The Tolerance Zone.

WHAT IS IT? WHY DO WE NEED IT? WHAT DO I NEED TO BE CAREFUL OF?

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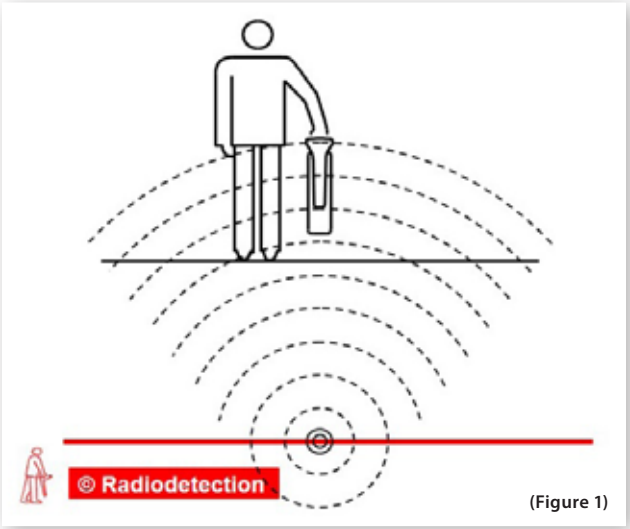
"**The line is right here.** That's where the mark is." In our industry, comments like this happen every day. An excavator makes a locate request, a facility owner sends a locate technician to mark the lines, and digging commences. According to the Common Ground Alliance DIRT report, 99% of the time this process works – underground facilities are protected from damage because of this simple process.



(Figure 1)

For the other 1%, different conversations occur: "Why was the mark offset from where the line was?" or "I was digging well off the mark, and I hit the line." These type of scenarios create other questions: "Why were the marks different?" and "How can we protect underground facilities when this occurs?"

The Tolerance Zone helps these situations. The Tolerance Zone is a defined horizontal space from the outside wall or edge of an underground line or pipe. The size or width varies by state and is defined in the individual state One Call legislation. In Pennsylvania, the Tolerance Zone is 18 inches, while in Florida the Tolerance Zone is 24 inches. Figure 2 shows the Tolerance Zone for the continental United States. For a 2-inch pipe or cable, the Tolerance Zone would be 38 inches wide (18 + 2 + 18) in Pennsylvania and 50 inches (24 + 2 + 24) in Florida, centered from the temporary mark placed by the locate technician.

The Tolerance Zone is important because the location of underground facilities is *indirectly* determined with locating equipment. What does this mean? Locating Theory 101 says that cable locators do not find cables. They find electromagnetic fields. Almost all locating equipment consists of two parts: the receiver (the piece of equipment in the locator's hands) and the transmitter. Both work together to help find the approximate location of underground facilities.

The transmitter is used to induce a radio frequency in the land mass near where underground pipes or cables are located. The receiver looks for the electromagnetic fields that find and surround the cable or pipe from the transmitter. The locate technician sweeps the receiver across the ground and measures the level of the electromagnetic field.

The location of the strongest electromagnetic field above ground, by inference, is where the cable or pipe is 'located'. See Figure 1.

Common sense suggests that this location is accurate. If the transmitter is clamped to the cable or pipe above ground, then the underground portion of the cable or pipe acts as an antenna, radiating electromagnetic energy that the receiver can easily and accurately find. However, this is not always the case.

There can be distortion in the electromagnetic field above ground – distortion caused by changing density of the earth, the composition of the earth, other underground facilities, the moisture content of the earth, and other factors. Because the level and direction of the distortion is unknown and unseen, the location of the underground facility may not be exactly where the strongest electromagnetic field is located above ground. This can cause the facility mark not to be exactly above the underground facility.

This is where the Tolerance Zone helps protect underground facilities. Because the location of the underground facility is found by inference, and the location mark may not be exactly where the underground facility is located, a Tolerance Zone surrounds the mark. Figure 2 shows the size of the Tolerance Zone by state. The Tolerance Zone is used to account for discrepancies caused by distortion, and to help protect underground facilities.

An excavator should *always* assume that the underground facility could be **anywhere within the Tolerance Zone** on either side of the temporary mark. When digging within the Tolerance Zone of a facility mark, extra care should be taken. Prudent excavation techniques –digging by hand or using soft excavation techniques such as vacuum excavation – should be employed until the location of the facility is exposed and known.

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(Figure 2)

Can I dig in the Tolerance Zone? What do I need to be careful of?

You can dig in the Tolerance Zone, but you must protect underground utilities by hand digging, pot holing, soft digging, vacuum excavation or other similar prudent excavation techniques. In some states, only hand digging is allowed within a Tolerance Zone. Excavators need to know the laws that apply to each dig site.

Use caution when digging with hand tools inside the Tolerance Zone:

- Never use pick axes, pointed spades or digging bars.
- Use a blunted shovel to loosen dirt, and a regular shovel to remove dirt.
- Never stab at the soil. Use a gentle prying action instead.
- Dig at an angle and parallel with the utility line. This will allow the shovel to slide off the surface of a pipe should you hit one.
- When you expose under-ground utilities, the color of the pipe or line may not indicate the type of facility contained within. For example, a plastic gas line may not be yellow.
- **Treat all lines as if they were live.**
- Support lines when soil is removed.
- If you encounter an unmarked line that is outside the Tolerance Zone, do not assume that the line was marked incorrectly. This may be another utility line.
- Locate marks must remain visible during your job.
- When using horizontal or directional drilling/boring, the depth and location of facilities along the boring path must be verified by means of vacuum excavation or hand dug test holes at each point. This includes all utilities that cross the boring path.
- Do not assume the depth of the utilities. Utilities may have been originally installed at a prescribed depth, but erosion or grade changes may cause the depth to change.
- Never dig up to a Tolerance Zone. Always expose the line first, and then dig up to the exposure.
- Utilities/Locators should accurately represent the size of the facility when marking, but that doesn't always happen. Don't assume the width of the facility based on the marks.

The Tolerance Zone also protects you. If you do not respect the Tolerance Zone, you risk damaging buried utilities. You also risk indirect damage by removing supporting soil, which could cause the utility to bend or break. You could be injured or killed, and your company could be liable for any damages that occur.

If you discover an unmarked utility, do not assume it is abandoned, retired or out of service.

When an excavator finds an unmarked or inaccurately marked facility, CGA Best Practices 5-21 recommends stopping excavation in the vicinity of the facility and notifying the facility owner/operator directly or through the One Call center. The excavator may continue work if the excavation can be performed without damaging the facility, unless specified otherwise in state/provincial law.

Excavation After Digging in the Tolerance Zone and Finding the Utility.

If your excavation work requires utilities to be exposed in significant spans, CGA Best Practices 5-22 recommends supporting or bracing exposed utilities to protect them from moving or shifting. Protecting exposed utilities helps to ensure that the utility is not damaged and at the same time protects employees working in the vicinity of the exposed utility and the surrounding neighborhood. The facility owner is the best source on how to support and brace exposed facilities. ESG

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