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Best Practice – Subsurface Utility Engineering (SUE)

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Scope

This Best Practice is meant to help industry stakeholders and the public understand the concept of **Subsurface Utility Engineering (SUE)** by defining it, citing relevant sources and portions of the Excavation Requirements Statute and discussing practical application/intention of the Law.

Best Practices are recommendations of the Underground Damage Prevention Safety Commission (Safety Commission).

SUE: Background

SUE is considered an effective practice by many organizations, including the American Society of Civil Engineers (ASCE), American Council of Engineering Companies of Colorado (ACEC), American Public Works Association (APWA), Federal Aviation Administration (FAA) and Department of Transportation (DOT). SUE is used to better understand underground infrastructure during the planning and designing phases of projects to:

- Allow better execution during the construction phase
- Reduce risks of underground utilities
- Observe significant cost savings on projects

Without SUE, some projects may experience delays and extra costs resulting from:

- Unnecessary utility locations based on incorrect location information
- Unexpected utilities found during construction
- Redesign of utility or structural project components
- Utilities located at unexpected depths
- Utility damage
- Unanticipated utility relocation construction

The intent is to design around utilities in the interest of public safety. The recommendation is to include SUE in the design phase. SUE combines civil engineering, surveying and geophysics to meet damage prevention goals.

The Safety Commission interprets the intent of the language in the Law to be a “floor” not a ceiling – meaning at a minimum, certain projects (those that meet the criteria as a SUE-required project per the Law) require SUE. More stringent requirements may be required by the project owner. Furthermore, other projects that do not meet SUE requirements per the Law may involve interaction with underground utilities, and performing a SUE investigation still serves as a damage prevention tool. If a SUE investigation is not required or performed, engineers should include utility information in design plans.

SUE Defined

“A branch of engineering practice that involves managing certain risks associated with utility mapping at 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.”

Relevant Definitions from the Excavation Requirements Statute (§9-1.5-102)

- (1) “ASCE 38” means the standard for defining the quality of an underground facility location as defined in the current edition of the American Society of Civil Engineers’ Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data (CI/ASCE 38-02)
- (6.7) “Subsurface utility engineering notification” means a notice to the notification association that a project is being designed by a licensed professional engineer and that the project will include the investigation and depiction of existing underground facilities that meet or exceed the ASCE 38 standard
- (6.8) “Subsurface utility engineering-required project” means a project that meets all of the following conditions:
- (a) The project involved a construction contract with a public entity, as that term is defined in section 24-91-102;
- (b) The project involves primarily horizontal construction and does not involve primarily the construction of buildings;
- (c) (I) The project:
- (A) Has an anticipated excavation footprint that exceeds two feet in depth and that is a contiguous one thousand square feet; or
- (B) Involved utility boring
- (II) For purposes of this subsection (6.8) (c), the term “two feet in depth” does not include rotomilling, and the contiguous one thousand square feet does not include fencing and signing projects.
- (d) The project requires the design services of a licensed professional engineer.

Practical Application

When is SUE required?

Per the Statute, SUE projects must meet **all four of these requirements** under subsection 6.8, summarized as follows:

1. Has a construction contract with a public entity
 2. Involves primarily horizontal construction
 3. The project:
 - a. Has an anticipated excavation footprint that exceeds two feet in depth and that is a contiguous one thousand square feet; or
 - b. Involves utility boring
 4. Requires the services of a licensed professional engineer.
- For purposes of subsection 6.8(c), the term “two feet in depth” does not include rotomilling, and the contiguous one thousand square feet does not include fencing and signing projects.
 - The intent of the Law is to understand the types of underground utilities and their location. Having utility information during the design phase is intended to help the design and construction process go smoothly and ensure damage prevention.

- **Projects do not need to be evaluated exclusively in their entirety. Rather, the project may be evaluated in segments. Segments of a project may require SUE** and others may not. Where all four criteria are met for that segment, then SUE applies for that segment only and not the entire project.
- **The Safety Commission recommends that the decision-making process used to determine the application of SUE should be documented.** Documenting decisions based on engineering judgement can help communicate with other stakeholders regarding what was done/not done and whether the SUE requirement was met as it pertains to meeting the quality level depicted.
- SUE may be beneficial from a professional judgement perspective regardless of whether the four conditions above are met. As a best practice, engineers should consider the potential hazards and may choose to apply SUE as a risk management strategy.
- Where SUE is completed, contract documents should clearly depict the quality level achieved so contractors can determine risk during bidding.
- Engineering notifications (otherwise known as “tickets”) are for design projects that do not meet SUE-required project criteria; it is an option to obtain location information on underground utilities from owners/operators (see below: **What is meant by ‘Other Request for Information’** for additional guidance).

What is meant by a construction contract in subsection 6.8?

Per the Statute, SUE projects or segments require a construction contract in addition to the other three requirements.

- A Design contract can be considered a construction contract because a construction contract is anticipated during the life of the project.
- Some parties are not including SUE in the preliminary design phase and requiring it be done at a later date. While it is ideal to begin the SUE process early in the design phase for maximum benefit to the project, it is possible to perform a SUE investigation at any point in the design process, and the stamped plans will still be useful information during construction.
- A permitting agency can determine requirements for issuing a permit. The Law neither requires nor prohibits an agency from requiring SUE as part of its permitting process.

What is meant by a public entity in subsection 6.8?

- §24-91-102 (3), C.R.S., defines a public entity as “this state or a county, city, city and county, town or district, including any political subdivision thereof.”
- [Airport Cooperative Research Program Synthesis 34](#) (through the FAA) establishes SUE as a Best Practice.
- Facilities and businesses that are unsure of whether they are a public entity should review the aforementioned definition, review the SUE-required project criteria and work with their legal counsel.

What is meant by primarily horizontal construction in subsection 6.8?

- The project has an anticipated excavation footprint that exceeds two feet in depth and that is a contiguous one thousand square feet.
- In practical application, horizontal construction will likely be primarily in the public Right of Way (ROW). In such circumstances, it may be best to segment the project.

If any horizontal part of the project requires connecting to utilities in the ROW (e.g., connecting to a water main), that is the part of the project for which to consider applying SUE. While the footprint of the building is not necessarily going to have a SUE investigation, the segment that ties into the ROW and utilities is where the exposure/risk of damage exists and should be considered for SUE requirements.

For projects started prior to August 8, 2018, can a project be ‘grandfathered’ from SUE?

Projects must be evaluated individually, as they range from small to large and may have been in different phases of planning and execution when the Law passed on August 8, 2018. The intent of SUE is to design the project around utilities to protect underground infrastructure and public safety. Therefore, the Safety Commission does not endorse grandfathering based solely on the August 8, 2018, effective date of the Law.

Excavation Requirements Statute §9-1.5-103(2.4)

At the project owner's expense, a licensed professional engineer designing for a subsurface utility engineering-required project shall:

- (a) Notify the notification association with a subsurface utility engineering notification;*
- (b) Either:*
 - (I) Meet or exceed the ASCE 38 standard for defining the underground facility location in the stamped plans for all underground facilities within the proposed excavation areas;*
or
 - (II) Document the reasons why any underground facilities depicted in the stamped plans do not meet or exceed ASCE 38 utility quality level B or its successor utility quality level;*
- (c) Attempt to achieve ASCE 38 utility quality level B or its successor utility quality level on all utilities within the proposed excavation area unless a reasonable rationale by a licensed professional engineer is given for not doing so; and*
- (d) Document the reasons why any underground facilities depicted in the stamped plans do not meet or exceed ASCE 38 utility quality level A or its successor utility quality level for underground facilities at the point of a potential conflict with the installation of a gravity-fed system.*

Practical Application

What is ASCE 38 and the quality levels referenced in § 9-1.5-103 (2.4)?

ASCE 38 Standard is a consensus standard by ASCE that references quality levels. Quality levels may be thought of as degrees of risk. There are four recognized levels, ranging from Quality Level D (lowest level) to Quality Level A (highest level).

- Similar to school grades, ASCE 38 advises levels of quality (i.e., diligence or uncertainty); it takes more effort to achieve Quality Level A than Quality Level D (as an example).
- Quality levels are applied individually to specific segments of utilities.
- While the Law requires an attempt to achieve Quality Level B, contracts may request a higher level.

Quality Levels, Summarized:

- A. Derived through Excavation (and only at the point of exposure)
- B. Derived from Geophysics
- C. Surface Visible Information
- D. Secondhand information

What is included in a plan set and how long is it good for?

- The quality level(s) applies for the life of the project and only for that project (non-transferable); during the life of a project, there may be new utilities added/found. Those should be incorporated as discovered. Regardless of quality level achieved on a project, utility information transfers to other projects/maps/records as Quality Level D.
- A project which has previously been through the SUE process and has been shelved should be reevaluated as to whether the work should be redone. The Safety Commission cannot recommend an exact amount of time to reevaluate a project (after the plans are produced); it requires an engineer's judgement. The plan set should include dates for when the surveys (or quality levels) were established, as well as the date the plan set was completed.
- **In practical application, the goal of a utility coordinator would be to manage information from SUE through project completion (monitoring the space) so that they know if something is being**

placed. Also, newly installed utilities (post August 8, 2018) may have an as built set and are required to be electronically locatable.

What is the purpose/usefulness of the SUE plan set?

- Tool for damage prevention
- Tool for contractors to determine the risk in their bids
- To help the excavation community and contractors avoid costly work delays and proactively avoid interactions with existing underground infrastructure
- **Excavation still requires a separate (excavation) notification and positive response before moving ahead (per § 9-1.5-103 (3)(a)(1)(A)).**

Excavation Requirements Statute §9-1.5-103(2.7)

An underground facility owner that receives a subsurface utility engineering notification or other request for information from a designer shall respond to the request within ten business days after the request, not including the day of actual notice, in one or more of the following ways:

(a) Provide underground facility location records that give the available information on the location, not to include depth, of underground facilities within the project limits;

(b) Provide a mark on the ground that gives the approximate location, not to include depth, of its underground facilities within the project limits; or

(c) Provide the available information as to the approximate location, not to include depth, of its underground facilities within the project limits.

Practical Application

What is meant by ‘Other Request for information’ and what are the similarities/differences between this and requesting a SUE notification/ticket?

- “Other request for information” is an Engineering notification.
- Engineering notifications (also known as “tickets”) are for design projects that do not meet SUE-required project criteria; it is an option to obtain location information on underground utilities from owners/operators.
- From the utility owner/operator standpoint, the response is the same: both require utility owners to provide records, marks on the ground or other available information as to the approximate location of utilities within ten business days. CO 811 will issue a notification to all owners/operators with underground infrastructure in the area.
- The Safety Commission interprets the intent of the language in the Law to be a “floor” not a ceiling – meaning at a minimum certain projects (those that meet the criteria as a SUE-required project) are using SUE. Where other projects may involve interaction with underground utilities, and performing SUE works as a damage prevention tool or allows the project to be designed around existing infrastructure, it is a recommendation for engineers to request information and owners/operators to provide this information.
- Under the Law, the owner/operator has three options: records, marks on the ground, or provide other available information, and all three of these options are valid forms of positive response. In recognition of the intent for the information request, most engineers prefer receiving records if available and the owner/operator is willing to provide them.
- The goal of damage prevention is shared by all parties involved in the SUE process. When information about utility locations are shared by utility owners/operators, the engineers are able to avoid and design around utilities.

What is meant by 'Positive Response'?

- Positive Response is confirmation through CO 811 that the owner/operator has provided records, marks on the ground, or available information in accordance with §9-1.5-103(4). Acknowledgement of receiving a notification request is not an adequate Positive Response.
- A SUE notification that has not received a Positive Response (including records, marks on the ground, or available information) within ten business days (not including the day of actual notice) should be followed up by the person making the request to CO 811 to create a renotification. Renotifications are automatically sent until Positive Response is achieved and are charged as another notification. An owner's/operator's failure to respond to a SUE notification is a violation of the Law.