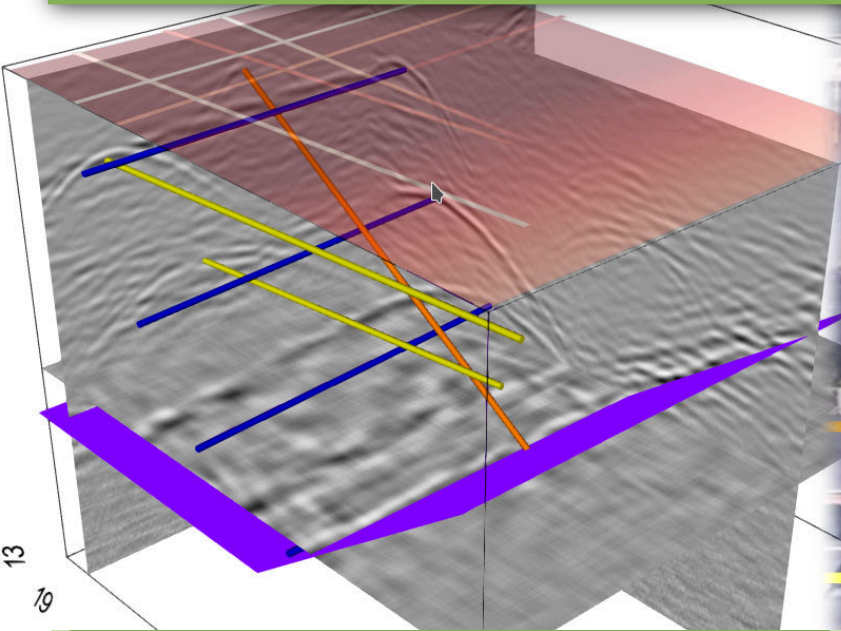




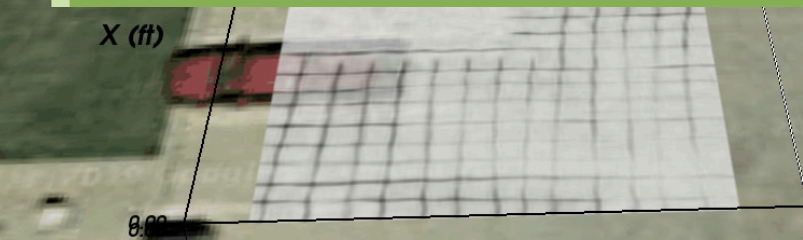
Earth Science Systems

ESSENTIAL UNDERGROUND INFORMATION



ESSentialUnderground

- Advanced 3D GPR Analysis
- Visualize Subsurface Targets
- Generate Reports and Drawings



ESSentialUnderground is a GPR data analysis package that provides 2D and 3D images of GPR data. Use it on a tablet when in the field, or in the office on a laptop or desktop PC. Provides fast visualization and browsing of GPR data in cross section, depth slice, or 3D views. Interpret and visualize subsurface objects. Combine surface images with subsurface imagery and target locations. Create surface layers from photos, Google Maps™, as-built drawings, or generate depth or thickness maps.

Supports the Subsurface Utility Engineering process by importing as-built drawings, add underground targets from GPR data, and create updated drawings that include located subsurface targets.

Generate reports with custom logos, cross-sections, depth slices, 3D images, and text. Save report in Microsoft Word™ format for further editing. Export DXF drawings showing the location of all subsurface targets.

ESSentialUnderground



Earth Science Systems
ESSENTIAL UNDERGROUND INFORMATION

Advanced 3D GPR Visualization, Analysis, and Reporting

GPR Data Processing

Streamline standard GPR processing operations such as background subtraction, filtering, range gain, and migration.

Identify Subsurface Targets

Interpret subsurface objects by scrolling through GPR data in cross section and depth slice views. Click to draw locations of pipes, planes, and localized objects.

Subsurface Utility Engineering

QL-D: Import as-built drawing

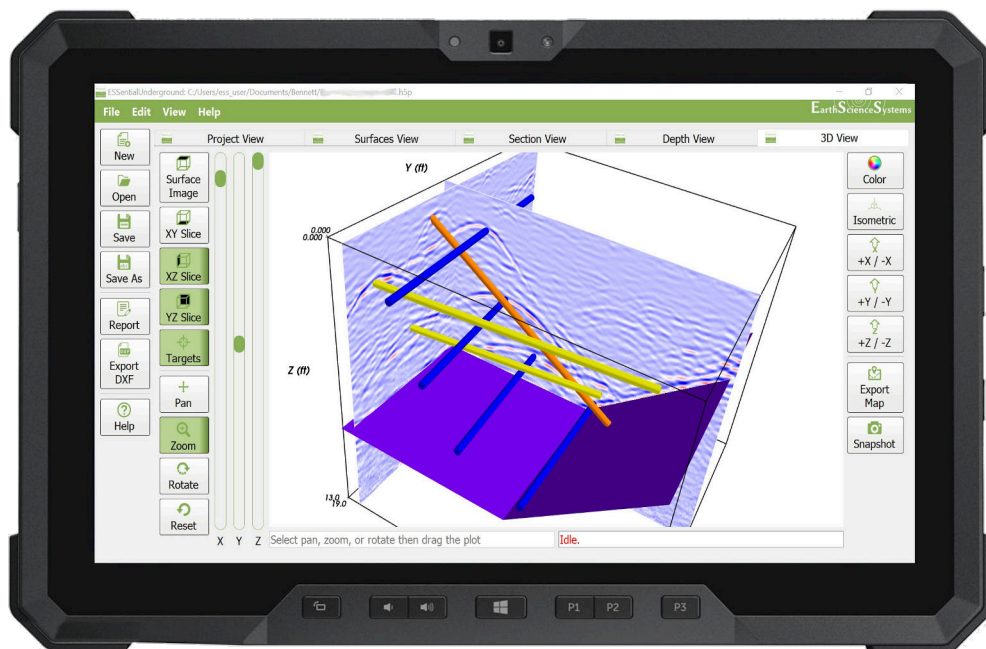
QL-C: Import GPS survey positions of surface features

QL-B: Import GPR data

QL-A: Import GPS survey positions of pot holes

Rich Reporting

Create reports and drawings in Microsoft Word, PDF, DXF, and incorporate Google Maps satellite imagery.



Features

- Import GPR data as a 3D dense survey grid, sparse line fence diagrams, or free form surveys
- Import surface photos, correct for keystone effect, and align with survey grid.
- Generate images of layer depth or thickness
- Import Google Maps™ images
- Import as-built drawings in image or DXF formats
- Draw targets as pipes, planes, or localized objects. Specify color and size.
- Export report as DOCX file
- Export drawing as DXF file

System Requirements

- Requires Windows 10™ on a tablet, laptop, or desktop PC.
- Intel i5™ processor or better
- Display resolution of 1920 x 1080 or more
- 8 GB or RAM or more (16 GB preferred)
- 128 GB SSD or better
- A rugged tablet is recommended for outdoor use, such as the Dell 7220

GPR Survey Report

Project Name	MPProject
Project Location	
Site Description	
Operator	
Date Recorded	November 07, 2008
Time Recorded	03:38 PM
Notes	
Service Provider	My company
Equipment Model	GEOTOMER FRESNEL Scanner 2000
Map Units	Feet
Elevation	92.79000
Latitude	-100.11784
Longitude	110.512
Line 1 Azimuth	90.0



123 Lots Lane
Denver, CO 80201
USA
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Date: Thursday, May 16, 2019 Page 1

Introduction

A geophysical survey has been conducted with the purpose of characterizing the subsurface.

Methods

The GPR method is a standard technique for locating and characterizing a wide variety of subsurface objects. In this method, a GPR transceiver emits a pulse of electromagnetic energy that travels into the subsurface. This pulse partially reflects off of subsurface objects with different electrical properties than the surrounding material. The reflected pulses are received by the transceiver, combined with location information, and recorded on a tablet computer.

The location measuring system uses a combination of wheel odometer, inertial sensing, and global positioning system readings.

Data Collection Parameters

The GPR survey was collected on a grid of survey lines that crossed the survey area in two directions. This provides the necessary data for creating three-dimensional subsurface images, as well as maps and diagrams of subsurface objects.

Recorded GPR data are processed to correct for zero time correction, range gain, band-pass filtering, migration, and Hilbert transform. Finally, outlines of subsurface objects can be drawn using the GPR image as a guide.

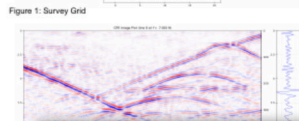
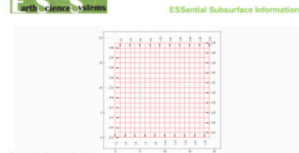
Results

After standard processing as outlined above, the vertical section images, depth-slice images, and three-dimensional images can be generated. Iso-surfaces of subsurface objects can be plotted into three-dimensional images along with surface image overlays from photographs or Google Maps. DXF files of subsurface objects can be exported for integration into CAD models.

The survey results are shown in the following figures.

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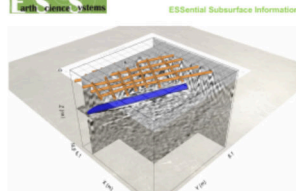


Figure 3: 3D View

Conclusions

The images produced by the survey provide valuable subsurface information for