

Utility Locating Technologies

Combining multiple technologies to suit soil type, terrain, and other geophysical attributes is better option

Subsurface utility engineers and geophysical service providers need the ability to detect, locate, and characterize subsurface utilities but face numerous challenges. The number and variety of underground utilities can hinder utility location. Underground utilities can be made from many different types of materials and can be located at random depths in soil conditions ranging from silty clay to sandy loam. Because of this constantly changing pattern of interference, it may take several different technologies to locate and identify unknown utilities.

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The Solution

As part of *Utility Locating Technologies* (R01B), the second Strategic Highway Research Program (SHRP2) identified two advanced utility identification technologies that may help transportation agencies looking for more detailed information than previously known about their subsurface conditions. The first is Multi-Channel Ground Penetrating Radar (MCGPR). Since this technology does not work well in clay soils, a second technology was identified in the research. Time Domain Electromagnetic Induction (TDEMI) can work in highly conductive soils; however, it cannot detect non-metallic utilities without a tracer wire. The two will be evaluated by agencies as part of the FHWA/AASHTO Implementation Assistance Program.

The best overall practice is to employ multiple types of geophysical technologies, deployed in multiple channel modes when possible. Using digital geophysical mapping in conjunction with common pipe and cable locating tools enhances utility detection and data interpretation. This combined approach produces more complete mapping and supports a more targeted and less expensive test hole program. Limitations in the technologies indicate that careful considerations need to be taken in regard to soil type, the terrain, and other geophysical attributes to determine which technologies of a multi-sensor system are proper for each applicant's implementation.

The Benefits

Using cost-effective technologies to streamline the location process can benefit both the private firms that conduct utility location work and the state and local government agencies that pay for this service. Saving time, increasing accuracy, and improving overall success rates provide additional benefits when the designer uses this information to engineer site-specific project solutions. Knowing the location, depth, and important attributes of utilities enables more efficient and productive coordination with utility owners during the design process, helps minimize utility conflicts, and can save lives, money, and

Multiple technologies on multiple channels help speed underground utility investigation

**FOCUS AREA:
Renewal (R01B)**

Save Lives

- Prevent serious injuries by minimizing accidental strikes on harmful utilities such as high-pressured gas or electrical lines.

Save Money

- Avoid costly utility relocations and time loss in construction schedules.

Save Time

- Minimize delays in construction due to utility surprises and relocation issues.

time through the sustainable application of Subsurface Utility Engineering technologies.

Who can use these tools?

These prototype technologies would be an asset to private-sector utility locators, and also have application for utility companies and state and local government agencies that identify underground utilities.

Who is using these tools?

Arkansas, California, Indiana, Montana, Ohio, Oregon, and Virginia are currently using *Utility Locating Technologies* through the FHWA/AASHTO Implementation Assistance Program.

How can you learn more?

Updates on current implementation efforts can be found at the AASHTO Utility products webpage at <http://shrp2.transportation.org/Pages/UtilityRelatedProduct.aspx>, or at www.fhwa.dot.gov/GoSHRP2. Research reports are also available through TRB at <http://www.trb.org/Publications/Blurbs/171470.aspx>. For more information, contact Ken Leuderalbert at FHWA, Ken.Leuderalbert@dot.gov, or Keith Platte at AASHTO, kplatte@ashto.org.

About SHRP2 Implementation



The second Strategic Highway Research Program is a national partnership of key transportation organizations: the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the Transportation Research Board. Together, these partners conduct research and deploy products that will help the transportation community enhance the productivity, boost the efficiency, increase the safety, and improve the reliability of the Nation's highway system.

Strategic Highway Research Program
