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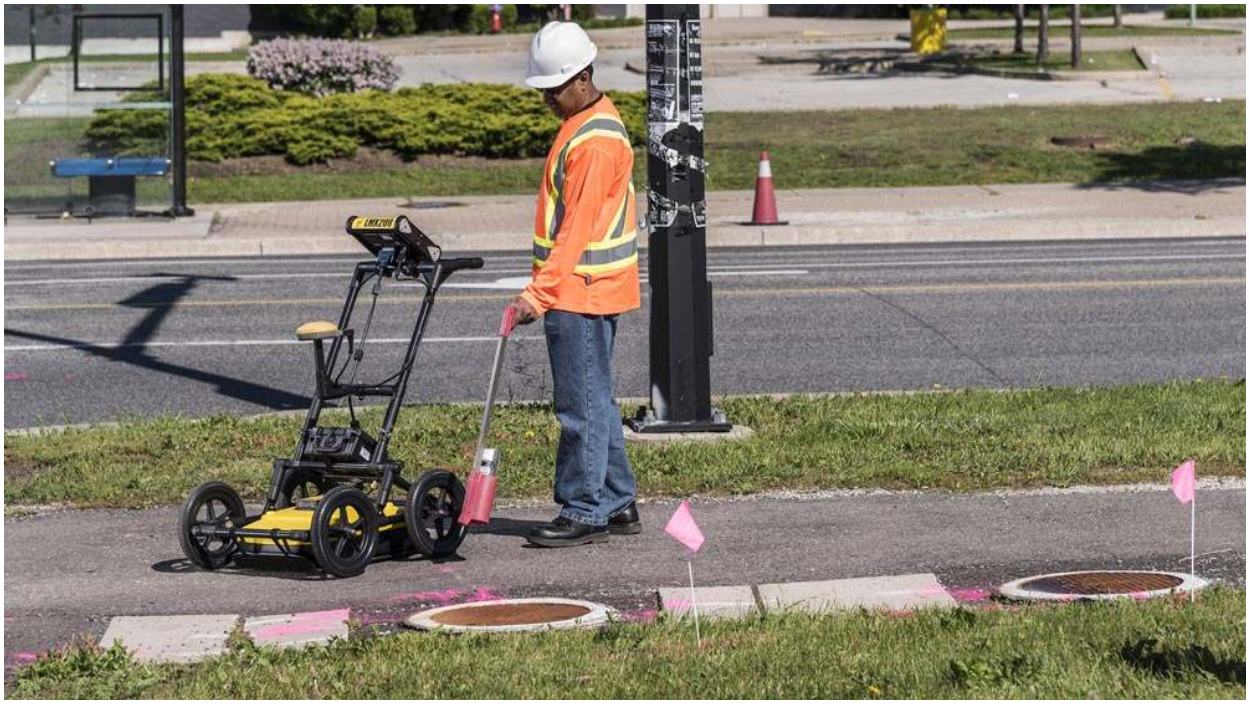
Subsurface utility engineering for water pipe line installation



Subsurface utility engineering for water installation

GPR is used as part of the SUE process to locate buried utilities prior to new installation.

A California city planned the installation of a new water line with the proposed route crossing several busy intersections.

Challenges

Many utilities existed beneath the intersections, but the accuracy of existing as-built drawings was in question. To obtain the precise position and depth of these utilities to plan the water line route, the City followed the SUE (Subsurface Utility Engineering) process.

Solution

SUE level B calls for the use of geophysical methods to verify the horizontal and vertical positions of buried utilities. Knowing that ground penetrating radar (GPR) could locate metallic, non-metallic and abandoned utilities, the city's project team contacted Sensors & Software for a product demonstration of a LMX200™ < https://www.sensoft.ca /products/lmx200/overview/ > GPR system.

The LMX200™ < https://www.sensoft.ca/products/lmx200/overview/ > is a professional level GPR system, with an integrated GPS, that provides for both real time and post-survey display and analysis of buried targets. Interpretations made in the field can be quickly transferred to engineering reports and georeferenced digital maps ready for integration into CAD and GIS systems. This seamless information flow makes the LMX200™ < https://www.sensoft.ca /products/lmx200/overview/ > GPR system ideal for use in SUE.

The city's project team collected test data in the middle of an intersection; this required traffic control for safe access to the area. Three parallel lines of data were collected in Line Scan mode starting from the same baseline. GPR targets were marked out in real-time using field interpretations (color-coded dots) placed at the apex of the hyperbolas (inverted V's) on the screen with associated position and depth information.

Data were downloaded into the EKKO_Project™ software, Sensors & Software's unique PC software used to organize and process data, as well as generate reports and output data in various third-party file formats. Since a GPS system was integrated with the GPR, the MapView window of EKKO_Project™ displays the path traveled, as well as the field interpretations. This information can be overlaid on a site image to help provide the perspective of where the data were collected and correlate findings with ancillary site data and surface features; in this case, a Google Earth image was used (Figure 1). Using MapView, the user can quickly see the spatial relationship of GPR targets and use the linear characteristic of pipes to help classify the target types.

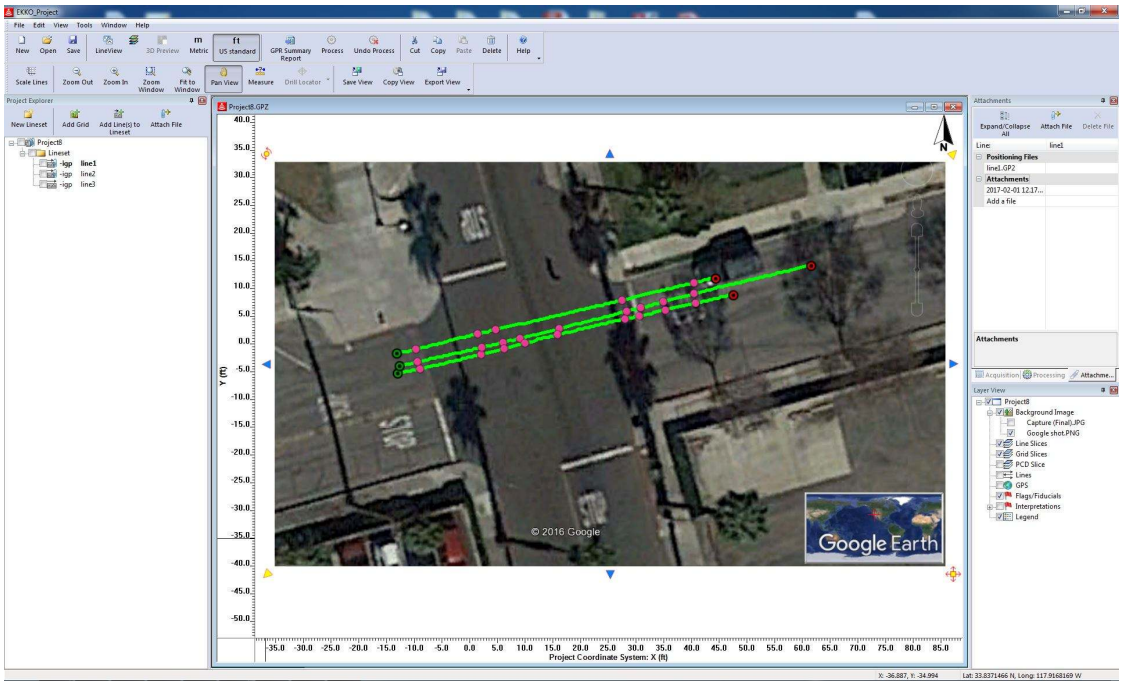


Figure 1:
EKKO_Project™ MapView shows the location of GPR lines and interpretations, overlaid on a Google earth™ image

Using the LineView module in EKKO_Project™, multiple GPR lines are easily viewed at the same time (Figure 2). In this case, lines 2 and 3 were displayed horizontally to enable comparison of responses. This allows the user to confirm that hyperbolas at adjacent positions have a similar shape and depth. Combining the LineView and MapView results, it is clear that all features show up on both lines and are indeed linear targets running through the intersection.

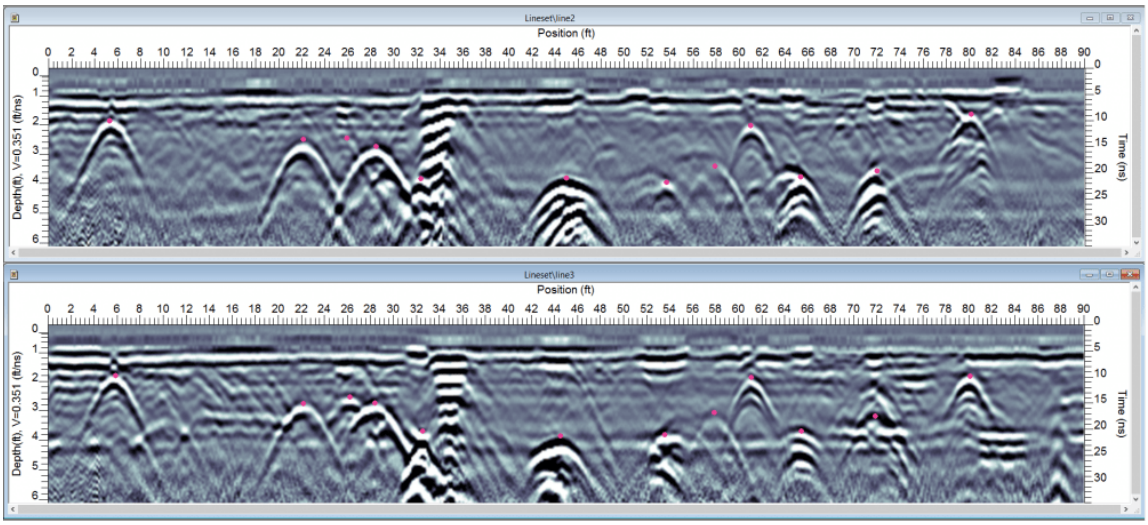


Figure 2:
Using the LineView module in EKKO_Project™, multiple GPR lines are easily viewed at the same time

Results

This case example shows how GPR can be deployed rapidly and provide high quality data. For Level B SUE projects the city obtained the information needed to design their new water line installation to avoid existing utilities. This approach not only prevented possible costly damage to existing infrastructure, but it also allowed optimization of the new installation with minimized costs and surface disruptions. Further, the digital records are available for future projects in the same area. Incorporating the LMX200™ into the SUE process for the city's water line installation provided many benefits and the approach will be an integral component of future city projects.

Click here and learn more about LMX200™ GPR < https://www.sensoft.ca/products/lmx200/overview/ >

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