California Underground Facilities Safe Excavation Board

September 9, 2024

Agenda Item No. 10 Information Item – Staff Report

Potholing Survey Work and Standards Update

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SUMMARY

At the Potholing Committee's August 2023 Standards Workshop, stakeholders identified factors that affected the distance between potholes for parallel excavation, the possibility of specifying a minimum frequency for potholing, and their needs or concerns regarding depth information. Subsequently, Board staff reached out to stakeholders and invited them to take two surveys with questions about these specific factors, needs, and concerns. Staff also conducted follow-up interviews with 12 survey participants to discuss their responses and a potential minimum frequency for potholing. Based on analysis of survey results and follow-up interviews, staff revised several potholing related standards in the Board's Draft Safe Excavation Standards (See Attachment 2). Staff recommends the Potholing and Planning and Design Committee and staff continue gathering information, potentially through a future workshop, on a minimum frequency for potholing and operators providing depth information to excavators.

STRATEGIC PLAN

2020 Strategic Plan Objective: Improve Excavation and Location Practice Safety

2023 Strategic Activity: Develop Standards to Assist Excavators in Identifying Locations to Pothole

BACKGROUND

The Board and its stakeholders frequently discuss potholing and the safety implications of facility exposure before construction. Some guidelines on where and how frequently to pothole exist in the Board's Draft Safe Excavation Standards. Board staff regularly solicit

feedback from stakeholders to revise these standards by holding public workshops and conducting surveys.

Government Code Requirements and Board Regulations

Government Code section 4216 and Board regulations, found in Title 19 of the California Code of Regulations (CCR), contain provisions for determining the precise location of an underground facility during an excavation project. For instance, excavators must determine the exact location of facilities with hand tools[1] or in some cases with a vacuum device[2], excavators and operators must hold on-site meetings in the vicinity of high-priority facilities to determine how to verify the location of the facility[3], and an excavator must request additional information on the location of a facility if they cannot determine its location with hand tools[4]. Excavators, if they cannot safely expose a facility with hand tools or allowed power tools, may request consultation with an operator, who must respond so that they may come to agreement on the use of different tools.[5]

California Government Code section 4216.18[6] requires the Underground Safety Board to develop safety standards for excavation around subsurface installations. The purpose of developing safety standards is to provide utility operators, locators, project designers, prime contractors, and excavators with a better understanding of their safety tasks and responsibilities before and during an excavation project. It is important to note that while these standards describe best practices, they need not duplicate existing relevant standards, including those put forth by the Common Ground Alliance[7]. In addition, the Board's standards should be informed by publicly available data whenever possible.

Draft Standards for Potholing: August 2023 Potholing Committee Workshop

In August 2023, the Board's Potholing Committee held a two-day workshop[8] to discuss best practices relating to potholing. During the workshop, stakeholders had a chance to discuss and to comment on the Board's current Draft Standards for Potholing. Stakeholders mentioned the need for more potholes over parallel excavations. The Board also received comments about a possible minimum interval between potholes. Later, the Board heard from excavators that facility depth information in hand is useful during an excavation project, and that operators are hesitant to disclose it for a variety of reasons.

DISCUSSION

Excavators that safely expose buried facilities ahead of construction will likely avoid costly dig-

[1] Gov. Code section 4216.4(a)(1)
[2] Gov. Code section 4216.4(a)(2)(A)
[3] Gov. Code section 4216.2(c)
[4] Gov. Code section 4126.4(b)
[5] 19 CCR section 4501(c)
[6] Gov. Code section 4216.18
[7] Common Ground Alliance. (2024). Best Practices Guide Version 20.0. Home (commongroundalliance.com)
[8] August 7 and August 11, 2023, Potholing Committee Workshop

ins and fatal incidents more often than those that rely solely on locate marks. Excavators partially expose, or pothole, facilities deemed "in conflict" and those that *might present conflict* with the excavation. The potholes must reveal each facility's exact horizontal and vertical extents at each location to help construction crews avoid damaging the facility during installation.

"Parallel Frequency" and the Risks and Rewards of Providing Depth Information

Stakeholders at the August 2023 Potholing Committee Workshop discussed excavation factors relevant to an adequate potholing plan, particularly for parallel excavations. When the discussion turned to "frequency," or the minimum distance between potholes, participants listed the following factors as having an effect:

- horizontal and vertical clearances from planned excavation to existing buried facilities
- the facility material, whether plastic, steel, encased, etc.
- the facility condition, including install vintage (year of install), if line slack exists, etc.
- whether the facility changes direction horizontally or vertically
- the extent of subsurface disturbance planned (surface grinding or grading vs. deeper)
- site and soil condition, such as presence of large rocks and boulders which might indicate frequent offsets and/or loss of ground cover from erosion or shifting soils.

The discussion later centered on which of these factors should receive a callout in standards. One participant noted the guidance would be too long if it defined each factor's effects in detail. However, multiple stakeholders voiced interest in a minimum frequency *of some kind* defined in the standards. The Board seemed receptive to this idea. Stakeholders also mentioned standard operating procedures (SOPs) from various organizations for potholing frequency which might provide the Board with more specifics.[9] After studying workshop participation, Board staff wanted additional clarification from stakeholders on what affects potholing frequency for them—especially on projects with long stretches of parallel excavation.

Workshop participants also discussed possible standards for guidance on the disclosure of depth information. Excavators suggested that depth readings were necessary information. They felt the more details about a facility they had before excavation, including depth, the more efficiently and safely they could expose it. They also expressed the need for more clarification on how exactly a provided depth impacts an excavator's approach to potholing and how this might impact standards guidance. Operators emphasized that facility depth information often feels hazardous to provide. They were concerned that depth may give the excavator the false confidence to excavate without potholing, that the depth information itself is often unreliable, and that site or soil conditions may have changed the depth of cover in the excavation area since the measurement was taken. Consequently, the operator might trust depth information in the hands of some excavators, but not others. It was not clear how

[9] August 7, 2023, Virtual Public Workshop of Safety Standards: Potholing – Day 1

operators determined this. A survey of operators who may provide depth to excavators might clarify what affects this decision the most.

Examples of Pothole Frequency for Parallel Excavation from Other States

Ohio Statutes for Trenchless Excavation

Ohio requires that excavators using trenchless excavation methods expose all parallel underground facilities in a nondestructive manner at the beginning and end of each trenchless excavation to the depth of the new facility.[10] If the new facility is in the tolerance zone—in this case, 18 inches to either side[11]—of any parallel underground facility, the existing facility must be exposed every 100 feet.

Virginia Regulations for Trenchless Excavation

For parallel type bores, Virginia requires excavators to expose a utility line by hand digging[12] at "reasonable distances" along the bore path.[13]

Existing Standard: California Department of Transportation

The California Department of Transportation's Project Development Procedures Manual[14] includes standards for potholing subsurface facilities for public road and highway projects. The locations of potholes need to be at sufficient intervals to reveal the utility location and alignment with a minimum of 2 locations. On projects with a high-priority line, spacing must not exceed 100 feet for longitudinal utilities and utility crossings with few exceptions.

Survey: Distance Between Potholes

Staff developed a survey to ask stakeholders whether each of the factors identified during the workshop affected the distance between their potholes, and if so, how. The survey listed eight different factors and participants could either choose "It Doesn't" or "It Does" [affect the distance between potholes] followed by an explanation, if applicable. The last two questions asked if their organization had SOPs for potholing based on any of these factors, and for which factors they had them.

Distance Survey Response

The survey ran for 15 days and received 91 responses. Excavators and operators accounted for roughly 80% of total participation, while designers, engineers, and consultants the other 20%. At the end of the survey, participants chose whether to leave their contact information for follow up. Staff conducted follow up interviews with 12 respondents that indicated their organization had SOPs for potholing, left contact information, responded to an email requesting follow up, and agreed to be interviewed.

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[10] Ohio Rev. Code section 3781.30

[11] Ohio Rev. Code section 3781.25(E)

[12] Code of Virginia section 56-265.15.

[13] Virginia Admin. Code section 20VAC5-309-150(A)(6)

[14] Caltrans Project Development Procedures Manual Chapter 17 Encroachments and Utilities, pp.33-36

Key Factors for Parallel Frequency

Chart 1 below shows the number of participants (out of 91) that responded "It Does" [affect the distance between potholes] when presented with each factor from the workshop. Direct quotes from survey participants about "how" each factor affected distance are included where appropriate.

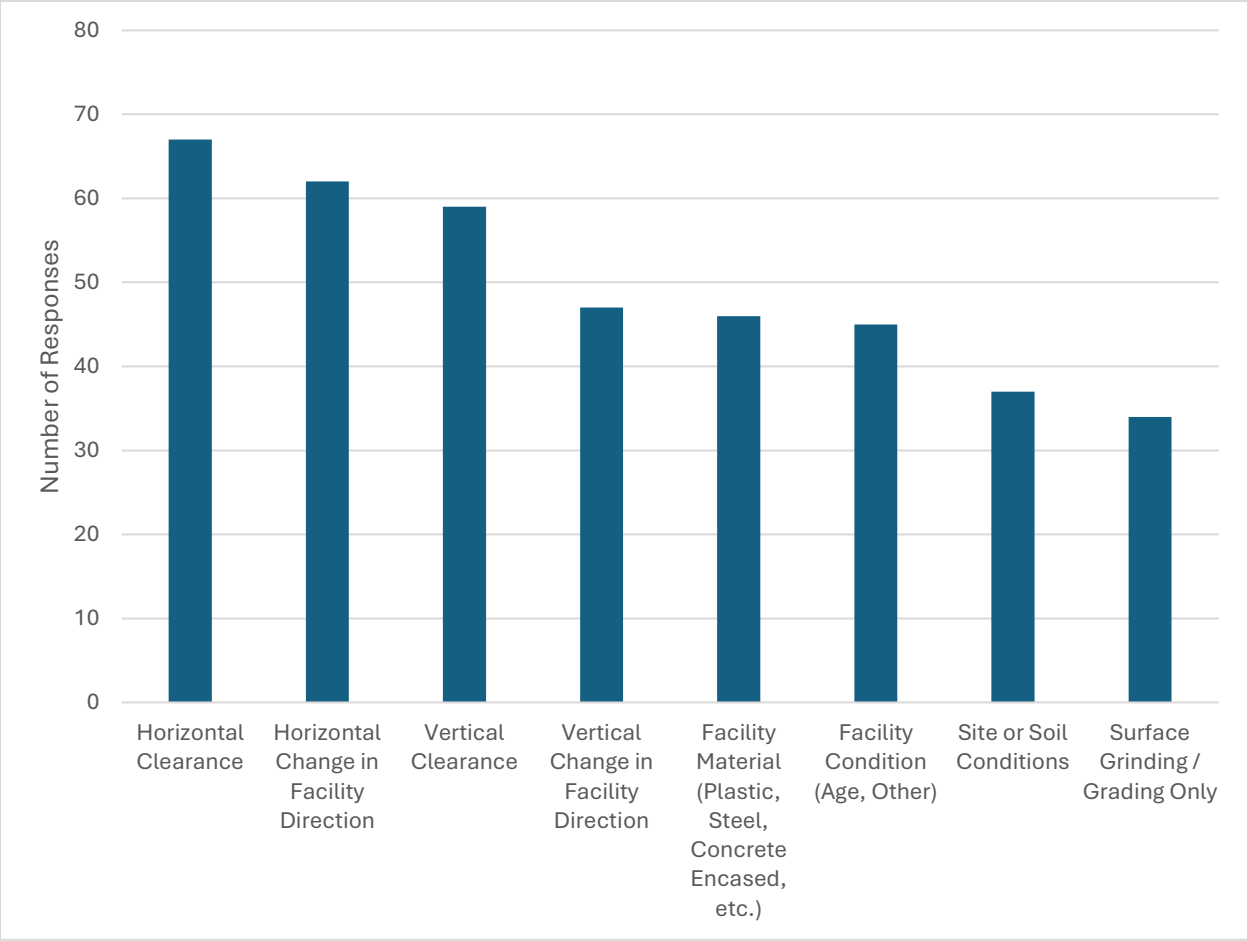

Chart 1: Distance Survey - Factors That Affect the Distance Between Potholes for Parallel Excavation

Separations; Horizontal and Vertical Clearances

Excavators pothole existing facilities in part to maintain minimum legal separations between existing lines and new construction. The lengths of these "minimum" separations vary by utility type, and excavators determine the exact path of any facilities that may threaten their required separations.

> *"Maintaining proper separation with existing utilities during excavation and boring operations is mandatory, to insure the safety and integrity of existing infrastructure."*

> *"Most of my work is in utilities. I need to ensure safe separations which conform to the specific utility(s) codes while not inundating the given work area by over spacing the new*

install."

Seventy four percent of survey respondents cited horizontal clearance as the top factor affecting distance between their potholes. Generally, the closer a planned excavation is to existing facilities, the more potholes are necessary to rule out conflicts.

> *"The closer the planned bore to an existing facility will usually have more spot check potholes. It also depends on how the existing facility was installed (sand trench, bored in, sawcut thru the pavement)"*

> *"If it is closer or in conflict with my proposed excavation I may pothole more to ensure it doesn't conflict or if it moves into or out of conflict"*

Vertical clearance was the third most cited factor, at 65%. While some participants listed the effect as, "same as horizontal clearance," others listed specific depth concerns.

> *"Vertical Clearance is always a need to know, even if you not excavating over the top of the utility. There is a very strong possibility that we are going over it with an extremely heavy load. The depth clearance will tell the utility owner if the amount of cover will permit us to safely travel over it with machines. Vertical clearance we would be a bit looser and say 100 LF."*

> *"Will I be able to safely parallel or intersect? Will I have to go over/under if so will I need to move back to make room for invert situation? These are the thoughts I have personally that I will base consistency of potholes."*

Most survey participants mentioned regular potholing to determine depth of cover in their responses. Staff considers—and excavators appear to consider-—vertical clearance to be just as important as horizontal clearance in terms of reasonable care. However, unlike horizontal clearance, vertical clearance may be difficult to estimate based on locate marks alone. This may explain why it did not score higher as a cited factor.

Changes in Direction

The second most identified factor was a horizontal change in facility direction, at 68%. Changes in direction may simply be the start of a new path, but they may hide other anomalies, too. They can also indicate an interface, like a utility appurtenance, a change in the facility's diameter, or even an abandoned, unmapped, or unlocatable stub. While a locator will mark the horizontal path of the facility, differences in depth at these areas are likely to occur as well. Excavators track these deviations and depth changes through additional potholes made over the change in direction.

> *"This can have a big impact on the direction we may need to bore as well as the depths."*

> *"Every horizontal change is a definite thing that we would be looking for Always!"*

> *"If we find an inconsistency in the path, we will open more holes"*

"Have to find bends and angles- also take into account thrust blocks poured at fittings that protrude well past locatable piping in water."

Facility Materials, Age, Vintage, and Condition

Survey participants chose other factors related to potholing frequency that pertained to the facility itself, including material and age, roughly 50% of the time. Some facilities are difficult to trace with electromagnetic (EM) locating methods and no alternative exists to locate them other than potholing. Other facilities may deviate from a straight path unpredictably due to their material composition or installation method. In either case, potholes can provide exact positioning for these lines.

"Where it is easier to trace reliably dictates less potholes"

"materials like steel, concrete encased and most ridge PVC lay pretty flat. There for less potholes are needed. Soft and coiled copper, Fiber cables, pvc gas tubing are not as predictable and it should not be assumed they are flat. Therefore, more checking, more potholes."

Many participants reported that a facility's age affected the distance between potholes. Depending on the project, age alone can be a reason to space potholes closer or further apart. Age might also dictate that the potholing crew work slower to avoid damaging the facility.

"Age makes us nervous due to a bunch of factors. We would suggest a tight distance between potholes just to get a visual for us and the utility owner both."

"If it's old, the slightest touch could damage or break something"

"Caution is required on older utilities for deterioration and weak product while potholing."

During a follow up interview, an operator noted that the vintage (age) of the installation may have an effect on pothole spacing. For instance, tee fittings from some vintages tend to protrude beyond the marked path more than others, and segments from these vintages may require potholes near to and directly over such features.

Site and Soil Conditions

Forty one percent of survey participants chose site and soil conditions as potholing frequency factors, but generally did not say how those factors affected distance between potholes. Some responses show that excavators investigate soil conditions along with utility positions during potholing. They pointed to the safety implications of soil quality in the excavation area:

"Unstable soil or subgrade conditions may allow heavy equipment to sink down into the unstable subgrade and hit the facility. Excavator needs to be aware of this possibility"

"Disturbance of soil around older pipes may cause a shift creating a leak or possible break down."

"Very important. You can undermine a line."

Excavators might choose to increase or decrease distance between potholes based on what comes up—literally. For boring work, potholes reveal the condition of the subgrade or backfill in the area and directly surrounding each utility, which is vital information when steering the drill:

"This greatly affects our ability to correct (in hard soils with rocks, debris, etc.) our bore machine as well as dictates what type of set up we may use."

"If a utility was bored in through hard pan, this makes potholing aggravating because those who are potholing rely on previously excavated material and so potholing a bored in line throws them off if they think the utility was trenched in."

Some projects also benefit from sampling the subgrade for other reasons:

"Soil conditions vary from area to area and can even vary across a single site or parcel. This could mean additional over excavation and infill, or it could mean you need to change your proposed location for subgrade improvements."

"Site soils are very important to us, the Geotechnical report that we get is a huge part of our work. It is a tool that we use for slope steepness when we cut next to a utility. If we are digging next to utility that has sand as backfill, we need to be 2 times the depth we are digging vertically away from existing utility horizontally. SAND would make us want at min 50-foot intervals on potholes."

Surface Grinding or Grading Only

Thirty seven percent of survey participants chose surface grinding or grading factors as relevant to frequency. Depth of cover is particularly important in these situations. When utilities lay within or just below the pavement layer, such as some traffic signal loops, or shallow electric or communications conduits, excavators must check these depths with potholes more frequently.

"Pothole to confirm that required cover is maintained."

"If I am only surface grinding it may reduce the # of potholes to just enough to be comfortable that the utility low enough."

"Only when there is evidence that the facility is embedded in the hardscape or just below the surface based on field depth measurements"

"It shouldn't, unless the operator has identified shallow or embedded facilities. This, of course, is only if the excavation is pavement grinding. If it is grading, the scope of work can vary drastically. Grading can be very minimal leveling of just a couple of inches, or cutting deep (multiple feet) to install an access road. Depending on the scope of work, the potholing methods and distances may be very different."

Grading activity may require extensive potholing, depending on the proposed depth of cut. Judging from survey responses, grading activity seems to receive the same potholing approach as vertical clearance.

> *"When grading requires removing a substantial amount of material we like potholes every 50' to make sure there is a sufficient amount of cover remaining over pipe."*

> *"Any soil disturbance has the potential for utility conflict."*

Survey: Using and Providing Depth Information

Board staff developed a two-part survey targeted at excavation contractors and operators that either use or provide depth information about buried facilities. This survey divided participants into two groups: those that use depth information provided by operators, and those that provide depth information to excavators.[15]

Depth Survey Response

The survey received 35 responses, of which approximately 31% were excavation contractors, 31% were facility operators, 14% were designers or engineers, and 24% were "Other"—including one inspector, several consultants, and a responder/dispatcher. At the end of the survey, participants chose whether to leave their contact information for follow up. Staff conducted follow-up interviews with 2 participants that left contact information, responded to an email request for follow up, and agreed to be interviewed. Follow-up interviews to the Distance Between Potholes survey also yielded information for this section, given that some of those interviewees used or provided depth information.

Depth Survey Part 1: Excavator Needs

The first part of the survey asked how depth information impacts an excavator's approach to potholing. Seventeen of 35 participants said they use depth information from operators. Of these, there were eight operators, one private locator, and two consultants.

Tools Brought to the Job Site

Forty seven percent of survey participants reported that tools for exposure changed according to depth information. Staff expected to receive feedback about which tools an excavator deems essential for exposing facilities at different depths. However, initial responses did not indicate a relationship between facilities at specific depths and their appropriate exposure tools—only that they differed *somehow*.

> *"[It affects] What equipment I need to use to expose the facility"*

> *"Depth can determine not only the tool selection but the equipment or excavation technique."*

Depth information from an operator may drive an excavator to bring EM locating tools of their

[15] Survey questions in Attachment 1

own to a job site. For instance, one survey response simply said, *"ground penetrating radar."* During a follow up with a different participant, staff heard that his company uses ground penetrating radar (GPR) when an area is "really congested" [with utilities]. At other times, a sufficiently deep facility rules GPR out—or perhaps would require a more capable unit. Follow up interviewees also mentioned using traditional pipe and cable locators (wands) to essentially "fill in the blanks" if they cannot find a facility using the marks provided during the 811-ticket response.

For exposing utilities in conflict with the proposed excavation, tool choices typically include hand tools, approved exceptions to hand tools (per 19 CCR 4501),[16] and vacuum excavation equipment. During a follow-up interview, one operator mentioned that he rarely sees potholing performed with hand tools anymore. On the other hand, those performing single point excavations, such as sign post installations, may pothole with hand tools exclusively. Several survey responses reported potholing with shovels occasionally, such as when working around multiple stacked facilities. However, these and other hand tools likely come with the excavator to every job site—depth information beforehand or not.

No responses to this survey nor follow-up interviews mentioned using tools other than hand tools and vacuum devices for potholing such as any of the pneumatic, electric, or hydraulically powered tools described in 19 CCR 4501[17].

Staff suspected that differences in capability between vacuum excavation equipment types might be a reason that excavators wanted depth information ahead of potholing. Participants were asked about the differences between vacuum excavation equipment types during follow up interviews. They reported that potholing crews use vac trailers and vac trucks, and that trailer mounted equipment may not reach to the same depths as truck mounted equipment. However, they also noted that the capabilities of each type are variable depending on the specific setup. One interviewee mentioned that trailer mounted units likely have a 6-foot to 12-foot excavation depth capability. Another mentioned that pressure wand and vacuum hose extensions are available to reach deeper than this if necessary.

The size of vacuum excavation equipment necessary for deeper test holes may or may not be a limitation on some job sites. Units capable of potholing the deepest must have enough suction that subsoils, rocks, and backfill do not become a challenge to remove as the hole gets deeper. Visiting several vacuum equipment manufacturer's websites,[18] staff found that vacuum excavation systems receive suction ratings in terms of inches of mercury, with vacuum hose size, blower air flow cfm (cubic ft/min), and engine size impacting overall suction ratings.

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[16] 19 CCR section 4501

[17] 19 CCR section 4501(b)(1)(A)

[18] Vac-Tron. (2024). *Making sense of Vacuum Excavator Specs - Vac-Tron Equipment is Now Vermeer MV Solutions (vactron.com)*, *Vermeer. (2024). Vermeer Vacuum Excavators - HDD and Fluid Management Equipment*, *Truvac. (2024). Hydro Excavation Trucks | TRUVAC Hydrovac Trucks*

The vacuum device engine powers the onboard water pumps and/or air compressors (for excavation). In addition, vacuum excavators must carry onboard tanks with enough capacity for the water used to excavate and to hold the spoil excavated from a project site's potholes. Each of these features adds weight and bulk. Project site attributes including limited depth of cover over fragile utilities, difficult access, or traffic control plans with little room for equipment inside the work area could impact what size of machine an excavator brings to expose facilities.

How Excavators Expose Multiple Stacked Facilities of the Same Type

Thirty-five percent of participants noted their approach to finding multiple stacked facilities changed based on depth. Several expressed the need for careful use of hand tools or vacuum excavation around stacked facilities, but it was not clear how depth information impacted their approach.

During a follow-up interview, one operator mentioned how depth information about a single leased facility within a multiple-duct structure might confuse an excavator. If, for example, an operator marks their asset within a leased duct and provides a depth to the asset, this leaves out the precise depths and paths of the other ducts within the structure. This becomes a concern if the structure's owner does not respond to a mark request for the other facilities in the structure.

When Excavators Choose to Not Pothole A Facility

Twenty-nine percent of survey participants revealed that depth information was a factor for not potholing in some cases. Of that group, only one participant suggested changing the path of excavation without a redesign plan if they know the depth of the existing facility—avoiding it, in other words. Whether this includes altering the horizontal or vertical path—or both—of the excavation, and to what extent, is unclear:

> *"When budget is tight and the design allows the contractor to go around any existing obstacles."*

The following response from a designer points to depth information as a reason to not pothole, but this may imply a redesign of the project, considering the source is a designer. Comments like this highlight the importance of acquiring and maintaining up-to-date facility records and getting those records into the hands of designers before field marking activities begin:

> *"An alternative location may be considered if a utility is present."*

Seventy-one percent of those surveyed said depth information did not affect their choice to pothole. Neither written comments nor follow up participants indicated that deeply buried facilities impacted their choice to pothole.

> *"Regardless of what information is provided we will always pothole marked facilities."*

> *"[…] As such there is not really a choice as to whether to pothole or not."*

"Currently, the requirement is you pothole "marked" utilities. usually, it may be only one mark to assume the depth for the entirety of the facility which can make trenching difficult."

Depth Survey Part 2: Operator Concerns

Eleven of 35 participants said they may provide depth information to excavators. Of these, there were eight operators, one private locator, and two consultants.

Ranking Operators' Concerns About Providing Depth Information

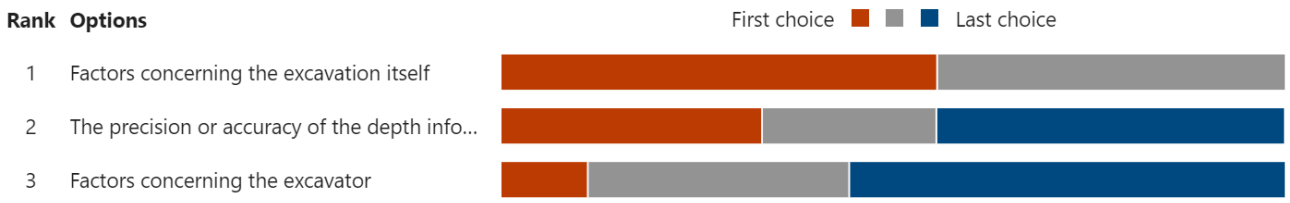

Chart 2: Depth Survey - Relative Importance of Three Factors When Providing Depth Information

Chart 2 above shows that surveyed operators placed the most importance on "excavation factors" when providing depth information (*see Chart 4 for definitions of "excavation factors"*).

The Importance of Communicating Excavation Details to Operators

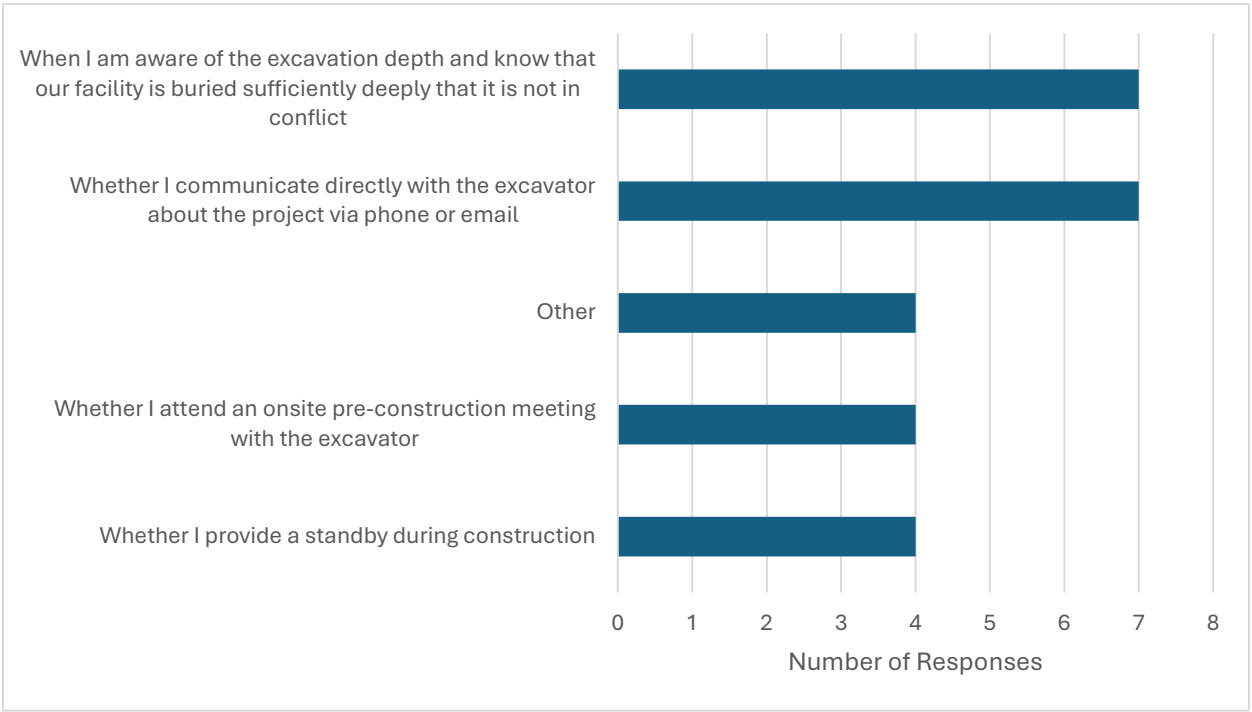

Chart 3: Depth Survey – Excavation Factors that Impact Whether to Provide Depth Information

Operators valued when excavators communicated the details of their excavations—including proposed depths. In the case of the two highest scoring responses (see Chart 3 above),

discussions take place between the two parties, but not necessarily in-person. In-person meeting obligations such as construction standbys and pre-construction meetings each received an equal number of responses. "Other" responses included two operators that always provided depth information, one that almost never provided it, and one who indicated "all of the above." This report provides several examples of excavators communicating necessary details in the section titled *Operators' Guidance to Pothole Deeper Facilities When Excavation Depth is Known*.

Concerns About the Accuracy of Records

Participants identified the precision and accuracy of maps as a top concern when providing depth. During a follow-up interview, one operator explained that they sometimes get depth information from as-builts by measuring the vertical distance between two features in the mapping software. In their case, "…a lot of the [electronic] records are very good." In a different interview, a designer/engineer described helping several water companies migrate facility records to GIS from an older mapping system. They commented that, "Mapping infrastructure accurately is the future. I probably know more about the locations of their facilities now than they do." On the other hand, a different designer relayed how an operator's inaccurate map—which portrayed the utility at a depth and horizontal position far from reality—led to a utility strike on one of their projects. Their contractors potholed the marks made by the operator 5 feet in either direction, and 5 feet down to the reported depth of the utility but did not locate it. Later construction work dug into the line more than 15 feet down and far from the operator's original marks. They were particularly concerned that the operator would choose not to update their maps with accurate depth information after the repair work on this line. They said that similar records management practices are typical for some operators.

The second most identified factor—concerns about depth collection and recording methods—is closely linked to mapping concerns. Operators and locators may reference an assortment of electronic and paper records for a given project, and what—if any—depth information that makes it to each map may not be precise or accurate. Board staff's July report on the GIS mapping statute discussed the importance of positional accuracy when collecting data bound for GIS—including the potential for future regulation of accuracy tolerances, collection methods, and tools.[19]

[19] July 8-9, 2024, Agenda Item No. 12, Clarifying the GIS Mapping Statute in Regulations

Experience and Professional Relationships with Excavators

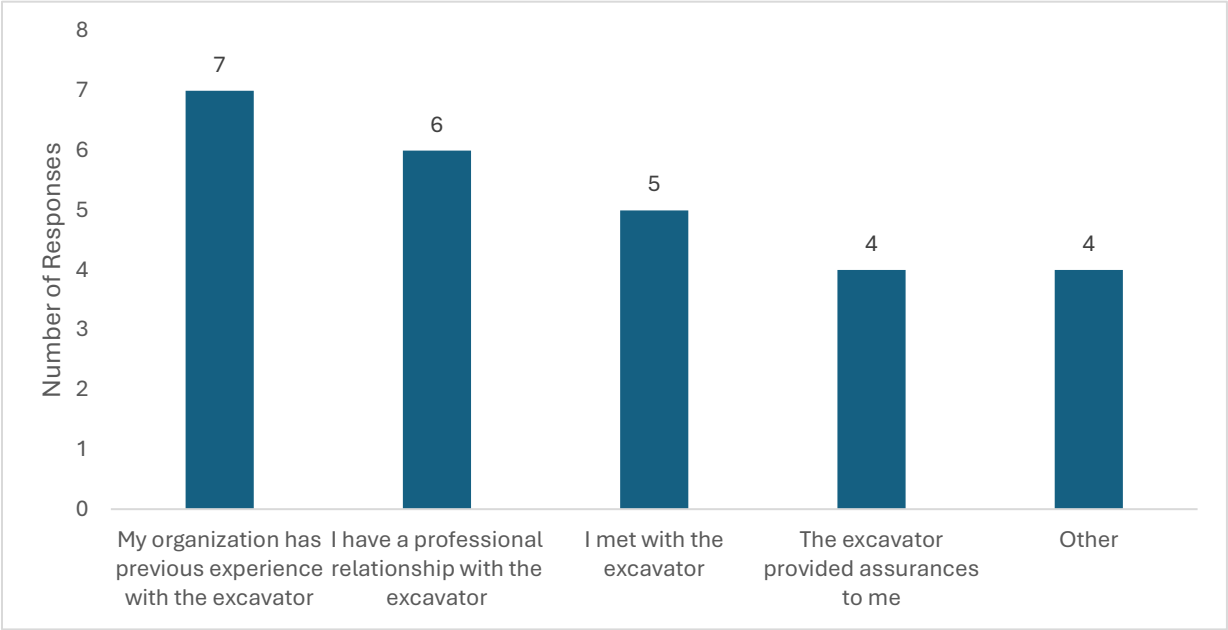

Chart 4: Depth Survey – Operators: Excavator Factors that Impact Whether to Provide Depth Information

Participants cited the importance of previous experience with an excavator—either through their organization or a direct professional relationship—most often. In a follow-up interview, one excavator explained that for them, professional relationships with locators and operators' staff paved the way for depth information. They characterized the process to get it as "always informal;" discussions about depth usually happened over the phone, since locators were, in their experience, unlikely to attend on-site 1:1 meetings. They also noted that forming these relationships with some operators and locators is more difficult, either due to high turnover or high workload volume at the locator level.

Operators may disclose depth more often to excavators under their direction. One survey question asked about this directly: participants chose how likely they were to provide depth to a crew they had hired vs. one that someone else had hired. Results indicated a preference for crews hired by the participant's organization. One operator, who rarely provided depth, explained that they:

> *"…will provide information to our own contractors doing work for us, but information provided is not guaranteed. Too many variables to provide accurate depth of structure."*

When to Provide Depth Information

Survey responses showed no clear pattern about when operators first provide depth information. Two out of three participants who chose "During Project Planning" also selected "Consultant" as their role. Staff asserts that these individuals likely perform subsurface utility engineering investigations or private locating activities on behalf of excavators and therefore

have a good reason to provide depth during planning. Neither responded to a request for follow up.

Three of 11 indicated an excavator must attempt exposure of the facility first. Staff expected more participants might choose this stage than did, considering that an excavator's request for more information per 4216.4(b)[20] might serve as a trigger for an operator to provide depth information. After consulting with legal staff, staff believed a new standard might guide operators to specifically include depth information as part of their response per 4216.4(b).

New Standard: 5.6 Operator Response to Excavator Request for Additional Information About the Location of a Subsurface Installation

If an excavator tries unsuccessfully to locate a facility, they must contact the operator to request more information which could lead to its exposure. The content of the operator's response in 4216.4(b)[21] is not specified. This new standard[22] suggests that the operator's response:

- Should be timely.
- Include depth information if it is available.

Key Themes from Surveys and Follow Up

SOPs Based on Clearance

Around 60% of participants indicated they had SOPs for clearance when potholing. Staff asked interviewees about these SOPs during follow-up interviews. Participants noted that outside of the 24 inch tolerance zone[23], and the specific requirements regarding high-priority facilities[24], some of these values were flexible, and that parties to pre-construction meetings will discuss and/or negotiate them at times. Notably, however, if the operator's representative recommended a certain frequency of exposure, exposing the facility less frequently almost always required the approval from more senior operator personnel. The decision to lower the frequency (increase the distance between potholes) usually came as a recognition of two factors:

- The existing facility's path was substantially straight and the depth predictable
- The new facility's installation method was unlikely to cause encroachment into the tolerance zone of the existing facility

Pre-Construction Meetings to Discuss Facility Exposure

- Follow-up interviewees supported holding more pre-construction meetings to discuss excavation details, methods, and exposure recommendations.

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[20] Gov. Code section 4126.4(b)
[21] Gov. Code section 4216.4(b)
[22] Text of new standard 5.6 Operator Response to Excavator Request for Additional Information About the Location of a Subsurface Installation is located in Attachment 1 at the end of this document.
[23] Gov. Code section 4216(u)
[24] Gov. Code section 4216.2(c)

- Feedback about pre-construction meetings in general included that, *at times*:
    - City inspectors will not attend the meetings unless locate marks are on the ground.
    - Excavators will not attend unless it is mandatory (e.g., a meeting for a high-priority facility).
    - Locators will not attend due to heavy workload.

Locators and Their Input on Pothole Frequency

During follow-up interviews, several survey participants mentioned that locators—in addition to providing marks—also helped excavators determine how frequently to pothole a facility. Another respondent mentioned that locators attended pre-construction meetings on behalf of the operator and were crucial sources of information about where and how often to pothole. Not surprisingly, the locator's input was especially valuable if they had direct experience installing or maintaining the specific facility in the past. One interview subject mentioned some companies often assign experienced locators to handle high-priority facilities.

It is important to note that not all participants relied on locator input—other than field markings—to the same extent. Several respondents reported that the locators they encounter either lack necessary training or do not have time to advise excavators on where to pothole. Even if highly trained and experienced, locators will not usually be on-site at the same time as excavators to provide this consultation. Notable exceptions include a prearranged meeting or if the excavator happens to be onsite when the locate and mark takes place.

On-site Meetings for High-Priority Subsurface Installations

Written responses revealed that excavators often make more potholes over high-priority facilities compared to other facilities within the same excavation area:

> *"Depending on what type of utility and how critical it is dictates spacing between potholes. A gas line or electrical conduit may be potholed every 50' to ensure marks are correct and the alignment doesn't change. we may space potholes to 100' or more if it is a storm drain line or other non-critical facility."*
>
> *"There are different requirements for critical facilities versus non-critical"*
>
> *"[We are] way more careful of direct burial, fiber optic, gas lines, or high voltage electric than a concrete storm drain"*

Per 4216.2(c),[25] an on-site meeting between the excavator and operator must take place for excavations within 10 feet of a high-priority facility, in part to discuss locating methods needed to find the facility. The outcome, based on the follow up interviews that staff conducted, is often a recommendation from the operator to pothole regularly along the length of the high-priority facility to ensure proper clearances. For example, a gas and electric utility operator said

[25] Gov. Code section 4216.2(c)

their representatives at these meetings advise excavators to pothole every 50 feet along the length of any high-priority facility within 10 feet of a proposed excavation. The operator also provides a standby during excavation in these circumstances.

Operators' Guidance to Pothole Deeper Facilities When Excavation Depth is Known

If they have reason to believe a facility lies far deeper than proposed excavation, excavators sometimes pothole a mark to a predetermined depth but stop short of locating the facility. In some cases, excavators and operators discuss this predetermined depth when meeting—either in person or over the phone. Survey responses and follow-up interviews confirmed that this practice occurs. One operator noted at the end of the Depth survey:

> *"[I'd like to add] Asking the excavator what their proposed depth is. If they're excavating to a depth of 4' and I know my utilities are double that, I only ask them to pothole to their depth and a few extra feet."*

In a follow-up interview, an operator explained how this process works in the field. The excavator seeking a facility's depth asks locators for this information. If the excavator does not know their proposed depth, the locator instructs the excavator to find the facility (by potholing) and provides no depth. If, however, the excavator knows their proposed depth, the locator asks permission from senior staff to provide the information they have available—for instance, that the facility lies deeply buried. If this is approved, the locator then suggests the excavator pothole to their expected excavation depth plus "a few feet" as a best effort toward reasonable care. Nowhere in the process does the operator or locator recommend the excavator forgo potholing entirely.

Another operator described a similar approach. If their facility lies 10 feet deep, and the excavator's target depth is 36", they might advise the excavator to uncover the facility thoroughly at both ends and EM locate in between. The operator also recommends using a slot trench[26] as the exposure method to improve the chance of finding the facility at each end. Like the earlier example, this guidance results from a discussion about exposure methods between the excavator and the operator—as this operator put it, "…to establish confidence in the plan."

Possible Forms for a Minimum Interval When Parallel

Responses and interview feedback identified several approaches already in use:

- Linear footage measurement—e.g. pothole the facility's starting point, every 50 feet thereafter, and end point within the project area
- Pothole the start and end points of the facility within the project area and use EM location data (to include depth) in between

[26] Wider "slot trenches" may find conflicts better than smaller round test holes. Multiple follow up interviewees emphasized the importance of wide slot cutting when potholing. If, instead of sinking one round hole over a locate mark, excavators make a narrow trench that extends several feet in each direction perpendicular to the mark, their odds of exposing the facility improve.

- Pothole the beginning, middle, and end of the facility within the project area

Common Ground Alliance's (CGA) Best Practices: Spacing Between Field Locate Markings

Currently, spacing between marks varies depending on the individual performing the locate and the policies and procedures of the operator or locating company. According to guidelines found in CGA's Best Practices: Appendix B[27], the maximum spacing between an operator's marks should be approximately 50 feet. In practice, the spacing between marks is usually smaller, especially if the facility's detectable path changes or if the locator simply marks the facility more frequently than every 50 feet when tracing its path. However, given that the locate and field mark law[28] contains no specific guidance on the spacing between marks, other than to use CGA's recommended range, one might conclude that 50 feet is the approximate upper limit of this spacing if locators are following requirements.

Minimum Interval Below 50 feet May Be Difficult to Apply in Every Situation

Since tolerance zone[29] is defined in relation to each field marking, excavators must use these markings when potholing to determine if conflicts are present. For example, multiple survey participants reported "potholing the mark." From a policy perspective, if Board standards recommend a minimum spacing for potholes below 50 feet without a corresponding change to the maximum spacing between an operator's field markings in a relevant standard, such a standard might be difficult for excavators to apply consistently.

Safe Excavation Standards Updates

After an analysis of survey responses and follow-up interviews, staff revised two potholing-related standards within the Board's Draft Standards for Safe Excavation. Staff also added a new standard addressing an operator's response to an excavator that cannot locate a facility when potholing, which this report discussed earlier.

5.3 Identification of Potholing Locations

- Redrafted the existing language for style and flow.
- Added draft language in the practice section for determining a minimum distance between potholes for certain parallel facilities. Distance is determined in part by:
    - Which facilities are likely to conflict with the excavation for known reasons—chiefly, the factors listed in the Distance survey.
    - The outcome of pre-construction meetings and mandatory high-priority facility meetings before construction.
    - Contractual agreements that identify exposure for certain facilities before construction.

[27] CGA Best Practices Appendix B: Uniform Color Code and Marking Guide, Guidelines for Operator Facility Field Delineation.
[28] Gov. Code section 4216(n)(1)
[29] Gov. Code section 4216(u)

- Added input from locators and operator staff as a consideration for the excavator when deciding where to pothole.
- Added explanations in the Discussion section for these two new components.

5.5 Deeply Buried Facilities – Exceptions to Positive Confirmation Based on Data Quality C Information

- Added that operators inform designers and excavators of deeply buried facilities before construction.
- Clarified that only a licensed engineer may depict utility quality levels according to ASCE 38-22[30].
- Added "surveyed" to description of surface indicators in quality level C.

RECOMMENDATION

Staff recommends the Board direct staff to continue gathering information about a minimum frequency for potholing and operators providing depth information to excavators. The Potholing and Planning and Design Committee may wish to hold another workshop to discuss which excavation subtypes, project sizes, and other specific project details might merit these practices.

Attachments:

1. *Draft Standards for Potholing Revised for this Report*
2. *2024 Potholing Surveys - Contents and Results*

[30] American Society of Civil Engineers. (2022). *Standard Guideline for Investigating and Documenting Existing Utilities (38-22). Pp 4-5*

ATTACHMENT 1: DRAFT STANDARDS FOR POTHOLING REVISED FOR THIS REPORT

5.3 Identification of Potholing Locations

The excavator determines where potholes are necessary to uncover the exact location of existing buried facilities within the project area. The excavator consults information from multiple sources for existing facility locations (as available) before potholing, including:

- design plans,
- field locate marks,
- surface indicator surveys,
- maps from utility operators,
- input from locators and operators' staff.

To determine direct points of conflict, the excavator considers:

- Proposed crossings. The excavator potholes where the proposed excavation and existing buried facilities will overlap. The excavator does not pothole in softscape outside the path of excavation to avoid potholing concrete or asphalt in the path of excavation.
- Existing crossings. The excavator potholes existing buried facility crossings. In an attempt to maintain appropriate facility clearances, depths often change at crossings. Information gathered through potholing at crossings supplements, but does not replace, information gathered from potholing other portions of the facility.
- Selected Joints. The excavator potholes at tees, changes in facility diameter, and any other locations where buried structures, features, or fittings are likely to protrude in the direction of excavation. This also includes any change in the facility's direction.
- Parallel facilities. When trenching or boring to install a new buried utility parallel to an existing one or road milling or grading over existing lines, the excavator determines where to pothole and how many potholes to make to preserve horizontal and vertical clearances (separations).
- A minimum distance between potholes for certain parallel facilities. The excavator makes regularly spaced potholes at set minimum intervals—e.g. every 50' feet—over any subsurface installations that are likely to conflict with the excavation, as well as any that parties to pre-construction meetings and/or contractual agreements have identified for such exposure ahead of construction.

Discussion: When determining pothole locations, excavators use multiple sources of information that may be present at the project area after the locate process, including field locate marks and surface indicators. Other sources, such as maps, design plans, and recommendations from locators and operators' staff require participation from external entities beyond the locate process. Crossings of any kind—both proposed and existing—are opportunities for encountering facilities at unpredictable depths and should be potholed.

Junctions, fittings, and other joints are often bulkier than the rest of a line and may also indicate the presence of unlocatable or abandoned stubs nearby. Parallel facilities present a continuous risk; maintaining horizontal and vertical clearances; investigating changes of direction, facility materials, facility conditions or vintage, and the soil conditions surrounding each utility may all be causes for additional potholes. Meetings for high-priority facilities within 10' of the excavation per 4216.2(c) and other pre-construction meetings may result in recommended potholing of some facilities at regular intervals to ensure adequate clearances. Contractual agreements regarding facility exposure may specify mandatory potholing of some facilities. Ultimately, the excavator must always evaluate the most current information available when potholing, including the appearance of new locate marks or surface indicators since the completion of design plans.

References:

Investigation 19SA1279: Geary Boulevard (San Francisco) Natural Gas Rupture and Fire

Case Study: Walnut Creek

Los Angeles Municipal Code, Section 62.03.1 (Notification and Location Requirements)

Related Requirements:

Government Code § 4216.4 (a)

5.5 Deeply Buried Facilities – Exceptions to Positive Confirmation Based on Data Quality C Information

If the utility operator identifies a facility significantly deeper than the excavation, designers and/or excavators can use a combination of Quality Level C and Quality Level D information in lieu of exposure. Utility operators communicate the presence of deeply buried facilities when providing information to designers and excavators before construction.

Discussion: Portions of some deeply buried facilities lay far enough below ground that even partially exposing them may be difficult. Examples include large-diameter pipes, tunnels, and certain wet-utility facilities but may also include communications, electric, and other facilities installed through horizontal directional drilling. Only a licensed engineer may depict a utility segment in records at quality level D (QLD) through quality level A (QLA). ASCE Standard 38-22 ranks these levels by certainty (of accuracy), with QLA the most certain:

- Quality Level D - refers to records research,
- Quality Level C - indicates a comparison of surveyed surface indicators and/or accessible underground features to records,
- Quality Level B - indicates a survey of electromagnetic locating and/or other geophysical locating methods performed at the surface,

- Quality Level A - requires the exposure of a portion of a buried facility to record an exact location.

References:

California Government Code § 4216.18(b)

ASCE 38-22, *Standard Guideline for Investigating and Documenting Existing Utilities.*

Related Requirements:

Government Code § 4216.4 (a)

5.6 Operator Responds to Excavator Request for Additional Information About the Location of a Subsurface Installation (New Standard)

An operator promptly provides information to the excavator for determining the exact location of a subsurface installation when an excavator has attempted to locate it and subsequently contacts the operator. This information may include the depth of the facility if known.

Discussion: Government Code §4216.4(b) requires that an excavator request additional information from operators if they cannot locate a subsurface installation using hand excavation, or by using approved exceptions to hand tools per 19 CCR § 4501. The information provided by operators to excavators in this situation may include a depth. Depth information provided to the excavator about a subsurface installation is not a substitute for the excavator exercising reasonable care during excavation.

Related Requirements:

Government Code § 4216.4(b)

19 CCR § 4501

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ATTACHMENT 2: 2024 POTHOLING SURVEYS – CONTENTS AND RESULTS

Distance Survey Questions

1. Which of the follow best describes your role in potholing facilities?
    - Excavation contractor
    - Designer / Engineer
    - Facility Operator with Construction Oversight
    - Facility Operator with Damage Prevention Oversight
    - Other

How does each of the following affect the distance between your potholes? (Please indicate whether each factor has an effect. If it does, explain how. If you are an operator, please indicate how you would want someone to pothole your facilities)

2. Horizontal Clearance from Existing Facility
    - It doesn't
    - It does (Move to next question number to enter how)
3. How?
4. Vertical Clearance from Existing Facility
    - It doesn't
    - It does (Move to next question number to enter how)
5. How?
6. Facility Material (Plastic, steel, concrete encased, etc.)
    - It doesn't
    - It does (Move to next question number to enter how)
7. How?
8. Facility Condition (Age, other)
    - It doesn't
    - It does (Move to next question number to enter how)
9. How?
10. Horizontal Change in Facility Direction
    - It doesn't
    - It does (Move to next question number to enter how)
11. How?
12. Vertical Change in Facility Direction
    - It doesn't
    - It does (Move to next question number to enter how)
13. How?
14. Surface Grinding or Grading ONLY

- It doesn't
- It does (Move to next question number to enter how)

15. How?
16. Site and Soil Conditions
    - They don't
    - They do (Move to next question number to enter how)
17. How?
18. Does your organization have standard operating procedures relating to any of the above
    - Yes
    - No
19. Which of the above factors does your organization have standard operating procedures regarding? (Check all that apply)
    - Horizontal clearance between proposed excavation and existing buried facility
    - Vertical clearance between proposed excavation and existing buried facility
    - Facility Material
    - Facility Condition
    - Horizontal change in facility direction
    - Vertical change in facility direction
    - Surface grinding or grading
    - Site or soil conditions
20. Anything we didn't ask that you'd like to say about the subject of potholing existing buried facilities?
21. Would you be willing to talk to Underground Safety Board staff about your answers?
    - No
    - Yes

(If yes)

22. Please provide your name
23. Please provide your email address
24. Please provide your phone number (optional)

Distance Survey Results

1. Which of the following best describes your role in potholing buried facilities?

More Details

Excavation Contractor	36
Designer / Engineer	14
Facility Operator with Constructi...	17
Facility Operator with Damage P...	18
Other	6

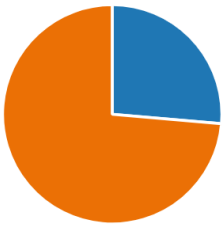
How does each of the following affect the distance between your potholes? *(Please indicate whether each factor has an effect. If it does, explain how. If you are an operator, please indicate how you would want someone to pothole your facilities)*

Horizontal Clearance

2. Horizontal Clearance from Existing Facility

More Details

It doesn't	24
It does *(Move to next question n...*	67



3. How? *(Please skip if you answered "It doesn't")*

More Details

64
Responses

Latest Responses

"There are different pothole requirements based on if you are within 5ft versus ...

"Depending on the length of the excavation we want to make sure we are main...

"If utilities have been installed closely to one another (either during initial instal...

1 Excavators need to pothole within the tolerance zone to the depth of their excavation to determine if the marked facility is in conflict with their planned excavation.

2 I only repair existing assets like water mains and services. My excavations are localized to fix leaks (4'x5') hole so when I pothole and find a utility, it usually doesn't stray from my hole. It does matter to me when other contractors are installing new utilities next to my existing assets. That's where I have the biggest issues with contractors not potholing correctly.

3 Maintaining proper separation with existing utilities during excavation and boring operations is mandatory, to insure the safety and integrity of existing infrastructure.

4 When paralleling an existing line it is imperative to identify the depth and exact location of that line anytime one is excavating or boring within three feet or less of that line. Potholes should be made at least every 25 feet but no more than 50 feet in order to determine exact location.

5 If the Existing Facility is getting further away there is no need to continue potholing.

6 Need to ensure distance from edge of encasement/utility to edge of design of pipeline

7 We need to make sure our excavation won't hit the utility that it's far enough away not to be undermined in our side slope.

8 We are typically installing vertically beyond 10-foot depth and lateral proximity plays into ability to complete the proposed installation, whether with respect to rotational drilling equipment, soil disturbance, or minimum clearance facility requirements.

9 Clearance matters when something is going same direction as you are.

10 may require some added potholing to avoid trench collapse or utility conflict

11 Hand digging the required dept to see if any facility.

12 You pothole 2’ from each side to make sure your clear

13 Basing minimum clearances, today's intersections are a matter of weaving through horizontal and vertical clearances.

14 Potable water & Recycle water must have some 10' horizontal clearance in most cases.

15 Anytime we are within 18" or less we will pot hole the utility every 25'. Anytime we are within 18"-30" we will pot hole the utility every 100'. In both cases we are just verifying that the marks are correct and the utilities stay true (in a straight line)

16 Our installations require adequate clearance for the post foundations, which can vary from 12 inches wide by 24 inches deep; to 36" wide by 60 inches deep.

17 elevation changes in utility's

18 I had a hard time understanding the question but these are what we consider when potholing and when someone potholes around our existing facilities : If you pothole on top of mark and within 2 feet of each side of facility (measured from edge of width/diameter of facility) and could not locate with reasonable vertical excavation, make a call to facility owner or to us for possible mismark

19 The distance should be based on the overall layout. For example, if you are along the side of a building, you probably want to also check for changes in direction. The problem is how do you find out the change in direction for plastic or concrete or clay materials. If it is metal or electric you can hopefully first get an idea of where the utility is. Otherwise you go in a line and then you backtrack if you don't find it by halving the distance until you find it.

20 Need to better understand the direction and connections if any the utility is associated with.

21 YOU NEED TO KNOW FOR CLEARANCE FOR ALYTHING THAT MIGHT NEED TO BE THERE.

22 Typically, our lines are straight so only the beginning, center and end of a conflict is required to maintain hor. clearance.

23 Specifications on clearances needed for new utilities being installed and safety clearances . For example (Sewer main to close to water pipe) or (how I'm excavating) or (space / room for installation and repairs) .

24 We like horizontal clearance in several spots especially near crossings of a street. Sometimes sleeves of conduits were placed under the road prior to the installation of utilities at different depths.

25 Different utilities have different separation from each other.

26 Most of my work is in utilities. I need to ensure safe separations which conform to the specific utility(s) codes while not inundating the given work area by over spacing the new install.

27 depends on the given distance. 6 ft or more would power drill, under 6 ft hand dig.

28 Existing facilities may shift or may have been rerouted over time.

29 Everything in the bore path no matter the depth of the bore or the information provided by the utility needs daylighted 2' around.

30 to keep a safe distance while digging

31 The closer the planned bore to an existing facility will usually have more spot check potholes. It also depends on how the existing facility was installed (sand trench, bored in, sawcut thru the pavement)

32 the distance for installation can vary: from a minimum of one foot when installing certain items, to a minimum of two feet for directional boring, and potentially up to five feet or more for certain utilities, ensuring proper clearance from our own utility lines.

33 It depends on the type of project and length of project. Infrastructure varies depending on the location.

34 Industry standard trench steps are one thing a sewer or storm drain line has to have positive fall if other utilities conflict with that positive fall different on site methods must take place

35 In older rural areas there are no accurate records and mapping, no tracer wire and very limited means of accurate marking. Even a 24" clearance is hard to verify with witching sticks. Pothole until you find it- existing utilities should take preference over speed of construction.

36 Having accurate locations for underground facilities is always important. Knowing where there are or are not pipes in the ground changes where we need to work.

37 We tend to cut a huge amount of slope. We need to know if utility is staying parallel with the slope because our cut tends to go down and away from utility. If it does not stay parallel to the cut slope, we may encounter it as we have made cut and dropped in elevation. I would say that we like potholes every 50 LF.

38 Varying specifications call for different clearances. Dependant on where you are working or what kind of infrastructure you are working around.

39 Pothole to confirm that required clearances are maintained.

40 If it is closer or in conflict with my proposed excavation I may pothole more to ensure it doesn't conflict or if it moves into or out of conflict

41 Excavators need to ensure they find the along the horizontal path if doing directional drilling or excavating down to the level of the operators facilities. Not all operators facilities are done in a straight line especially if your facilities are put in through directional drilling. This method tends to have more movement in the running lines which would require more potholing along the path of those facilities.

42 Can affect if we need to open trench or not

43 we are required to have a minimum of 1ft of clearance between facilities.

44 We need to design new utilities to avoid existing facilities. How close an existing facility is located can affect the cost of installing the new utilities.

45 At least 5 feet

46 They need to pot hole every 50 feet

47 Need to know of anything in the area of excavation.

48 I f the depths vary from pothole to pothole.

49 Sign post depth and sign width for clearance above and below the ground

50 Depending on what type of utility and how critical it is dictates spacing between potholes. A gas line or electrical conduit may be potholed every 50' to ensure marks are correct and the alignment doesn't change. we may space potholes to 100' or more if it is a storm drain line or other non-critical faciltiy.

51 Need to determine if new pipe installation will conflict with existing utility, will there be enough room to safely excavate and install new pipe.

52 If boring we need to know horizontal distance if open cutting and going below existing utility, we need to know how close we may be to the existing trench excavation.

53 Service line contents and pressure Rating and hazard class Would help Decision of how far apart to pot hole to get a Comprehensive Data Sampling .

54 We normally hand excavate within 4 feet of the pipe. We pothole to minimize the hand excation.

55 Due to the type of work to be performed sometimes creates a hazardous condition for the employees.

56 depends on the work being performed

57 I would never believe underground utilities are as recorded in the as built maps. Therefore, depending on the facilities being located and the materials installed the distance between potholes should vary. Open trench installation is more dependable. Therefore, less potholes would be needed. Direct boring is unpredictable and would be closer, more potholes.

58 Space between our facilities and theirs is important for making sure we don't hit each other during future wok projects

59 Must hand dig to expose utilities 2 feet on both sides of marking(s)

60 Our policy is to physically see every line we cross

61 Our protocol is to do at least one pothole if the existing facility is marked within 10 ft of the planned work, to confirm that the +/- on utility markings doesn't hide a conflict.

62 If utilities have been installed closely to one another (either during initial installation or later installation of one or more subsurface utility), performing work may be very challenging. This also may be an indicator of unique installation methods to negotiate around other previously installed utilities. We have experienced damages when a utility has to be routed around, above or below existing utilities such as storm drains or non-pressurized sewer lines.

63 Depending on the length of the excavation we want to make sure we are maintaining the required horz. separation the length of our excavation.

64 There are different pothole requirements based on if you are within 5ft versus when you are within the tolerance zone and facility type

Vertical Clearance

4. Vertical Clearance from Existing Facility

More Details

5. How? *(Please skip if you answered "It doesn't")*

More Details

57
Responses

Latest Responses

"Only in grading operations"

"We pothole existing facilities to make sure we have the vertical separation nee...

"If utilities have been installed closely to one another (either during initial instal...

1 Excavator needs to verify if the existing facility is in conflict with the vertical depth of their excavation.

2 Maintaining proper separation with existing utilities during excavation and boring operations is mandatory, to insure the safety and integrity of existing infrastructure.

3 Need to work around it

4 Vertical clearance is important to many facility owners. As an excavator vertical clearance is especially critical when directional drilling.

5 Pipeline profile design is based on vertical clearance

6 We need to know vertical clearance to tell if our excavation bottom will be at the utility. Also, the vertical clearance matters so that we don't crush the existing facility by driving over it.

7 Minimum six-inch clearance.

8 Will I be able to safely parallel or intersect ? Will I have to go over/under if so will I need to move back to make room for invert situation ? These are the thoughts I have personally that I will base consistency of potholes.

9 Potable water & Recycle Water must have no less than 1' clearance.

10 WE generally keep at least 1' of clearance from a utility (sometimes more). We need to daylight down to the depth we would bore at if going under a utility.

11 Avoiding conflict with existing underground obstructions prevent potential failure of our above ground structures (fences).

12 If with horizontal parameters (2 feet on each side) above met and reasonable vertical excavation you do not find the facility, please contact us or facility owner for possible mismark

13 Very similar to the horizontal clearance. You would need to know if the facility dips and the increase in depth. Very difficult.

14 For drilling of borings or for excavations we need to know the vertical clearance for the planned work.

15 NEED TO KNOW SPERATION

16 Depending on the conflict. Our lines have vertical deviation under roads and other utilities

17 Specifications on clearances needed for new utilities being installed and safety clearances . For example (Sewer main above water pipe) or (how I’m excavating) or (space / room for installation and repairs).

18 Vertical clearance is important because we do not want utilities sitting on top of the sewer pipe to avoid creating an offset.

19 Different utilities have different separation from each other.

20 Vertical clearance will not only affect the proposed layout, but also could include additional required infrastructure.

21 vertical clearances can vary from the original install, thus we need to be careful and hand dig. example, previous site work may have made the installation shallower, also weather and runoff.

22 Facilities need space for vibration or movement (settling) Also high-pressure facilities should have clearance, so they are not disturbed.

23 Every conflict needs to be daylighted in the bore path.

24 We almost never install in line or on top of an existing facility

25 the distance for installation can vary: from a minimum of one foot when installing certain items, to a minimum of two feet for directional boring, and potentially up to five feet or more for certain utilities, ensuring proper clearance from our own utility lines.

26 Again, it depends on the type of project and length of project. Infrastructure varies depending on the location.

27 Just as important as previous question- also proper clearance of utilities for future safety

28 Determines depth that our utility will be installed.

29 Having accurate locations for underground facilities is always important. Knowing where there are or are not pipes in the ground changes where we need to work.

30 Vertical Clerance is always a need to know, even if you not excavating over the top of the utility. There is a very strong possibility that we are going over it with an extremely heavy load. The depth clearance will tell the utility owner if the amount of cover will permit us to safely travel over it with machines. Vertical clearance we would be a bit looser and say 100 LF.

31 Varying specifications call for different clearances. Dependant on where you are working or what kind of infrastructure you are working around.

32 Pothole to confirm that required clearances are maintained.

33 Need to know if facility is low enough

34 If it is closer or in conflict with my proposed excavation I may pothole more to ensure it doesn't conflict or if it moves into or out of conflict

35 Try to find the facilities the best you can, Some facilities are very deep depending on whether they had to be installed deep to go under other operators utilities. Excavators need to have more field meets with the operators locators to ensure questions are answered. Most operators care about not hitting other companies utilities. At least that is what I have experienced in the Sacramento region. Some companies don't care and they are drill a foot below facilities and then the bore head finds the path of least resistance. Should stay a minimum of 2' away whether it's under, over or to the side of existing facilities.

36 Can affect if we need to Pot hole or open trench

37 we are required to have a minimum of 1ft of clearance between facilities.

38 We often need to cross existing facilities and we need to verify proper separation between the existing utilities and the proposed utilities.

39 At least 2 feet

40 Every 5 to 10 feet away

41 The depth of the utility from the surface determines how deep the excavation can go before damaging the utility in question

42 Need to make sure you are clear of the utility you are potholing and no surprises in close vicinity of your pothole.

43 Same answer as above.

44 Signs mounted higher on posts need clearance from power lines

45 OSHA standards are 10 feet from any power lines

46 Need to determine if there is enough clearance above or how deep excavation need to be to go under existing utility.

47 If we need to cross above or below an existing utility we need to know its depth

48 It is important to the get the vertical clearance for gravity lines to flow correctly.

49 fully pothole top and bottom of facility to understand size and type

50 Same answer as above

51 Hand dig to top of utilities & 1 foot below or to the depth of the trench being dug. Whichever is deeper

52 Determines whether I hand dig or use a mechanical means to expose. Also if I need to acquire backfill

53 Same as above

54 We would pothole at the point of horizontal interference to confirm vertical clearance.

55 If utilities have been installed closely to one another (either during initial installation or later installation of one or more subsurface utility), performing work may be very challenging. This also may be an indicator of unique installation methods to negotiate around other previously installed utilities. We have experienced damages when a utility has to be routed around, above or below existing utilities such as storm drains or non-pressurized sewer lines. We have also seen physical barriers installed to protect unique installations that may give a false sense of how utilities are installed throughout the length of the project.

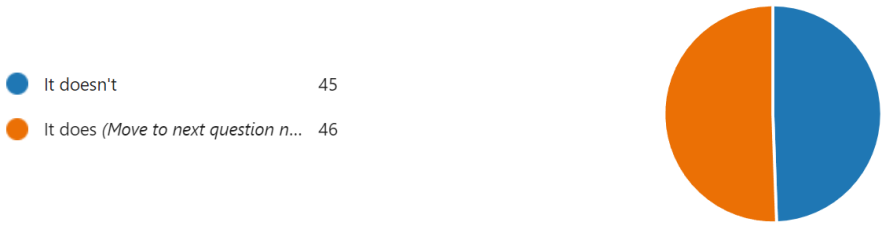
56 We pothole existing facilities to make sure we have the vertical separation needed while designing and installing any perpendicular crossings.

57 Only in grading operations

Facility Material

6. Facility Material (Plastic, Steel, Concrete Encased, etc.)

More Details



7. How? *(Please skip if you answered "It doesn't")*

More Details

41
Responses

Latest Responses
"When pipelines are installed within casings (either by initial design, such as tra...

1 For water mains, it matters to know how we are connecting to the existing water main. If we can weld on it or hot tap etc.

2 Any kind of material matters as you don't want to damage or break anything

3 Six-inch clearance.

4 Pot hole by hand to make sure you don’t damage anything

5 This would be crucial in regards to knowing how to approach any situation. Is it older steel water main ? Is it fully encased or capped leaving potential for voids (potential damage to facilities or safety breach of crew). I have encountered this many times with gas and electric greatly hampering backfill operations. FYI many contractors just loosely backfill in this situation leaving void's for following crew's to deal with . Settlement from potholing doesn't just create a pothole in the road it can easily cause damage to facilities.

6 This will dictate what type of clearance we need as well as give insight to the type of back fill, and in some cases we cant have a utility exposed for to long.

7 All obstructions regardless of the type of material can prevent the proposed fence footprint from being in keeping with the intent of the design.

8 for tie in purposes

9 Very important and very difficult.

10 Old AC lines are very brittle.

11 plastic

12 Need the information to better inform workers of conditions present.

13 Different classes of pipe have different clearance requirements

14 ITS IMPORTANT TO SEE THE MATERIAL IN THE GROUND.

15 Space for repair or installation . Steel for example would require a bell hole sized hole so I would need more room . PVC , adjustments could be made above ground prior to installation .

16 More caution needs to be taken around plastic pipe.

17 Every material has specific handling and connection requirements.

18 way more careful of direct burial, fibre optic, Gas lines, or high voltage electric than a concrete storm drain.

19 Some of the older facilities may be more prone to breakage if they are disturbed or if earth is moved beneath them.

20 No mater the material the utility is made from it still has to be found.

21 depends on the equipment used to dig is how you can maneuver around the material facility

22 Where it is easier to trace reliably dictates less potholes

23 Type of material matters because it can interact with our utility we can melt it if it's too close or catholic protection can interact with it. If it's steel we need to know what's being installed around us to both protect us and the utility or the product that's being buried around us.

24 Pipe size matters for tapping into

25 It lets us know weather or not we have found the correct facility

26 Very important again due to how we locate, what we use, and how much weight it can handle with existing cover or if we have to add cover or even plate it with steel and additional cover.

27 You need to be able to identify the type of material to verify any plans or drawings that have been provided of the buried infrastructure.

28 if slurry caped or concrete encased pothole above and below facilities to ensure you can see the whole casing before determining how deep you need to go.

29 Can affect if we need to Pot hole or open trench

30 we are required to have a minimum of 1ft of clearance between facilities.

31 Knowing the type of existing material can affect the proposed designs of new facilities.

32 So we know what to look for when exposing it.

33 Small Polly gas pipe can be damaged with Hydro excavation making it important to regulate wand pressure

34 You need to know to identify the utility and what to expect.

35 Identifying if correct line is located by type marked on ground. Also helps to know how fragile type of material may be.

36 Was service line wrapped and direct Burried in Dirt or Set in two sack Sand and cement Engineered Fill

37 materials like steel, concrete encased and most ridge PVC lay pretty flat. There for less potholes are needed. Soft and coiled copper, Fiber cables, pvc gas tubing are not as predictable and it should not be assumed they are flat. Therefore, more checking, more potholes.

38 Care needs to always be taken when potholing anything. Or it might be damaged

39 We try to stay out of any surfaces except soil

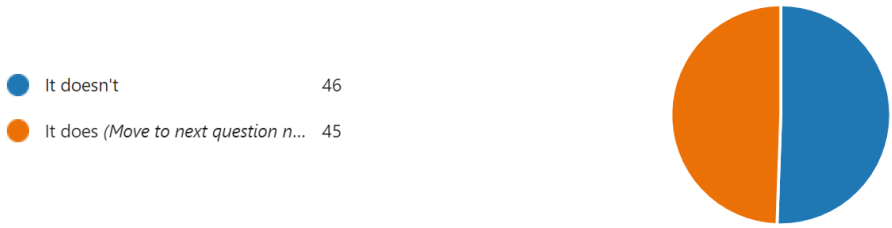
40 How much care must be used when digging the facility

41 When pipelines are installed within casings (either by initial design, such as traversing under high traffic roadways, being hung on bridges, etc. or as a secondary installation through insertion and using the initial installation as a casing), the point of insertion is not always clear. This means a pipeline might be marked as being a 1/2" plastic pipeline inserted into 1" steel casing (or previous 1" steel pipeline). The excavator may find a plastic pipe that is not within the casing or the casing and plastic pipe separate or only the casing (pipeline inside). This is not just true for service lines feeding residences, but also on some main pipelines. When potholing inserted pipelines, or those within casings, the operator should relay this information to the excavator and the excavator should expect to see one or both, the pipeline and the casing.

Facility Condition

8. Facility Condition (Age, Other)

More Details



9. How? *(Please skip if you answered "It doesn't")*

More Details

40
Responses

Latest Responses

"There are different requirements for critical facilities versus non-critical"

"This generally only applies to older pipelines. Older pipelines or conduits may r...

1 Age and the environment of existing facilities does come into consideration when we pothole, we will adjust our means and methods to insure the integrity of the utility being exposed.

2 Might have to reroute and replace if in service

3 Older infrastructure can deteriorate with age and become more susceptible to damage from vibration caused during the construction process.

4 May have to check more often since it could be more easily damaged.

5 Gives us an indication if it may be an asbestos containing product.

6 If it's old, the slightest touch could damage or break something

7 If any facility be found and not in good condition, call the responsible unit.

8 It matters the material because some certain materials are not detectable when line locating.

9 The older, the pipe the more fragile

10 I disagree with your method of questioning, every question so far applies to ALL entities involved (engineers, owners, contractors, in house maintenance, etc.). If these factors are not applied to design of projects, it DOES NOT become the responsibility of the contractor in the field to figure it out, due diligence or not ! FYI this is becoming the new standard and insurance companies are on to it. I firmly believe that you can expect excavation cost to

increase substantially in coming years which I assure you will place liabilities and responsibilities all other entities from corporate proposal's to design. This WILL trickle down to digalert, yes obviously age plays a huge role and concern in potholing.

11 we typically will keep greater caution around a pipe that is older (has rust, corrosion, etc.) or around older water pipes that may have a casing around it.

12 useable system

13 Older facilities can be corroded (if metal) or brittle (if plastic or concrete).

14 AC sewer lines can get soft with age from sewer gases.

15 Need the information to better inform workers of conditions present.

16 Types of valves and installation practices used in previous years matters . Is it a sideways facing valve that has an abnormally large foot print ? Does it have multiple valves on it for pressure relief or equalization?

17 This matters because a pipe could be damaged the older it is.

18 Depending on how fragile the existing facilities are, may require a different design.

19 Specifically, in the case of public improvements, if you're replacing sections of existing infrastructure, and your pothole information indicates that you should replace a bit further due to very poor conditions in the existing infrastructure, it's better to err on the side of caution and replace to your next alternative stopping point.

20 Clay and older concrete pipe may be more prone to breakage during an excavation or directional boring.

21 Regardless of the age or being abandoned it still has to be found

22 if you know the age of the line or how is uncovered a visual check can help on how to get safe around it and/or keep distance and/or change the way is need to dig for the new line

23 Condition of pipe to be tapped into

24 You have to be more careful potholing around older facilities that are easily damaged with normal potholing techniques

25 Age makes us nervous due to a bunch of factors. We would suggest a tight distance between potholes just to get a visual for us and the utility owner both. We would be looking for 30 LF intervals. This would be based on Old as the description of age.

26 Verifying the material condition will help determine the type of excavation you proceed with.

27 Asbestos water lines can be brittle

28 we are required to have a minimum of 1ft of clearance between facilities.

29 This is often harder to determine from potholing, but can be important information.

30 Year and what material

31 The age of pipe can make it more brittle and more susceptible to being easily damaged.

32 Caution is required on older utilities for deterioration and weak product while potholing.

33 Our facilities are at least 100 years old. So boring or trenching next to them can affect ours.

34 older pipe lines need to be inspected and hydrotested to prove fit for Service .

35 Old utilities or poor installation could initially stop the pothole process.

36 Well, this seems like a trick question. Age doesn't matter. That is why contractor's potholes on old and new utilities to protect the facilities.

37 Older material can be a lot more fragile. and needs to be taken care of carefully

38 How much care is needed when exposing the facility.

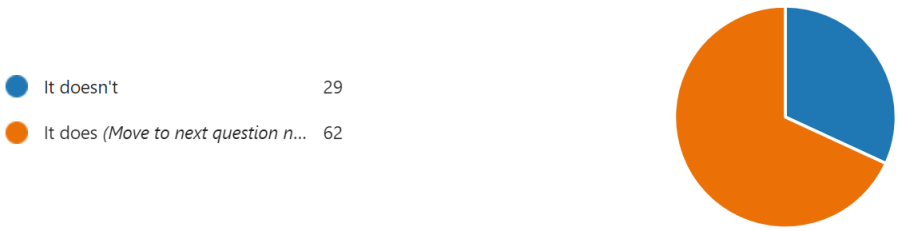
39 This generally only applies to older pipelines. Older pipelines or conduits may require adjusting excavation methods to prevent damage. If subsurface installations are comprised of potentially brittle or fragile materials, the operator should provide this information to the excavator to help them use the appropriate excavation techniques to prevent damage. The excavator should also use appropriate techniques to prevent damage or request conferences to discuss the planned excavation methods and how to deploy them safely.

40 There are different requirements for critical facilities versus non-critical

Horizontal Change in Facility Direction

10. Horizontal Change in Facility Direction

More Details



11. How? *(Please skip if you answered "It doesn't")*

More Details

55
Responses

Latest Responses

"So we can continue to make sure we maintain desired separation."

"Different facility types are installed using different methods which alters the w...

1 If horizontal direction changes the the operator needs to follow the changes and mark the facility accordingly so the excavator will know where to pothole and check for conflict.

2 If we encounter a horizontal change we will reduce the distance between potholes (increase the number of potholes) and adjust our running line if required

3 Reroute conduit or pipe

4 Could impact proposed running mine of new construction

5 I need to know exactly where the utilities are in an area so I can move my alignment if needed

6 Could change into our excavation

7 Anytime a change in direction could cause you to hit it.

8 verify its actual per markings/as-builts

9 So we can see which way the pipeline is moving to have the most accurate information and proper safety precautions in place.

10 Intersecting, how many extra potholes will be required to verify.

11 Must be 10' of separation.

12 This can have a big impact on the direction we may need to bore as well as the depths.

13 Again, we install fences which typically are intended to have a specific footprint or layout. The change of direction of an underground utility can impact the proposed footprint of the fence.

14 elevation and routing

15 It affects it if not indicated (marked) but there is change noticed while potholing

16 See above. Very, very important.

17 Need the information to better inform workers of conditions present.

18 pot hole should be preformed each time a shift in lineament

19 Same as #1 answer

20 It does . Crossing / passing existing facilities .

21 This would give operators a false sense of depth it they assume a utility is at the same depth at every location when it is not.

22 Maintaining separation.

23 No as-built sketch, in my experience, will ever give you exact routing. if you encounter an unknown horizontal jog or bend while potholing, it can completely change how and possibly what you'll be installing.

24 Very important that it is obvious which way the facility goes undergrnd. Chk original plans, USA Marks, etc.

25 Not all facilities run straight.

26 Any conflict, especially if there’s a change needs verification. These marks can and most times are wrong.

27 it can go from dirt to concrete or asphalt and it can make you change your new digging path to keep a safe distance from it

28 If we find an inconsistency in the path, we will open more holes

29 We need to know if somebody’s moving closer or away from us yes

30 Have to find bends and angles- also take into account thrust blocks poured at fittings that protrude well past locatable piping in water.

31 We must always know what is in our work area

32 Every horizontal change is a definite thing that we would be looking for Always!

33 Knowing this can help an excavator avoid hits on buried lines that change direction or avoid unnecessary excavations.

34 Pothole to confirm that required clearances are maintained.

35 If it is closer or in conflict with my proposed excavation I may pothole more to ensure it doesn't conflict or if it moves into or out of conflict

36 Answered that in previous question. facilities deviate especially when directional drilling. Joint trench tend to stay straighter and depths are more consistent.

37 Can affect if we need to Pot hole or open trench

38 we are required to have a minimum of 1ft of clearance between facilities.

39 It is important to verify any changes in alignment of the existing utilities. Often the utility companies can't provide the exact locations of those jogs from their records.

40 Can make the difference of accidental conflict.

41 Definitely changing drop section

42 If a utility suddenly changes direction and it's not tracked and located properly the chances of damaging it increase

43 You have to be aware of changes in your area of excavation

44 If the depths vary we pothole closer together.

45 Need to determine if new pipe installation will conflict with existing utility, will there be enough room to safely excavate and install new pipe.

46 if existing utility is installed on a radius, knowing the location is beneficial.

47 you want to consider" A low spot in Servcie line" that may accumulate Condensation in Future With Accelerated internal Damage from water

48 use records or plans to understand alignment changes and verify markouts. Pothole at any change in direction that may affect your installation or repair.

49 utilities often change depth with grade changes. Change of grade is another need for potholes in this area. As needed.

50 You need to know where it is going

51 Hand dig to expose utilities, until the mark(s) move 2 or more feet away from excavation

52 Accurately documenting/locating the facility

53 Any changes in Direction or elevation has to be verified

54 Different facility types are installed using different methods which alters the way in which they change directions (e.g. plumbing uses "T" fittings while electric and telecom using conduit with sweeps and pull boxes. Potholing for various utilities should consider the facilities present and the common installation methods.

55 So we can continue to make sure we maintain desired separation.

Vertical Change in Facility Direction

12. Vertical Change in Facility Direction

More Details

13. How? *(Please skip if you answered "It doesn't")*

More Details

47
Responses

Latest Responses

"Different facility types are installed using different methods which alters the w...

1 Excavator is responsible for damages to the marked facility to any depth. Excavator know this and needs to be be careful.

2 I only repair existing assets like water mains and services. My excavations are localized to fix leaks (4'x5') hole so when I pothole and find a utility, it usually doesn't stray from my hole. It does matter to me when other contractors are installing new utilities next to my existing assets. That's where I have the biggest issues with contractors not potholing correctly

3 Have to work around it

4 Could impact proposed running mine of new construction

5 Currently vertical distances are not given. Also, vertical distances can change fast.

6 I need to know exactly where the utilities are in an area so I can move my profile if needed

7 If it becomes shallower it could be in conflict with our excavation.

8 Intersecting, same as previous.

9 Must be 1' of separation.

10 Anytime we bore, it is imperative we know the depths of all utilities as we bore next to or cross a utility.

11 For a responsible and functional fence, there is a minimum depth requirement for the post footing (varying by the height of the fence).

12 See above. Very, very important.

13 Need the information to better inform workers of conditions present.

14 Changes depending on minimum clearances

15 JUST INCASE YOU NEED TO GO UNDER OR OVER.

16 Same as #1 answer

17 It does . Crossing / passing existing facilities .

18 Knowing the depths at every location is invaluable information for excavators.

19 Maintaining separation.

20 No as-built sketch, in my experience, will ever give you exact routing. if you encounter an unknown vertical jog or bend while potholing, it can completely change how and possibly what you'll be installing.

21 Old and new facilities may run with current streets or certain elevations. Especially for gravity fed pipes.

22 The same applies for vertical marks because of the manner and materials used to secure the change will often cause more conflicts than usual.

23 if you need to cross it going over or under

24 Yes, we need to know if somebody’s moving above or below us

25 You pothole till you find it and proper potholing will lead you to vertical changes.

26 We must always know what is in our work area

27 We deal with tight tolerances in our grading. Inches matter so all vertical changes.

28 Knowing changes in elevation can help an excavator avoid hits on infrastructure.

29 Pothole to confirm that required clearances are maintained.

30 If it is closer or in conflict with my proposed excavation I may pothole more to ensure it doesn't conflict or if it moves into or out of conflict

31 Same as horizontal when doing directional drilling depths can vary

32 Can affect if we need to Pot hole or open trench

33 we are required to have a minimum of 1ft of clearance between facilities.

34 Vertical changes in existing utilities can be very important when designing new facilities.

35 Can make the difference of accidental conflict.

36 Changes in depth that are not noted increase the odds of breaking the utilities do to undetermined digging depth.

37 You have to be aware of changes in your area of excavation

38 Same as above.

39 It would be at top, middle and bottom of said vertical change.

40 Need to determine if there is enough clearance above or how deep excavation need to be to go under existing utility.

41 Same as above

42 use records or plans to understand alignment changes and verify markouts. Pothole at any change in direction that may affect your installation or repair.

43 You need to be aware of any depth changes

44 Hand dig to expose utilities until you have proper clearance

45 Indication of whether different locating equipment is needed

46 Only if we are crossing the line

47 Different facility types are installed using different methods which alters the way in which they change directions (e.g. plumbing uses "T" fittings while electric and telecom using conduit with sweeps and pull boxes. Potholing for various utilities should consider the facilities present and the common installation methods. T fittings for gas are often different than water or sewer. Gravity versus pressurized are also constructed differently.

Surface Grinding / Grading ONLY

14. Surface Grinding / Grading ONLY

More Details

15. How? *(Please skip if you answered "It doesn't")*

More Details

27
Responses

Latest Responses

"Only when there is evidence that the facility is embedded in the hardscape or j...

"When grading requires removing a substantial amount of material we like pot...

"It shouldn't, unless the operator has identified shallow or embedded facilities. T...

1 Many traffic loop wires and microtrenched fiber optic conduits are being placed at very shallow depths and could very well be damaged by surface grinding, asphalt milling and pavement removal

2 I don’t surface grind and as a facility operator of a water company, it doesn’t affect me and there is little to no chance my assets will be damaged.

3 There are no guarantees where facilities lay after year's of improvements, elevations obviously change during improvement requiring more verification.

4 If grinding is deep

5 I would be extremely careful and try not to grind because of sparks and heat.

6 What type of equipment is being used , example depth of grading and penetration of equipment . Grading not so much .

7 Sometimes utilities are shallow and could be damaged if it is assumed they are not shallow.

8 I deal in full site development, from subgrade exploration to overhead installations. if the subgrade does not meet the required proctoring requirements, and/or the pavement section is not up to spec, these are all important things to consider in your design and construction.

9 Some facilities, street lighting, loops are not as deep as other facilities.

10 Any hydraulic excavation needs to verify that no conflicts are present.

11 Yes, we still need to know if works being conducted on top of us even if they are only grinding or grading

12 Locating of utility boxes in pavement, so A-holes aren't paving over or disturbing your valve boxes

13 In grinding as our example this time, we tend to use grinders to do more than just grind AC. We tend to use grinders to do excavation and make cut after AC is removed. So we would not want confusion about griding only be associated with pavement.

14 Pothole to confirm that required cover is maintained.

15 If I am only surface grinding it may reduce the # of potholes to just enough to be comfortable that the utility low enough.

16 Can change the restoration needed to restore surface and closing out permits.

17 we request to have a representative of ours to be present.

18 Any soil disturbance has the potential for utility conflict.

19 Sand

20 Can not excavate at all even if only going minor depth.

21 It does on some. As I said our depths vary on certain pipelines do to dirt removal over time.

22 At what Depth was the service line installed ?? Use Depth finding Techniques To Verify Any Area that Will Be Ground to remove Surface layer of dirt or road way .

23 If we are grinding any deeper than asphalt we must put eyes on the line

24 Any physical exploration would be only to the depth of the work.

25 It shouldn't, unless the operator has identified shallow or embedded facilities. This, of course, is only if the excavation is pavement grinding. If it is grading, the scope of work can vary drastically. Grading can be very minimal leveling of just a couple of inches, or cutting

deep (multiple feet) to install an access road. Depending on the scope of work, the potholing methods and distances may be very different.

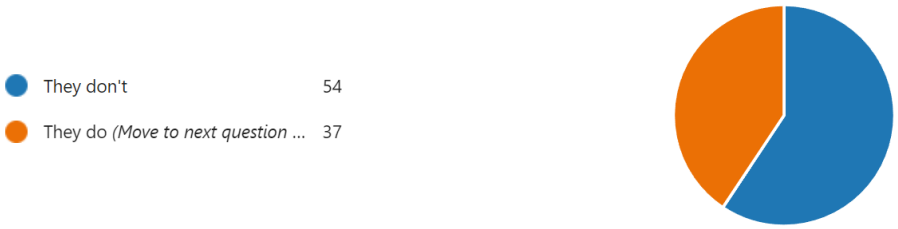
26 When grading requires removing a substantial amount of material we like potholes every 50' to make sure there is a sufficient amount of cover remaining over pipe.

27 Only when there is evidence that the facility is embedded in the hardscape or just below the surface based on field depth measurements

Site or Soil Conditions

16. Site or Soil Conditions

More Details



17. How? *(Please skip if you answered "They don't")*

More Details

32
Responses

Latest Responses
"Soil conditions may give an indication of the previous installation methods, ro...

1 Unstable soil or subgrade conditions may allow heavy equipment to sink down into the unstable subgrade and hit the facility. Excavator needs to be aware of this possibility.

2 Site and soil conditions definitely impact the methods in which new construction is performed and the manner in which existing utilities are located.

3 Will we need to bring soil from a different site for filling/compaction or is native going to be okay

4 stability of our excavation determined by the soil conditions.

5 If things were buried over a long period, changes in soil conditions could of occurred and shifted things.

6 Wether paralleling or crossing and yes it affects potholing especially soil conditions (was protective sand removed from pipes, are rock's now laying on facilities?).

7 It’s a soft dust, not much of rocks in the facility

8 This greatly affects our ability to correct (in hard soils with rocks, debris, etc.) our bore machine as well as dictates what type of set up we may use.

9 Digging in clay or rocky soils require additional labor, as many times fence post footings are bug by hand.

10 Very important. You can undermine a line.

11 Need the information to better inform workers of conditions present.

12 NEED TO KNOW WHAT KIND OF SOIL YOU WILL BE DIGGING IN.

13 This can be adjusted with install and backfill .

14 If a utility was bored in through hard pan, this makes potholing aggravating because those who are potholing rely on previously excavated material and so potholing a bored in line throws them off if they think the utility was trenched in.

15 Soil conditions vary from area to area and can even vary across a single site or parcel. This could mean additional over excavation and infill, or it could mean you need to change your proposed location for subgrade improvements.

16 Disturbance of soil around older pipes may cause a shift creating a leak or possible break down.

17 Marks are marks no matter what the ground or grade may change.

18 if the digging collapse for any reason on the existing facility it can be damaged by the force or by the void in the ground

19 This information can help if we’re driving out

20 Site soils are very important to us, the Geotechnical report that we get is a huge part of our work. It is a tool that we use for slope steepness when we cut next to a utility. If we are digging next to utility that has sand as backfill, we need to be 2 times the depth we are digging vertically away from existing utility horizontally. SAND would make us want at min 50-foot intervals on potholes.

21 If an over ex condition exists due to unsuitable soils

22 The soil could reduce the # of potholes. If the potholing is really difficult and the results of the potholing are as expected or better than expected you night reduce.

23 Affects the difficulty of the project. Which changes the time it takes to complete the project along with the cost.

24 we request to have a representative of ours to be present.

25 Soil conditions can make significant differences when proposing trenching for new utilities.

26 Fill soils indicate the potential to encounter underground utilities. Formational soil (not disturbed) - unlikely (unless installed by tunneling).

27 Potholing in different materials can cause problems. Sucking small diameter crush rock can cause erosion under the road. To large material such as cobble can be very difficult or impossible to vacuum out.

28 Determines method of potholing.

29 If the soil is compacted well, it will take longer to excavate.

30 The harder the ground the less feel the operator has and truthfully the less likesy people are to hand dig

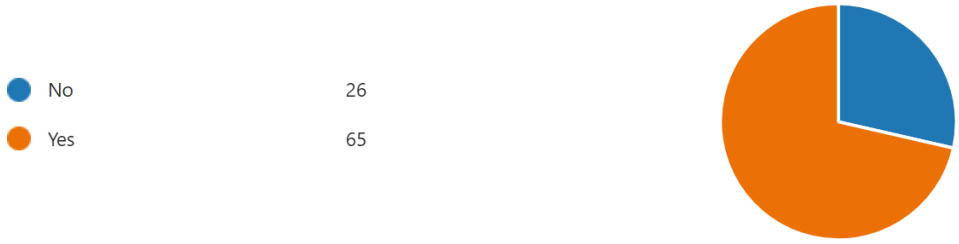
31 We don't break through concrete or asphalt when avoidable.

32 Soil conditions may give an indication of the previous installation methods, routing of subsurface installations or alter the method of excavation for potholing.

SOPs for Potholing

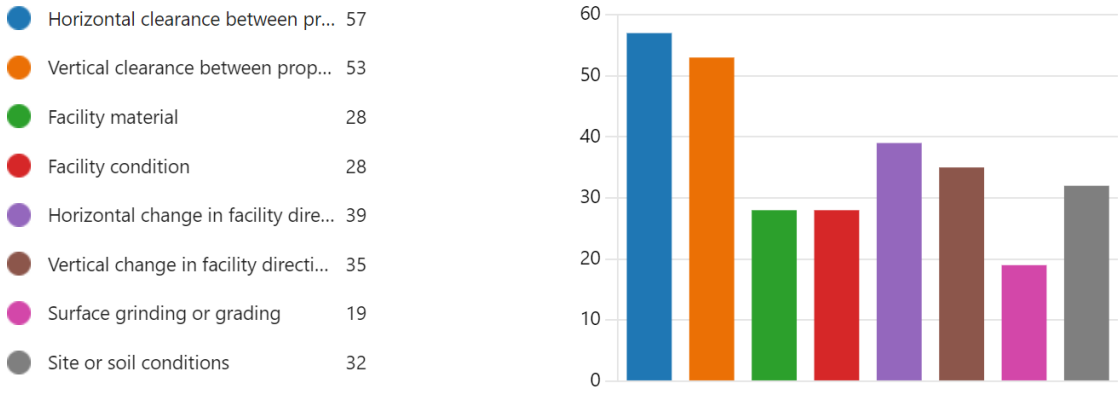
18. Does your organization have standard operating procedures related to any of the conditions above?

More Details



19. Which of the above factors does your organization have standard operating procedures regarding?

More Details



Shared SOPs for Minimum Potholing (Sorted by Clearance to Mark)

10 feet

- High priority line every 50 feet (gas operator)
- Protocol is to do at least one pothole (designer/engineer)

5 feet

- Every 20 feet (boring contractor)
- Every 50 feet (rural water operator)
- Tells contractors to pothole force mains at least once (sewer operator)

3 feet

- Between 25 feet and 50 feet (exc. contractor)

30 inches

- Every 50 feet (exc. contractor)

Tolerance Zone

- Everything in the bore path no matter what info is provided needs to be daylighted 2 feet around (excavation contractor)

18 inches and under

- Every 25 feet (exc. contractor)

Anything else you'd like to add?

20. Anything we didn't ask that you'd like to say about the subject of potholing existing buried facilities?

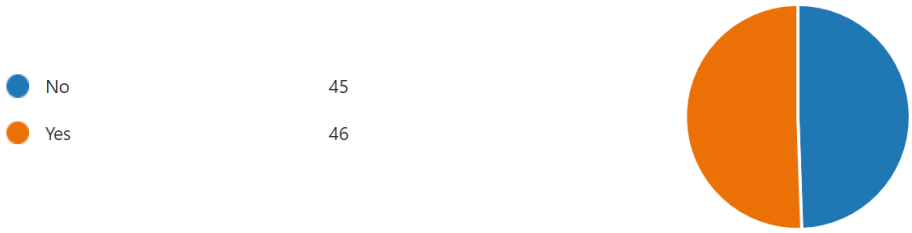
More Details

26
Responses

Latest Responses
"I think giving some direction on how and when to request a field meeting to di...

21. Would you be willing to talk to Underground Safety Board staff about your answers?

More Details



1 Excavators pothole to satisfy their understanding of reasonable care, knowing that they are responsible for any damages to a properly marked facility within the width of full tolerance zone to any depth.

2 I wish USAN would make potholing mandatory and require proof that the potholing was done. There's not enough policing or easy ways to report contractors who don't follow 4216. If Pelican's new system had a way to share photos between the excavator and the utility owners that would be great. I would pay more for that option any day. Contractors should also have to pay if you call in more than a certain amount of tickets in CA. The main reason contractors don't pothole is because they don't have access to hydro vacuum systems or it's too expensive to use/hire someone to vac for them. They also don't open up the surface of the asphalt enough and end up potholing an upside down mushroom shape because they don't want to pay for asphalt restoration.

3 No

4 Our work is location specific, so potholing is only conducted within a 12-inch diameter clearance area and specifically for the planned vertical installation. Horizontal distance does not play into the design as much as vertical distance between the surface and utility. Knowing the depth at which to look for or expect a facility is more relevant.

5 When pot holing you have to keep spoils 2' from ether side

6 Our excavation is very much outside of all the direct burial power lines, gas line and cables in an exception when it get close to the handhold

7 I thin its worth asking or making note that some utility companies allow (some times prefer) hydro excavation around their lines. This may be an important question moving forward as I am seeing a lot more of this style of daylighting.

8 Every time subsurface excavation is undertaken there can be "a surprise inside" leading to delay, realignment of the proposed fence footprint, damage to underground wet and dry utilities and worst case, injury. Performing potholing through hand digging after utility locations have been identified is the safest way we proceed. We also have engaged underground radar investigation for on-site locations too far away from dig alert markings.

9 May want to have a minimum distance based on industry experience (and change in direction). In this way, owners are also aware when contractors ask to do things. Better to be very safe.

10 The distance between potholes should be dependent on the information needed for the work and not prescript by the standard.

11 I think you could ask if anybody has ever encountered unknown existing infrastructure during potholing procedures. Just last week, I was completing a field inspection of existing onsite underground infrastructure so the contractor could begin backfilling and compaction for the footings and new building pad. The backhoe unexpectedly tipped forward and to the side. We had just found a 30+ year old septic tank, which forced me to make the call that additional excavation was required, and the existing leach field needed to be found and completely remediated.

12 The only bad potholes are in the ones we didn’t do. Most damages are caused because of taking markings for granted and only fools proceed.

13 there is a lot o buried facilities that are abandoned it will be good if they can identified for potholing purposes

14 We are asked sometimes to leave the potholes open during a boring operation. Critical crossbores over say high pressure gas or large telecom installs are ok being observed but minor crossings dont need to be left open so long as there is at least 12"-24" of vertical clearance

15 Many of the locators DO NOT mark the number of pipes in the work area, for instance ABC 4 Ducts 2".

16 I feel after being in the Grading and Excavation trade for all of 38 years, that the more information we have on utilities the better we are. To say that we should have an SOP that is standard would not necessarily be the answer. It would not hurt either, we have a process that we follow, every situation is different. With that said i feel that things like this survey are important and having people that help from 811 USA north is a huge help to us. I

have got a bunch of help in my last year from the staff at USA NORTH. The safety of our people and the public are the biggest concerns we have. Thank you for giving us the opportunity to complete this survey. Hopefully it will help make our trade safer every day.

17 Need to be present when contractor is potholing our facilities.

18 The SOP's are more for general changes and ensuring that the pothole info can be documented to ensure that the organization has a comfort level with the potholes done and can defend it if needed.

19 All of our excavation work is contracted out so we hold out contractors to standards through project inspection.

20 The number and locations of potholes required varies significantly depending on the specifics of the proposed construction project.

21 We call in Dig alert, we use private geophysical subcontractors to clear borings, we make all attempts to find drawings from utility or facility owner, we manually hand clear (or use air knife) to clear locations to a depth of 5 feet.

22 It is very important to get as much information possible from subscribers marking their facilities.

23 Expose an document depth an location on as built set plans

24 I would say there is no rules to minimize pothole scheduling. If you do not know where a facility line is, the only safe way to process is to hand dig and locate it period. Anything else could cost more than you can afford in terms of money and life.

25 no

26 I think giving some direction on how and when to request a field meeting to discuss specific worksite concerns or challenges would be helpful. Guidance and standards and maybe requirements for each party to engage in a field meeting if/when requested and time requirements to respond. I understand this is not a simple process to prescribe, or ensure it is managed appropriately.

22. Please provide your name

More Details

46
Responses

23. Please provide your email address

More Details

46
Responses

24. Please provide your phone number (Optional)

More Details

36
Responses

Depth Survey Questions

1. Which of the following best describes your role?
    - Excavation Contractor
    - Designer / Engineer
    - Facility Operator
    - Other
2. Do you currently use depth information from facility operators when potholing a proposed excavation area? (Includes operators that may perform potholing on their own projects using information from another operator)
    - Yes
    - No

(If "Yes" to Question 2)

Part 1 - Excavators:

Does an operator's depth information change your approach to potholing in any of the following ways?

3. The tools you bring to the job site?
    - No
    - Yes
4. If yes, How?
5. How you expose multiple stacked facilities of the same type?
    - No
    - Yes
6. If yes, How?
7. When you would choose not to pothole a facility?
    - No
    - Yes
8. If yes, How?

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9. Are you a facility operator (or a locator working for an operator) who may provide facility depth information to assist an excavation project?
    - Yes
    - No

(If "Yes" to Question 9)

Part 2 - Operators:

10. What factors about the facility information did you use in determining whether to provide it?
    - Your confidence in the detail or precision of the maps you have available
    - You have reason to doubt the methods used to obtain or record the depth information you have available
    - Your confidence that surface activities since the facility was installed have not impacted its current depth
    - Other
11. What factors about the excavator did you use in determining whether to provide the information?
    - My organization has previous experience with the excavator
    - I have a professional relationship with the excavator
    - I met with the excavator
    - The excavator provided assurances to me
    - Third-party information about the excavator, such as from Contractors State License Board, Better Business Bureau, etc.
12. What factors about the excavation itself did you use in determining whether to provide the information?

- Whether I provide a standby during construction
- Whether I attend an onsite pre-construction meeting with the excavator
- Whether I communicate directly with the excavator about the project via phone or email
- When I am aware of the excavation depth and know that our facility is buried sufficiently deeply that it is not in conflict

13. (Optional) Please rank the following concerns about providing depth information in order of importance:
    - The precision or accuracy of the depth information
    - Factors concerning the excavator
    - Factors concerning the excavation itself
14. Once you've decided that you would provide depth information, when would you provide it?
15. How likely are you to provide depth information to a crew working around your lines if:
    - Your organization hired the crew?
    - Someone outside your organization hired the crew?
16. Is there anything else you'd like to add?
17. Would you be willing to talk to Underground Safety Board staff about your answers?

(If yes)

18. Please provide your name
19. Please provide your email address
20. Please provide your phone number (optional)

Depth Survey Results

1. Which of the following best describes your role?

More Details

Excavation Contractor	11
Designer / Engineer	5
Facility Operator	11
Other	8

2. Do you currently use depth information from facility operators when potholing a proposed excavation area? *(Includes operators that may perform potholing on their own projects using information from another operator)*

More Details

Yes	17
No	18

12. What factors *about the excavation itself* did you use in determining whether to provide the information? *(Check all that apply)*

More Details

Whether I provide a standby du...	4
Whether I attend an onsite pre-...	5
Whether I communicate directly...	7
When I am aware of the excavat...	7
Other	4

13. (Optional) Please rank the following concerns about providing depth information in order of importance: (top is most important)

More Details

1	Factors concerning the excavati...
2	The precision or accuracy of the...
3	Factors concerning the excavator

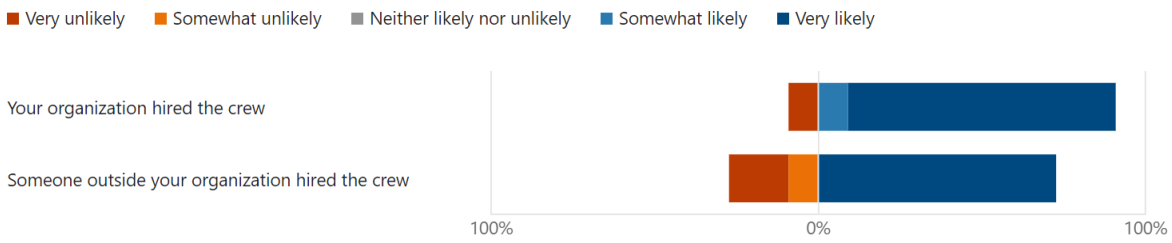
14. Once you've decided that you would provide depth information, when would you provide it?

More Details

Upon request	2
During project planning	3
When first responding to a ticket	2
When the excavator has attemp...	3
Other	1

15. How likely are you to provide depth information to a crew working around your lines if:

More Details



16. Is there anything else you'd like to add?

More Details

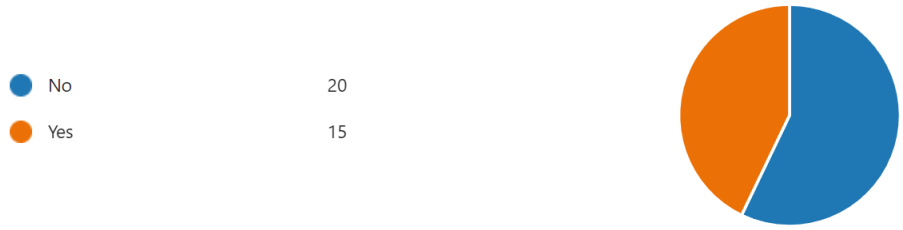
4
Responses

Latest Responses

"I would always provide depth information when asked but also tell the excavat...

17. Would you be willing to talk to Underground Safety Board staff about your answers?

More Details



Does an operator's depth information change your approach to potholing in any of the following ways?

Job Site Tools

3. The tools you bring to the job site?

More Details

4. If Yes, How?

More Details

6
Responses

Latest Responses

"as the majority of our sign posts go in 24" to 26", the information is valuable f...

"What equipment I need to use to expose the facility"

1 Do I use a mini Ex or backhoe or vac truck.

2 I am an engineer for a sewer district. We dont bring tools anywhere, we rely on contractors. As to previous question--the only information we rely on is our internal records and the USA.

3 Ground Penetrating Radar

4 Depth can determine not only the tool selection but the equipment or excavation technique.

5 What equipment I need to use to expose the facility

6 as the majority of our sign posts go in 24" to 26", the information is valuable for placement options

Multiple Stacked Facilities

5. How you expose multiple stacked facilities of the same type?

More Details

No	11
Yes	6

6. If Yes, How?

More Details

5
Responses

Latest Responses

1 Carefull hand digging or jetting with a vac

2 Vacuum excavation.

3 Hand dig when in proximity

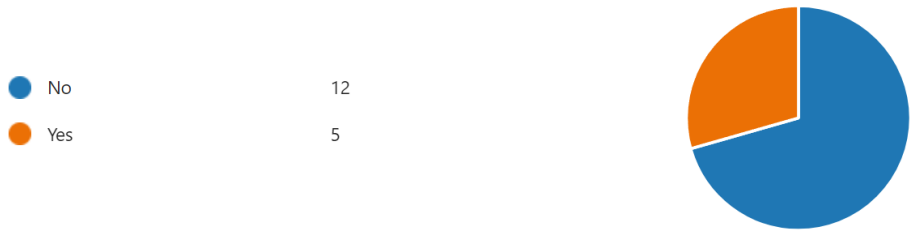
4 We do more by hand exposure around multiple facilities

5 If you are required to expose the facility 360 but have no depth then an utility strike could occur

When You'd Choose Not to Pothole

7. When you would choose not to pothole a facility?

More Details



8. If Yes, How?

More Details

6
Responses

Latest Responses

1 Regardless of what information is provided we will always pothole marked facilities.

2 An alternative location may be considered if a utility is present.

3 Difficulty in accessing the site, then just design to the best available information, and have the contractor to verify during construction.

4 We pothole when required by sewer conditions (presence of lateral tie to be connected for instance or because of a change of direction, presence of other utility etc), not to shorten the pull for pipe bursting or simply to find what is there. As such there is not really a choice as to whether to pothole or not.

5 When budget is tight and the design allows the contractor to go around any existing obstacles.

6 Currently, the requirement is you pothole "marked" utilities. usually, it may be only one mark to assume the depth for the entirety of the facility which can make trenching difficult. Also if a "vertical tolerance zone" is established then riles for using equipment are not allowable with 2 ft of the marked depth, then it may be beneficial in time and cost of a project

Operator Providing Depth Information

9. Are you a facility operator (or a locator working for an operator) who may provide facility depth information to assist an excavation project?

More Details

Yes	11
No	24

10. What factors *about the facility information* did you use in determining whether to provide it? *(Check all that apply)*

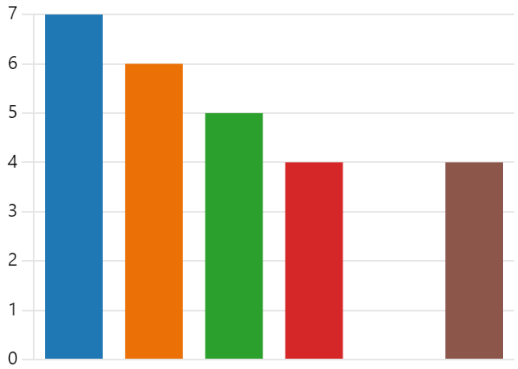
More Details

Your confidence in the detail or ...	5
You have reason to doubt the m...	4
Your confidence that surface act...	2
Other	4

11. What factors *about the excavator* did you use in determining whether to provide the information? *(Check all that apply)*

More Details

My organization has previous ex...	7
I have a professional relationshi...	6
I met with the excavator	5
The excavator provided assuran...	4
Third-party information about e...	0
Other	4



Anything else?

1 no

2 Certain engineered projects come to us with pothole information of our facilities. Others send us plans and notify us of a project coming and we pothole in advance and relay that information and discuss possible conflicts.

3 We provide the depth as much as possible. We do explain to the contractor that it is not exact and that they are still responsible . But i do believe that it has help us avoid some dig ups

4 I would always provide depth information when asked but also tell the excavator it is only an estimate and they must still dig with care