January/February 2006

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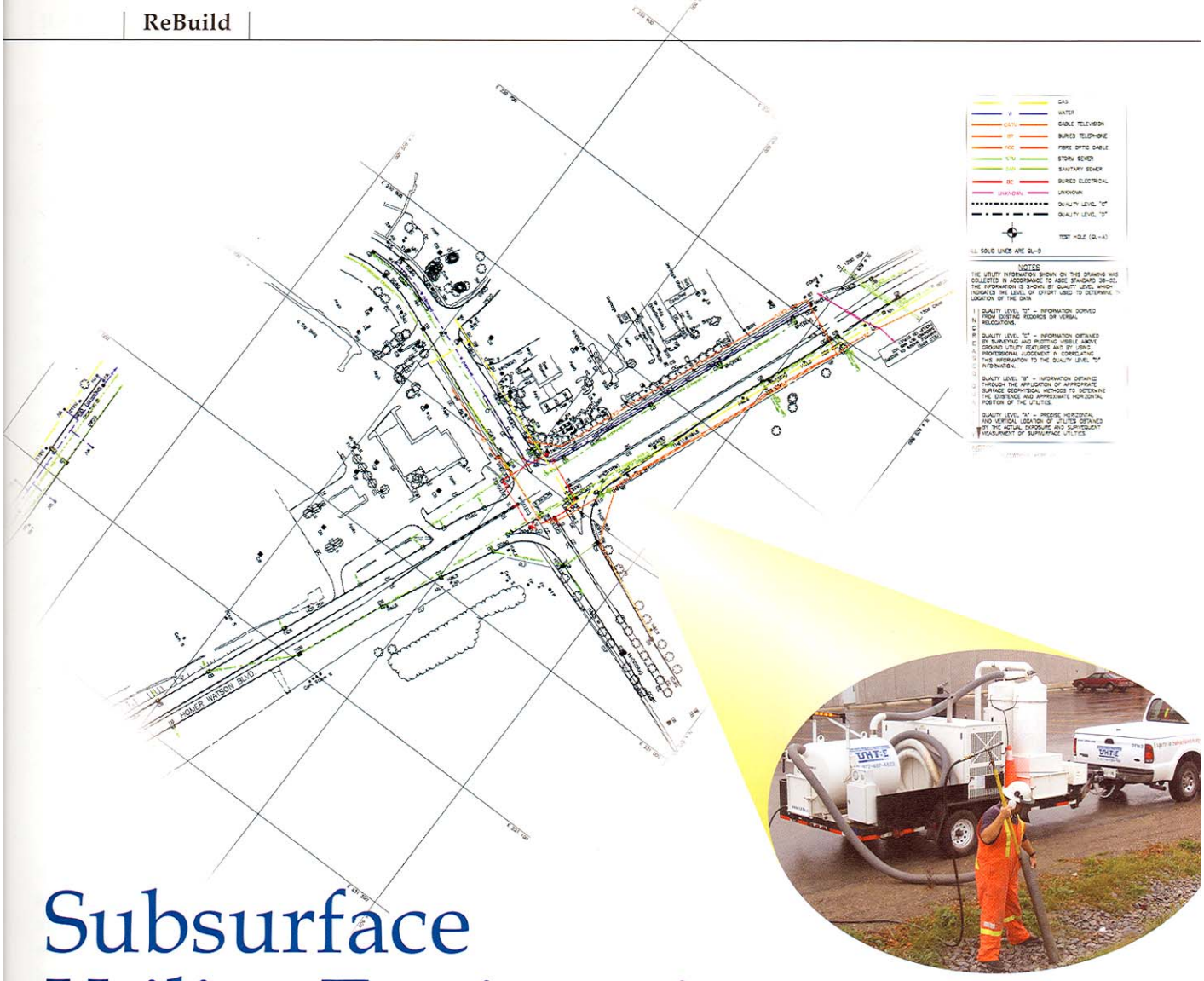

Subsurface Utility Engineering

A common language we can all understand and use.

By Lawrence Arcand

EVER heard the term GIGO—garbage in, garbage out?

Unfortunately, in a lot of situations, the utility record information that engineers and designers use on projects is GIGO, with information that is incomplete, inaccurate or non-existent. And the problem can't be changed overnight.

It's time to re-think how we deal with this utility information—and Subsurface Utility Engineering (SUE) is leading the way.

What the SUE process has effectively done is set up a common language that engineers, owners, contractors and utilities can all understand and use. The basis of this is outlined in the American Society of Civil Engineers (ASCE) CI/ASCE 38-02: Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data.

The process is really quite simple:

1. Determine what you need and how accurately you need to know it.
2. Collect the information to the accuracy that you need.
3. Show the information on the drawing, and show how you found it.

The ASCE standard outlines four Quality Levels used to categorize utility information, ranging from quality level "D" to quality level "A". Identifying utility information using these quality-level parameters allows users to understand how the information was collected and to recognize when additional information or clarification is required. It takes very little additional time and yet provides a great deal of additional benefit.

How the Process Works:

Early on during the planning stages, the engineer responsible for the SUE investigation should advise the owner of potential impacts the project could have on existing subsurface utilities and recommend a scope for the utility investigation.

Typically the first step in the investigation is to gather utility records from all available sources. This may include as-built drawings, field notes, distribution maps and even oral accounts from people who were involved in the planning, building or maintenance of the utilities in question. All the records data should then be compiled into a composite drawing and labelled as "Quality Level D".

A site visit should be made to survey all the visible surface features of the existing subsurface utilities including manholes, pedestals, valves and so on. The survey may be conducted at the same time as the topographic survey completed for the project. Where this information can be used to help further define the location of utilities, the data can be upgraded to "Quality Level C".

At this point a decision can be made as to which utilities may have an impact on the proposed design and thus warrant the need for further investigation. Using a variety of geophysical techniques, the horizontal position of these critical utilities can be determined. This information is compiled into the utility drawing as "Quality Level B" data.

The final step in the data collection process is to install test holes at key locations where the exact size, material type, depth and orientation of the utility being investigated are identified. The test hole information is surveyed and included in the utility drawings, which are now "Quality Level A".

All the information from the investigation is compiled in a utility layer that can be included with the design drawing or, based on the complexity, may be included as a separate utility drawing in the overall design package. The information is then available for the project designer as well as the contractor bidding on, and building, the project. Having this reliable information not only increases the efficiency of the design process, but it also has been shown to reduce contractors' bids and virtually eliminate extras associated with utility conflicts in the field.

SUE for Asset Management:

The same SUE principals of using quality levels can be utilized when gathering subsurface utility information for asset management purposes. Assigning a quality level to the data gives the user a higher confidence level with regard to the spatial accuracy of the data. If it's labelled as quality "Level A" the user can be confident that things are where the records say they are.

Operators of asset management systems would start with quality levels "D" and "C" and upgrade the information to quality levels "B" and "A" in critical areas or on critical infrastructure.

University of Toronto Study:

The University of Toronto was commissioned by the Ontario Sewer and Water main Construction Association (OSWCA) to study Ontario projects that utilized SUE. The 12-month study, which was completed in October 2005, includes detailed documentation of nine sample projects undertaken by the City of Toronto, City of Hamilton, Region of Durham, Region of York, Town of Richmond Hill and the Ontario Ministry of Transportation.

The study successfully drew both qualitative and quantitative conclusions on the effectiveness of SUE on the projects studied. Overall the study found that for every dollar spent on the SUE process, the project owner realized a saving of $3.41 on average. In other words, if the owners spent $10,000 on the investigation, they saved $34,100 on the overall project cost. The actual saving on each project varied from $1.98 to $6.59, but all projects realized a positive return on investment.

The study findings were very similar to the findings of an investigation that was completed in the United States by Purdue University. The Purdue investigation, which studied 71 projects, found an overall cost saving of $4.62 for each dollar spent on the SUE investigation.

Those who have tried it are seeing the benefits of utilizing SUE services and as such the use is steadily increasing in Ontario and elsewhere. Engineers, designers and project owners should be encouraged to learn more about SUE and to begin utilizing the guidelines set out in the ASCE Standard.

The sooner we all re-think the way we deal with our underground utility infrastructure, the sooner we will be able to coin a new term: IIEO—information in, efficiency out.

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