

4355J Cobb Parkway
Suite 402
Atlanta, GA 30339

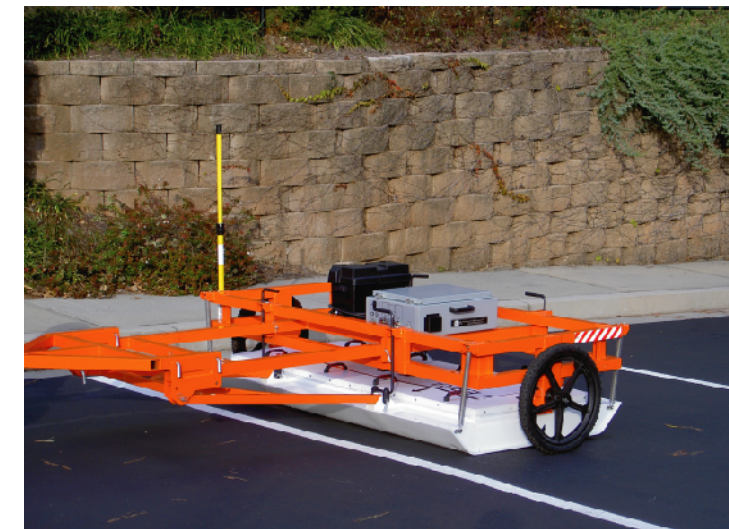
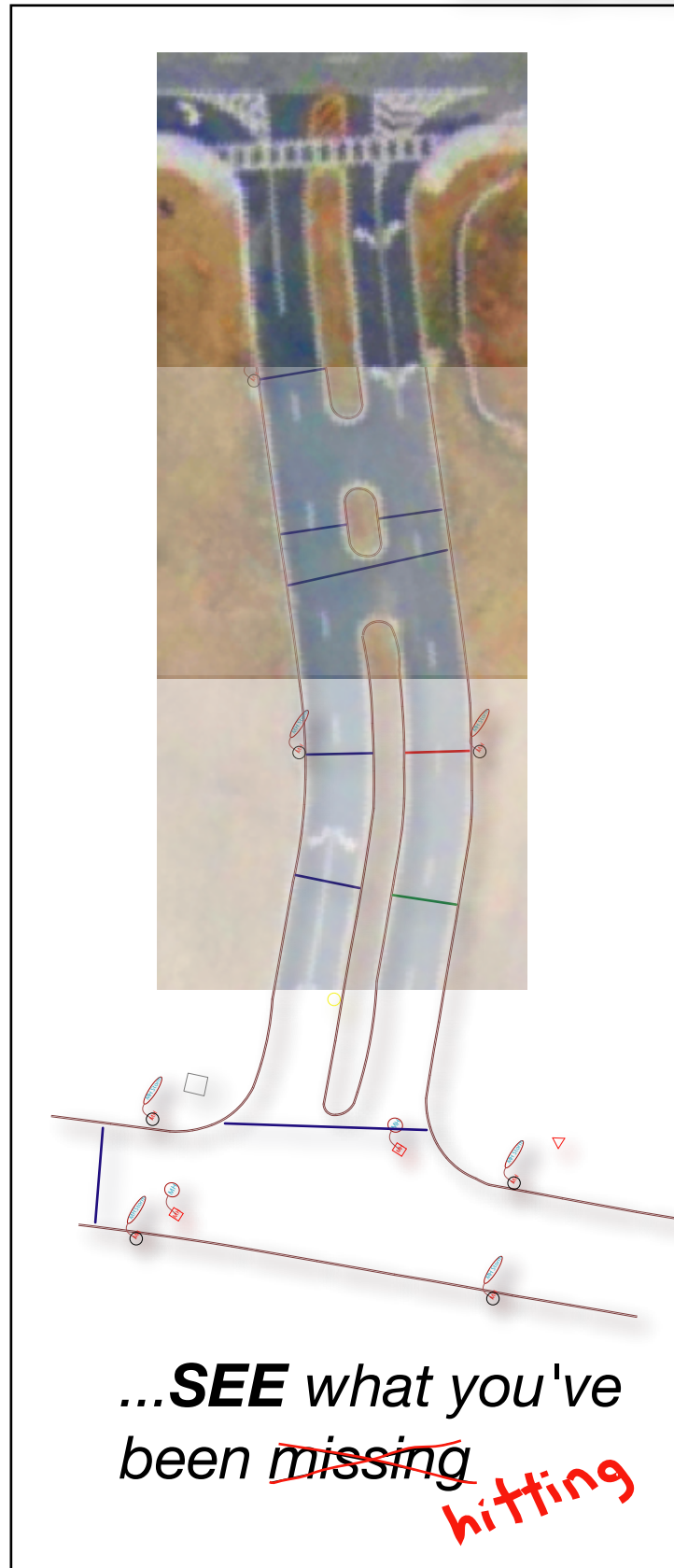
Virtual
Underground
Incorporated

Virtual Underground Incorporated

Virtual Underground is a service company dedicated to solving your underground infrastructure problems. Using latest generation, *TerraVision™* 3-D ground penetrating radar technology and software (developed by Geophysical Survey Systems Inc), combined with the most experienced 3-D radar team in the industry, we provide the most advanced and accurate underground mapping solution available.

The radar map created by our technology is capable of identifying and locating pipes, conduits, and other structures as small as one inch in diameter made from all commonly used materials including metal, plastic, cement, and vitrified clay.

By providing a detailed and accurate map of the underground, we minimize the risk of unforeseen obstacles to construction, reduce project completion time and decrease overall costs. Our services represent a radical improvement over existing technologies and have the capacity to transform the way you interact with the underground environment. We tailor our products and services to each client / project to maximize value.



Products:

We provide a precise map of underground objects. The locations of which are mapped to within two inches on the surface, and, in an industry first, to within four inches in **depth**.

As part of our service, we conduct a surface survey of the surrounding area as a reference. This survey typically consists of curbs, manholes, valve covers, fire hydrants, etc., and can be customized to the specific needs of your project on a case-by-case basis.

Maps can be presented as printed drawings and/or in a digital format such as CAD. The specific format of the data can be customized to your needs or preference.

Services Offered:

- Underground Utility Locating and Mapping
- Sub-Surface Infrastructure Mapping
- Pre-construction Utility Locating / Clear-Path Identification
- Underground Site Characterization
 - Underground Storage Tanks (UST)
 - Foundations / Structures
 - Buried Objects / Materials
 - Utilities
 - Geology (Rocks, Bedrock, Water Table, Sinkholes, etc.)
 - Landfill Delineation
 - Archeological / Forensic Locating

How Can You Arrange for Mapping Services from Virtual Underground?

Contact us to arrange a free project and site evaluation.

With a brief visit we will determine the suitability of our services to your project and provide you with a detailed price quote.

Reduced scope demonstration projects can be arranged to evaluate our technology.

We start with a **visit to your site**. Using a portable version of our system we determine how deep the radar can "see". The depths we reach vary from 4'-6' with a maximum of around 10' in the metropolitan Atlanta region. Traffic patterns, obstacles and safety considerations are also evaluated. We can handle most locations with a surface somewhat smooth and free of obstacles (roads, parking lots, cleared fields). After discussing the project with your representative we provide you with a detailed proposal.

The **mapping** begins with a survey of the surface landmarks. Next, the 8' wide TerraVision™ radar system is towed across your site. By constantly moving, our system normally requires only moderate traffic control when operating on streets. In an uncongested area, we can cover approximately one acre per day. Larger projects can be performed in phases and linked together upon conclusion. Once the data is collected the on-site portion of the job is complete.

Data analysis is done at our offices (see inset "How we do it...") resulting in a custom map of your location an example of which is pictured in the background.

Delivering the map doesn't end the job. We provide **follow-on support** to help you get the most out of our results.

A company would like to sell an abandoned industrial site. A potential buyer raises concerns over the possible presence of buried drums and tanks. Virtual Underground is contracted to map the site. A small collection of drums is identified. Knowing their precise location, the company is able to quickly remediate the site clearing the way for the sale.

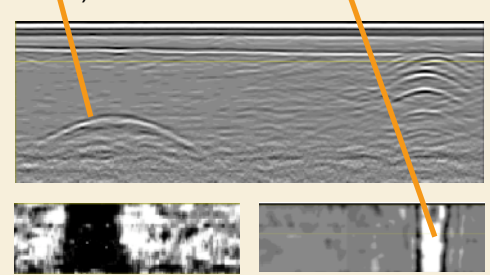
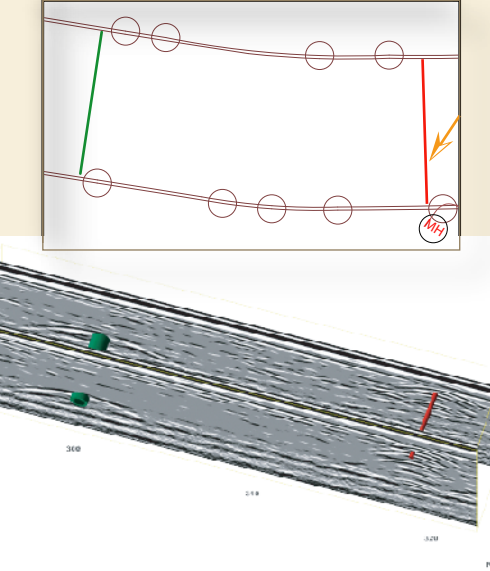
Subsurface Utility Engineering (**SUE**) is fast becoming the recommended method for construction project planning. According to a study conducted for the Federal Highway Administration, "a savings of \$4.62 for every \$1.00 spent on SUE was quantified". These savings were realized for projects utilizing Quality Level A or B techniques. Virtual Underground's radar mapping qualifies as level B and can be used alone or in conjunction with other techniques to realize these savings.

A municipality needs to replace a sewer main. The main is in an urban area with multiple utilities and few accurate records. The project planning team needs to factor in contingencies resulting in added cost and time. By using our service to acquire an accurate map of the area, unforeseen problems are minimized resulting in reduced contingencies, lower cost and less time-to-completion.

How we do it...

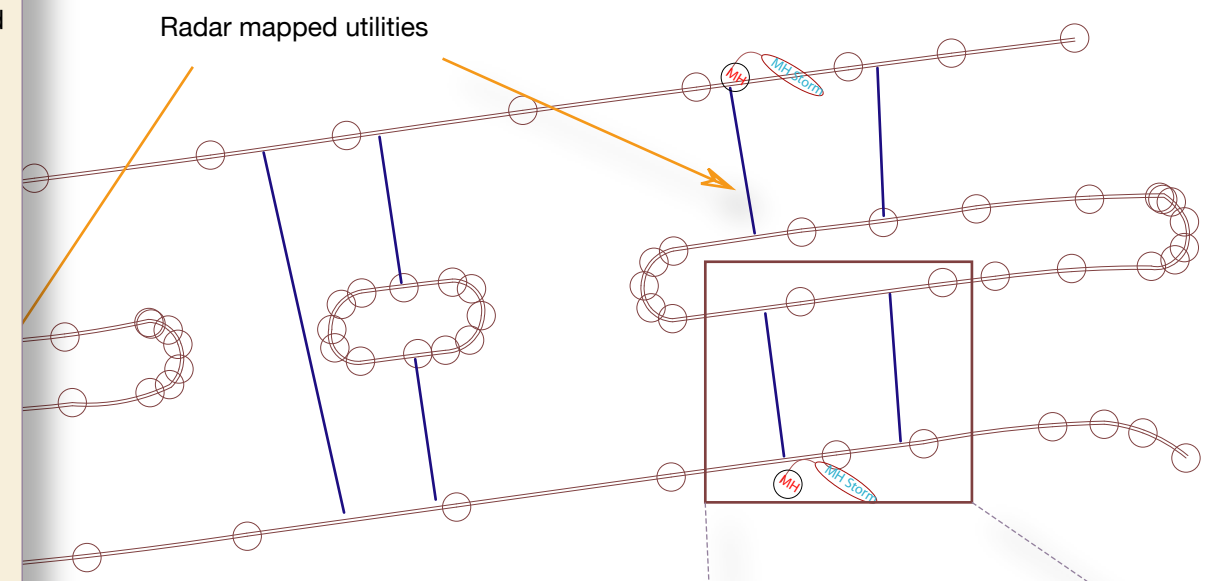
As we pass over an underground object a recognizable reflection is recorded (Note the two patterns in the image below).

With 3-D radar, the size and shape of objects can be clearly seen in a plan-view at the proper depth. (The two slices below are at six and three feet).

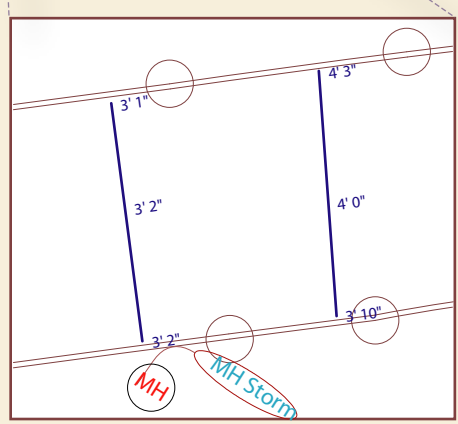
With RADAN software the position and depth of each object is obtained (the red and green pipes above). These locations can be converted to a three dimensional map and combined with surface landmarks.

Radar images created with RADAN 6.0 from GSSI



The map

in the background of this page is a simplified survey of a site in northwest Atlanta. Roughly 20,000 square feet were collected in an afternoon and the results were mapped in CAD. The map consists of surface information (curbs, manholes, storm drains, etc.) and radar located utilities (printed in blue, green and red). The radar mapped objects are located in 3-D with accurate depth (see blowup on right).



Radar located utilities labeled with depth-to-surface. Can also display elevation.

Surface survey (curbs, manholes, ...)

A hospital is planning to add a building in a congested area of its campus. The construction schedule is very tight and disruption of traffic must be minimized. By using our non-invasive service, access to the site is maintained throughout the planning phase of the project. Additionally, our maps identify the empty corridor for the new utility service installation -- ultimately reducing construction time and facility down time.

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4355J Cobb Parkway
Suite 402
Atlanta, GA 30339

(404) 315-4828

sales@virtualug.com

www.virtualug.com

