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Subsurface Utility Engineering and Utility Locating: What's the Difference?

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Subsurface utility engineering (SUE) and utility locating may appear to be similar, but each serve a different purpose. In reality, both may utilize electro-magnetic (EM) locating equipment to identify the location of underground utilities, but the similarities generally end there.

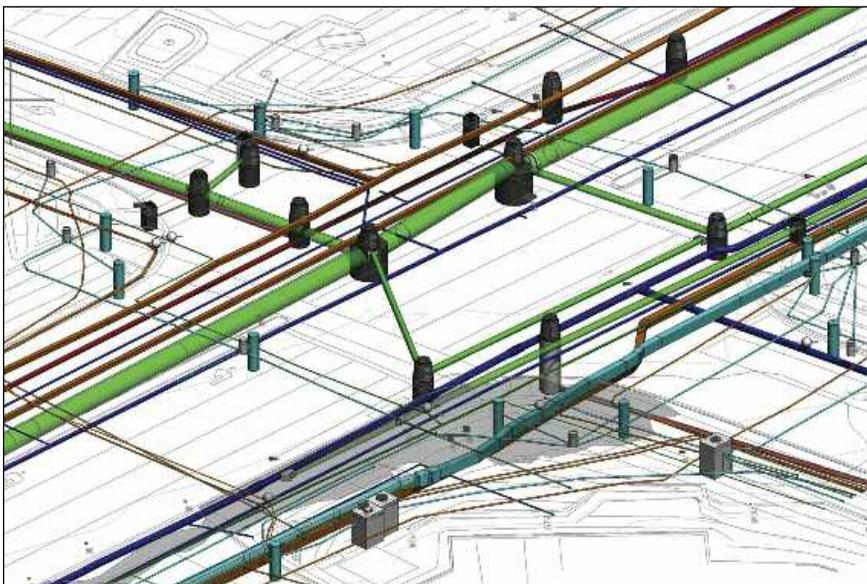
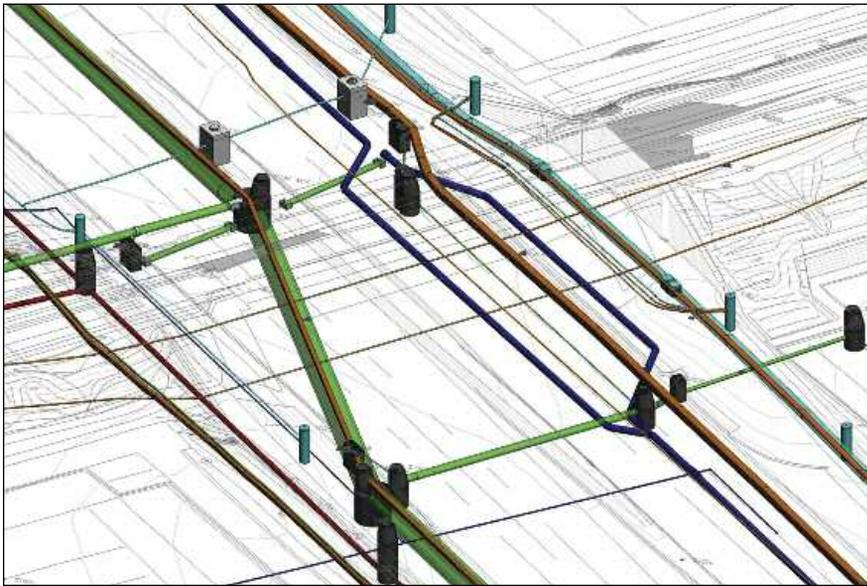
The practice of SUE was formalized in

2002 with the creation of ASCE 38-02 — the Standard Guideline for Collection and Depiction of Existing Subsurface Utility Data. It promotes the use of field investigations and records research to determine the most likely location of underground infrastructure. Most importantly, the ASCE 38-02 provides a process to identify the quality of the results, and allow

users to determine the degree of uncertainty of the information depicted. The standard was created to provide reliable information to engineers to aid in the design process, plan for utility relocations, reduce overall project costs and aid in improving project safety during construction.

Utility locating has been around since





infrastructure has been buried. It was once a survey function and did not have a great deal to do with infrastructure protection, but rather for layout of ongoing infrastructure projects. A large push to have utilities buried occurred and utility locating for damage prevention as an industry took shape. Third-party contract locating began in the early 1980s when So-Deep, Inc. began marking all utilities in the planned routing for a large CATV build in suburban Washington, D.C. Private locates were brought to the forefront in the late 1990s when utility providers stopped

assuming liability of their plant past the demarcation points and the private locate industry evolved for damage prevention on private utilities. In most regions of North America, one-call services are a government-mandated requirement prior to any excavation and are governed by municipal bylaws.

The EM locator is a go-to tool in both industries, but its application and end results are very different. The EM locator is actually a very sophisticated geophysical tool, but when the science of geophysics is not taught with the use of the tool, a vast

majority of its usefulness is limited. When used in the damage prevention industry it is called locating, but when used in the SUE industry it is referred to as designating (as defined in ASCE 38-02). The EM locator determines the location of magnetic fields either naturally present on conductors or through induction with the use of transmitters. The location of the buried conductive plant is marked on the surface of the ground. The utility locator will place marks on the ground using colour-coded paint specific to each utility. Sometimes the marks for SUE investigation are placed using pink paint (temporary markings) to avoid confusion with locating markings. The interpretation of the signals and an understanding of the geophysical properties of the earth and conductive elements is key to producing reliable data in both industries.

The SUE investigation will use EM locators as well as a variety of other geophysical technologies to determine the location of known utilities and unknown signals during the designation phase. For SUE investigation, the information collected in the field is surveyed, and integrated using CAD software onto a utility mapping drawing. Other site investigations and field observations related to the utility infrastructure that may be present are collected from the site. SUE investigation includes a review of the record information (construction drawings, for example) and resolves discrepancies that may be found. The SUE utility-mapping drawing includes all utilities either identified in the field or identified on records, even if they could not be designated in the field. In many projects the construction methods and sequencing may be reviewed to better understand the presence of abandoned or removed utilities. The engineer responsible for the investigation reviews all information and makes a professional judgment as

to the quality of the information and how to depict it on the drawing. The distinction between how utilities are identified is made using quality levels according to ASCE 38-02. To make this distinction, the engineer uses judgment regarding the likely validity of the designating marks and the methods used, as well as the survey data; the engineer also compares record drawings and checks the probability of the alignment based on known installation practices. The engineer will also provide a SUE report which outlines the methodology used for the investigation (including geophysical equipment used), the findings of the investigation and how they may impact the project. Often, there will also be recommendations for any additional investigations suggested to further identify the location of utilities in critical locations. The focus of additional investigations is specific to the project.

Risk Reduction

SUE is a design service, and is used to reduce risks during design. Once construc-

tion begins, the results of the SUE investigation may help the contractors understand the risks associated with the buried utilities prior to excavation. Private/ Public locates would still be required prior to any physical excavation.

Utility locating (one-call or private locating) is primarily focused on public safety and damage prevention during construction. Utility locating allows excavators to understand the location of the known underground utilities in the field, which is a necessity for safe excavation. In one-call or private locating, the EM locator is used to verify alignments of known active in service utilities shown on the utility company records. In many jurisdictions, they are performed by third-party contract locate companies. The utility locator places marks on the ground using colour-coded paint to indicate the horizontal alignment of the known utility and creates a no-dig zone, stating that a utility lies beneath the marked area. In the damage prevention industry, the information is most commonly conveyed on a locate

sheet with a sketch showing the specific utility in the target area. If a locator is responsible for multiple utilities, multiple utilities may be shown on the same sketch. Sketches are commonly provided on-site or can be transmitted via email. Typically, once a locate is completed, there is no independent technical or practical review of the sketch produced prior to providing it to the end user, which is the contractor. A "locate" has no accuracy associated with it; the mark on the ground is only a statutory mechanism to determine who is going to pay for the cost of the repair of the utility if it is damaged during construction.

Although their purposes and executions are different, both subsurface utility engineering and one-call or private utility locating provide important valuable information for their end users. One call and/or private locate are commonly mandatory and even legislated in some jurisdictions. They are required and necessary even when a SUE investigation is completed. SUE is recognized as a best practice in the Canadian Common Ground Alliance Best Practices Manual, the Transportation Association of Canada's Guideline for the Coordination of Utility Relocations and other key documents. SUE is a valuable tool for any engineer to manage utility risks on their project.

Together SUE and one-call or private utility locating are an effective one-two punch that can be used to ensure your project's overall success.

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