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Vacuum excavation has grown in popularity over the last decade and many excavators, contractors and utility owners now require it when working around their utilities or facilities. Vacuum excavation can be done by air pressure or water pressure, creating a jet of force to penetrate the ground without puncturing the utility when contacted. While this form of excavation is by far one of the safest methods used in the industry today, there are pros and cons to its use that need to be considered.

#### Identifying facilities without exposing

Yesterday's accepted form of identifying a utility was probing, and there are a variety of probes made for different soil conditions. Some will have pointed tips while others are rounded; some have just a T-bar handle, while others come with hammers. Hammers are great in frozen

or dense soils, however they deliver more of an impact on the utility when it is contacted. A couple of concerns have risen over the years regarding probing. First, it takes a skilled hand and experience to know when you have contacted a utility with a probe. Even then it may take a few attempts in order to verify you have contacted the utility, and not a series of cobble rocks that usually frequent pre-disturbed soil. The effects of probing should be taken into account, especially for metallic utilities, as should the age of the utility to be located, since backfilling requirements are not the same 40 years ago as they are today. Today we have such equipment as Ozzie padders, Outlaw, and ALLU grinder and shaker buckets. These buckets provide a very nice backfill and supporting underbelly for the utility itself in order to help with sagging after the trench has settled and cycled through a few periods of freeze and thaw.

The second main concern is that probing has been linked to coating damage, which over time leads to holidays and pitting. The pointed tips on probe rods help drive through hard soil, compacted sand, and clay but can damage utilities that have older types of coating such as coal tar. Coal tar was used as a rock shield and often flakes off when exposed if it has undergone exposure to moisture over time. That is why the guessing game of what a contractor, third party, or utility representative may or may not find is eliminated when using vacuum excavation, as it gives you an opening in the ground to see your utility with minimum potential for damage.

#### Minimizing damage with vacuum excavation

Vacuum excavation is done with either a large truck that comes with onboard water heaters, compressors, and generators or mobile tow units. Vac trucks may be able to carry more excavated material, however they are sometimes cumbersome and bulky. Vac trucks are favored on solid ground where there is ample room to maneuver and work. Transporting the excavated material may take considerable



turnaround time and cause delays without the availability of an onsite or nearby dumping area. Also, environmental permits may need to be applied for depending on the location and material of the area to be excavated.

Mobile units are designed to be more portable and used in congested or difficult-to-access areas, which means that oftentimes contractors may purchase a tow-behind unit as they are more user friendly and applicable to a larger variety of working environments. If vacuum excavation is regularly required in a contractor's scope of work, they may purchase tow-behind units for efficiency, independence, and long-term cost effectiveness.

In most cases, vacuum excavating a utility provides a pot-

hole simply to identify where a utility is, not so much to fully expose it. A pothole is most commonly a circular hole in the ground leading to the suspected area where the utility may be. How the pothole will be made depends on what the contractor needs to know. If a utility just needs located, then the pothole will be made just to the top of the utility so the owner or contractor can verify that it is indeed there. This measure is often required as assurance and verification within company's safe work policies and procedures.

If the exact size and location is needed then the pothole will identify both the top and sides of the utility with the sides fully exposed until the downturn is verified. This allows contractors to identify the common 2' rule, which means



An ALLU bucket in action.



An exposed plastic gas service and tracer wire.

The answer is that vacuum excavation is a form of mechanical excavation, however it is not deemed to be a form of excavation that the rule is intended for, such as those made by a trackhoe, backhoe, or tiling machine. If a bore is to take place near or under a utility then the entire utility must be found, and definitely should include the top, sides, and bottom of the utility. This determines location, size, and surrounding environment of the utility as some utilities share a trench with others. This information should be gathered and openly communicated in a drill profile before any type of bore is made which crossed or parallels any utility, including all con-

ventional bores, horizontal directional drills, track bores, cradle bores (suspended bores), and hammer bores (thumpers). It is recommended that a coating representative or corrosion technician who has hands-on coating application experience, knowledge with multiple coating brands and application methods, and who is NACE (National Association of Corrosion Engineers) certified, should accompany any pothole excavations to verify the coating condition during and following vacuum excavation. This information is vital for possible repairs needed on the coating and the overall condition of the coating on any utility in that vicinity.

Potholes made on utilities crossing right-of-ways that will undergo construction should be done a minimum of three times per utility. More than three potholes may be required when the direction of a utility changes and 100% verification of location is needed on the right-of-way area to be constructed on. This helps identify the points of intersection, and is a recommended practice for verifying direction, depth, and shared trench lines. This step is crucial for the safety of any crews that might follow with excavation activities, as the more exact the data provided, the safer the crews will be in the future.

that no mechanical excavation should occur within 2' of any buried facility. This rule is common in the industry, however due to recent line contacts and accidents in the oil and gas industry, some companies are reviewing their internal damage prevention policies and procedures, and increasing the minimum footage mechanical excavation is allowed. This raises the question that if vacuum excavation is mechanical excavation, should the rule apply?



Three pot holes have been made along the path of this buried utility, meaning it could be intersecting another line somewhere down the path.



Exposing entire spans of buried cables in a right-of-way.



#### Pros and cons of vacuum excavation

**Pros** – Potholing a utility by vacuum excavation is the safest form of excavation today. It should be practiced following submission of a one-call ticket for the area to be excavated. Potholing provides a form of positive identification required in most damage prevention programs today and can eliminate any guesswork relative to size, depth, and location of a utility in question. Excavating with a tow-behind unit can also mitigate environmental damage to sensitive wetlands or areas affected by rain or runoff.

**Cons** – Truck units gain weight the more they excavate, and this weight can make them heavy and difficult to access wet or congested areas or right-of-ways. Approved dumping may be an issue due to lack of space or environmental regulations. Getting water for the hydro-vac units may also cause additional turnaround time. These variables should be considered when determining the type of vacuum excavation service you may pursue, or if it may be worthwhile to purchase your own small unit. And of course, both tow-behind units and trucks are mechanical and anything mechanical can break, causing downtime at the dig site.

Whichever way you decide to implement this good practice, be sure to remember your men and women operating these units. They will be exposed to all kinds of weather, and vacuum excavating can be a dirty and exhausting job.

In an effort to maintain safe conditions, be sure they are equipped with insulated water proof clothing, hearing protection, hand protection, and comfortable safety glasses. Also be sure that whatever type of vacuum excavation rig is used for potholing, that there is an equipment safety checklist completed daily on the unit, and that at minimum it has a first-aid kit, approved fire extinguisher, and a spill kit.

