



PYRAMID GEOPHYSICS
(PROJECT 2025-332)

GEOPHYSICAL INVESTIGATION

METALLIC UST SURVEY: PARCEL 11 NCDOT PROJECT U-5728 (54019.1.1)

124 BELL FORK ROAD, JACKSONVILLE, NC

September 25, 2025

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C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 11 – 124 Bell Fork Road
Jacksonville, Onslow County, North Carolina

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LIST OF ACRONYMS

CADD	Computer Assisted Drafting and Design
DF	Dual Frequency
EM.....	Electromagnetic
GPR.....	Ground Penetrating Radar
GPS	Global Positioning System
NCDOT.....	North Carolina Department of Transportation
ROW	Right-of-Way
UST	Underground Storage Tank

EXECUTIVE SUMMARY

Project Description: Pyramid Geophysics (Pyramid), a department within Pyramid Environmental & Engineering, P.C., conducted a geophysical investigation for the North Carolina Department of Transportation (NCDOT) at Parcel 11, located at 124 Bell Fork Road, in Jacksonville, NC. The survey was part of an NCDOT Right-of-Way (ROW) investigation (NCDOT Project U-5728). The survey was designed to include all accessible portions of the area indicated to Pyramid by the NCDOT. Conducted on September 18, 2025, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of nine EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. The geophysical survey identified evidence of utilities and/or buried metallic debris.

Two probable USTs were observed near the northwest corner of the building. Probable UST #1 is approximately 13 feet long by 5.5 feet wide and Probable UST #1 is approximately 11.5 feet long by 6 feet wide. Collectively, the geophysical data recorded evidence of two probable USTs at Parcel 11.

INTRODUCTION

Pyramid Geophysics (Pyramid), a department within Pyramid Environmental & Engineering, P.C., conducted a geophysical investigation for the North Carolina Department of Transportation (NCDOT) at Parcel 11, located at 124 Bell Fork Road, in Jacksonville, NC. The survey was part of an NCDOT Right-of-Way (ROW) investigation (NCDOT Project U-5728). The survey was designed to include all accessible portions of the area indicated to Pyramid by the NCDOT. Conducted on September 18, 2025, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site consisted of a service facility surrounded by concrete, asphalt, and gravel surfaces. An aerial photograph showing the survey area boundaries, and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Pyramid collected the EM data using a Geonics EM61-MK2 (EM61) metal detector integrated with a Geode External GPS/GLONASS receiver. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

According to the instrument specifications, the EM61 can detect a metal drum down to a maximum depth of approximately 8 feet. Smaller objects (1-foot or less in size) can be detected to a maximum depth of 4 to 5 feet. The EM61 data were digitally collected at

approximately 0.8-foot intervals along north-south trending or east-west trending, generally parallel survey lines, spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 15.0 software programs.

GPR data were acquired across select EM anomalies on September 18, 2025, using a Geophysical Survey Systems, Inc. (GSSI) SIR 4000 control unit coupled to a 350 MHz HS antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. The GPR data were viewed in real-time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 6 feet, based on dielectric constants calculated by the SIR 4000 unit in the field during the reconnaissance scans. GPR transects across specific anomalies were saved to the hard drive of the SIR 4000 unit for post-processing and figure generation.

Pyramid’s classifications of USTs for the purposes of this report are based directly on the geophysical UST ratings provided by the NCDOT. These ratings are as follows:

Geophysical Surveys for Underground Storage Tanks on NCDOT Projects			
High Confidence	Intermediate Confidence	Low Confidence	No Confidence
Known UST Active tank - spatial location, orientation, and approximate depth determined by geophysics.	Probable UST Sufficient geophysical data from both magnetic and radar surveys that is characteristic of a tank. Interpretation may be supported by physical evidence such as fill/vent pipe, metal cover plate, asphalt/concrete patch, etc.	Possible UST Sufficient geophysical data from either magnetic or radar surveys that is characteristic of a tank. Additional data is not sufficient enough to confirm or deny the presence of a UST.	Anomaly noted but not characteristic of a UST. Should be noted in the text and may be called out in the figures at the geophysicist's discretion.

DISCUSSION OF RESULTS

Discussion of EM Results

A contour plot of the EM61 results obtained across the survey area at the property is presented in **Figure 2**. Each EM anomaly is numbered for reference in the figure. The following table presents the list of EM anomalies and the cause of the metallic response, if known:

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1	Building	✓
2	Two Probable USTs	✓
3	Suspected Fuel/Vent Line	✓
4	Utility	
5	Guy Wires/Signs/Right-of-Way Markers	
6	Drop Inlet	
7	Utility	
8	Reinforced Concrete	✓
9	Suspected Buried Metallic Debris	✓

The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface, including a building, utilities, guy wires, signs, right-of-way markers, and reinforced concrete. GPR was performed around and across all areas of significant metallic interference to confirm that the interference did not obscure any significant structures such as USTs. GPR was also performed across EM Anomalies 1, 2, and 9 to confirm whether the anomalies were the result of a more significant structure such as a UST.

Discussion of GPR Results

Figure 3 presents the locations of the formal GPR transects performed at the property as well as select transect images. All of the transect images are included in **Appendix A**. A total of fifteen formal GPR transects were performed at the site.

GPR Transect 1 was performed across EM Anomaly 3 and GPR Transect 14 was performed across EM Anomaly 9. These transects showed minor hyperbolic reflectors consistent with suspected fuel and/or vent lines and suspected buried metallic debris, respectively.

GPR Transects 2 and 3-4 were performed across EM Anomaly 2. GPR Transect 2 showed a large, high-amplitude hyperbolic reflector and GPR Transects 3-4 showed large, high-amplitude flat reflectors. These reflectors are consistent with the widths and lengths of USTs, respectively. Probable UST #1 is approximately 13 feet long by 5.5 feet wide and Probable UST #1 is approximately 11.5 feet long by 6 feet wide. **Figure 4** provides the locations and sizes of the probable USTs overlain on an aerial, along with ground-level photographs.

GPR Transects 5-13 and 15 were performed around and across the areas of significant metallic interference. These transects showed reinforcement within the slab. These transects also showed minor hyperbolic reflectors consistent with utilities and/or buried debris. No significant structure such as USTs were observed. Collectively, the geophysical data recorded evidence of two probable USTS at Parcel 11.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 11 in Jacksonville, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface.
- The geophysical survey identified evidence of utilities and/or buried metallic debris.
- Two probable USTs were observed near the northwest corner of the building. Probable UST #1 is approximately 13 feet long by 5.5 feet wide and Probable UST #2 is approximately 11.5 feet long by 6 feet wide.
- Collectively, the geophysical data recorded evidence of two probable USTs at Parcel 11.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for the North Carolina Department of Transportation in accordance with generally accepted guidelines for EM61 and GPR surveys. It is generally recognized that the results of the EM61 and GPR surveys are non-unique and may not represent actual subsurface conditions. The EM61 and GPR results obtained for this project have not conclusively determined the definitive presence or absence of metallic USTs, but the evidence collected is sufficient to result in the conclusions made in this report. Additionally, it should be understood that areas containing extensive vegetation, reinforced concrete, or other restrictions to the accessibility of the geophysical instruments could not be fully investigated.

APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA



View of Survey Area (Facing Approximately Northwest)



View of Survey Area (Facing Approximately Southeast)



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PROJECT

NCDOT PROJECT U-5728
PARCEL 11
JACKSONVILLE, NC

TITLE

PARCEL 11 -
GEOPHYSICAL SURVEY BOUNDARIES
AND SITE PHOTOGRAPHS

DATE

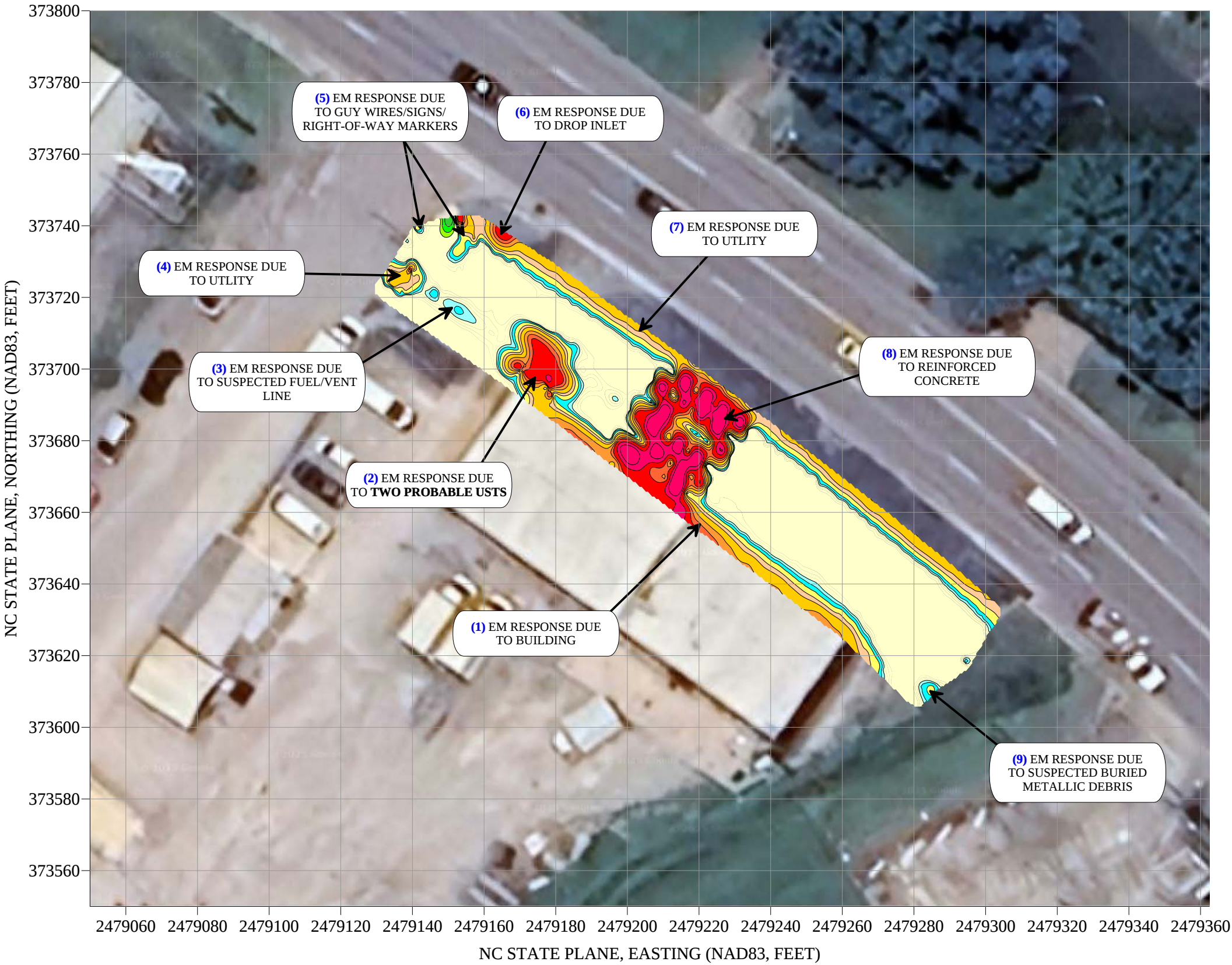
PYRAMID
PROJECT #: 2025-332

CLIENT

NCDOT

FIGURE 1

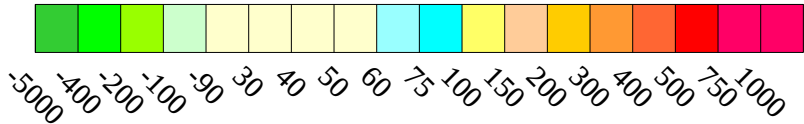
EM61 METAL DETECTION RESULTS



EVIDENCE OF TWO PROBABLE USTS WAS OBSERVED.

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM data were collected on September 18, 2025, using a Geonics EM61-MK2 instrument. Verification GPR data were collected using a GSSI SIR 4000 instrument with a 350 MHz HS antenna on September 18, 2025.

EM61 Metal Detection Response (millivolts)



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NCDOT PROJECT U-5728
PARCEL 11
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TITLE

PARCEL 11 -
EM61 METAL DETECTION CONTOUR MAP

DATE

9/22/2025

CLIENT

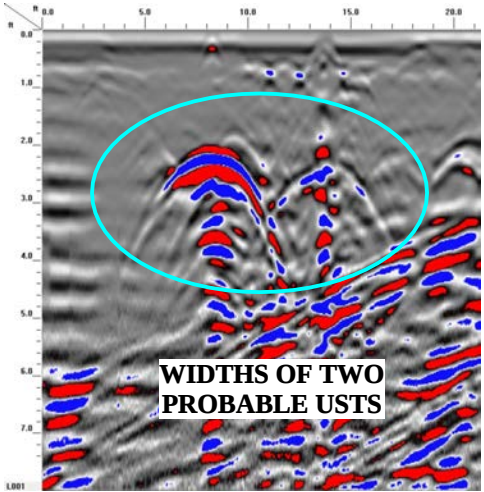
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PYRAMID
PROJECT #:

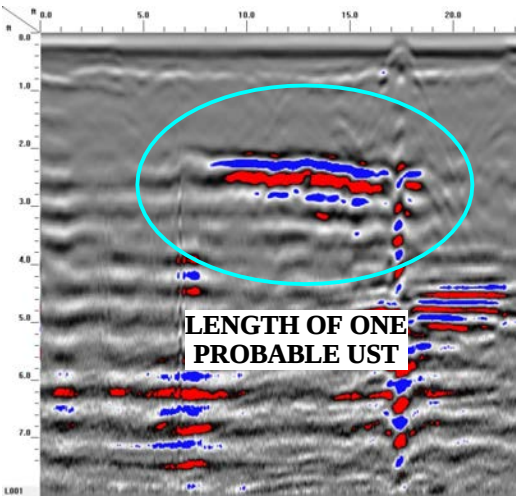
2025-332

FIGURE 2

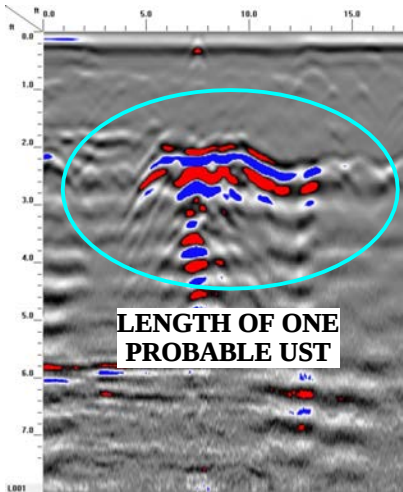
GPR TRANSECT LOCATIONS



GPR TRANSECT 2 (T2)



GPR TRANSECT 3 (T3)



GPR TRANSECT 4 (T4)



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NCDOT PROJECT U-5728
PARCEL 11
JACKSONVILLE, NC

TITLE

PARCEL 11 -
GPR TRANSECT LOCATIONS AND SELECT IMAGES

DATE

9/22/2025

PYRAMID
PROJECT #:

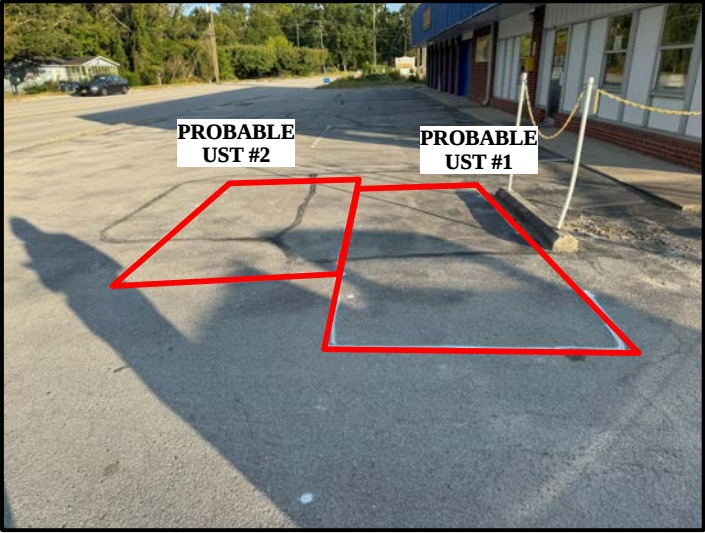
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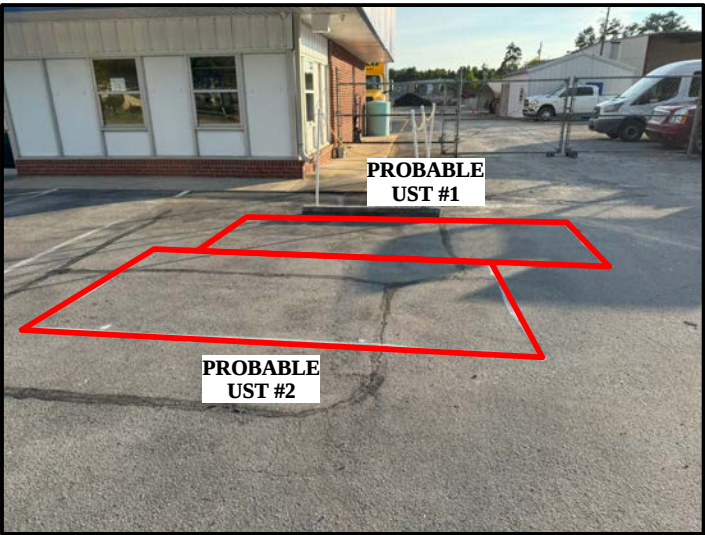
NCDOT

FIGURE 3

LOCATION OF TWO PROBABLE USTs



View of Two Probable USTs
(Facing Approximately Southeast)



View of Two Probable USTs
(Facing Approximately Southwest)



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PARCEL 11
JACKSONVILLE, NC

TITLE

PARCEL 11 -
LOCATIONS AND SIZES OF TWO
PROBABLE USTs

DATE

9/22/2025

CLIENT

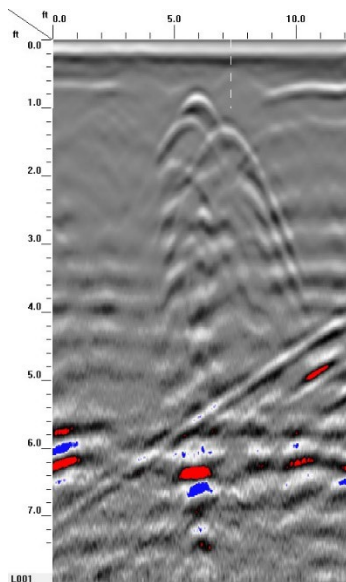
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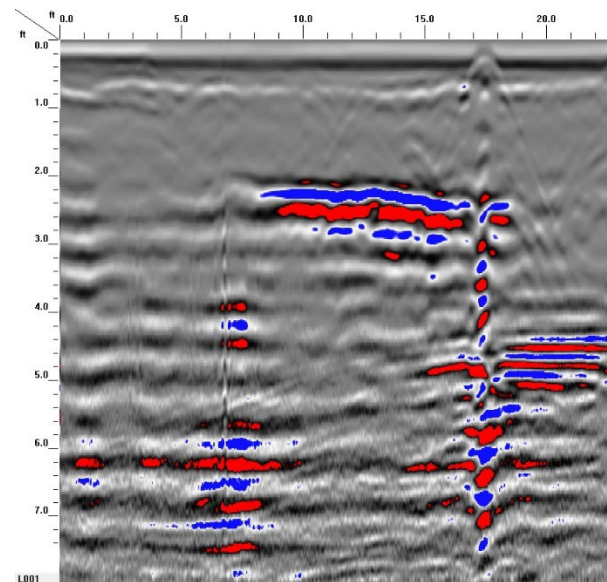
2025-332

FIGURE 4

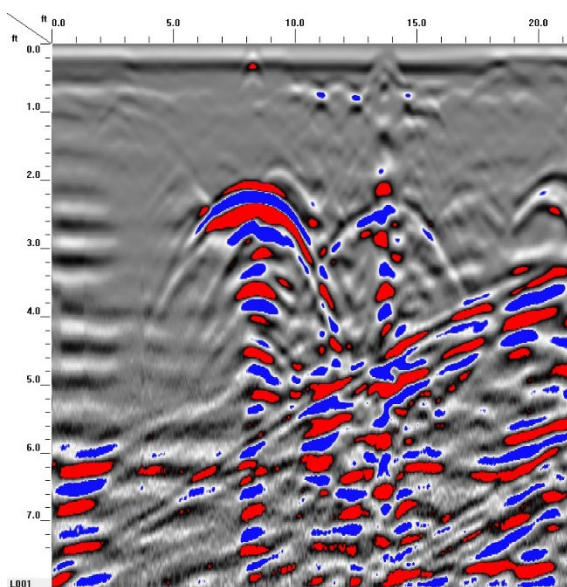
Appendix A – GPR Transect Images



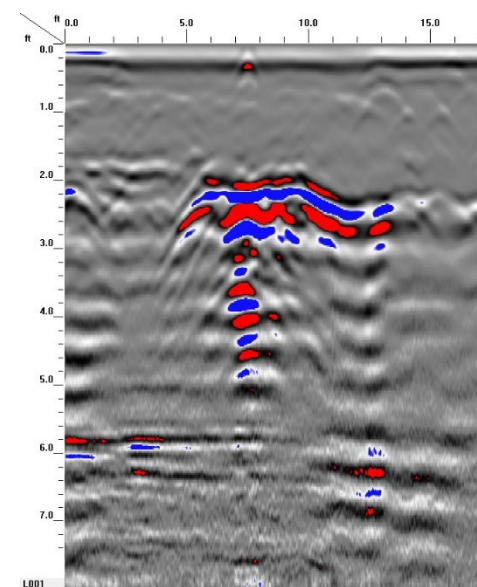
GPR TRANSECT 1



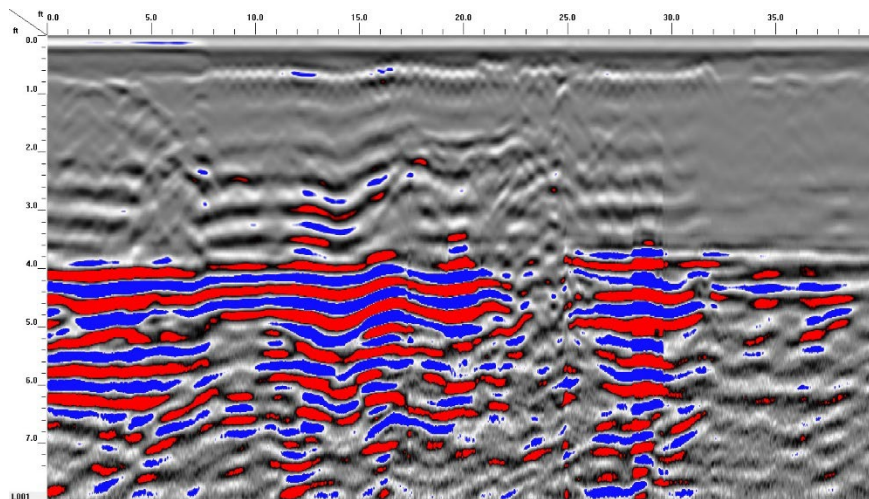
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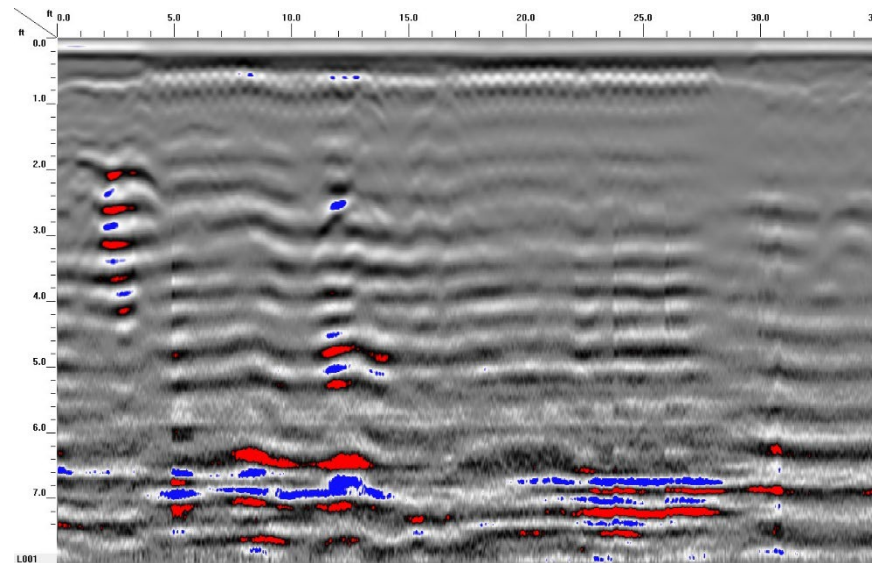
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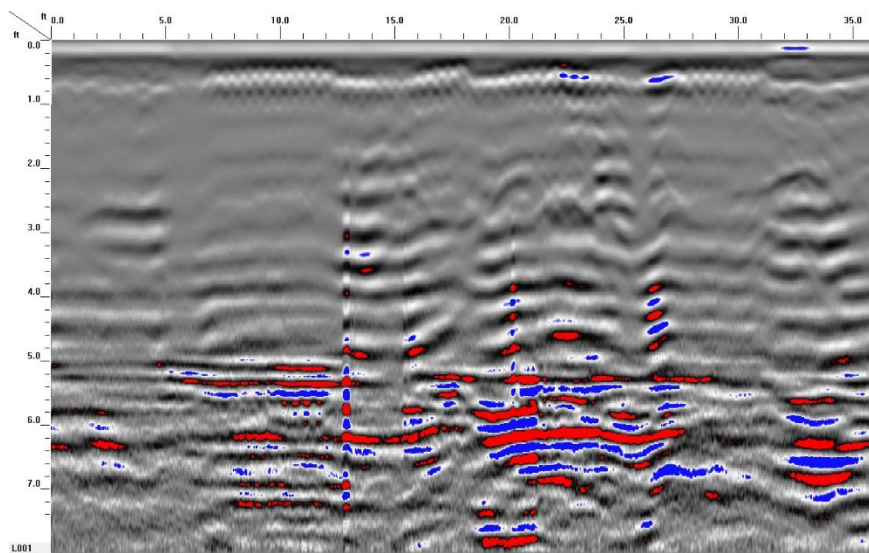
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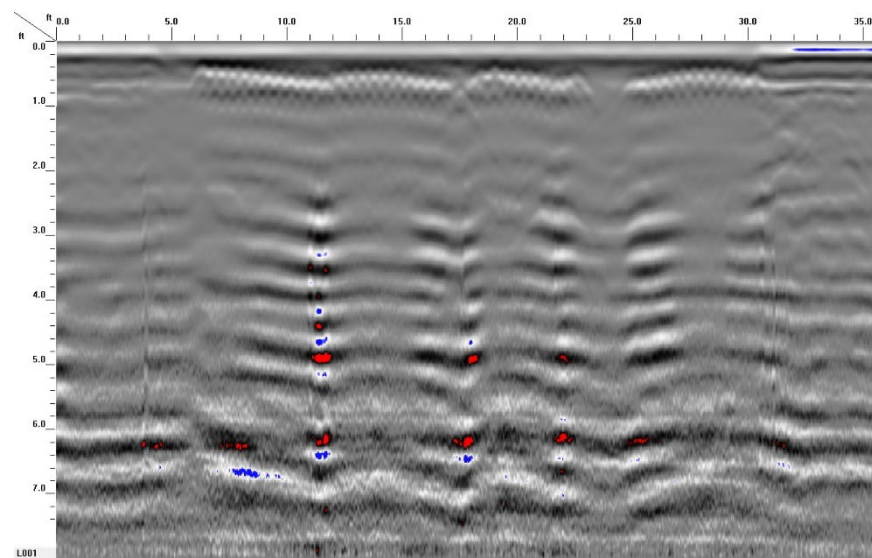
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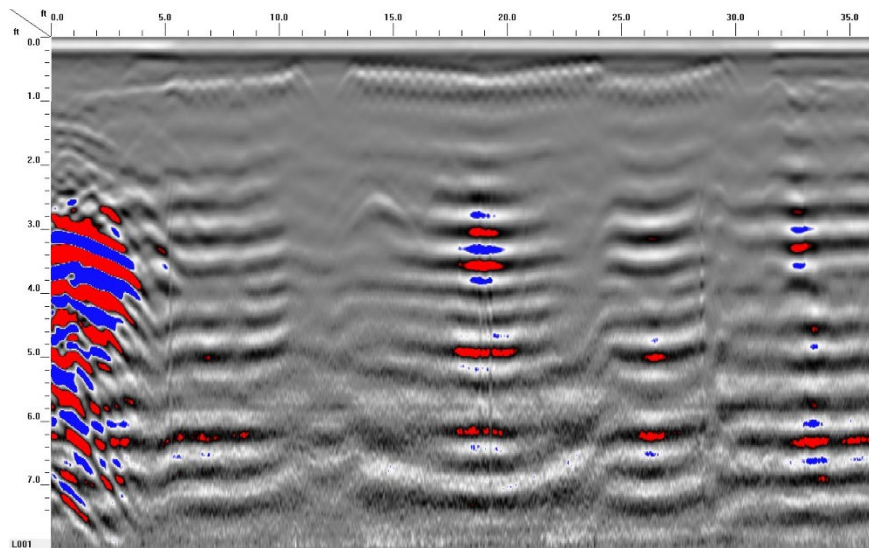
GPR TRANSECT 7



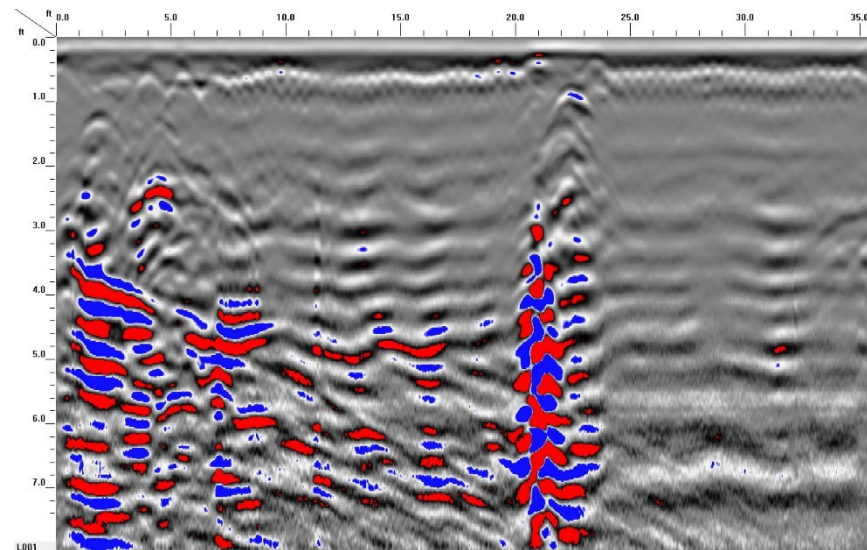
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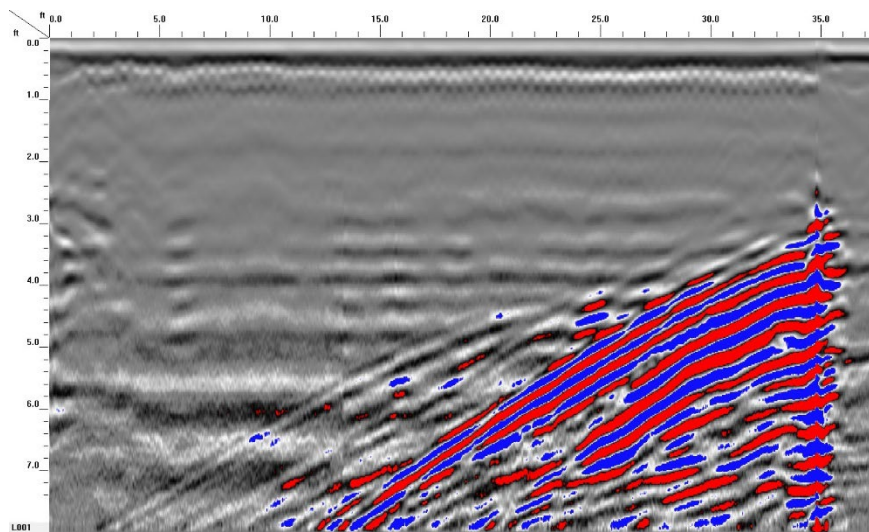
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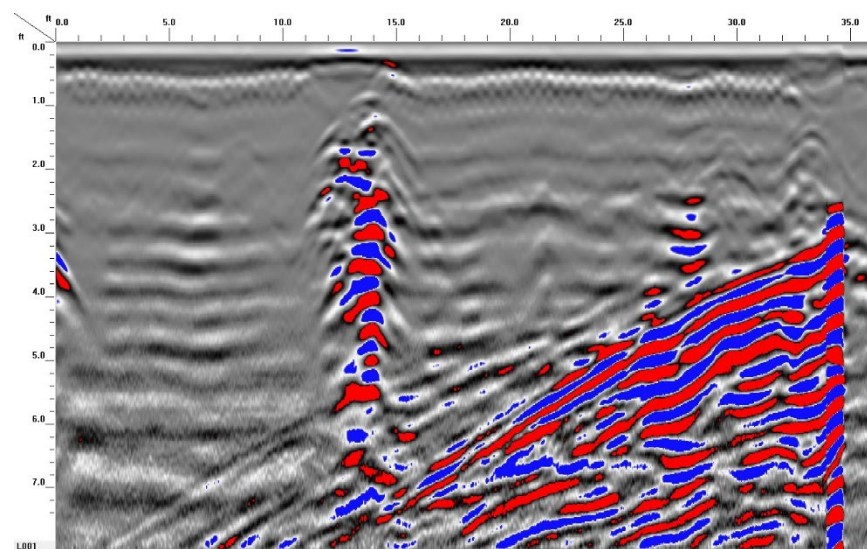
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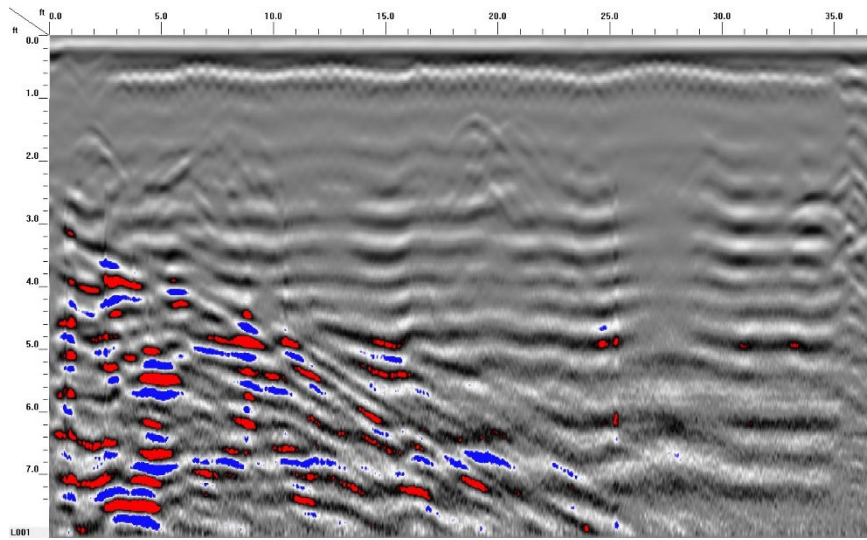
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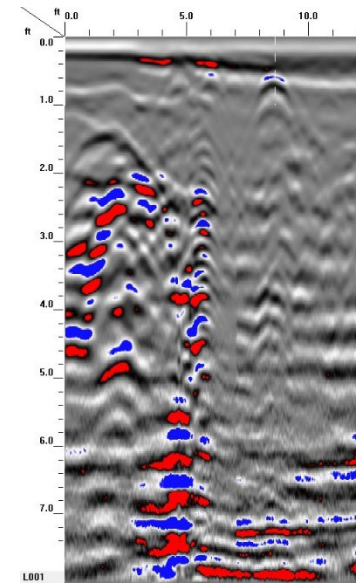
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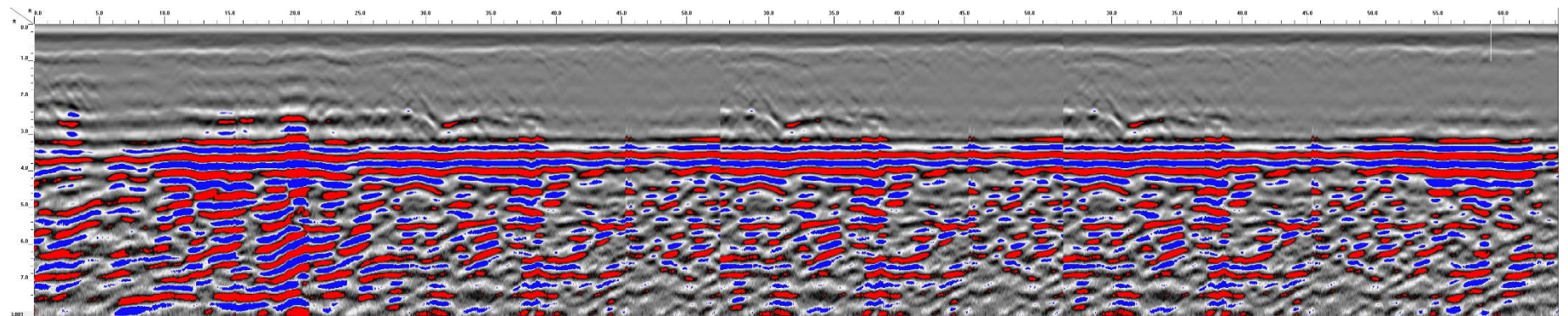
GPR TRANSECT 12



GPR TRANSECT 13



GPR TRANSECT 14



GPR TRANSECT 15