

SUE and the Surveyor

By Lawrence Arcand, P.Eng.

Are you called upon by your clients to map underground utilities? Have you or your clients been fooled by relying on utility record information that was incorrect or incomplete? Are you confused about the difference between One-Call, Design Locates, and SUE?

Let's clarify a few things.

One-Call is a center set up for the purposes of damage prevention. The premise is that calls are made prior to a ground disturbance, and the One-Call center will contact their member companies to mark out the location of the utilities in the immediate vicinity where the ground disturbance will take place. Now the reality – not all utilities are members of One-Call. Therefore you have to take the initiative to call all other utilities on your own in addition to One-Call. If you call for utility information for survey or design purposes, they will provide you with contact people at the various utilities. They will not come and mark out the utilities – hence the need for #2 – Design Locates.

Design Locates are locates which are performed for the purpose of a survey or design. They are typically completed by a private locate contractor and paid for by the requestor, who will typically pass the cost along to the end client. The typical deliverable for a design locate is a field sketch showing the location of the utilities as marked in the field.

SUE or Subsurface Utility Engineering is a branch of engineering practice that involves managing certain risks associated with accurate utility mapping using

appropriate quality levels, utility coordination, utility relocation design and coordination, utility condition assessment, communication of utility data to concerned parties, utility relocation cost estimates, implementation of utility accommodation policies, and utility design. The foundation of the SUE process is the production of accurate and reliable utility mapping. The engineer responsible for the investigation reviews all the information available and produces a composite utility drawing using the various quality levels as described in the ASCE Standard. The final deliverable is a signed and stamped report and CAD drawing outlining the results of the investigation.

So those are the basics of the various processes.

One-Call's function is to mark utilities prior to excavation or ground disturbance, the purpose of design locates is to mark utilities for design and survey, and SUE is a full comprehensive process that produces an accurate reliable utility drawing, and qualifies the information on that drawing for the engineers at the design stage of projects.

One of the key aspects of SUE is the use of quality levels to distinguish on the utility plan how the utility information was collected. The American Society of Civil Engineers Standard 38-02: Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data clearly defines four quality levels of utility data.

Quality Level D is the most basic level of information and is based only on existing records information.

Quality Level C builds on Quality Level D information by correlating the survey of visible utility facilities such as manholes and hydrants with the records information. Judgement is used to resolve discrepancies between the record and survey information.

Quality Level B information is collected by designating the horizontal location of the underground utilities



using an appropriate surface geophysical technique.

Quality Level A information is the highest level of accuracy and is obtained by exposing the underground utility using a non-destructive excavation technique. This quality level adds vertical information as well as horizontal.

Labelling utility information by Quality Level allows the user of this information to understand how the information was collected and then place an appropriate amount of reliance on it. Risks to the project related to the underground utilities can then be properly managed.

The key tasks involved in a typical SUE investigation include designating, locating and data management. Designating is the use of surface geophysical techniques to locate the horizontal position of underground utilities. A variety of technologies are available to the SUE provider including electromagnetic pipe and cable locators, ground penetrating radar, acoustical pulse, metal detectors and many others.

Locating is the process of exposing and recording the precise horizontal and vertical position of the underground utility. This typically involves using non-destructive excavation equipment to expose the utility at key points to determine its position and other attributes such as size, material and condition.

Finally, data management is a very important part of the SUE process and it is at this step when surveyors become involved in the overall process. Data management involves surveying the utility information obtained in the field and transferring the information into CAD files, GIS files or other data management methods required by the client. The survey of the information is a key component of the overall SUE



process and must be accurate and complete. Generally the survey is not a full legal survey but a survey of the utility information relative to project control that has already been established. SUE providers and surveyors need to work together to deliver the best possible product to the project owner. We must establish a strong relationship so that all aspects of the process run smoothly.

SUE follows a procedure that starts with comprehensive records research, continues with fieldwork to map out the utilities and ends with deliverables preparation. Following the full process allows the SUE provider to produce an accurate and complete deliverable that addresses all utility types in the project area. The resulting drawing allows the client to proceed with their project knowing that the utilities have been dealt with in the most complete way possible.

The performance of the steps by a qualified SUE provider allows the engineer to sign and seal the resulting information in accordance with the ASCE Standard. Signing and sealing the information means that the SUE provider

stands behind their findings and takes responsibility for them.

In development right now is a Canadian Standard that is being produced by the Canadian Standards Association. It appears that this standard will mirror the SUE quality levels found in the ASCE document.

The proven benefits of carrying out a SUE investigation at the design stage of a project include reduced costly utility relocations because the engineer can react to the results of the SUE investigation and design around many potential conflicts. It also eliminates unexpected conflicts with underground utilities during construction, which results in fewer project delays and subsequent contractor claims. In addition the SUE process takes the liability away from surveyors for the accuracy of the information shown. The surveyor is responsible for picking up the location of all the flags and paint marks placed by the SUE technician, and for tying them into proper project control, however the accuracy of the actual utility data and assignment of the quality levels is the

responsibility and liability of the SUE engineer.

SUE does not replace the need for One-Call, nor does it preclude the use of design locates for more basic investigations that do not need the accuracy and reliability provided by SUE. Using SUE processes for the creation of utility mapping is an excellent method of ensuring a high quality reliable product for clients. The final product allows the client to effectively manage utility related risks which helps achieve everyone's goal of a quality project completed on time and on budget.

So next time you are asked to deal with utilities on one of your projects consider SUE to effectively deal with utility related risks.



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