

This document is disseminated by the American Council of Engineering Companies of Colorado (ACEC Colorado) in the interest of information exchange. ACEC Colorado assumes no liability for the use of the information contained in this document. This legislation amended and added to Colorado Revised Statutes 9-1.5-102 through 106. The focus of this FAQ is to provide a summary of CRS 9-105-103 regarding Plans and Specifications. These FAQs do not address all elements of the legislation. Please also refer to the final legislation SB 18-167 (<http://leg.colorado.gov/bills/sb18-167>) and Colorado 811 (<http://colorado811.org/one-call-legislation/>).

What is the motivation/goal of Senate Bill 18-167?

- Increase public safety and reduce utility related cost and delay throughout the project lifecycle, including construction.
- The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) issued a rule in 2015 establishing new criteria for state damage prevention enforcement programs. The rule requires states to enforce pipeline safety through the state level one call law. Colorado's existing law did not have adequate enforcement, therefore the new Safety Commission and the power granted it in SB18-167 addresses PHMSA's requirements.
- Require public agencies to use risk-based utility mapping and depiction process consistent with national standards to avoid utility delays, claims, redesign, unnecessary relocations, and damages as much as possible

What are the main components of this legislation?

- For a subsurface utility engineering (SUE) required project, project owners are obligated to:
 - Notify 811 via subsurface utility engineering notification. Surface utility engineering notification requires utility owners to provide records, field mark, or other available information as to the approximate location to design team within 10 business days
 - Provide stamped plans depicting utilities at their achieved quality level and attempt to meet or exceed ASCE 38 quality level B and quality level A at potential conflicts with the installation of a gravity feed system, OR document reasons why not
- 811 excavation notice requires utility owner to mark within three business days
- All new underground facilities must be electronically locatable when installed
- Creation of Underground Damage Prevention Safety Commission
- 811 becomes true one call, Tier Two members must become Tier One members

What is a "SUE required project"?

- Horizontal construction project by a public entity requiring the design services of a licensed PE. Project construction would also require over 2 feet deep of excavation and contiguous 1,000 square feet of disturbance OR involve a utility boring.

What are the project owner requirements during design for a SUE required project?

- Notify 811 with a subsurface utility engineering notification. 811 will notify utility owners with an “engineering locate request” and utility owners have 10 days to respond with records or field mark
- Depict utilities/underground facilities in the stamped plans to meet or exceed ASCE 38 quality level B or successor quality level
 - Attempt to achieve ASCE 38 quality level B depiction for the project level UNLESS a reasonable rationale by a licensed PE is given for not doing so; and
 - Document reasons why any underground facilities depicted in stamped plans do not meet or exceed ASCE 38 quality level A for underground facilities at the point of a potential conflict w/ installation of a gravity-fed system. Additionally, ASCE 38 recommends quality level A test holes to confirm conflicts with other critical utilities, such as high pressure gas, water conduit, multi conduit duct banks, and facilities that would have a major impact to cost, schedule, or public safety.

What are the ASCE 38 quality levels?

- ASCE 38 provides a nationally recognized, standard guideline for the collection and depiction of existing subsurface utility data. The quality level provides a professional opinion of the quality and reliability of the utility information.
- Quality Level D. QL D is the most basic level of information for utility locations. It is a utility segment depicted on plans that is derived from existing utility records, verbal recollections, or field marks provided by utility companies, put into context with all the other information held by the professional at that time. QL D is useful primarily for project planning and route selection activities.
- Quality Level C. QL C is a utility segment depicted on plans that is derived from surveying visible above ground utility facilities (e.g., manholes, valve boxes, etc.) and correlating this information with existing utility records, information observed from looking into vaults and manholes, and all the other information held by the professional at that time.
- Quality Level B. QL B is a utility segment depicted on plans that is derived from the application of appropriate surface geophysical methods to determine the existence and horizontal position of known and unknown subsurface utilities within a project’s limits. The process is known as designating and when surveyed and put into context with all the other information held by the professional at that time can be sealed as a QL B utility segment. When QL B is not able to be obtained on a known utility for whatever reason, the utility is depicted at its highest achievable Quality Level, QL C or QL D.
- Quality Level A. QL A, also known as "daylighting" or “test hole”, is the highest level of certainty confirming the accurate and precise horizontal and vertical location of the underground utility. QL A provides an accurate point and may also confirm the type, size, condition, material and other characteristics of underground feature. Exposure is typically achieved through hand digging or vacuum excavation. See the ASCE 38 publication for more details. An abridged version can be obtained at <http://www.dot.ga.gov/PartnerSmart/utilities/Documents/ASCE%2038-02.pdf>

If the utility companies respond to the subsurface utility engineering notification or excavation notice with field marks why does the agency (project owner) have to pay for quality level B designation in its stamped plans?

- When the source, means, or methods of geophysical and/or survey work are not performed under the responsible charge of the professional of record providing the sealed plans, the marks can only be deemed to be QL D.
- The marks themselves are never considered QL B. Professional judgement must be exercised in correlating geophysical data, records, surface features, and knowledge of construction of utility systems to depict something as QL B.
- Marks provided through use of the 811 system in response to a subsurface utility engineering notification or excavation notice are placed by the utility company's one call locator. One call locators are agents of the utility owner and represent the utility company's best available records of the utilities horizontal position.
- Marks may be placed on the ground by the utility owner by any method, not just geophysics. There is no way to know the method.
- The professional has no idea of the training, equipment, capabilities, or state of mind of an individual not working under their direct responsible charge
- No utility owner or their agent spends any effort looking for unknown utilities, which can comprise a significant percentage of utilities actually existing on a project.

How should an engineer depict the project limits for a Subsurface Utility Engineering Notification?

- The best way is to attach a map showing the anticipated limits of the design footprint of the project.

What if project design started before August 8, 2018 and does not provide ASCE quality levels on sealed plans?

- After August 8, 2018, the engineering requirements of SB 167 apply to all subsurface utility engineering required projects.
- Exercise professional judgement in cooperation with the agency (project owner) to depict the quality level of underground facilities on the stamped plans. Document reasons why any underground facilities depicted in stamped plans do not meet or exceed ASCE 38 quality level B and its successor levels. Extent of depiction and quality levels represented may vary on a case by case basis depending on phase of project development, agency expectations, and the project's level of excavation/disturbance.

How should abandoned utilities or unknown underground facilities be depicted on sealed plans?

- Abandoned utilities found via geophysical methods will be surveyed and may be depicted as QL B and listed as "unknown". If records or verbal recollection from the owner states, there is an abandoned line that cannot be found via geophysics it will be drawn in the CAD file and labeled as QL D with the source noted.

When is the best time to start the SUE process?

- Early as possible, the sooner your design team has accurate existing utility information the more resilient your design will be. We suggest that the SUE QL B investigation be performed concurrently with the topographic survey, prior to preliminary design. QL A data is usually performed iteratively throughout the project development process. Note that SUE investigations may be different (more focused in a smaller area) than the project survey topographic mapping.
- The FHWA recently published a report entitled “National Utility Review: Utility Coordination Process”, that address this question. A copy of FHWA training on the report can be found at <https://www.fhwa.dot.gov/utilities/training.cfm>. The report will be available shortly to the Public.

Who is responsible for enforcement of this legislation?

- The bill created the Underground Damage Prevention Safety Commission
- The Safety Commission will include 15 members, review complaints, and may apply penalties between \$250-\$75,000 per violation based on the severity of the infraction and the number of infractions within a twelve month period
- Home rule cities can create their own safety commissions

What are the deadlines?

- August 8, 2018 – SB 167 effective date of bill and subsurface utility engineering requirements
- January 1, 2019 – Governor to appoint 15-member Safety Commission
- January 1, 2020 – All new underground facilities must be electronically locatable when installed
- January 1, 2021 - Tier 2 members who convert to Tier 1 will not be charged outgoing transmission fees until this date

Where can I get more information on how to implement this legislation?

- Final legislation SB 18-167 - <http://leg.colorado.gov/bills/sb18-167>
- 811 - <http://colorado811.org/one-call-legislation/>
- ASCE 38 Standard – Abridged version available from <http://www.dot.ga.gov/PartnerSmart/utilities/Documents/ASCE%2038-02.pdf>
- Updated ASCE 38 is anticipated winter 2018/2019 <http://www.asce.org/templates/publications-book-detail.aspx?id=8162>
- Training opportunities - <http://acec-co.org/calendar/> - March 5 and 6, 2019 Training for Colorado Transportation & Environmental Professionals
- FWA’s Office of Infrastructure: National Utility Review: Utility Coordination Process Final Report, June 2018; <https://www.fhwa.dot.gov/utilities/hif18039.pdf>
- CDOT – see CDOT FAQs provided at training session

If all known utilities in a project area are locatable via tracer wire or a pipe locator, do any other geophysical methods need to be used to achieve Quality Level B?

- This question assumes an inherent premise that there aren't any unknown utilities within the project area, (which is rarely if ever the case). We don't know how such a premise can be made. Such a premise would necessitate that every utility owner since the start of time made a record, indicated that their utility was forever locatable throughout time, and that record was discoverable by the engineer.
- The intent of achieving QLB is to perform an investigation within project limits using geophysical methods coupled with surface investigative methods, records research, and engineering assessment in an attempt to recover and make sense of all the lines of evidence for utilities, past and present, known and unknown, unless the project owner and engineer agree to take the risk that certain utility systems are not to be investigated. Although individual utility systems may be depicted at QLB, an "attempt" to depict all utilities at QLB requires systematic geophysical search methods to look for unknown utilities, and provide assurance that there aren't unaccounted buried infrastructure which can cause misleading designations. If one does not know that a utility exists, and accordingly does not know its characteristics (e.g., depth, size, material), one does not know which type of geophysics might be effective for detecting it. Although it is impractical to attempt to use all possible geophysical methods, a general standard of care for this search includes the use of inductive and passive electromagnetic pipe and cable locating methods, and ground penetrating radar (GPR) (unless specific site experience dictates that GPR is ineffective in that locality for detecting any utility regardless of depth or size, and this has been agreed upon by the client to not include in the scope of work). In general, multiple frequencies and signal coupling techniques are used for pipe and cable locators to determine and verify designated alignments, and work through "bleed over", weak signal to noise ratios, and lost signals. For networks which are typically mapped via non-conductive methodologies, such as CCTV or "sonding," a scope item must be agreed upon with the client and/or it would be agreed to use QLC/QLD to depict them.

Do you need to use geophysical methods to try and find abandoned utilities in a project area if no known abandoned utilities are noted from utility owners?

- It depends upon the authorized scope of work as well as the potential risk. If the scope of work says to attempt to find all utilities, that includes abandoned or out-of-service ones. Many times it is difficult until exposure and evaluation to determine the operational status of a utility. Sweeping or scanning the area using a suitable form of geophysical instrument is industry practice. As a professional engineering investigation, the utility engineer also must elevate the concern for risk to the project owners if the authorized work scope specifies the omission of certain facilities or constrains the investigative limits. The utility investigation needs to account for all buried features which might pass within the project area and this requires the investigator to step back and look beyond the authorized project limits for clues. Also, the investigator needs to be aware of all buried facilities to accordingly understand where geophysical anomalies may produce misleading results.

Generally, when is it required to use geophysical methods other than tracer wire or a pipe locator to achieve Quality Level B?

- Tracer wire is not a geophysical method; it's just a conductive wire can be used to directly introduce an alternating current that hopefully can produce a traceable magnetic field at the ground surface which will represent the alignment of the target facility.
- Generally speaking, every project requires the investigative survey to be designed based on a myriad of criteria including type, size, and depth of utilities, utility congestion, access, environmental and social factors, reinforced concrete surfacing, traffic constraints, soil matrix, moisture content, cost and schedule constraints, etc. In nearly every situation a suite of geophysical techniques and methods are utilized. Inductive EM pipe and cable locators are subject to several limiting factors: 1) current follows the path of least resistance; 2) inductive magnetic fields create currents in adjacent conductors which distort the resulting magnetic field; and 3) the magnetic field for the target facility diverges and dies off dramatically with depth, which creates an inadequate signal to noise ratio.
- There are various geophysical instruments available for acquiring data regarding the existence and locations of underground utilities. Geophysical instruments use non-invasive technologies to image subsurface conditions in the earth through measuring, analyzing, and interpreting physical properties. Every geophysical instrument depends upon the ability to identify contrasts in subsurface materials that are comprised of various properties. Common geophysical instruments and/or comparative techniques for utilities include: pipe and cable locators; ground penetrating radar (GPR); metal detectors; magnetics; sondes or RFID markers, push-rods or closed-circuit television (CCTV); lasers and visible light; and elastic wave methods.
- It is important that a Professional is familiar with, and has access to, various geophysical instruments for the successful designation of underground utilities. Every geophysical instrument and technique has its limitations; however, the use of independent methods helps the investigator sort through confused scenarios as well as identify unknowns, which elevates the confidence in the interpretation of the anomalies. In general, it is safe to say that more than one instrument and/or technique will often be required for designating utilities within a set geographic area; as different instruments and techniques yield different capabilities and results, using a combination of instruments and techniques will yield more comprehensive results. The interpretation of different site environments, such as soil conditions, pipe material, the type of pipe joints, depth of utility, and jurisdictional requirements may require the consultation with a specialist, such as a geophysicist.
- In addition the use of geophysics alone does not necessarily dictate achievement of QLB. The results from the geophysics need to be compared with available records information, surface evidence, the history of the location including the roads and types of businesses that are present or existed there in the past, and knowledge of utility installations and distribution systems for the professional to make the judgement to qualify the information as QLB. A QLB depiction, as all Utility Quality Levels, is a judgement by the professional of the relative unquantifiable uncertainty of the location of an unobservable utility segment. As such, there may be cases where a "located" trace wire may be judged to be insufficient to depict the utility that the trace wire is supposed to represent at QLB, and it should be classified as QLC or QLD instead. An example would be a trace wire whose underground location seems to be impossible to represent a piping system's geometry. However, a sonde inside the pipe, or a GPR signal of the pipe may assist in reducing the uncertainty enough to indeed classify the depiction as QLB.

What are other topics/questions that may need to be addressed with the Underground Damage Prevention Safety Commission, your organization's leadership and legal counsel, and Colorado 811?

- Are agencies required to locate underground storm culverts as part of an 811 request? Are underground storm culverts considered exempt from electronically locatable requirements since they are visible from the invert and outlet?
- If a municipality doesn't require stamping by their in-house engineers, but does require outside projects to be stamped by a PE; is there a difference in the project requiring the design services of a PE based on the PE using their stamp?
- What are municipality SUE requirements related to the approval of private development and/or infrastructure constructed as part of a private development?
- If a utility facility owner is doing the entire project from design to installation, but don't have a contract (such as a permit) with a public entity, are they excluded from the SUE requirements?