Best Practices to Achieve Excavation Safety

Executive Summary

Strong state Damage Prevention programs are critical to protecting underground infrastructure and civilian safety. Excavation damage continues to be a leading cause of pipeline incidents in the U.S. – some of which lead to destruction of property, injury, and in the worst cases, fatalities. Further, hundreds of thousands of other underground facilities, including water lines, sewer lines, telecommunications infrastructure, and power lines, are damaged each year during excavation leading to outages, lost productivity, and delayed construction schedules.

Ideally, we would be more precise with damage estimates, but there is no nationwide standard requiring mandatory incident reporting. In fact, there is very little reliable data available surrounding the Damage Prevention process. And, therein lies the problem. Without accurate information it's difficult to determine the primary drivers of these incidents. There are numerous steps operators, excavators, locators, and one-call centers can take to improve excavation safety in real-time, and eventually improve the entire Damage Prevention process, reducing incident rates, improving on-time performance, and increasing economic efficiency.

Real-time improvements should focus on adopting enhanced communications techniques and technologies throughout the excavation process. Longer-term improvements require comprehensive data collection and sharing practices to help identify safety trends, improve individual company performance, and enhance enforcement efforts. The Common Ground Alliance (CGA) has built a strong foundation on both fronts over the years. Specifically, CGA updates and publishes a set of "Best Practices" annually, and collects annual incident and near miss data on an ongoing basis, which is aggregated and analyzed in an annual Damage Information Reporting Tool (DIRT) report.

Rather than try to reinvent the wheel, the Alliance for Innovation and Infrastructure (Aii) sought to build upon and strengthen CGA's efforts through a set of very specific recommendations. This report identifies improvements that can be made to CGA's Best Practices manual, including data submission practices, and describes the reasoning behind, and purpose of, each recommendation. In their entirety, our recommendations are focused on:

- Strengthening accountability for owner/operators and or locators to identify the location of all facilities beneath the worksite no later than the deadline provided by state law or regulation. We do this by:
    - Creating a new requirement that contractor specific on-time locate data be submitted as part of the DIRT process; and

- Specifying that owner/operators bare liability for incidents that occurred as a result of failure to mark a worksite on time.

- Ensuring each locator notifies the one-call center immediately after a site is marked, or the point at which the locator determines there are no facilities beneath the site. Specifically, we update the definition of "positive response" to require an actual response by clarifying that marking the worksite itself does not constitute a "positive response."

- Adding a "push" notification requirement to positive response systems to ensure an entity that creates a ticket is notified immediately after a ticket is closed.

- Standardizing all reporting and information gathering processes. One-call centers should be the central repository for all positive response information. One-call centers should also collect data on all excavation projects from start to finish, including date the ticket is created, date the ticket is closed, whether the ticket was closed on time and name of party that performed the locate, and any incidents or near misses that occurred during the excavation. All information should be submitted no less than annually to the OCSI Data Collection Tool for inclusion in that year's DIRT Report.

Section-by-Section Analysis

Section 3-28: One Call Center Data

Change:

Practice Statement: All one call centers annually submit their ticket and transmission volumes, as well as ticket on-time performance rates, to the OCSI Data Collection Tool.

Practice Description: Ticket and transmission volumes from the One Call Systems International (OCSI) data collection tool are shared with the Damage Information Reporting Tool (DIRT) to make a correlation between one call center ticket and/or transmission volume to damages or events that have occurred. Many one call centers currently provide this data to the OCSI data collection tool. Receiving ticket and transmission volumes from all one call centers allows all stakeholders to review, on a national level, more accurate projections and to determine the cause and possible solutions for damages to subsurface installations. Similarly, making on-time ticket completion rates available through DIRT will help determine whether a site remaining unmarked at the start of excavation significantly impacts the likelihood that damages or events occur. This information will assist stakeholders and policymakers assess whether delayed ticket response is a leading cause of damages or events, and if so, enhance enforcement efforts to deter future events.

Explanation:

On time performance is critical to project safety and improving economic efficiency. From a safety standpoint, failure to mark a site on time could lead an excavator to believe that the site was cleared as having no underground facilities when they show up to break ground. This in turn could lead to an incident that would have been entirely avoidable had the facility owner/operator or contracted locator performed the work on time. Economically speaking, if an excavator is able to determine the job was not completed on time, the incident can be avoided, but the project timeline is delayed, increasing project costs and potentially creating a ripple effect that can displace construction crews.

There is currently no available data set that shows how often jobs are not completed on time and whether sites not marked on time are more likely to experience an incident. This information would improve understanding of the importance of on time performance, and assist state enforcement agencies in rooting out bad actors that continually fail to meet their obligations.

4–9: Positive Response to Locate Request

Change:

Practice Statement: Owner/operators provide one call center a p~~P~~positive response for ~~is provided to~~all facility locate requests within the timeframe specified by state/provincial law. Positive response is then "pushed" out to the ticket's creator.

Practice Description: All facility locate requests result in a positive response from the facility owner/operator to the excavator by way of the one call center. Creating a statewide uniform process and point of contact for positive response removes uncertainty, improving communication among all parties. A positive response shall~~may~~ include all~~one or more~~ of the following: markings or documentation left at the job site, name and contact information of the entity performing the locate, and entry into the~~callback, fax, or~~ automated response system. The automated response system should then proactively notify the party that created the ticket the site has been marked to avoid confusion and delay. A positive response allows the excavator to know whether all facility owners/operators have marked the requested area prior to the beginning of the excavation.

Explanation:

Many states do not currently have a serious positive response program in place. If marking a site constitutes a positive response, an excavator has no way of knowing whether an unmarked site is clear, or whether the locator did not perform the locate within the requisite statutory or regulatory timeframe. Such a practice can create unnecessary confusion. Additionally, even when a locate is performed on time and a positive response is entered in the system, many systems require the excavator to look each ticket up on an individualized basis.

Improving communication will go a long way towards improving safety. This recommendation would streamline the communication process by requiring an affirmative positive response under any and all circumstance and ensure that response is immediately relayed to the excavator. These efficiencies will protect against the risk of breaking ground on an unmarked site, and accelerate project timelines.

4–15: Documentation of Work Performed

Change:

Practice Statement: Documentation of work performed on a locate is maintained, including entity performing the locate, the specific time the locate

request was initiated, time by which the locate must be completed under law or regulation, and time the locate was actually completed.

Practice Description: A facility locator always documents what work was completed on a locate request. This assists in the locate process by requiring a locator to review what was located and then to verify that all facilities within the requested area were marked. Careful documentation helps ensure that there is an accurate record of the work performed by the locator and helps eliminate confusion over what work was requested by the excavator. Making clear note of who performed the locate and when facilitates quality control efforts prior to excavation and improves safety of future projects by ensuring all contract locators maintain satisfactory on-time performance rates.

Explanation:

Unless made more comprehensive, documentation of work performed on a locate is unhelpful for improving future safety outcomes. This recommendation ensures that locate documentation includes information on when the request was made, the "due date" to perform the locate based on state law or regulation, and the name of the party responsible for performing the locate. This information will inform regulators and enforcement agencies how regularly the law is or is not be followed and which parties are consistently in compliance or out of compliance with state law.

Transparency and enforcement will lead to better on time performance outcomes, which drive safety and efficiency.

4–18: Quality Assurance

Change:

Practice Statement: Underground facility owners/operators have a quality assurance program in place for monitoring the locating and marking of facilities.

Practice Description: The process of conducting audits for locates is a critical component to the protection of underground facilities. The recommended components listed below are assembled from multiple sources and are meant to provide general guidelines for auditing the work of locators.

Components:

A: Conduct field audits and choose some locations to be audited/surveyed purely at random.

B: Check accuracy to within, governed, contractual, and minimum tolerance levels.

C: Measure timeliness, as defined by regulation/statute.

D: Check completion of a request with specific focus on whether locate was completed within the legally required timeframe.

E: Check evidence of accurate and proper communication, including a notification to the ticket's creator when the site is marked for underground facilities.

F: Check that proper documentation exists.

G: Check than an audit/survey is documented.

H: Communicate results to applicable personnel.

I: Trace audits for trend analysis.

J: Verify proper hook-up and grounding procedures where applicable.

K: Verify the reference material used to document that the locate was up to date (electronic plans or paper plans).

L: Verify that appropriate safety equipment and procedures were used by the locator.

M: Verify that tools and equipment are in proper working order and properly calibrated.

Explanation:

This recommendation creates conformity with several other recommended updates throughout the Best Practices manual. Specifically, this update focuses on ensuring regular on time compliance with locating and marking requirements, and ensuring a "push" notification is sent to a ticket's creator after a site is marked or cleared.

5–8: Positive Response

Change:

Practice Statement: The underground facility owner/operator either 1) identifies for the excavator the facility's tolerance zone at the work site by marking, flagging, or other acceptable methods and notifying the excavator by way of the one call center immediately after completion; or 2) notifies the excavator by way of the one call center that no conflict situation exists. This takes place after the one call center notifies the underground facility owner/operator of the planned excavation and within the time specified by state/provincial law.

Practice Description: If a facility owner/operator determines that the excavation or demolition is not near any of its existing underground facilities, it notifies the excavator through the one call center that no conflict exists and that the excavation or demolition area is "clear." This notification by the facility owner/operator to the excavator must be made through the one call center's automated response system for the purpose of record keeping, but may also be provided in any additional reasonable manner including, but not limited to face-to-face communications;

phone or phone message, facsimile or other electronic means; posting at the excavation or demolition area; or marking the excavation or demolition area. If an excavator has knowledge of the existence of an underground facility and has received an "all clear," a prudent excavator will attempt to communicate that a conflict does indeed exist, and the locator will make marking these facilities a priority before excavation begins. Better communication between the excavator and the facility owner/operator is required as an area of excavation becomes more crowded with new underground facilities.

"Positive response" is a term used to describe the two types of action taken by a facility owner/operator after it receives notification of intent to excavate. The facility owner/operator must 1) identifies for the excavator the facility's tolerance zone at the work site by marking, flagging, or other acceptable methods and notifying the excavator by way of the one call center immediately after completion; or 2) notifies the excavator by way of the one call center that no conflict situation exists.~~1) mark its underground facilities with stakes, paint, or flags; or 2) notify the excavator that the facility owner/operator has no underground facilities in the area of excavation~~. This process allows the excavator to begin work in a timely manner.

When the excavator makes the request to the one call center, the excavator is told which facility owners/operators will be notified. The excavator logs these facilities on a job sheet and identifies which facility owner/operators have responded by notifying the one call center's automated response center that the owner/operator or a contracted locate firm has marked~~ing~~ or~~and which have~~ cleared the area. When a facility owner/operator does not respond to the automated response center with the specific time allowed by state/provincial law~~by marking or clearing~~, it may indicate that the facility owner/operator did not receive a locate notice or that the one call center's contact information for that facility owner/operator may be incorrect, incomplete, or corrupt (which could result in calamity).

When the excavator has obtained all required information, the excavation can commence with confidence that the safety of the work crew and the public at large has been considered.

Explanation:

Communication between all parties is the most effective way to improve work-site safety in real time. Positive response is the most direct and immediate communication tool available for an owner/operator to communicate to an excavator that a site is fully prepared for excavation. For positive response to work as intended all parties need to use a central clearinghouse for project status information updates.

This recommendation ensures that there is a single comprehensive definition of what affirmative actions constitute a positive response, and identifies the one-call center as the central clearinghouse for project status updates. As with other recommendations, this Best Practice ensures the positive response is submitted on or prior to the state's statutory or regulatory deadline.

5–9: Facility Owner/Operator Failure to Respond

Change:

Practice Statement: If the facility owner/operator is unable to mark all applicable underground facilities with the time specified by state/provincial requirements, the owner/operator must notify the excavator that the underground facility cannot be marked within the time frame and find a mutually agreeable date for completion. If the facility owner/operator fails to respond to the excavator's timely request for a locate (e.g., within the time specified by state/provincial requirements) or if the excavator and owner operator are unable to reach an agreement, the one call center shall refer the owner/operator to the state/provincial enforcement body for failure to perform under applicable law. ~~facility owner/operator notifies the excavator that the underground facility cannot be marked within the time frame and a mutually agreeable date for marking cannot be arrived at, then the excavator re-calls the one call center.~~ However, this does not preclude the excavator from continuing work on the project. The excavator may proceed with excavation at the end of two working days, unless otherwise specified in state/provincial law, provided the excavator exercises due care in all endeavors. Under these circumstances, the owner/operator should be made responsible for any potential damages resulting from the failure to mark underground facilities they are responsible either through ownership or an operating agreement.

Practice Description: The facility owner/ operator and the excavator partner together to ensure that facilities are marked in an acceptable time frame to allow for underground facility protection. The owner operator should bare responsibility for completing this process in accordance with state/provincial law or finding a mutually agreeable date by which to perform these duties.

Explanation:

There are unpredictable circumstances under which it can be impossible to perform a locate within the required statutory or regulatory timeframe. This recommendation puts the onus on the owner/operator to notify an excavator when such a circumstance occurs and make their best efforts to reschedule for a mutually agreeable time. Further, it ensures that if an agreement cannot be reached, the relevant enforcement body is notified of a failure to perform. The enforcement body may excuse a well-justified failure, but these reports ensure records are kept and habitual bad actors are identified.

Further, there is currently no economic risk to an owner/operator for not performing. Basically, the project gets delayed, or the excavator carries forward, but is exposed to significant liability. This recommendation ensures that the owner/operator that fails to perform under state law and regulation bares all the economic risk of potential incidents. The economic motive will likely compel owner/operators to take their responsibility to perform on time more seriously, and reduce the risk of a potential incident as a result.

5–11: Documentation of Marks

Change:

Practice Statement: An excavator uses dated pictures, videos, and~~or~~ sketches with distance from markings to fixed objects recorded, to document the actual placement of markings.

Practice Description: In most situations when underground facilities are not properly marked, excavators have no way of knowing where underground utilities are located. If locate markings are adequately documented through the use of photographs, video tape, and~~or~~ sketches before excavation work begins, it is easier to resolve disputes if an underground facility is damaged as a result of improper marking, failure to mark, or markings that have been moved, removed, or covered. It is important for excavators and locators to document the location of markings before excavation work begins. The primary purpose of this best practice is to avoid unnecessary litigation and expensive legal fees for all parties involved.

Explanation:

The more information available on a worksite, the safer the worksite will be. This recommendation requires the locator to share as much visually descriptive information as possible with the excavator to ensure the location of underground facilities is well understood. There are numerous off the shelf technologies that allow a locator to generate and share this information easily and seamlessly.

7–1: Public and Enforcement Education

Change:

A: Public Education

Practice Statement: Public education programs are used to promote compliance.

Practice Description: A single entity is charged to promote comprehensive and appropriate programs to educate all stakeholders about the existence and content of

the damage prevention laws and regulations. This is not meant to discourage individual stakeholders from providing educational programs.

B: Enforcement Education

Practice Statement: Mandatory education is considered as ~~an alternative or~~ a supplement to penalties for offenders of the damage prevention laws and regulations.

Practice Description: When a violation of the damage prevention laws or regulations has occurred, consistent enforcement and civil penalties are the most effective way to improve future compliance. Additionally, mandatory education is an effective ~~alternative or~~ supplement to civil penalties. Mandatory education as an enforcement tool promotes compliance with damage prevention laws and regulations.

Explanation:

Consistent enforcement efforts serve as a strong motivator for compliance under any legal or regulatory regime. Education is a worthwhile supplement to enforcement to ensure the non-compliant party understands both the consequences of non-compliance and best practices for compliance moving forward. However, education alone is not sufficient to deter future non-compliance.

7–3: Penalties

Change:

Practice Statement: Compliance programs include clear penalties and consistent enforcement for violations of the damage prevention laws or regulations.

Practice Description: Within the context of one call statutes, there exists specific provisions for penalties for failure to comply with the damage prevention laws and regulations. ~~Performance and penalty incentives are equitably administered among stakeholders subject to one call provisions.~~Setting regulated parties expectations about the penalties that will be assessed and demonstrating consistent enforcement are the most effective deterrent to future violations.

A ***penalty system*** includes education as a~~n alternative or~~ supplement to civil or other penalties.

Explanation:

The most effective deterrent to non-compliance is consistent enforcement and increasingly stiff violations for continued non-compliance. In many circumstances, non-compliance may be more cost-beneficial than investing in safety equipment or

procedural enhancements to ensure compliance with the laws on the books. This is especially true if the offending party won't be held civilly liable for any damages resulting from their non-compliance.

Ensuring that regulated parties understand the penalties for non-compliance, and ensuring non-compliance is always more costly than compliance will help regulated parties understand that continued compliance and best safety practices and equipment is always cost-beneficial.

9–2: Standardized Information Is Reported by All Stakeholders

Change:

Practice Statement: The requested data is standardized and consists of essential information that can be analyzed to determine what events could, or did, lead to a damaged facility. This means that collected data includes damage information, downtime, ~~and~~ near misses, and tickets not closed out under time requirements specified by state/provincial law. All stakeholders submit the same damage, near miss, and downtime data via simple answers and check boxes. (Refer to Appendix C for example form)

Explanation:

This recommendation is for conformity. Specifically, this will ensure that among the standardized data reported is an accounting of all tickets that were not closed out within the requisite statutory or regulatory timeframe.

9–3: Identify the Noncompliant Stakeholder

Change:

Practice Statement: It is important to identify the noncompliant stakeholder (facility owner/operator, excavator, locator, or one call notification center) so that this group can be targeted with education and training. ~~It may not be necessary to pinpoint the names and addresses of the offenders for the purpose of improving the damage prevention program.~~

Explanation:

Including the names and addresses of the offending parties will ensure regulators and enforcement agencies can use all available tools to improve performance among habitual offenders. These targeted efforts will necessarily have a disproportionate impact on overall safety.

9–17: Data Is Used to Promote Underground Damage Awareness

Change:

Practice Statement: The reported data is ~~not used to penalize or punish; rather, it is~~ used to promote underground damage awareness through recommended training and education. However, this data should also be made available to state/provincial enforcement authorities to ensure damage prevention laws are enforced consistently and equitably.

Explanation:

The data collected and reported will not sufficiently meet its safety objective if its not made available to those responsible for enforcing the law. Not every violation need be subjected to harsh punishment, as long as enforcement efforts are consistent. However, it is critical that the regulators and enforcement officials charged with overseeing Damage Prevention programs know where to focus their efforts and have the opportunity to target repeat offenders.

The prospect of being targeted for enforcement may deter parties from voluntarily submitting information about incidents, near misses, and non-timely ticket closures. This is precisely why each state should implement a mandatory reporting requirement.