONS
GEOENVIRONMENTAL

CONTAMINATED SOIL (1/27/2023)

The Contractor's attention is directed to the fact that soil contaminated with petroleum hydrocarbon compounds may exist within the project area. Information relating to these contaminated areas, sample locations, and investigation reports will be available at the following web address by navigating to the correct letting year and month then selecting, "Plans and Proposals", "B-5985A", "Individual Sheets/520 GeoEnvironmental":

http://dotw-xfer01.dot.state.nc.us/dsplan/

Petroleum contaminated soil may be encountered during any earthwork activities on the project. The Contractor shall only excavate those soils that the Engineer designates necessary to complete a particular task. The Engineer shall determine if soil is contaminated based on areas shown on the plans, petroleum odors, and unusual soil staining. Contaminated soil not required to be excavated is to remain in place and undisturbed. Undisturbed soil shall remain in place, whether contaminated or not. The Contractor shall transport all contaminated soil excavated from the project to a facility licensed to accept contaminated soil.

In the event that a stockpile is needed, the stockpile shall be created within the property boundaries of the source material and in accordance with the Diagram for Temporary Containment and Treatment of Petroleum-Contaminated Soil per North Carolina Department of Environmental Quality's (NCDEQ) Division of Waste Management UST Section GUIDELINES FOR EX SITU PETROLEUM CONTAMINATED SOIL REMEDIATION. If the volume of contaminated material exceeds available space on site, the Contractor shall obtain a permit from the NCDEQ UST Section's Regional Office for off-site temporary storage. The Contractor shall provide copies of disposal manifests completed per the disposal facilities requirements and weigh tickets to the Engineer.

Measurement and Payment:

The quantity of contaminated soil hauled and disposed of shall be the actual number of tons of material, which has been acceptably transported and weighed with certified scales as documented by disposal manifests and weigh tickets. The quantity of contaminated soil, measured as provided above, shall be paid for at the contract unit price per ton for "Hauling and Disposal of Petroleum Contaminated Soil".

The above price and payment shall be full compensation for all work covered by this section, including, but not limited to stockpiling, loading, transportation, weighing, laboratory testing, disposal, equipment, decontamination of equipment, labor, and personal protective equipment.

Payment shall be made under:

Pay Item	Pay Unit
Hauling and Disposal of Petroleum Contaminated Soil	Ton

NORTH CAROLINA PROFESSIONAL SEAL 036892 ENGINEER Ethan J. Caldwell

DocuSigned by:
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01/27/2023