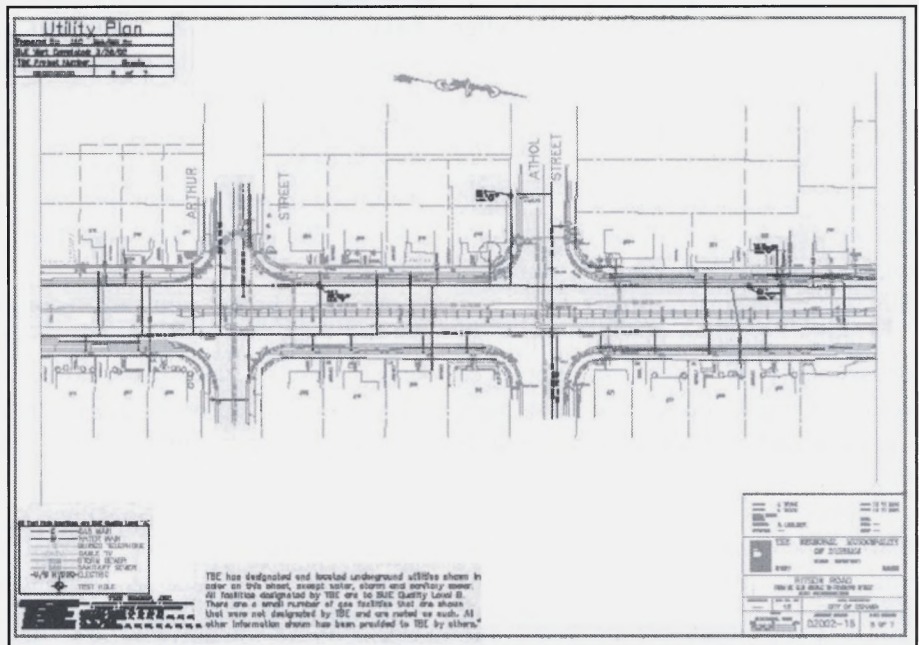


# Subsurface Utility Engineering Services Gaining Momentum In Ontario

By Lawrence Arcand, P.Eng.  
SUE Project Manager for  
TSH/TBE Subsurface Utility  
Engineers JV

An accurate survey of surface features is an integral part of almost every construction project. These are features that can easily be seen with the naked eye. Why then are features that can't be seen ignored when they can cause cost overruns, delays, and safety concerns? With the exception of picking up any valves and pedestals that give us only a rough idea as to their location, the position of utilities such as gas lines, telephone ducts, hydro cables, and watermains are usually ignored. Instead common practice is to rely on old maps and as-built drawings that may or may not reflect the true conditions that exist underground. It is time to start putting as much effort into the survey of these below ground features as goes into above ground features.

The Ontario Regional Common Ground Alliance (ORCGA), has recognized Subsurface Utility Engineering,



Sample drawings showing SUE deliverables for a project in Oshawa, Ontario.

or as it is better known as SUE, as a solution to this problem. It takes the issues related to mapping underground infrastructure, and applies a defined engineering process to ensure that reliable subsurface utility information is gathered. One of the basic principles behind SUE is the inclusion of quality levels on underground infrastructure maps. The quality levels are clearly

defined in the American Society of Civil Engineers ASCE Standard 38-02: Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data. Using quality levels provides an understanding of how the data was collected, which leads to increased confidence of the information that is displayed.

Both records research (QL-D) and the survey of surface features (QL-C) are straightforward, and are typically deemed to be the general practice used today in Ontario. Collection of QL-B information during the design stage of a project is not a general practice in Ontario, although the benefits of collecting this information can be enormous. SUE service providers typically utilize a combination of geophysical instruments including: pipe and cable locators, metal detectors, ground penetrating radar (GPR), acoustic emission, and other techniques currently available to gather this information. In critical locations quality level A data is collected using vacuum excavation techniques. Air based excavation units are preferred

## Quality Level Descriptions from ASCE Standard 38-02

**Quality Level D** - Information derived from existing records or oral recollections

**Quality Level C** - Information obtained by surveying and plotting visible above-ground utility features and by using professional judgment in correlating this information to quality level D information.

**Quality Level B** - Information obtained through the application of appropriate surface geophysical methods to determine the existence and approximate horizontal position of subsurface utilities. Quality level B data should be reproducible by surface geophysics at any point of their depiction. This information is surveyed to applicable tolerances defined by the project and reduced onto plan documents.

**Quality Level A** - Precise horizontal and vertical location of utilities obtained by the actual exposure (or verification of previously exposed surveyed utilities) and subsequent measurement of surface utilities, usually at a specific point. Minimally intrusive excavation equipment is typically used to minimize the potential for utility damage. A precise horizontal and vertical location, as well as other utility attributes, is shown on plan documents. Accuracy is typically set to 15-mm vertical and to applicable horizontal survey and mapping accuracy as defined or expected by the project owner.



**SUE Technicians installing a test hole at the intersection of Airport Road and Derry Road in Mississauga, Ontario.**

because they minimize disruption to the surrounding soil and allow the native material to be returned to the hole immediately following excavation thus eliminating the need for dumping and hauling in new fill.

The field data is then collected using a variety of techniques, most commonly by a traditional total station or GPS equipment depending on the accuracy required. The survey will collect all visible surface features (QL-C), paint marks which indicate the horizontal position of the utility below ground as found using the geophysical instruments (QL-B), and the precise location of the utilities within the test holes (QL-A). The data is then incorporated into a CADD drawing and can also be delivered in a GIS format for inclusion in the owners GIS database.

The depiction of this data in the final format is another area that sets a SUE service provider apart from a contract locating firm or a vacuum excavation firm. In the same way that a licensed land surveyor is expected to seal and stand behind his/her surveys, the engineer responsible for the investigation will stamp and certify the utility information on the drawings. This step insures that the information has been properly reviewed and that the owner can have confidence in the data

provided at the various quality levels. It also shows that the SUE provider is willing to accept liability for the information, which is a major commitment to the quality of their work.

SUE services are still in their infancy in Ontario, however they are gaining a great deal of acceptance as project owners begin to realize the benefits that can be gained. The ORCGA lists SUE as one form of utility surveying that meets its best practices outlined for Planning and Design. Lower contractor bids, reduced delays, reduced redesigns, reduced utility relocations and improved project safety are only a few of the many benefits that users are experiencing. SUE services are here to stay in Ontario so you are encouraged to learn more about how they could be utilized to save money on the projects you are working on.



**For more information on SUE you can visit the TSH/TBE website at [www.tshtbe.ca](http://www.tshtbe.ca), or contact Lawrence Arcand at 905-668-8822 x2508 or [larcand@tshtbe.ca](mailto:larcand@tshtbe.ca).**