



# ENVIRONMENTAL PROBING INVESTIGATIONS, INC.

833 MONMOUTH ROAD  
CREAM RIDGE, NJ 08514  
609.758.9000

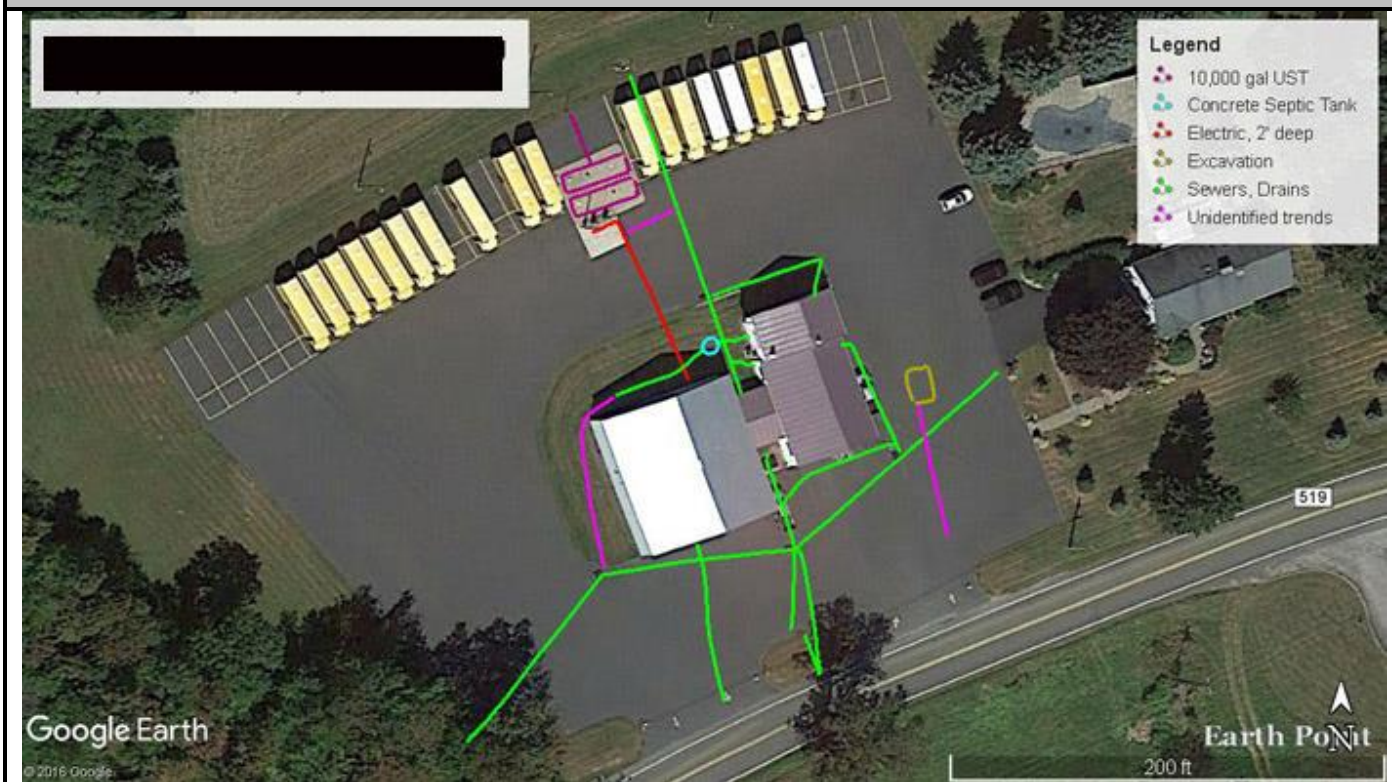


## SUBSURFACE SURVEY REPORT

DATE	January 6, 2018	CLIENT	
WEATHER	Sunny, 20s	PROJECT NAME	
EPI Geophysicist	Paul McLeod	PROJECT ADDRESS	

### EQUIPMENT USED

GPR: GSSI SIR-3000 RADAR SYSTEM- 400 MHz antenna	X
RADIO FREQUENCY (RF) LINE TRACING: VIVAX/METROTECH – vLOCPro2	X
TRIMBLE Geo7X GPS	X



### PROJECT SCOPE

Environmental Probing Investigations, Inc. (EPI) was contracted by . . . . to locate utilities and investigate areas of concern surrounding a bus service building.

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### **Visual Site Inspection**

The Bus Service building is surrounded by an asphalt-paved area where school busses can be fueled and parked. A fueling island behind the building has two pumps, one for gasoline and one for diesel. Two 10,000 gallon USTs sit adjacent to the fueling island. At least a half-dozen grates throughout the asphalt-paved area suggest a network of storm sewers beneath the asphalt.

Power arrives at the bus service building from overhead lines. Water is supplied by an on-site well. Wastewater is processed on-site with a septic system at the rear of the building. There is no apparent gas line into the building, although there is a fuel-oil AST inside of the building.

### **Geophysical Survey Results**

The GPR survey made use of a GSSI SIR-3000 together with a 400 MHz antenna mounted on a cart. The method involves the transmission of microwave-like signals directly down into the ground and the reception of those same signals as they reflect back up to the receiver. The method works best in dry, sandy, resistive soils with an approximate depth of penetration of around 8'. In damp, clayey, conductive soils the depth of penetration may be as little as 2-3'. The soils at this particular project site allowed a signal penetration down to a depth of around 6-7'. Survey lines were run in at least two perpendicular directions at a line spacing of around 4' throughout the specified areas of concern.

Line Tracing was undertaken with a Vivax-Metrotech system, specifically the Loc-10Tx (10 Watt) transmitter and a VLocPro2 receiver. The system works on at least two modes including a passive mode where the receiver detects any lines carrying current as well as an induction/conduction mode. In the induction/conduction mode, a specific radio frequency is transmitted into a cable or pipe (either through direct connection or through inductive coupling) and that same frequency is then detected with the receiver to trace the location of the buried pipe or cable.

Storm sewers and smaller drains were documented all around the building and mapped in green. The larger sewers sat at depths of 3-5' while the smaller gutters and drains sat at depths of 1-2'. These were all mapped with GPR. The septic system behind the building consists of a cylindrical concrete tank approximately 6' in diameter. The tank is fed by a short line at a depth of 3' which also features a clean-out adjacent to the building. That line enters the tank on its east side. A PVC lateral sitting at a depth of 3' exits the tank on its west side. . . . . an employee who watched the installation of the system reports that the PVC pipe sits in a gravel-filled trench. GPR data suggests that the lateral ends near the NW corner of the building but that the gravel-filled trench continues along the west wall of the building and connects to a storm sewer system near the SW corner of the building.

The grassy area south of the septic tank formerly hosted a 1000 gallon UST which sat to the east of the N-S trending storm sewer ( . . . . , personal communication). GPR work was conducted in this area in an attempt to locate the exact area of the grave, but the limited space made finding the grave difficult.

Two 10,000 gallon USTs sit to the north of the fueling island. Each measures 27' x 8' and their tops sit 3' below surface. A pair of vent pipes is mapped to the north of the tanks. A buried electric line leads from the building to the fueling island and is mapped in red. This line was detected with both GPR and line tracing. GPR work was conducted around the fueling island to search for graves or excavations related to earlier USTs, but no graves were detected.

On the east side of the building there was a historic oil-water separator and a possible fuel UST, neither of which are still in place. One distinct excavation area was discovered measuring 13'x 10'. The excavation appeared to have steep sides with a strong reflection at 4' and a weak reflection at 2' possibly indicating clay layers associated with the filling of the excavation. A weak trend at a depth of 3' trends south from the excavation. This unidentified feature could be a pipe, possibly a clay pipe. The area to the southeast of the building was scanned with GPR in search of relics from a historic gas station, but no remains of this structure were found.

Upon completion of the geophysics fieldwork, all of the results were surveyed using a Trimble Geo7X. The uncorrected location data from this instrument has an accuracy of approximately 2', but correction with Pathfinder software increases the accuracy to approximately 1'.

### **Limitations**

EPI completes non-intrusive geophysical surveys using equipment and techniques consistent with the standards of the subsurface utility mapping industry. However, there can be no guarantee that every target will be detected at a particular site. Sub-surface conditions may prevent some or all geophysical methods from detecting a particular target. Targets that are non-metallic or deep, as well as areas that are paved or covered with re-enforced concrete may difficult to locate.

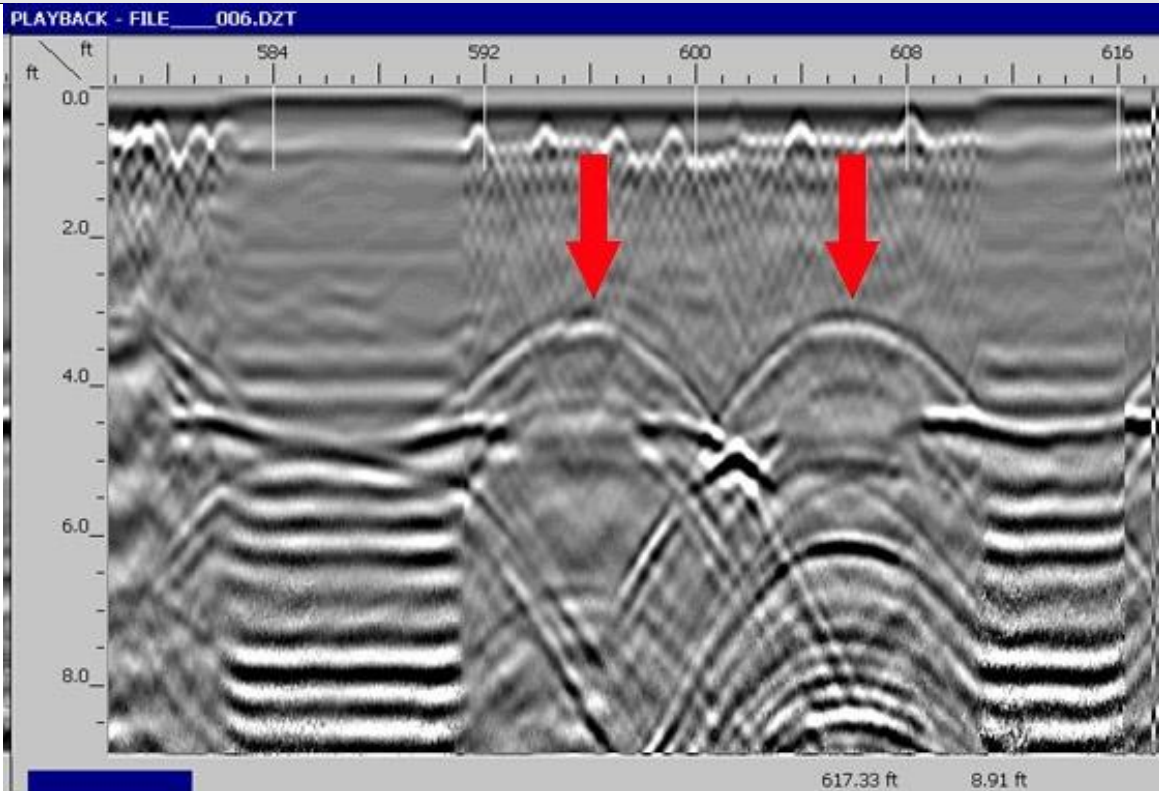
Every reasonable effort was made to locate all systems of interest whether indicated on records available to us or not, but EPI does not guarantee that all existing utility systems can or will be detected. The results of this investigation should only be used as a tool and should not be considered a guarantee regarding the presence or absence of USTs or piping.

PHOTO 1



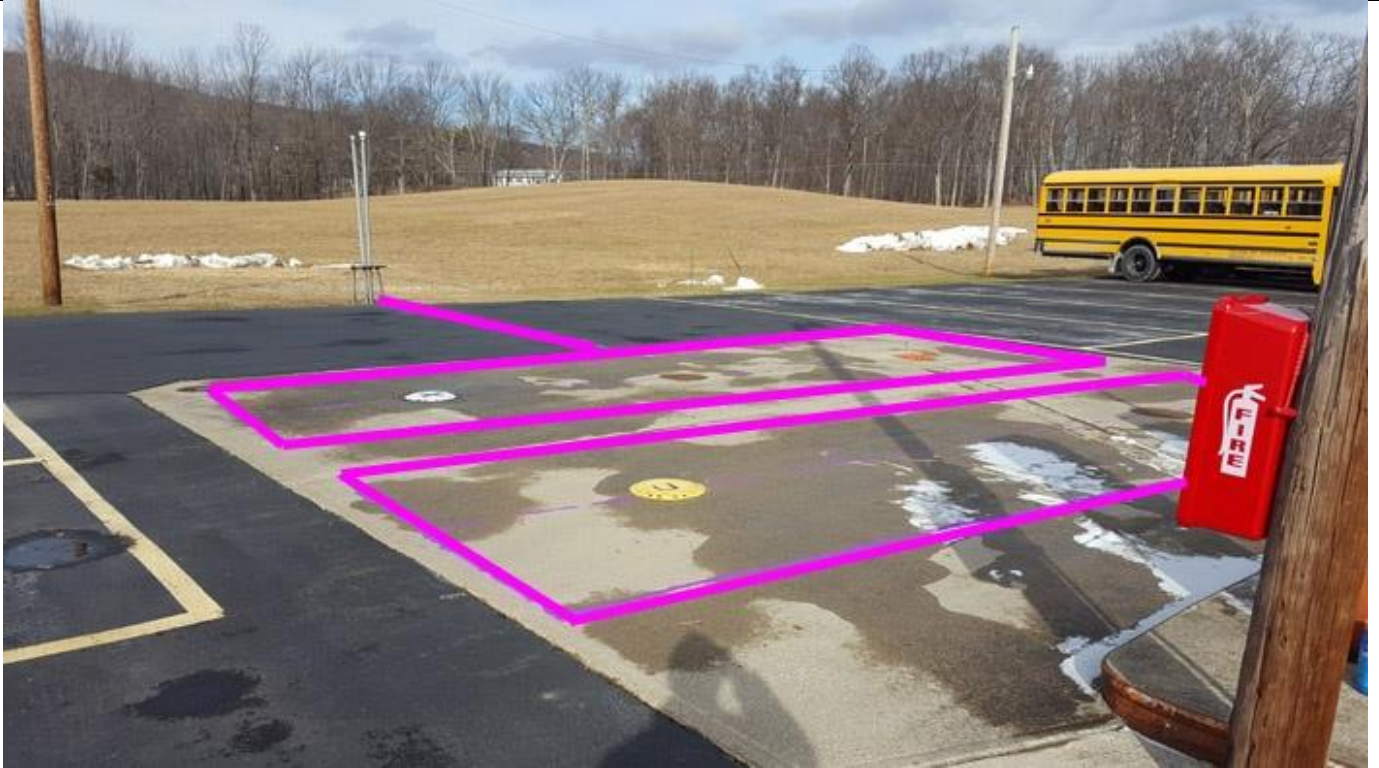
The arrows point to the two 10,000 gallon USTs which measure 27' long and 8' wide. A pair of vent pipes sits at the contact between the asphalt and the grass. Electric power to the fuel island is shown in red and arrives via a buried line from the building.

PHOTO 2



GPR transect across the two USTs shows that the tops of those tanks sit at a depth of 3' below surface.

**PHOTO 3**



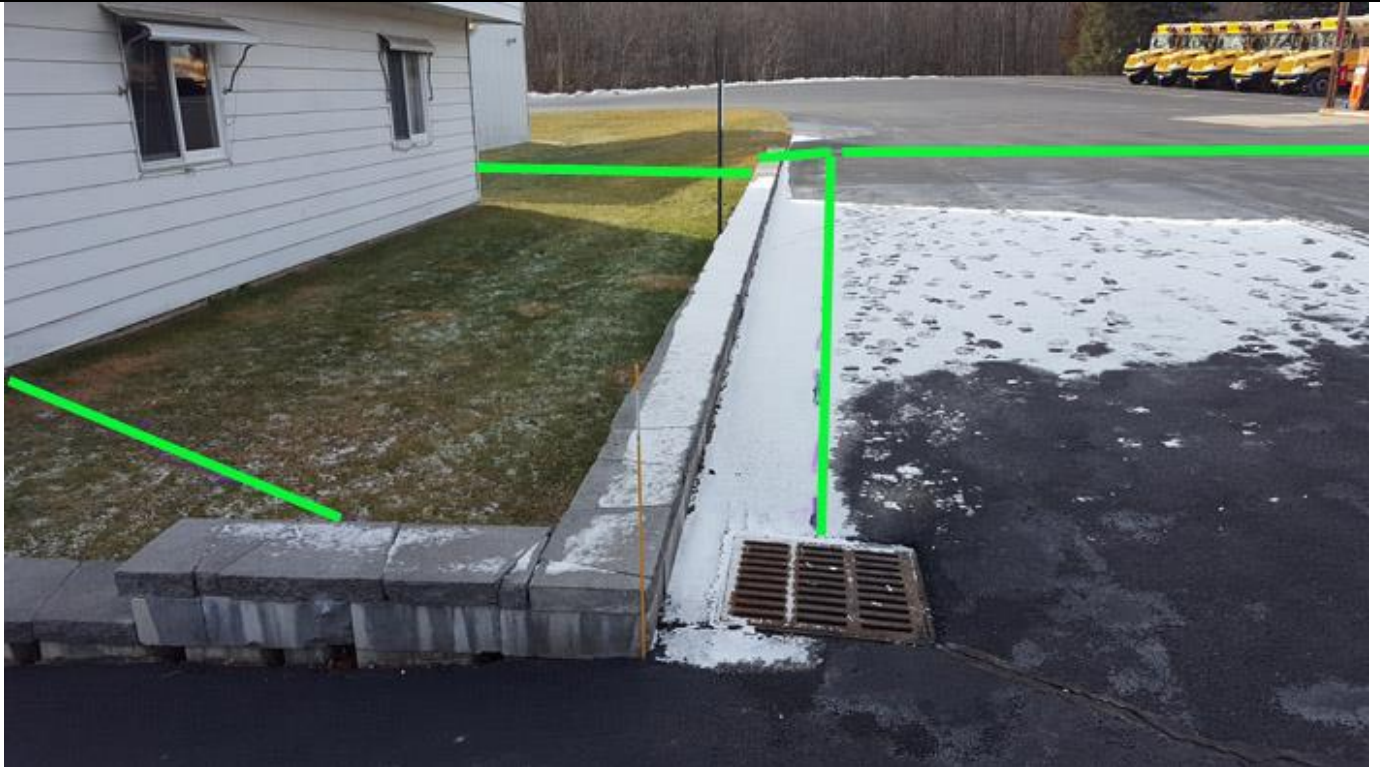
Northeast facing photo shows the outlines of the two 10,000 gallon USTs. The tanks each measure 27' x 8'. The vent pipe is visible behind an perpendicular to the tanks.

**PHOTO 4**



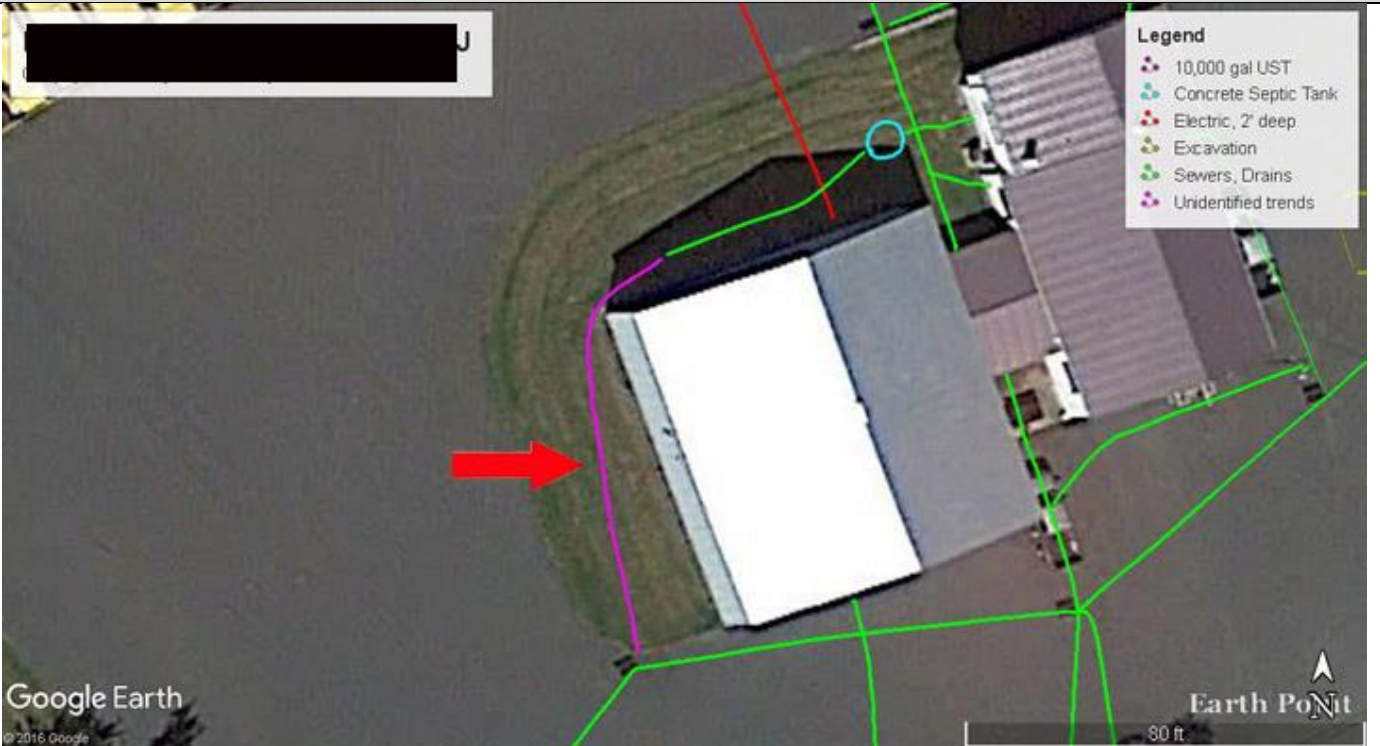
Northwest facing photo of the fueling island area as seen from near the building shows the electric line in red and a storm sewer in green.

PHOTO 5



Southwest facing photo shows a series of storm sewers and drains in green.

PHOTO 6



Sewer and drains surround the bus service building. The circle near the northeast corner of the building is a concrete septic tank, and the green line to the west of the septic tank is a PVC lateral. The purple line indicated by the arrow appears to be a gravel-filled trough allowing the filtered wastewater to drain into the storm sewer.

**PHOTO 7**



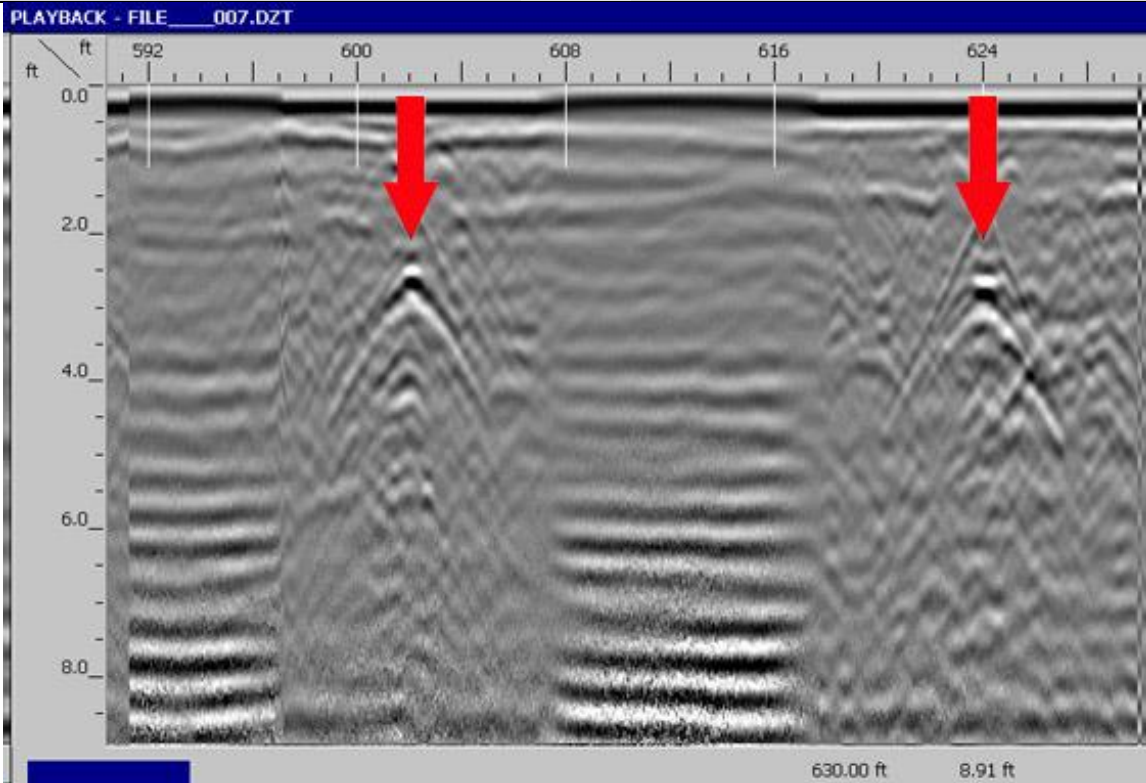
Northeast facing photo shows the circular concrete septic tank measuring around 6' in diameter. A sewer line conveys wastewater from the building to the tank. The lateral is in the foreground. The solid green line is a NW-SE trending storm sewer that goes beneath the building.

**PHOTO 8**



Southwest facing photo shows the circular concrete septic tank and the lateral PVC line that leads away from it. The lateral coincides with a topographic trough which is apparently filled with gravel.

PHOTO 9



GPR transects across the PVC lateral shows that the lateral sits at a depth of around 3'.

PHOTO 10



South facing photo shows the path of a zone which appears to be a gravel filled trough that conveys wastewater from the septic system to the storm drain in the distance.

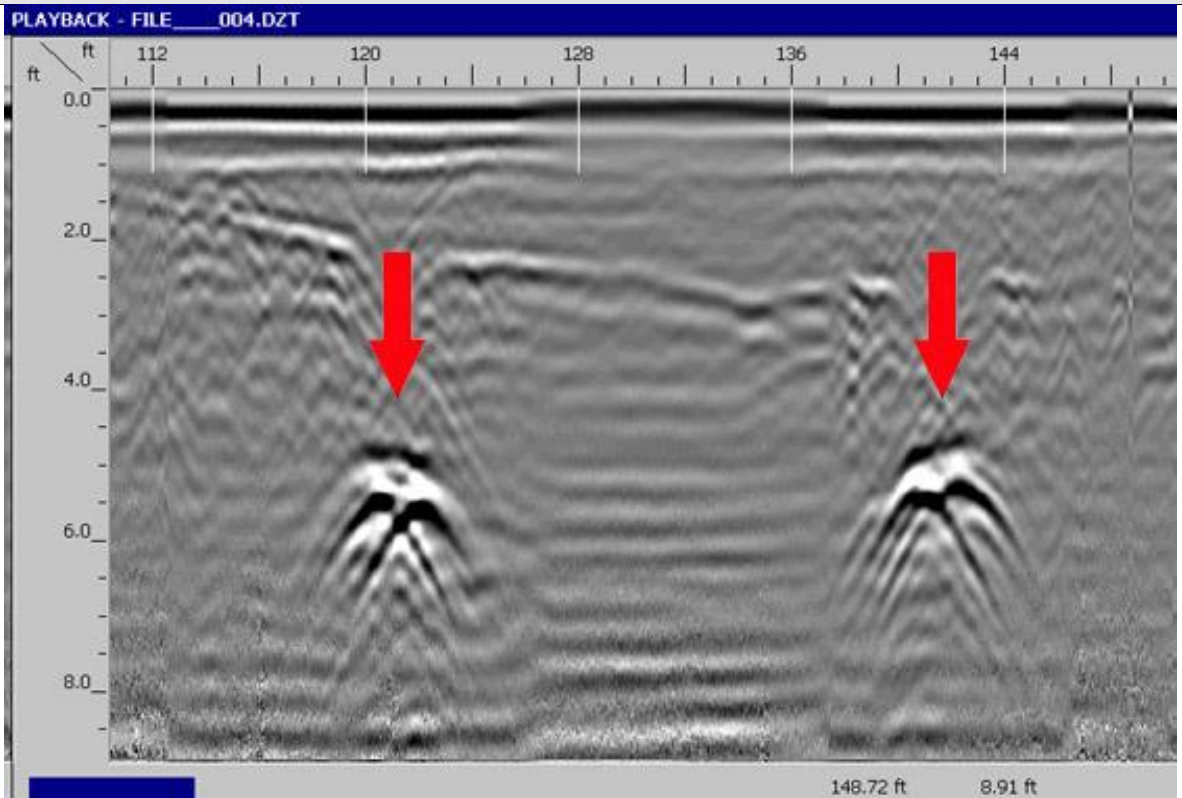


PHOTO 11



Northeast facing photo shows the storm sewer leading from the bus service building to a NW-SE trending creek on the west side of the property.

PHOTO 12



GPR transects across the storm sewer line in Photo 11 shows that it sits at a depth of around 5'.

**PHOTO 13**



Northeast facing photo shows the storm sewer system beneath the asphalt. The sewers sit at depths of 3-4'.

**PHOTO 14**



Northeast facing photo of the central sewer grate in front of the bus service building where five separate drains converge.

**PHOTO 15**



Southeast facing photo of the central sewer grate shown in Photo 14.

**PHOTO 16**



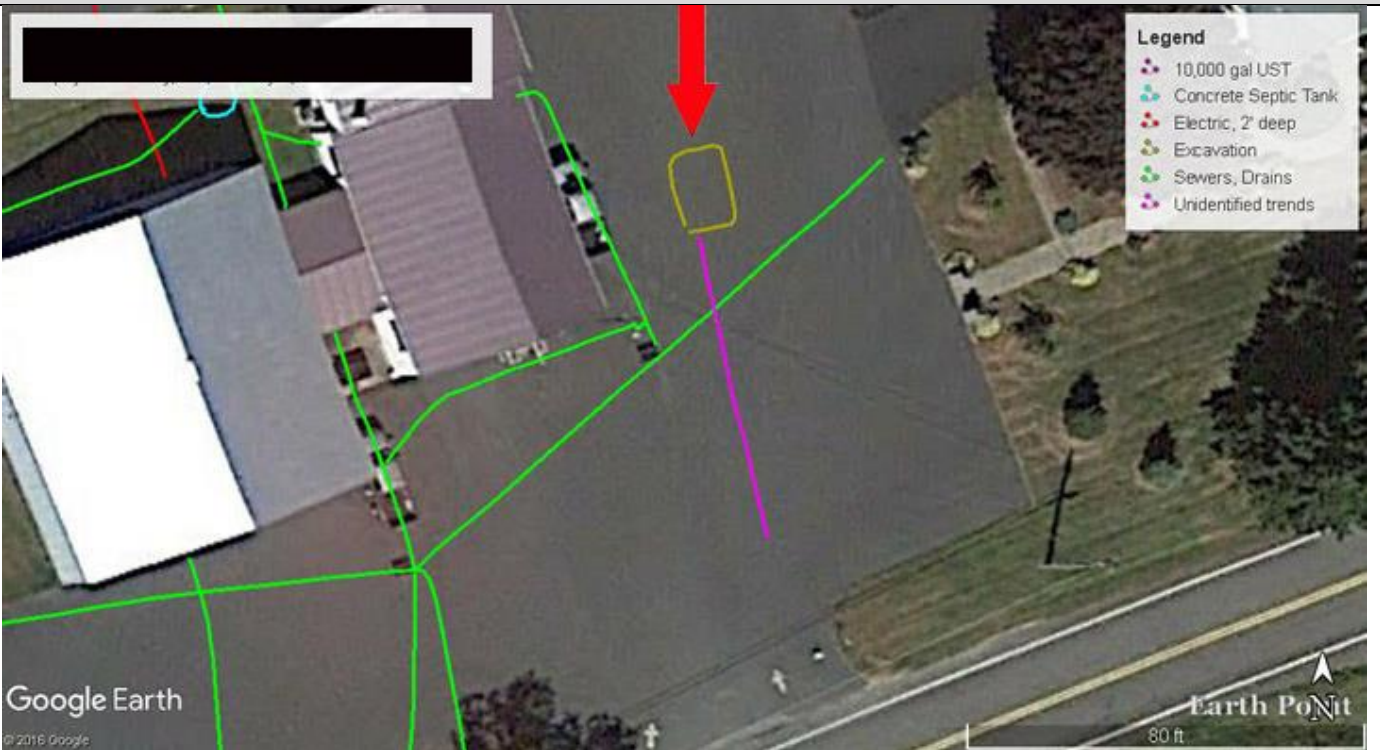
Northwest facing photo shows the storm sewer line which passes underneath the building and emerges on the back side.

PHOTO 17



Northwest facing photo shows storm sewer lines.

PHOTO 18



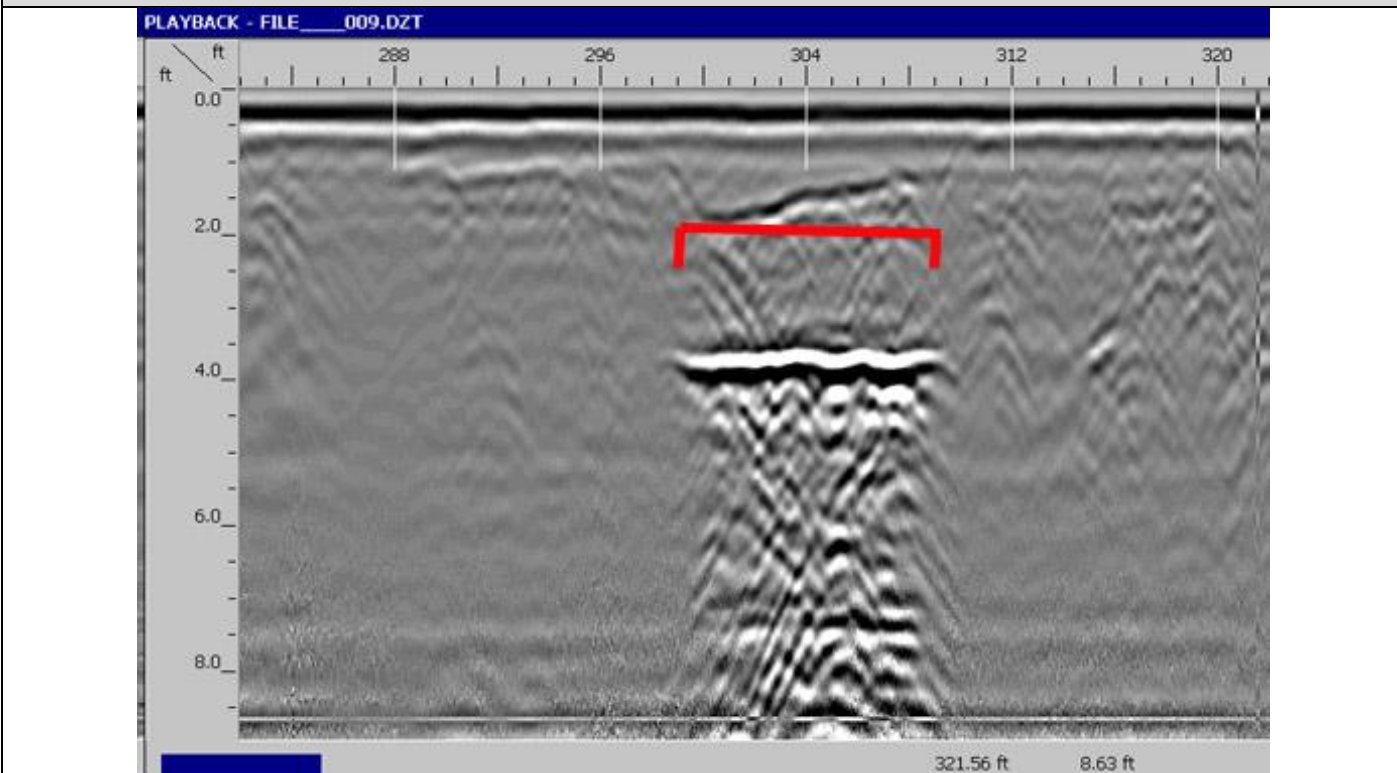
The red arrow indicates an area measuring 13' x 10' which is an apparent excavation area. The purple line trending south from the excavation is a weak unidentified trend at a depth of around 3'.

PHOTO 19



Northwest facing photo shows the apparent excavated area from Photo 18 as well as the unidentified trend leading south from that zone.

PHOTO 20



GPR transect across the apparent excavated area shows a strong reflection at a depth of 4' which may be a clay layer. A weaker reflection at around 2' may be an additional clay layer.