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Jane Castor, Mayor

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Michael W. Chucran, Director
306 East Jackson Street, 4N
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ADDENDUM 4
Via E-Mail
DATE: July 2, 2021

Contract 21-C-00031 Morris Bridge East Ground Storage Tank Improvements

Bidders on the above referenced project are hereby notified that the following addendum is made to the Contract Documents. BIDS TO BE SUBMITTED SHALL CONFORM TO THIS NOTICE.

Item 1: The Bid Opening date is here by changed to July 13, 2021.

Item 2: Investigation beneath tank floor shall include all labor, materials, and equipment to investigate the condition of the soil beneath the tank floor to verify if there are any voids from leaks via GPR. The previous investigation beneath the tank floor of the Morris Bridge West GST is attached for reference.

All other provisions of the Contract Documents and Specifications not in conflict with this Addendum shall remain in full force and effect. Questions are to be e-mailed to Contract Administration@tampagov.net.

Jim Greiner
Jim Greiner, P.E., Contract Management Supervisor

FINAL REPORT
GEOPHYSICAL INVESTIGATION
CITY OF TAMPA REPUMP STATION SITE
WEST GROUND STORAGE TANK (GST)
TAMPA, FL

Prepared for Husky Corp.
St. Petersburg, FL

Prepared by GeoView, Inc.
St. Petersburg, FL

November 14, 2019

Mr. Scott Crandall, P.E.
Husky Corp.
204 37th Avenue North, # 435
St. Petersburg, FL 33704

Subject: Transmittal of Final Report for Geophysical Investigation
City of Tampa Repump Station Site – Tampa, FL
West Ground Storage Tank (GST)
GeoView Project Number 30577

Dear Mr. Crandall,

GeoView, Inc. (GeoView) is pleased to submit the final report that summarizes and presents the results of the geophysical investigation conducted at the above referenced site. Ground penetrating radar equipment was used to evaluate near-surface geological conditions. GeoView appreciates the opportunity to have assisted you on this project. If you have any questions or comments about the report, please contact us.

GEOVIEW, INC.

Michael J. Wightman, P.G.
Principal Geophysicist, President
Florida Professional Geologist
Number 1423

Scott F. Purcell
Senior Geophysicist

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St. Petersburg, FL 33711
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1.0 Introduction

A geophysical investigation was performed on November 7, 2019 using ground penetrating radar (GPR) within portions of the interior and wall of a 5-million-gallon water tank (tank) within the Tampa Repump Station located at 17101 Dona Michelle Drive in Tampa, Florida. The tank was drained of water prior to the geophysical investigation. Access to the tank interior was provided through a manhole along the south side.

The tank has experienced water leaks in the past. Previous repair activities were performed along the interior areas of the concrete floor bottom, consisting of crack repair, patching and sealant as shown on Figures 1 and 2 and on site pictures 1-3 (Appendix 1).

The tank is approximately 166 feet (ft) in diameter. The geophysical survey area was approximately 80 ft long and 20 ft wide along the approximate southeast side of the tank floor where cracks and previously repaired areas are present. An additional GPR investigation was performed along the exterior wall in an area with cracks in the concrete, as shown in the Site Picture 4 and Exterior Diagram (Appendix 1).

The purpose of the geophysical investigation was to determine the presence and locations of potential voids below the interior concrete bottom of the tank and check the integrity of the exterior tank wall in a designated area where cracking has occurred. The location of the interior geophysical survey area is provided on Figures 1 and 2. The approximate location of the exterior geophysical survey area is provided as part of Picture 4 in Appendix 1. A discussion of the field methods used to generate the report figure is provided in Appendix A2.1.

2.0 Description of Geophysical Investigation

2.1 Interior of Tank

A GPR survey was conducted along a series of perpendicular transects spaced 5 ft apart on the designated interior concrete bottom area of the tank. Additional GPR data was collected across identified anomalies along the interior floor slab. The interior GPR data was collected with a GSSI radar system with a 900 Megahertz (MHz) antenna with a time range setting of 30 nanoseconds. This equipment configuration provided an estimated depth of exploration of 3 to 4 ft below the surface of the tank.

2.2 Exterior Walls of Tank

The GPR survey was conducted in an area where cracking is present in the exterior wall of the tank. The survey was performed along a series of horizontal transects spaced two ft apart between two previously patched areas. The exterior GPR data was collected with a GSSI Mini radar system with a 2600 MHz antenna. This system provided an exploration depth of 6 to 9 inches.

A description of the GPR technique and the methods employed for void characterization studies is provided in Appendix A2.2.

3.0 Identification of Possible Void Features Using GPR

The features observed on GPR data that are most commonly associated with void conditions are:

- The occurrence of relatively continuous and horizontal GPR reflectors, representing soil horizons, which in the area of the anomaly dip down toward the feature center.
- The actual void or soil pipe is typically represented by parabolic or bow-tie shaped high amplitude GPR reflectors.
- Erosional features are characterized by a downwarping towards a common center and possible discontinuity in the GPR reflector sets associated with various soil horizons. An increase in GPR signal penetration depth or amplitude is often observed.

The greater the severity of the void conditions, or an observed combination of these reflection patterns, the greater the likelihood that the identified anomaly is a void or a low-density soil zone.

4.0 Survey Results

4.1 Interior of Tank

Thickness of the concrete tank bottom is estimated to be approximately 4 inches. The bottom of the tank is a structural slab with 2 layers of #4 rebar spaced 8 inches on center.

No voids were observed beneath the slab. Three areas of density variation were observed in the GPR data. These three areas possibly indicate the presence of minor, lower density soils when compared to adjacent soils. The subtle variation could also be indicative of changes in soil types, moisture content or a minor soil disturbance. The locations of these three areas are provided on Figures 1 and 2.

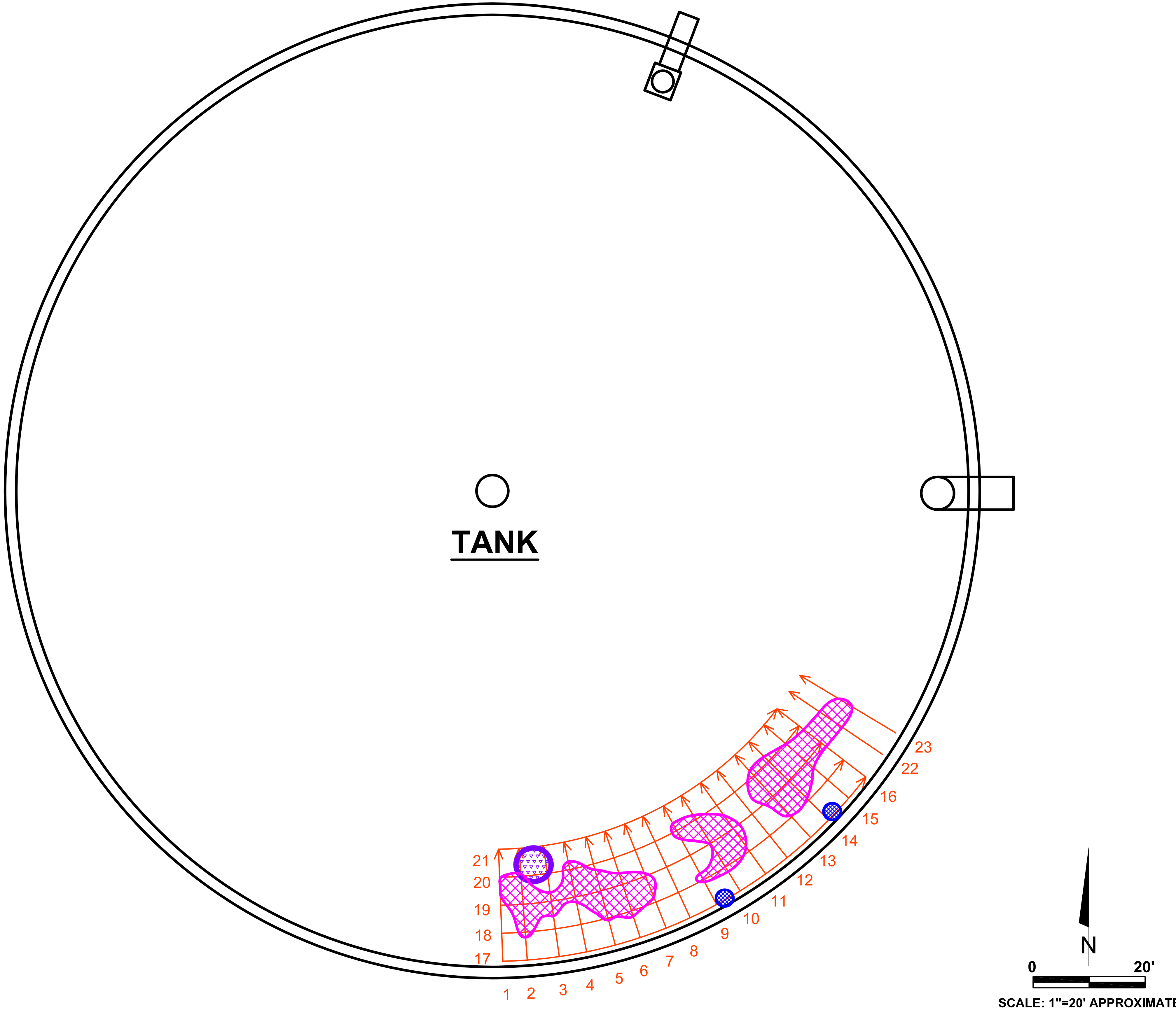
A discussion of the limitations of the GPR technique in void characterization studies is provided in Appendix A2.3. An example of the GPR data associated with an area of suspected disturbed soils is provided in Appendix 1.

4.2 Exterior Wall of Tank

Three areas on the exterior tank wall were scanned with a hand-held GPR. The areas scanned are shown on the Exterior Tank Diagram located in the appendix of the report. The GPR survey did not indicate the presence of an internal voids within the surveyed area of the tank wall. The reflection patterns were consistent with competent concrete with vertical rebar reinforcing on 12 to 14-inch centers. An example of the rebar that was observed in the GPR data is provide as GPR Example 2 in Appendix 1.

APPENDIX 1

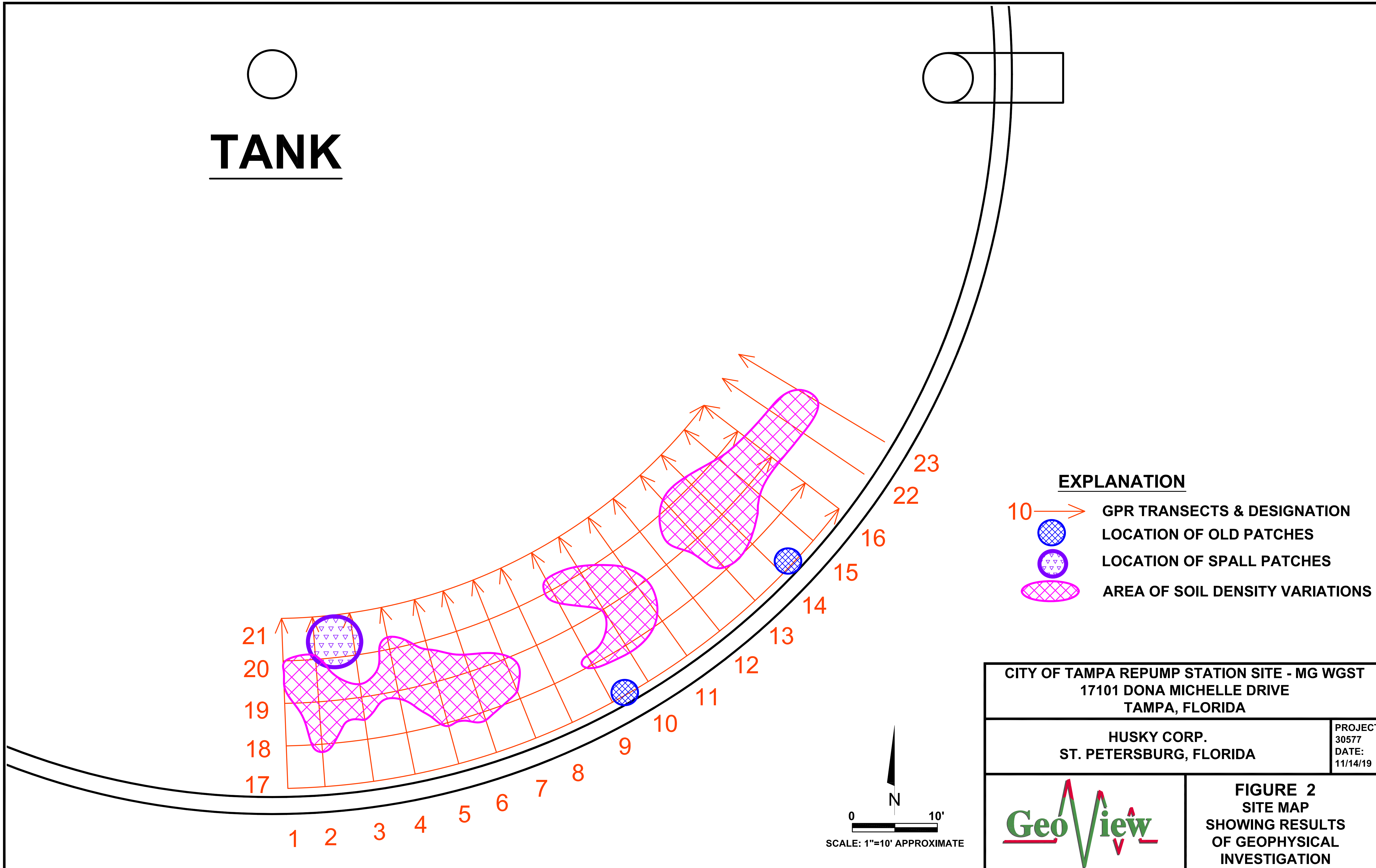
FIGURES, SITE PICTURES AND EXAMPLES OF GPR DATA



EXPLANATION

- 10 → GPR TRANSECTS & DESIGNATION
- LOCATION OF OLD PATCHES
- LOCATION OF SPALL PATCHES
- AREA OF SOIL DENSITY VARIATIONS

CITY OF TAMPA REPUMP STATION SITE - MG WGST 17101 DONA MICHELLE DRIVE TAMPA, FLORIDA	
HUSKY CORP. ST. PETERSBURG, FLORIDA	PROJECT: 30577 DATE: 11/14/19
GeoView	**FIGURE 1** OVERALL SITE MAP SHOWING RESULTS OF GEOPHYSICAL INVESTIGATION


TANK
EXPLANATION
10 GPR TRANSECTS & DESIGNATION
LOCATION OF OLD PATCHES
LOCATION OF SPALL PATCHES
AREA OF SOIL DENSITY VARIATIONS
1
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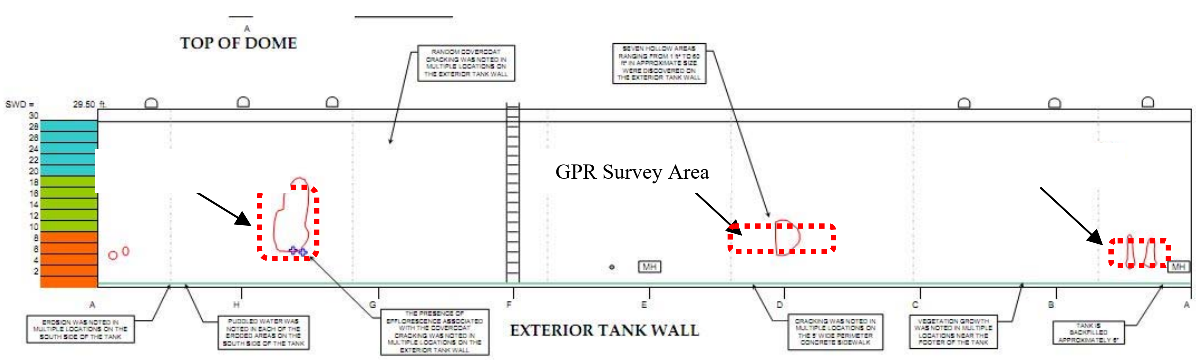
10'
SCALE: 1"=10' APPROXIMATE
CITY OF TAMPA REPUMP STATION SITE - MG WGST
17101 DONA MICHELLE DRIVE
TAMPA, FLORIDA
HUSKY CORP.
ST. PETERSBURG, FLORIDA
PROJECT:
30577
DATE:
11/14/19
GeoView
FIGURE 2
SITE MAP
SHOWING RESULTS
OF GEOPHYSICAL
INVESTIGATION

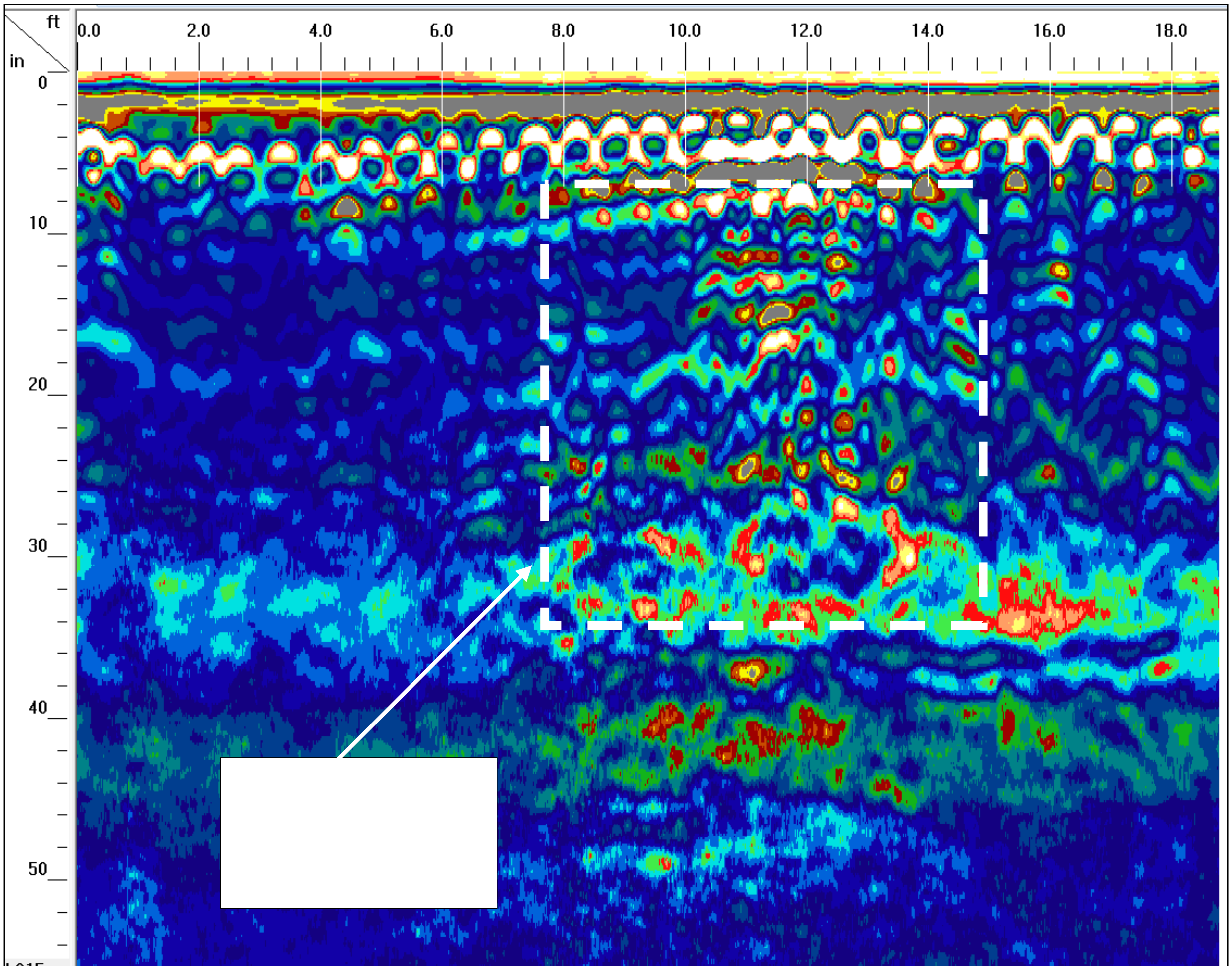
Site Picture 1 Showing A Patch on the Tank Floor Slab

Site Picture 2 Showing Patches on the Tank Floor Slab

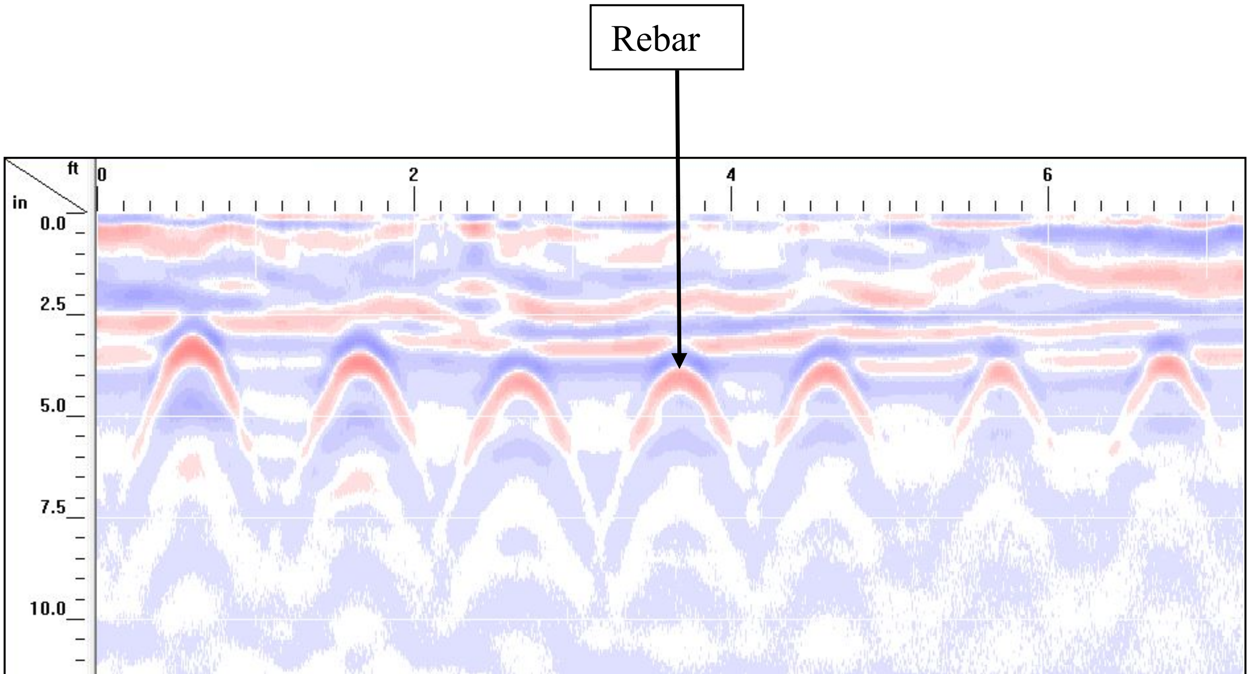
Site Picture 3 Showing Concrete Spalling Repairs on the Tank Floor Slab

Site Picture 4 Showing the Survey Area of the Exterior Tank Wall and the Approximate Locations of the GPR Transects





Example View of GPR Anomaly Area Seen Below MB WGS Tank Slab Indicating Variations in Soil Density (GPR Transect 15)



GPR Example 3 Showing Good Concrete and the Presence of Rebar in the Tank Wall

APPENDIX 2
DESCRIPTION OF GEOPHYSICAL METHODS, SURVEY METHODOLOGIES AND LIMITATIONS

A2.1 On Site Measurements

The measurements that were collected and used to create the site map were made using the plan-view drawing of the water tank provided by Husky Corp., and a fiberglass measuring tape to establish the geophysical survey grid lines. The degree of accuracy of such an approach is typically +/- 2.5% for lengths and +/- 2.5 degrees for angles.

A2.2 Ground Penetrating Radar

Ground Penetrating Radar (GPR) consists of a set of integrated electronic components that transmits high frequency (2600 and 900 megahertz [MHz]) electromagnetic waves into the ground and records the energy reflected back to the ground surface. The GPR system consists of an antenna, which serves as both a transmitter and receiver, and a profiling recorder that both processes the incoming signal and provides a graphic display of the data. The GPR data can be reviewed as both printed hard copy output or recorded on the profiling recorder's hard drive for later review. GeoView uses a GSSI GPR system.

A GPR survey provides a graphic cross-sectional view of subsurface conditions. This cross-sectional view is created from the reflections of repetitive short-duration electromagnetic (EM) waves that are generated as the antenna is pulled across the ground surface. The reflections occur at the subsurface contacts between materials with differing electrical properties. The electrical property contrast that causes the reflections is the dielectric permittivity that is directly related to conductivity of a material. The GPR method is commonly used to identify such targets as underground utilities, underground storage tanks or drums, buried debris, voids or geological features.

The greater the electrical contrast between the surrounding earth materials and target of interest, the greater the amplitude of the reflected return signal. Unless the buried object is metal, only part of the signal energy will be reflected back to the antenna with the remaining portion of the signal continuing to propagate downward to be reflected by deeper features. If there is little or no electrical contrast between the target interest and surrounding earth materials it will be very difficult if not impossible to identify the object using GPR.

The depth of penetration of the GPR signal is very site specific and is controlled by two primary factors: subsurface soil conditions and selected antenna frequency. The GPR signal is attenuated (absorbed) as is passes through earth materials. As the energy of the GPR signal is diminished due to attenuation, the energy of the reflected waves is reduced, eventually to the level that the reflections can no longer be detected. As the conductivity of the earth materials increases, the attenuation of the GPR signal increases thereby reducing the signal penetration depth. In Florida, the typical soil conditions that severely limit GPR signal penetration are near-surface clays and/or organic materials.

The depth of penetration of the GPR signal is also reduced as the antenna frequency is increased. However, as antenna frequency is increased the resolution of the GPR data is improved. Therefore, when designing a GPR survey a tradeoff is made between the required depth of penetration and desired resolution of the data. As a rule, the highest frequency antenna that will still provide the desired maximum depth of penetration should be used. For GPR void investigations, a high-frequency (900 MHz) antenna is used.

A GPR survey is conducted along survey lines (transects) that are measured paths along which the GPR antenna is moved. An integrated survey wheel electronically records the distance of the GPR system along the transect lines.

For void characterization surveys, the GPR survey is conducted along a set of perpendicularly orientated transects. The survey is conducted in two directions because subsurface features such as voids are often asymmetric. Spacing between the transects typically ranges from 2 to 5 ft. Closely spaced grids are used when the objective of the GPR survey is to identify all void features within a project site. This information can be used to provide recommended locations for geotechnical borings.

Depth estimates to the top of lithological contacts or void features are determined by dividing the time of travel of the GPR signal from the ground surface to the top of the feature by the velocity of the GPR signal. The velocity of the GPR signal is usually obtained from published tables of velocities for the type and condition (saturated vs. unsaturated) of soils underlying the site. The accuracy of GPR-derived depths typically ranges from 20 to 40 percent of the total depth.

A2.3 Interpretation and Limitations of Geophysical Data

The analysis and collection of GPR data is both a technical and interpretative skill. The technical aspects of the work are learned from both training and experience. Having the opportunity to compare geophysical data collected in numerous settings to the results from geotechnical studies performed at the same locations develops interpretative skills for void characterization studies.

The ability of GPR to collect interpretable information at a project site is limited by the attenuation (absorption) of the GPR signal by underlying soils. Once the GPR signal has been attenuated at a particular depth, information regarding deeper geological conditions will not be obtained. In addition, GPR data can only resolve subsurface features that have a sufficient electrical contrast between the feature in question and surrounding earth materials. If an insufficient contrast is present, the subsurface feature will not be identified.

GeoView can make no warranties or representations of geological conditions that may be present beyond the depth of investigation or resolving capability of the GPR or SIR equipment or in areas that were not accessible to the geophysical investigation.