Summary of Scanning for Subsurface Voids

Prepared For: Silver Valley Association

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We appreciate the opportunity to provide this report for our work completed on Friday February 28, 2020.

PURPOSE

The purpose of the project was to search for subsurface voids that may be present within the scanned areas and, if found, to mark out their approximate boundaries. The scope of work consisted of one location measuring approximately 120 x 120 feet. The client showed us the desired location prior to our scanning. Location consisted of two asphalt/concrete paved tennis courts, badly damaged by cracks and surface ground settling.

EQUIPMENT

- **400 MHz GPR Antenna.** The antenna is mounted in a stroller frame which rolls over the surface. The surface needs to be reasonably smooth and unobstructed in order to obtain readable scans. Obstructions such as curbs, landscaping, and vegetation will limit the feasibility of GPR. The data is displayed on a screen and marked in the field in real time. GPR works by sending pulses of energy into a material and recording the strength and the time required for the return of the reflected signal. Reflections are produced when the energy pulses enter into a material with different electrical properties from the material it left. The strength of the reflection is determined by the contrast in signal speed between the two materials. The total depth achieved can be as much as 8' or more with this antenna but can vary widely depending on the conductivity of the materials. Depths provided should always be treated as estimates as their accuracy can be affected by multiple factors. For more information, please visit: Link

PROCESS

Initial GPR scans were collected in order to evaluate the data and calibrate the equipment. Based on these findings, a scanning strategy is formed, consisting of scanning the entire area in a grid with five to ten foot scan spacing in order to locate any potential voids that may underneath the tennis courts at the site. At this site we had 15 GPR grid lines. Lines 1,3,5,7,9 run in E to W direction. Lines 2,4,6,8 run in W-E direction. Lines 10,12,14 run in S-N direction. Lines 11,13,15 run in N-S direction. The GPR data is viewed in real time and anomalies if any, would be located and marked on the surface along with their depths using marking paint. All 15 scan examples were saved and will be provided in this report. During this project we did not mark anything on the surface as the results show voids and debris over the entire scan area.

LIMITATIONS

Void mapping is not a definitive process. A void will be the highest amplitude negative response in the GPR signal but there are materials other than air that may cause strong negative responses. Therefore, there may be false positives in our findings. There also may be voids that are not able to be detected for a number of reasons. GPR can determine the approximate boundaries/edges of voids that are detected along with the approximate depth to the top of the void but cannot determine the depth to the bottom of the void (volume).

FINDINGS

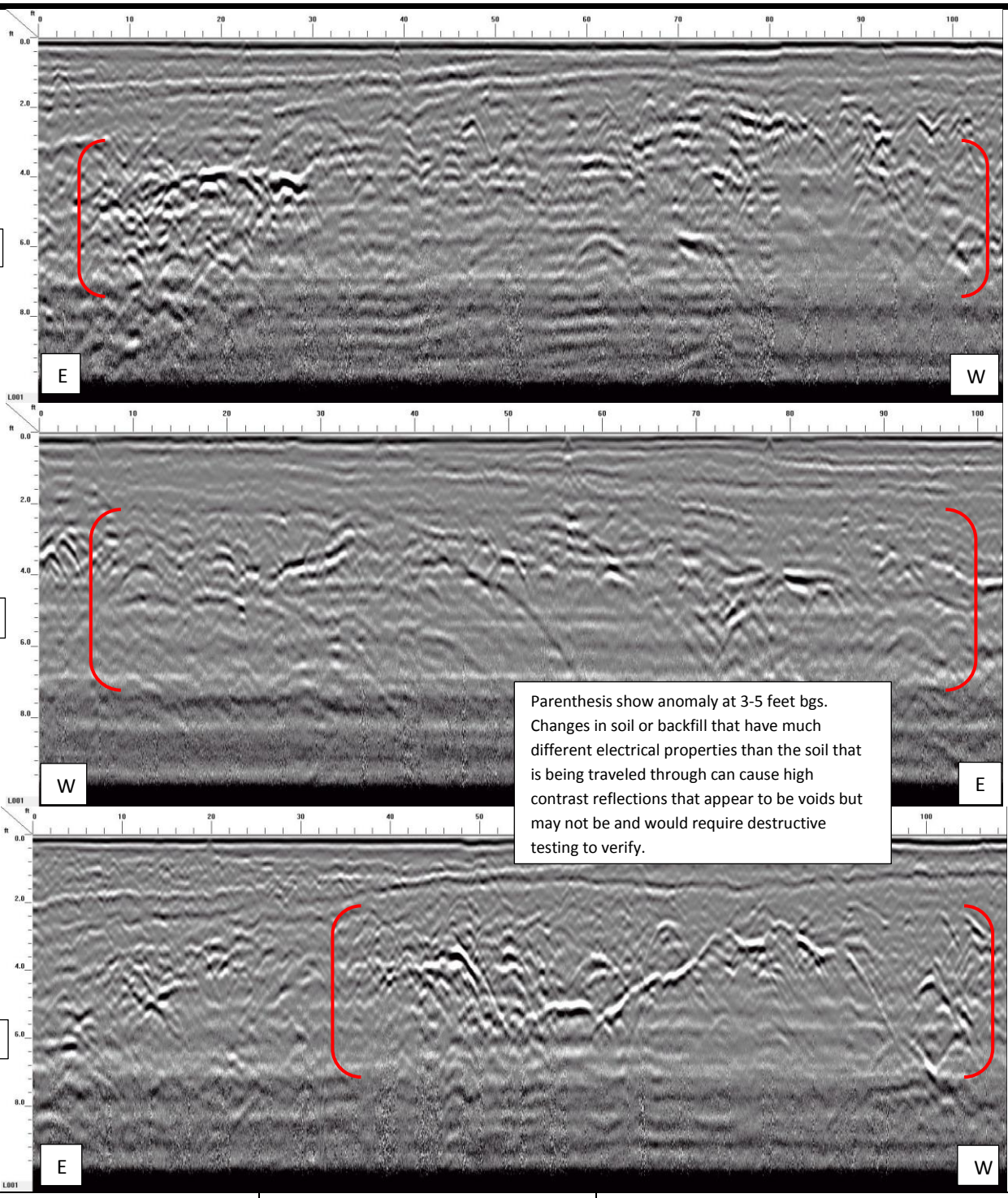
The tennis slab was found to be approximately 5" thick in most areas and was not reinforced. The subsurface conditions at the time of the scanning allowed for maximum GPR depth penetration of 5 to 7 feet below ground surface in most areas. Historically the tennis courts were built on top of the old quarry landfill.

Based on the areas scanned, anomalies were found within the areas shown in the supporting photos, data, and site map provided. The following pages outline data from scans performed during this investigation. No potential utilities were located during the scan

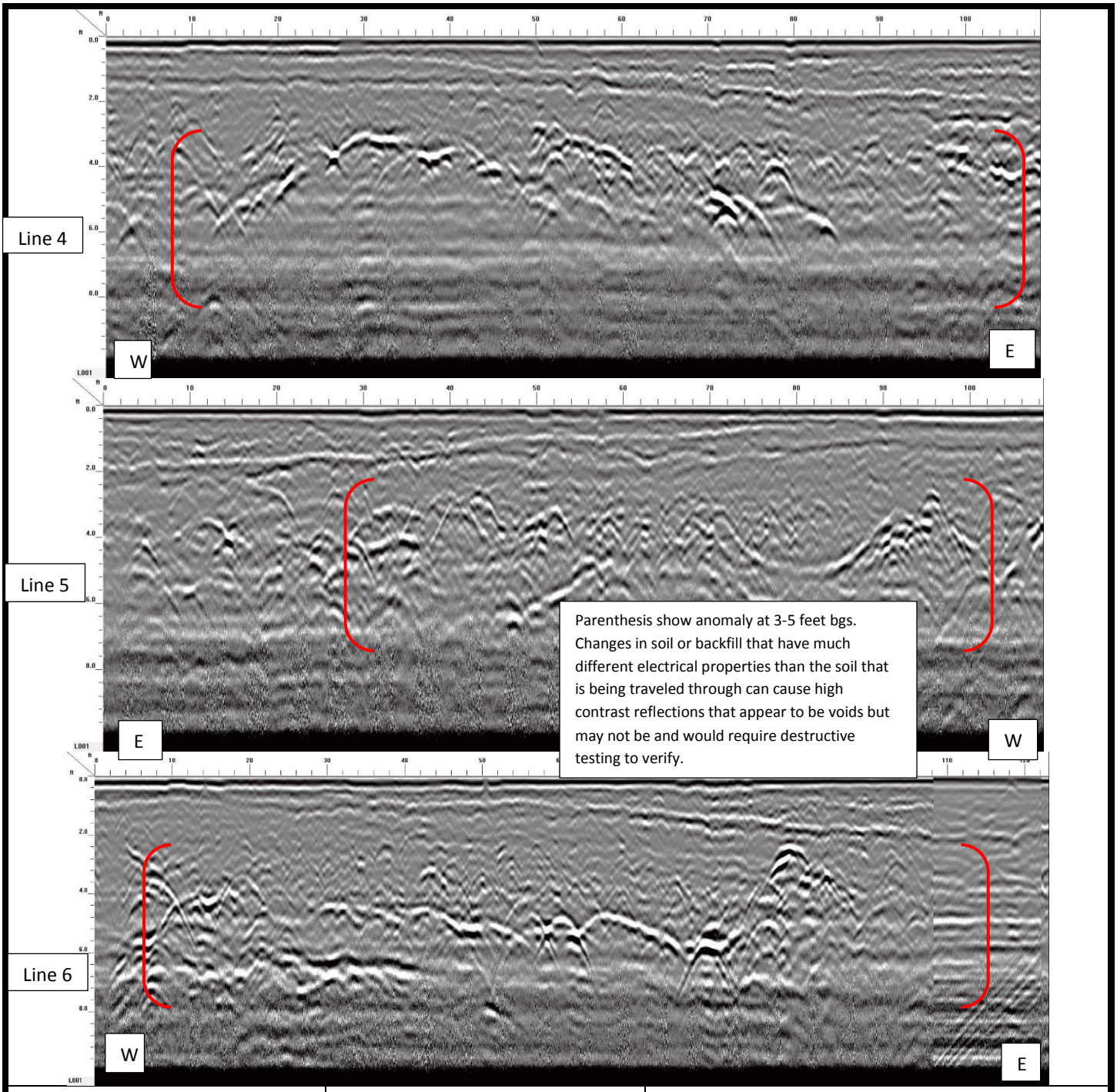
process. However, even if they were, they would outside the scope of this particular project. The following pages will provide further explanation of the findings. The GPR data shows a strong boundary at about 1 – 1.5 feet below ground surface (bgs), between the gravel and sand that is located below the asphalt/concrete courts. At about 3 - 5 feet bgs there is an anomalous signature running under the northern area especially. This may be the boundary between the top soil and the quarry landfill boundary, which can be quarry production debris which were deposited in the landfill and then covered with topsoil. This can also be possible voids and also debris such as rocks, But also we must keep in mind that changes in soil or backfill that have much different electrical properties than the soil that is being traveled through can cause high contrast reflections that appear to be voids but may not be and would require destructive testing to verify.

Survey Location and survey boundaries depicted by red square.	Location: 184 Falls River Rd., Munroe Falls, OH	GPRS

Grid Pattern of GPR survey with numbered lines and direction. Lines 1,3,5,7,9 run E-W. Lines 2,4,6,8 run W-E. Lines 10,12,14 run S-N. Lines 11,13,15 run N-S.	Location: 184 Falls River Rd., Munroe Falls, OH	GPRS



GPR Data Screenshots.	Location: 184 Falls River Rd., Munroe Falls, OH	GPRS



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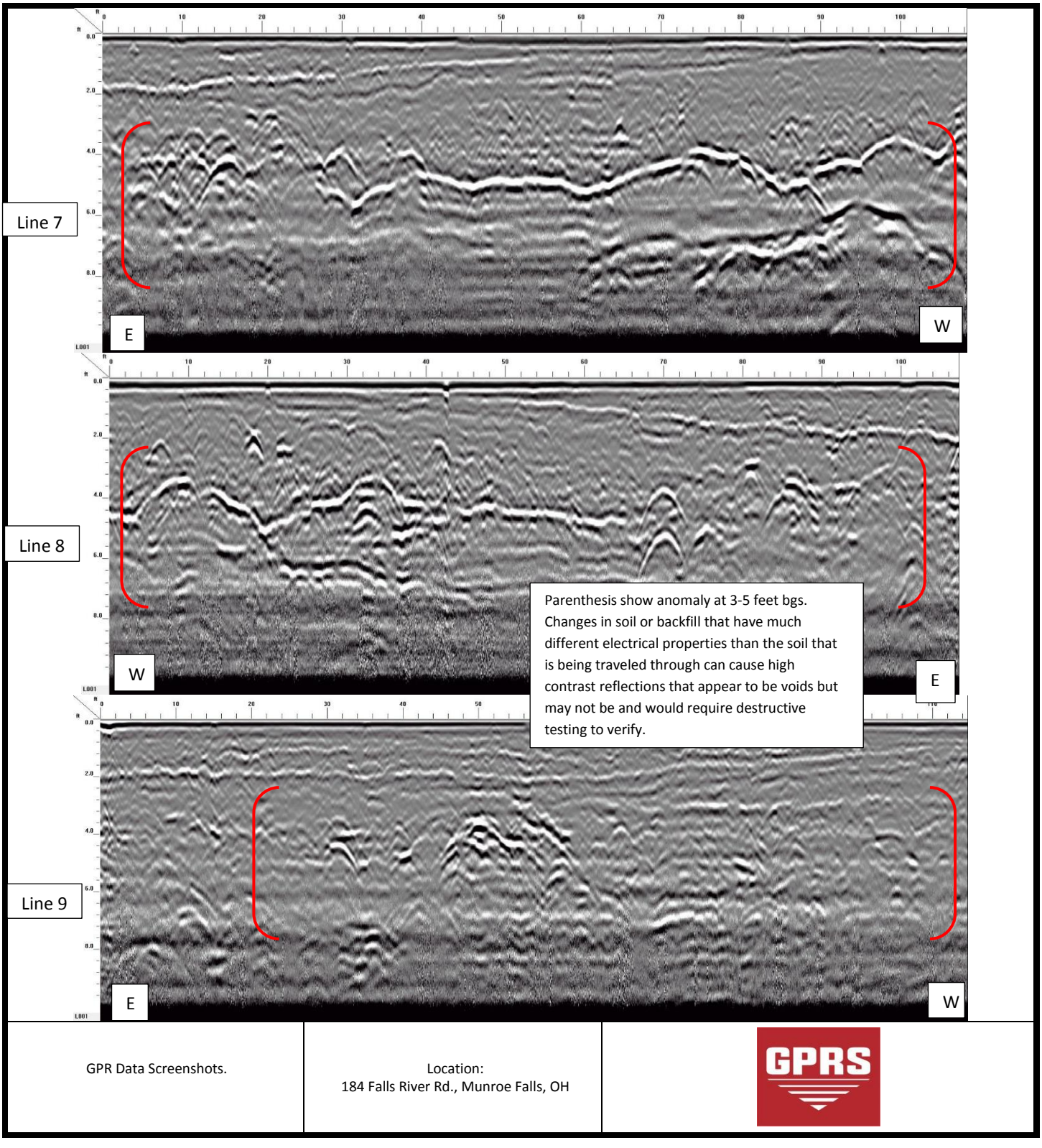

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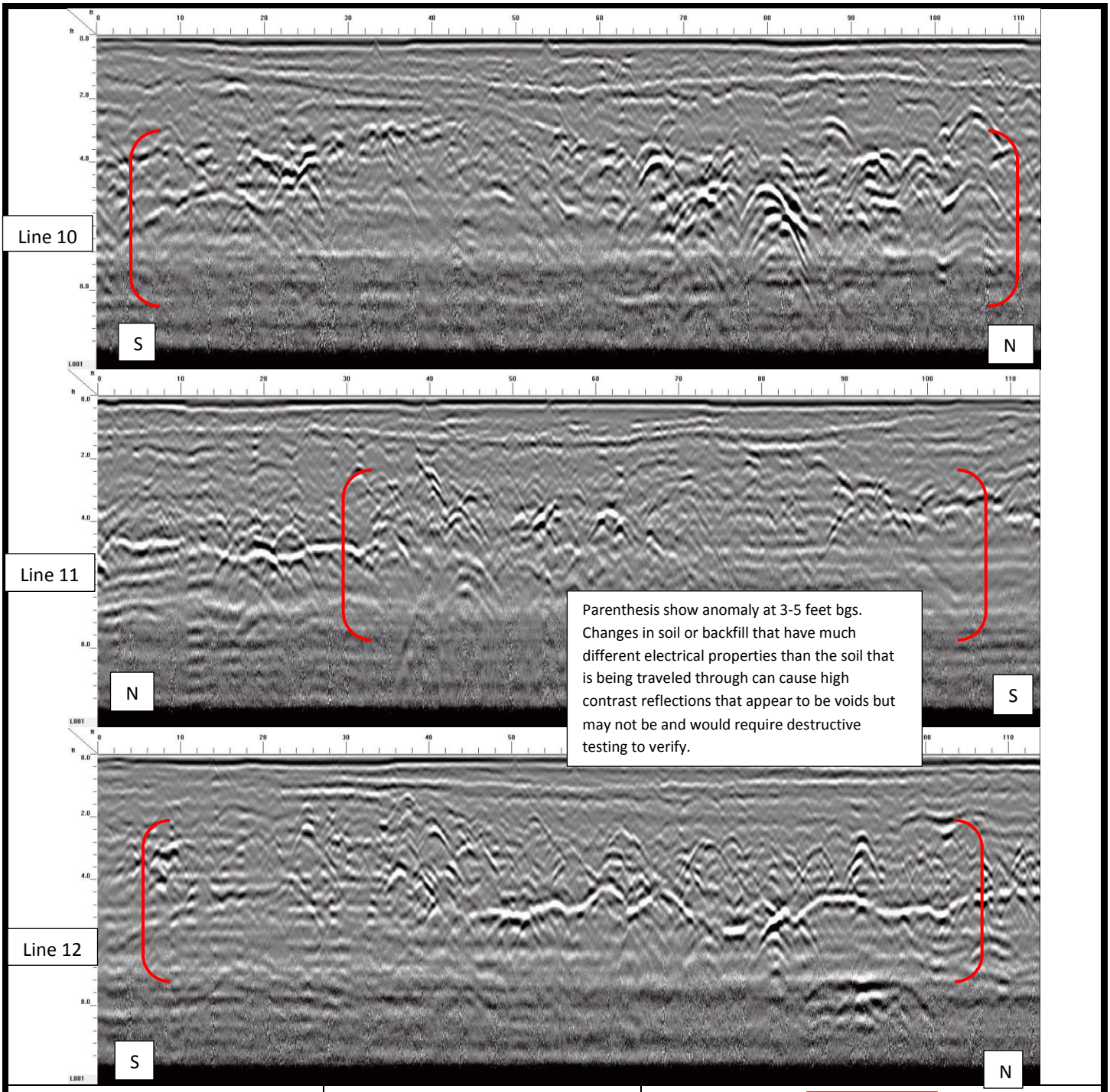
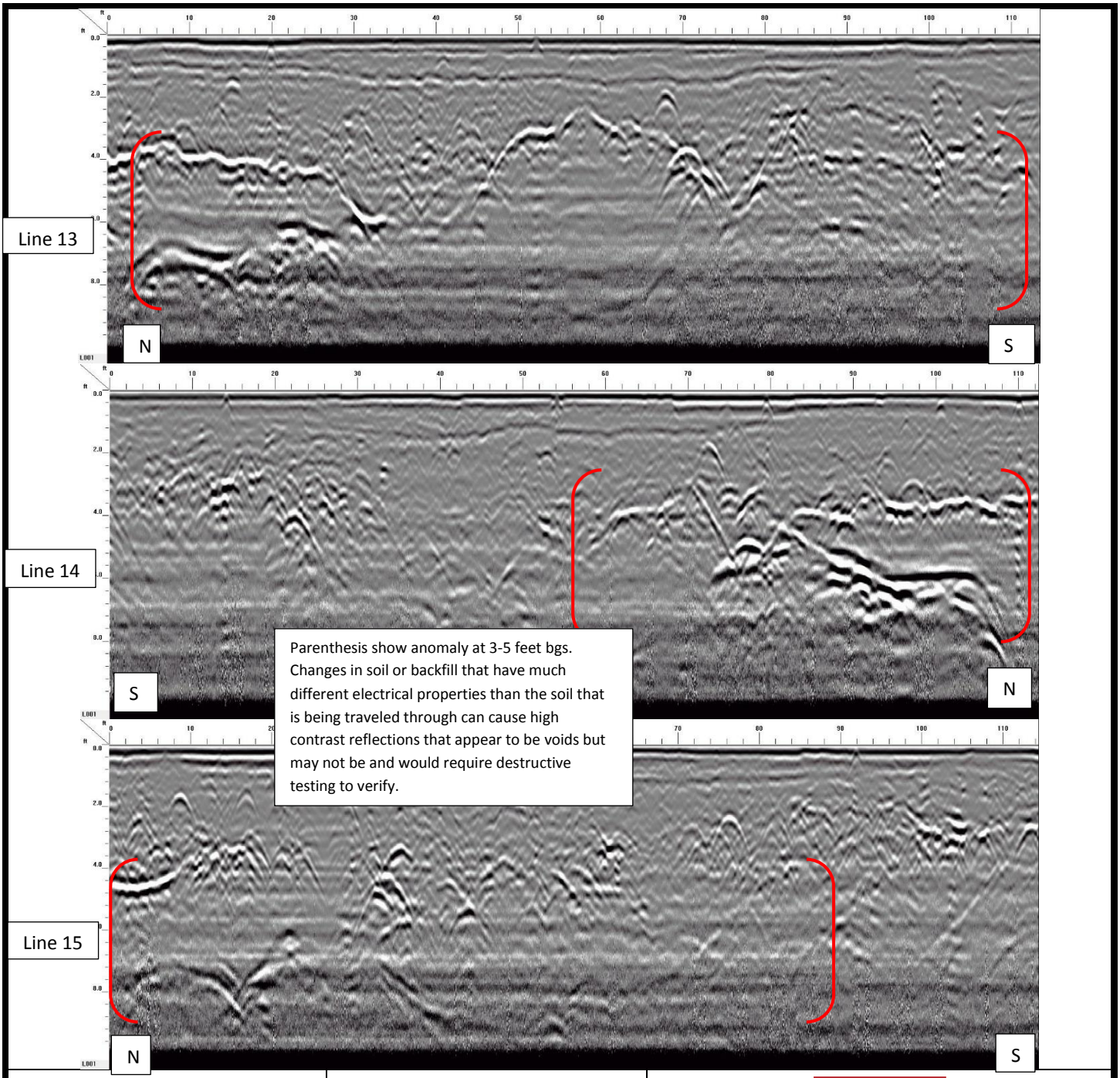


GPR Data Screenshots.	Location: 184 Falls River Rd., Munroe Falls, OH	GPRS



GPR Data Screenshots.

Location:
184 Falls River Rd., Munroe Falls, OH

GPRS

Map of Results Red is approximate limits of anomaly at 3-5 feet bgs.	Location: 184 Falls River Rd., Munroe Falls, OH	GPRS

CLOSING

GPRS, Inc. has been in business since 2001, specializing in underground storage tank location, concrete scanning, utility locating, and shallow void detection for projects throughout the United States. I encourage you to visit our website (www.gprsinc.com) and contact any of the numerous references listed.

Based on the areas scanned, anomalies were found within the areas shown in the supporting photos, data, and site map provided. The following pages outline data from scans performed during this investigation. No potential utilities were located during the scan process. However, even if they were, they would outside the scope of this particular project. The following pages will provide further explanation of the findings. The GPR data shows a strong boundary at about 1 – 1.5 feet below ground surface (bgs), between the gravel and sand that is located below the asphalt/concrete courts. At about 3 - 5 feet bgs there is an anomalous signature running under the northern area especially. This may be the boundary between the top soil and the quarry landfill boundary, which can be quarry production debris which were deposited in the landfill and then covered with topsoil. This can also be possible voids and also debris such as rocks, But also we must keep in mind that changes in soil or backfill that have much different electrical properties than the soil that is being traveled through can cause high contrast reflections that appear to be voids but may not be and would require destructive testing to verify.

GPRS appreciates the opportunity to offer our services, and we look forward to continuing to work with you on future projects. Please feel free to contact us for additional information or with any questions you may have regarding this report.

Signed,

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Reviewed,

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