To deliver high quality, efficient, safe and innovative solutions to protect City of Aurora's infrastructure and critical utilities.

Our goal as water utility locators is to have a 100% accuracy rate when providing locates to our customers

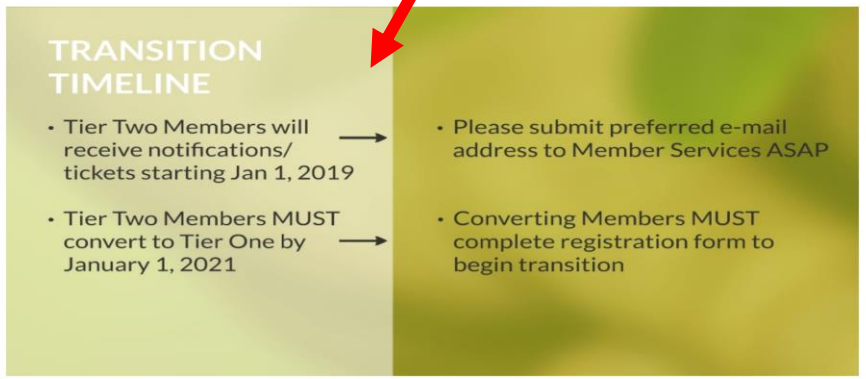
We strive for excellence!

An electric current that reverses itself is?

Alternating Current

How a locate through the one call sy

1. Notify your local 811 call center (by dialing 811) or using the online request 2-3 days before the work begins.
2. The utility owners have 48 hrs. (business days) to complete the locate request .
3. Respect the marks and dig with care.
4. The locate marks are good while visible or 30 days after the locate.



What does a Water Utility Locator do??

- **We are responsible for pinpointing the paths of water lines, cables and other conduits that carry utilities underground.**

- **Our efforts protect the City of Aurora's infrastructure from damage during projects involving excavation**

How much leakage is acceptable for packing glands?

20-60 Drops per minute

Accurate underground utility locating is critical in preventing unintentional utility strikes and ensuring that projects proceed safely, on-time and within budget.

Really?

811 CALL 811 BEFORE YOU DIG

IT'S FAST.
IT'S FREE.
IT'S THE LAW.

We want YOU to stay SAFE!

Not calling 811 before digging can pose several dangers and consequences:

- **Serious injury or death. Hitting a service line can result in electrocution. A punctured gas line might require an evacuation or could even cause an explosion.**
- **Loss of service. Cutting a fiberoptic line can cause a loss of cable TV, internet, or phone service.**
- **Excavators, including homeowners, could be penalized for not calling 811 or for ignoring location markers.**
- **Utilities could be penalized for not responding to requests to locate lines or for improperly or inaccurately locating or marking underground facilities.**
- **Failure to notify can also result in fines, something that's sure to grab homeowners' attention.**
- **Worst-case scenario is that damage resulting from a no call excavation leads to serious injury or death.**

AURORA

Explosion at Heather Gardens
Aurora, Colorado
November 16, 2018

Before digging or excavating, you must call Colorado 811 or submit a locate ticket.

It’s the law & at no cost

to you!

Click or Call Before you Dig!

Practicing safe digging and excavation starts with contacting Colorado 811. Whether you're a homeowner wanting to refresh your yard or a professional excavator, you need to know what's below! Colorado 811 makes it easy for homeowners and professionals who are going to excavate do so safely by submitting a utility locating ticket request online or call 811 before you dig. Either way, you can have the underground cables, wires and utilities marked before you begin excavating so that you are safe and do not destroy important underground facilities.

I'm not digging very deep. Do I really need to contact 811?

Yes, no matter how shallow or how deep you are digging, you must contact 811 first. Colorado State law defines excavation as "any operation in which earth is moved or removed by means of any tools, equipment, or explosives and includes auguring, backfilling, boring, ditching, drilling, grading, plowing-in, pulling-in, ripping, scraping, trenching, hydro excavating, post-holing, and tunneling".

Clear water entering a sewer system may indicate?

5 STEPS FOR SAFE DIGGING

Working on an outdoor project? Careless digging poses a threat to people, pipelines and underground facilities. Always call 8-1-1 first. Here are five easy steps for safe digging:

811

1. NOTIFY
Call 8-1-1 or make a request online two to three days before your work begins. The operator will notify the utilities affected by your project.

2. WAIT
Wait two to three days for affected utilities to respond to your request. They will send a locator to mark any underground utility lines.

2-3

3. CONFIRM
Confirm that all affected utilities have responded to your request by comparing the marks to the list of utilities the 8-1-1 call center notified.

WARNING

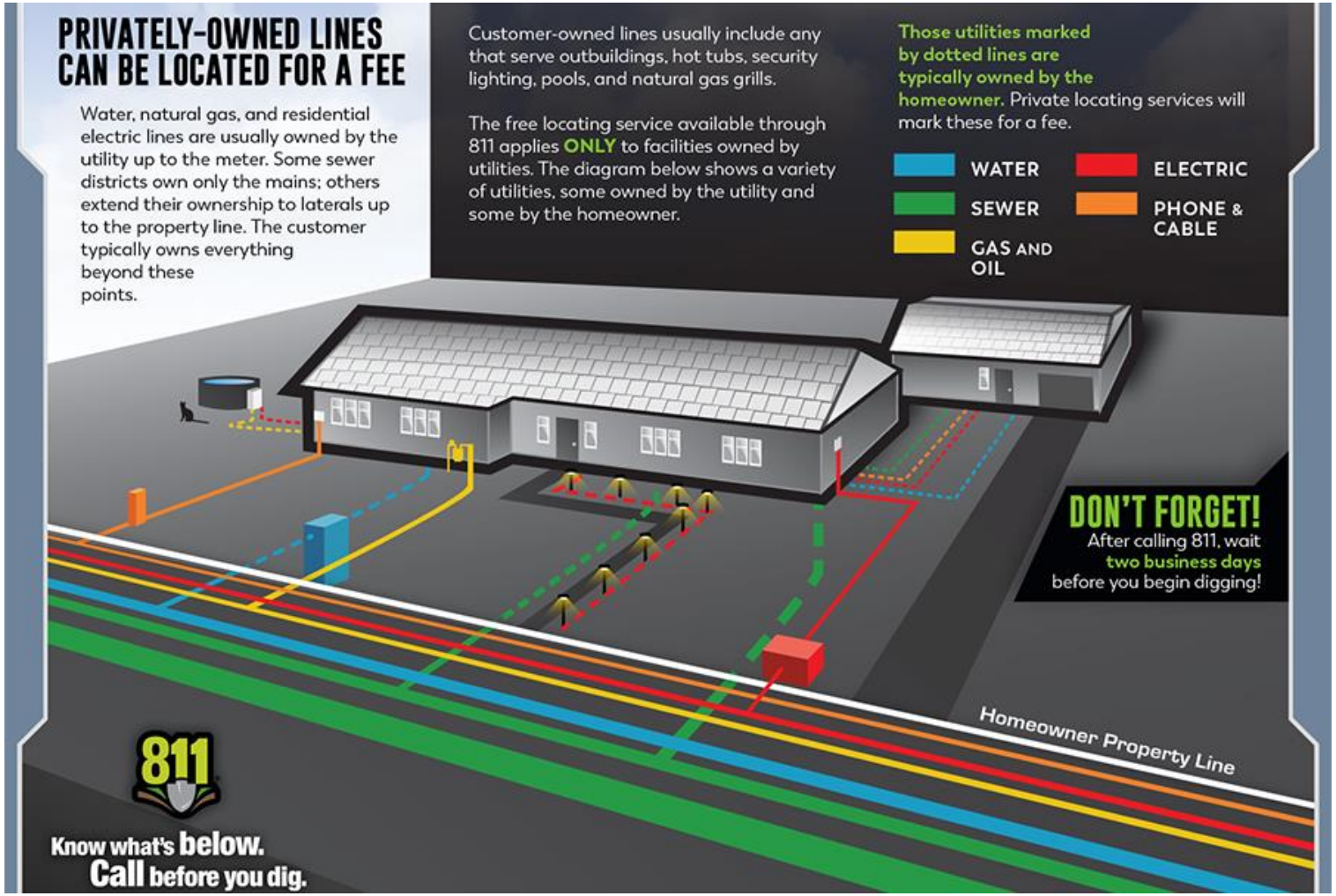
4. RESPECT
Respect the markers provided by the affected utilities. The markers are your guide for the duration of your project.

5. DIG CAREFULLY
If you can't avoid digging near the markers (within 18-24 inches on all sides, depending on state laws), consider moving your project location.

Source: call811.com

Inflow
&
Infiltration

AURORA



Who locates Private utilities?

Who marks the utilities?

The utility companies will mark the lines, some have in-house locators who mark their lines, while other hire a locating firm to mark their lines. **Colorado 811 is not a locating company and does not locate utilities.**

City of Aurora's Infrastructure

Water Department- Water, sanitary, storm drain, reuse, raw water, fiber optic & electric

Parks Department- Irrigation

Public Works- traffic electrical

Private utilities - Are owned by the owner of a property and will not be marked with your request. These can include water and sewer laterals, power to a detached garage, sprinkler/irrigation systems, lines connected to a propane tank or septic system, etc. There may be private utilities within your dig area. It is your responsibility to have private facilities marked. For a list of private locating companies, please visit https://colorado811.org/private-locate-companies/.

A		Ordinary Combustibles	Wood, Paper, Cloth, Etc.
B		Flammable Liquids	Grease, Oil, Paint, Solvents
C		Live Electrical Equipment	Electrical Panel, Motor, Wiring, Etc.
D		Combustible Metal	Magnesium, Aluminum, Etc.

Fire Extinguishers

Class A = Paper
Class B = Oils
Class C = Electric
Class D = Metals

Ho e underground utilities, pipe or cables?

The depth of utilities varies by location and by type. Erosion or leveling may cause the depth of a utility to change over time. For that reason, utility owners/operators only indicate depth if it is known. City of Aurora locators will not give depth of a utility to the contactor

Water Utility Locator Hazards

- ***Locators routinely encounter a variety of safety hazards on a daily basis.***

1. Working in traffic
2. Climate and weather
3. Insect bites and stings
4. Walking, lifting, bending and squatting
5. Slips, trips and falls
6. Time on the road / Your office is in your truck.

Which direction must you pick up traffic control cones? (assuming they were properly placed.)

PLANNING

Reverse order in which they were placed.

Safety practices begin in the planning phase of any work area. which includes hazard recognition and analysis.

Locators should perform a preliminary inspection of the work area for signs of all hazards in the area before performing a locate.

Proper PPE

Working in the field requires personal safety equipment, including the following:

- Hardhats
- Steel-toed boots
- Gloves
- Safety Glasses
- Work Vehicle equipped with an Arrow board & safety cones.

City of Aurora has their locate tickets generated through PelicanCorp Software – Locate Access App

1/1/2024 - 9/30/2024

Call Data

179,169
Total Calls

2:43
Average Hold Time

5%
Caller Disconnect Rate

8:16
Average Talk Time

Ticket Data

264,479
Voice Tickets

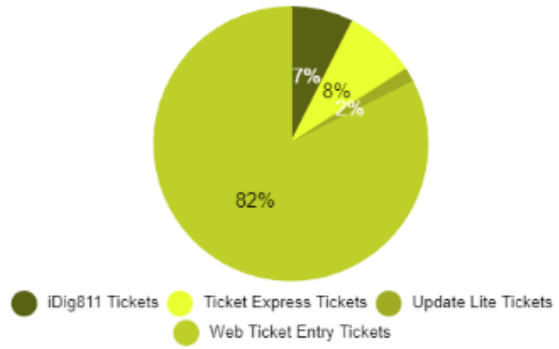
690,693
Total Online Tickets

955,172
Total Tickets Processed

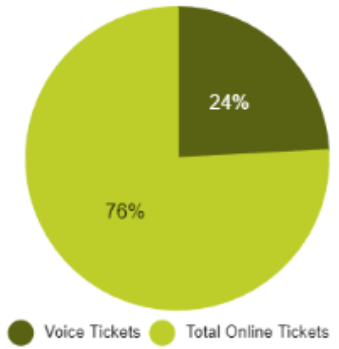
48,797
Excavator Renotifications

5.1%
Excavator Renotifications % of Total Volume

Online Tickets



Ticket Data



LocateAccess™

Citywide

DYLAN ROBY

Tickets (527 records)

Order by...

Filter...

Start route from | My location | Point on map | Route by priority | Route by time | Show my location | Zoom to all

Legend

Layers

Norm **4 d** 417101593

1181 Ursula St - Aurora

Fence New/footers — Leo Cisneros

Marvin Centeno — **Analysed**

SELECT | START POINT | END POINT | ZOOM

Nonc 4 d 417100261

1563 S Biscay Ct - Aurora

Sump Pump New — Nick Weyand

Groundworks — Analysed

Nonc 4 d 417100970

0 E 40th Ave - Aurora

Storm Install — Connor Neenan

Fiore & Sons, Inc — Analysed

Nonc 4 d 417101134

6000 Catawba St - Aurora

New Com Gas Svc /Potholing — Dylan Roby

Mears Group — Analysed

Nonc 4 d 417102134

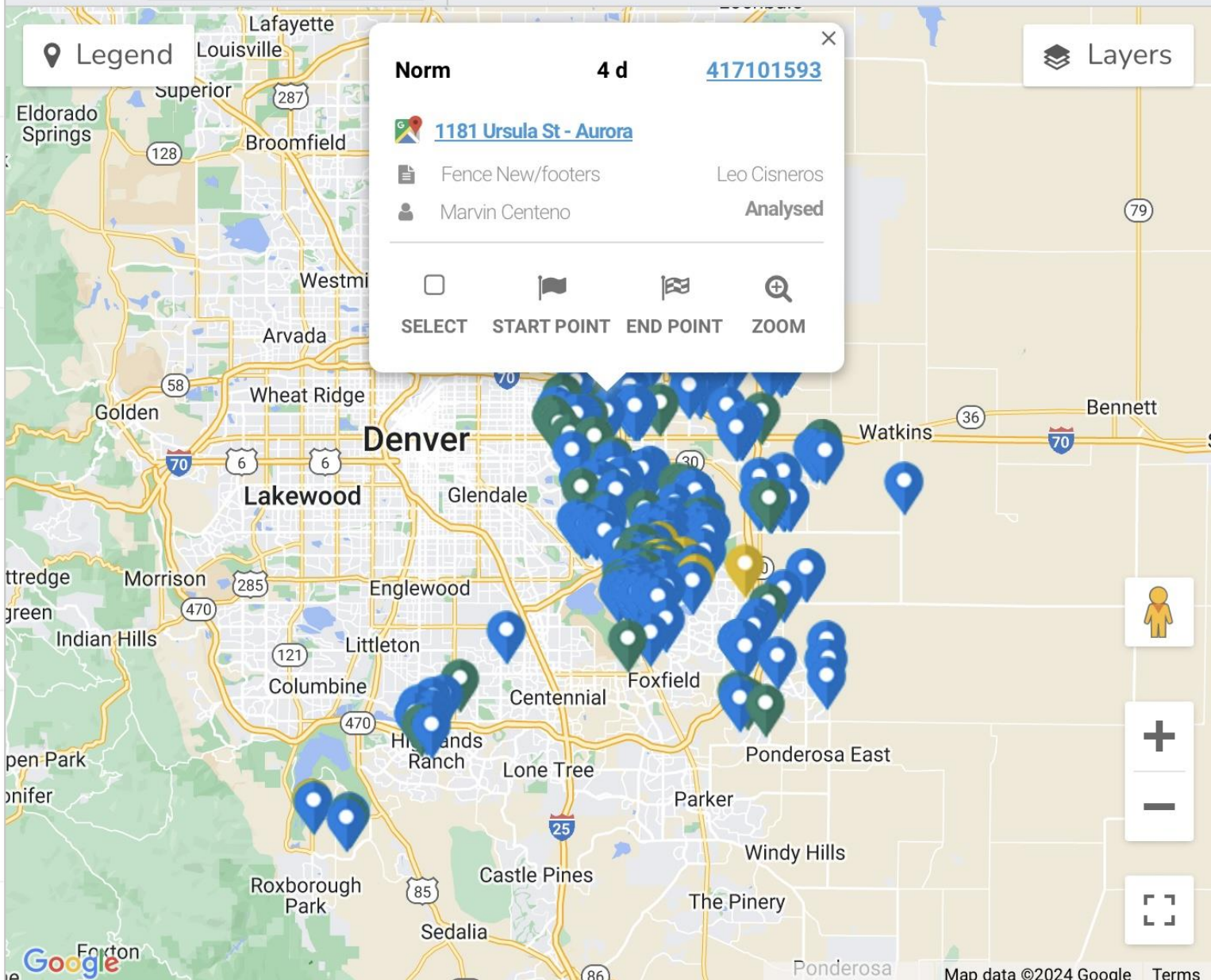
2663 S Vaughn Way - Aurora

Fiber Conduit New/pothole — Gina Lofton

Mainline Construction — Analysed

Rush 1 d 416500874

1918 S Coolidge Way - Aurora



Emergency Request

EMERGENCY

- An Emergency Request is for immediate excavation necessary to prevent *loss of life, damage to property, damage to underground facilities, or restore a service outage*, when advance notice for the proposed excavation is impractical under the circumstances.

- Emergency Requests are prioritized ahead of all other types of locate requests, and Member Facility Owners/Operators will respond as soon as practicable. Should the facility owner fail to respond as stated in the "Recommended Member Facility Owner/Operator Response", the excavator should submit an Excavator Re-Notification and contact the facility owner directly.

- The excavator making the Emergency Request must be at the excavation site within the time frame as stated in the "Recommended Member Facility Owner/Operator Response".

- Emergency Requests may be processed 24 hours a day, seven days a week.

- The excavator must give the Colorado 811 agent the type of emergency and if there are any safety hazards on site (example gas blowing, high vehicle traffic area).

- Respond to all after hour emergencies within a two-hour time frame.

Opening 811 ticket request

```
Ticket Nbr: B426701398-00B
Original Call Date: 09/23/24  Time: 01:36 PM  Op: DBE
Locate By Date    : 09/25/24  Time: 11:59 PM  Meet: N  Extended job: N
State: CO     County: ARAPAHOE          City: AURORA
Addr:      0  Street: S ESPANA CIR
Near Intersection(s): S ENSENADA WAY
Grids: 04S066W34SE                :                :              Legal: Y
Lat/Long: 39.658352/-104.762142 39.659468/-104.761675
        : 39.656858/-104.758574 39.657974/-104.758107
Type of Work: H2O MAIN REPL                                  Exp.: N  Boring: N
Location: LOCATE ENTIRE INTERSECTION OF E ESPANA CIR & S ENSENADA WAY. CONTINUE
        : LOCATING EAST DOWN E ESPANA CIR FOR APP 900FT ROW TO ROW FROM 3200 TO
        : 3264 E ESPANA CIR. TO INCLUDE LOCATING DOWN THE CUL-DE-SAC OF S ESPANA
        : CIR FROM ROW TO ROW.  *ACCESS OPEN* PAINT/FLAG/EMAIL SKETCH
Company : CITY OF AURORA WATER                        Type: NONR
Address : 13645 E ELLSWORTH AVE
City    : AURORA                          St: CO  Zip: 80012
Caller  : DARION BELT                  Phone: (303)815-4077
Fax:   Email: dbelt@auroragov.org
Done for: CITY OF AURORA WATER
Remarks:
```

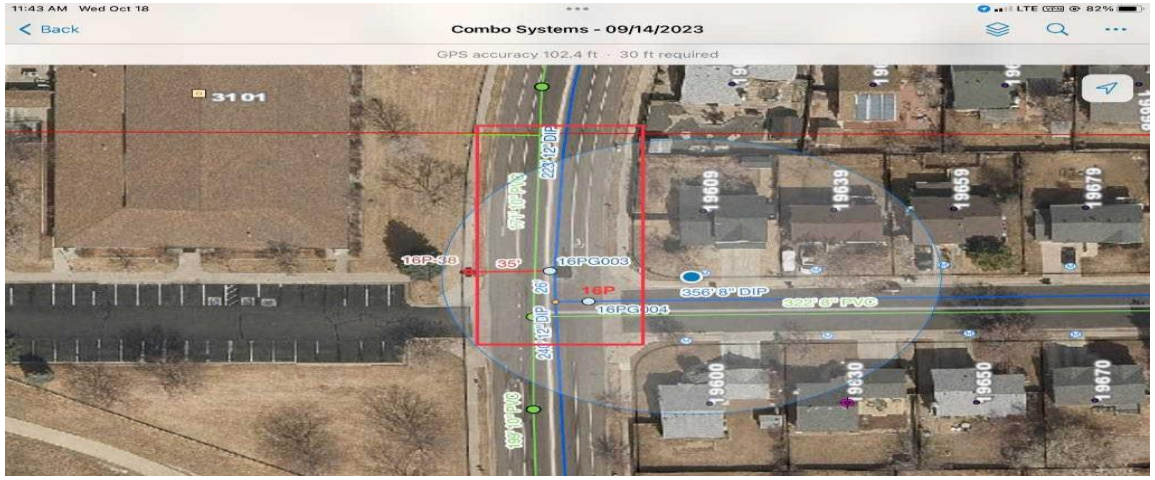
City of Aurora Water Service

Combination Underground Location Sketch

Service Center: 303 326-8645 Fax: 303 326-8085 After Hours: 303 739-6241
13645 E. Ellsworth Ave. Aurora, CO 80012

AURORA WATER

Service Request: 329101402		**Date:** 10/18/2023	11:41:00
Requested Location: 0, S FLANDERS ST	AURORA		
Company Name: CITY OF AURORA WATER			
Contact: DARION BELT	**Phone:** (303)-815-4077 ext.	**EMail:** T_DLOCATES@AURORAGOV.ORG	
Request Type:		**Completed:**	

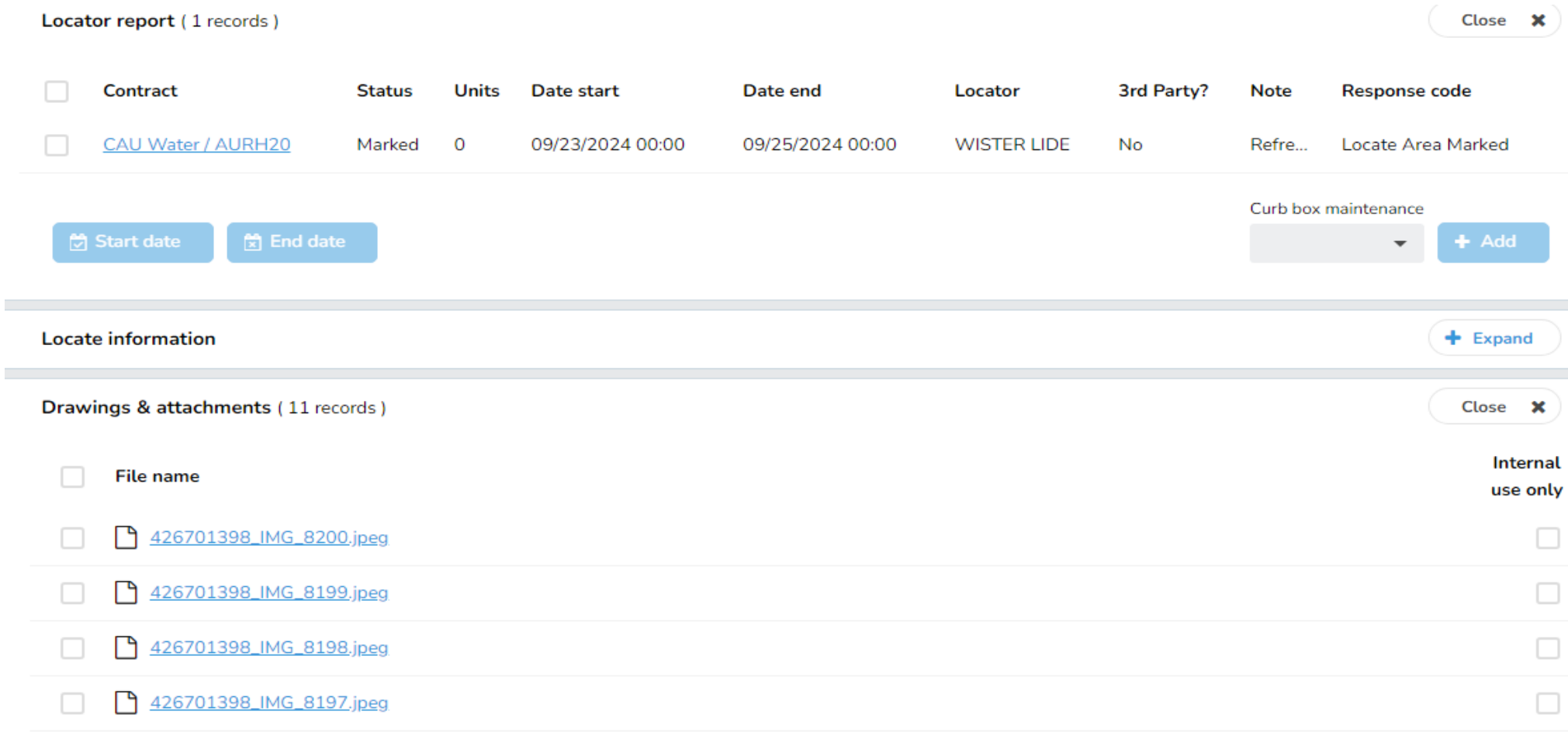


Customer Comments:
LOCATION: **HAZARD: N/A **EMERGENCY** **REP ON SITE: Y IF NO, ETA: N/A : **REASON:SERVICE WILL BE OUT **MARKING INSTRUCTIONS: LOC ENTIRE : INTERSECT THEN CONT LOC N/100FT ON S FLANDERS ST *ACCESS OPEN* GRIDS: 04S066W34*E : : LEGAL: N LAT/LONG: 39.660868/-104.759293 39.660912/-104.757518 : 39.659169/-104.759250 39.659214/-104.757475

Additional Comments:
STATUS: Marked - LOCATOR NOTES:
ADDITIONAL NOTES:

♦Locates are within 18" from either side of locate mark.♦
Color code: Blue for water, green for sanitary and storm lines, red for electric, orange for fiber, and purple for re-use water.
Locate sheets must remain on the job site. When working over or crossing Aurora's water utilities the excavator must pothole and expose all water lines affected and visually observe the safe crossing. This locate is valid for 30 days.
State law CRS 1973, 95-15-101 (Senate Bill N-155) requires everyone planning to dig in or near a public road, street, alley, right-of-way, or utility easement to notify the Utility Notification Center of Colorado of your intent. (Two business days before you dig) Call 811.
If city of Aurora utilities are not found or located according to the sketch, you must notify 811 immediately for relocate.

Completing a locate ticket




THE FORUM
DEVELOPMENT COMPANY
COMING SOON
ER

Utility locating equipment we use day to day

What is one disadvantage of PVC pipe?

Difficult to locate

RADIODETECTION®

AURORA

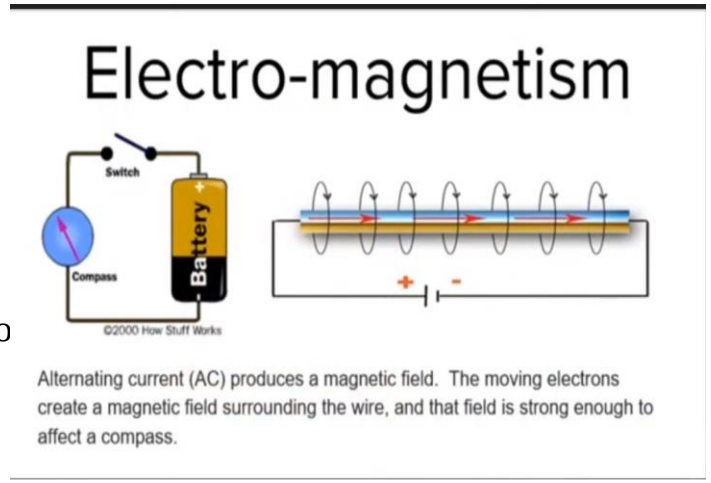
McLAUGHLIN

Providing Solutions Since 1921

AURORA

The basics

- As confusing as it may appear, it all boils down to one simple thing: magnetic fields. Remember that electricity produces magnetic fields, and that forms the basis for utility locating.
- It all works off magnetics. Anytime electric current flows, it produces a magnetic field. **Electro-Magnetism**
- To understand how locators work in conjunction with these magnetic fields, let's start from the beginning. The most commonly used locating systems utilize two basic components: a transmitter and a receiver (a hand-held wand). Both are battery powered.
- The transmitter sends current through a line, and the receiver detects the resulting electromagnetic waves, or frequencies, produced by that current.
- The receiver is capable of picking up a wide range of frequencies, typically ranging from a low end of 256 Hz to a high end of 8 kHz (or 8,000 Hz).



Advantages of Electro-magnetism

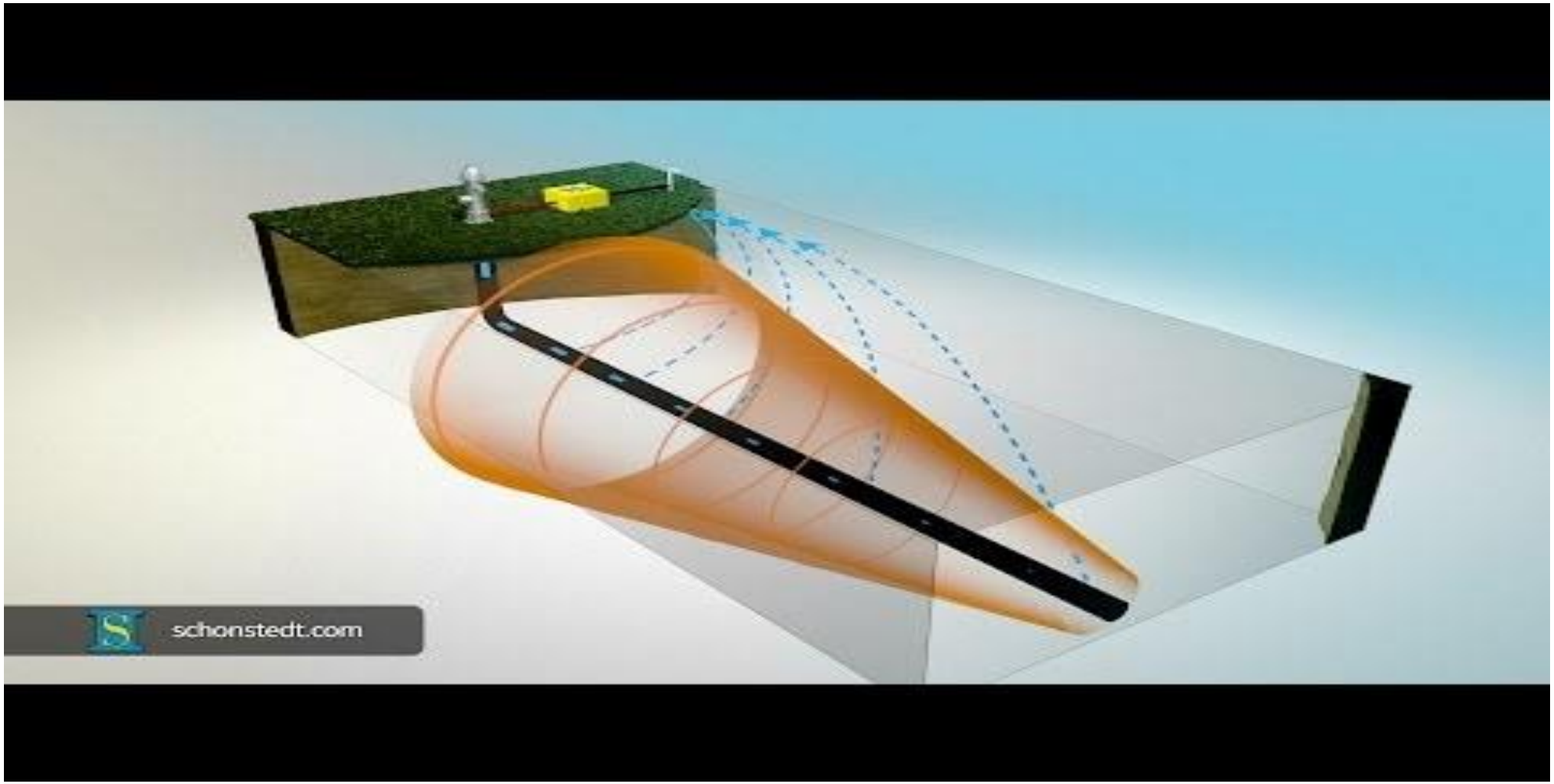
1. Locate through all soils and cement
2. Measure depth
3. Measure current
4. Current direction
5. Isolate your target line

Two types of locating / Active vs. passive locating

1. **Active locating** involves searching for a specific line using either the direct connection or inductive method. Each line gives off a signal, so the locator is either attached directly to the line or, if the operator cannot make a direct connection to the line, a frequency is selected and induced into the ground which attaches itself to the utility.

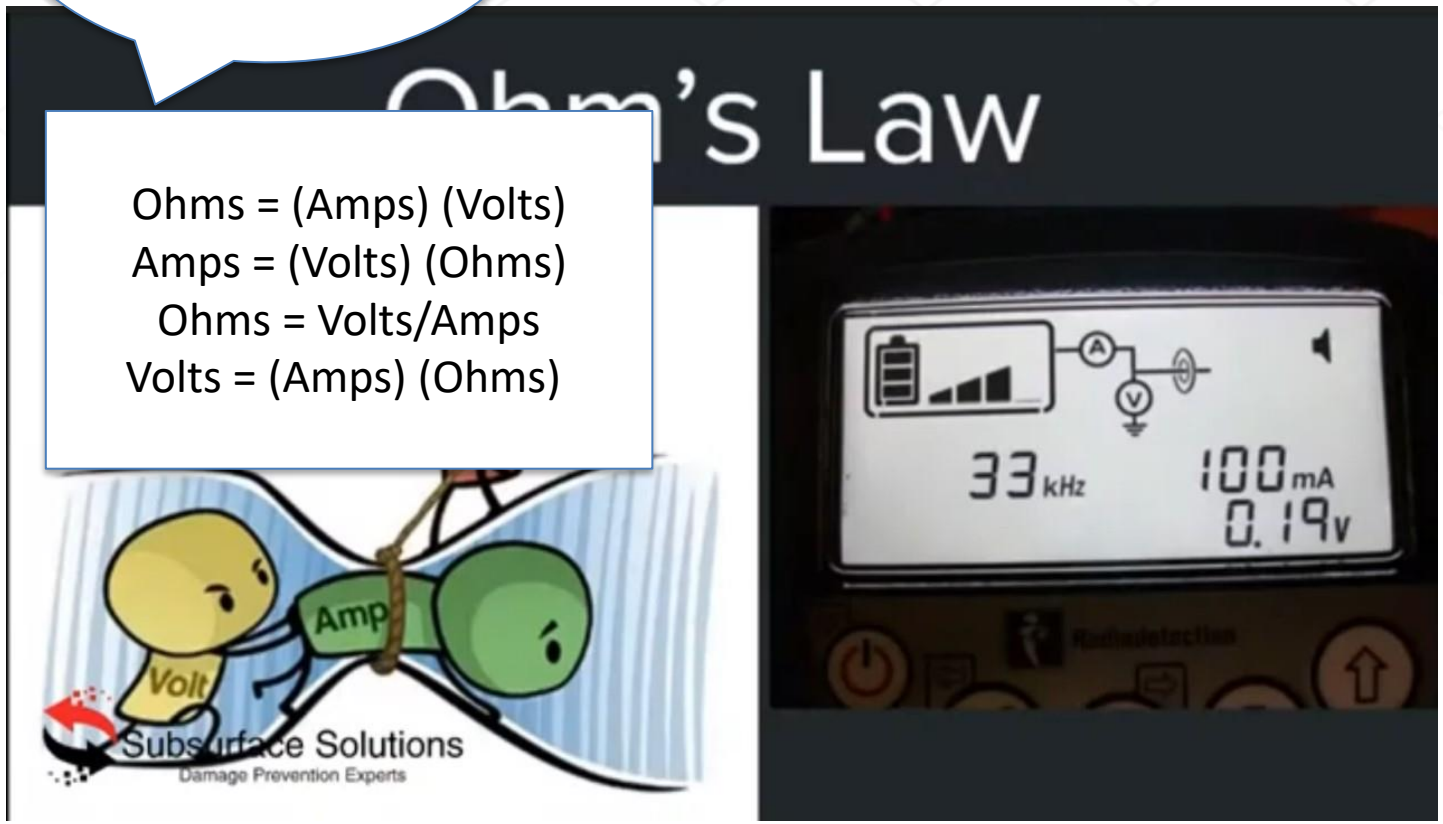
2. **Passive locating** is a method used by contractors to check the area for unknown lines. This method detects any frequencies created by energized conductors and radio signals being radiated by utilities. However, this method does not allow the operator to distinguish between the types of lines. Passive locating is often used in two ways: at the beginning of a project to scan the jobsite for utilities where access points are unknown and as a final step after utilities are located to ensure no utilities were missed. Good method to use for electric and communication lines, but ***NOT*** water.

Basic concept of utility locating



Which of the following represent Ohm's Law?

Ohms = (Amps) (Volts)
Amps = (Volts) (Ohms)
Ohms = Volts/Amps
Volts = (Amps) (Ohms)



Ohm's law is where it all begins.

Ohm's are the resistance that restrict the amps passage.
Volt's are what push the amps down the line.

Volts = (Amps) (Ohms)

Frequencies

- Transmitters, receivers, milliamps, and hertz (Hz) and kilohertz (kHz) frequencies — how does it all work?
- Turn on the transmitter and choose a low frequency, then set the receiver (wand) to the same frequency. Look at the wand's milliamp reading to verify good continuity; the higher the milliamp reading, the better the connection.

Why start at a low frequency? A lower frequency is not as prone to "bleeding off" onto other nearby lines, which is critical in an area congested with underground infrastructure.

High Frequency is Like a Flashlight

Low Frequency is Like a Laser Beam

Subsurface Solutions
Damage Prevention Experts

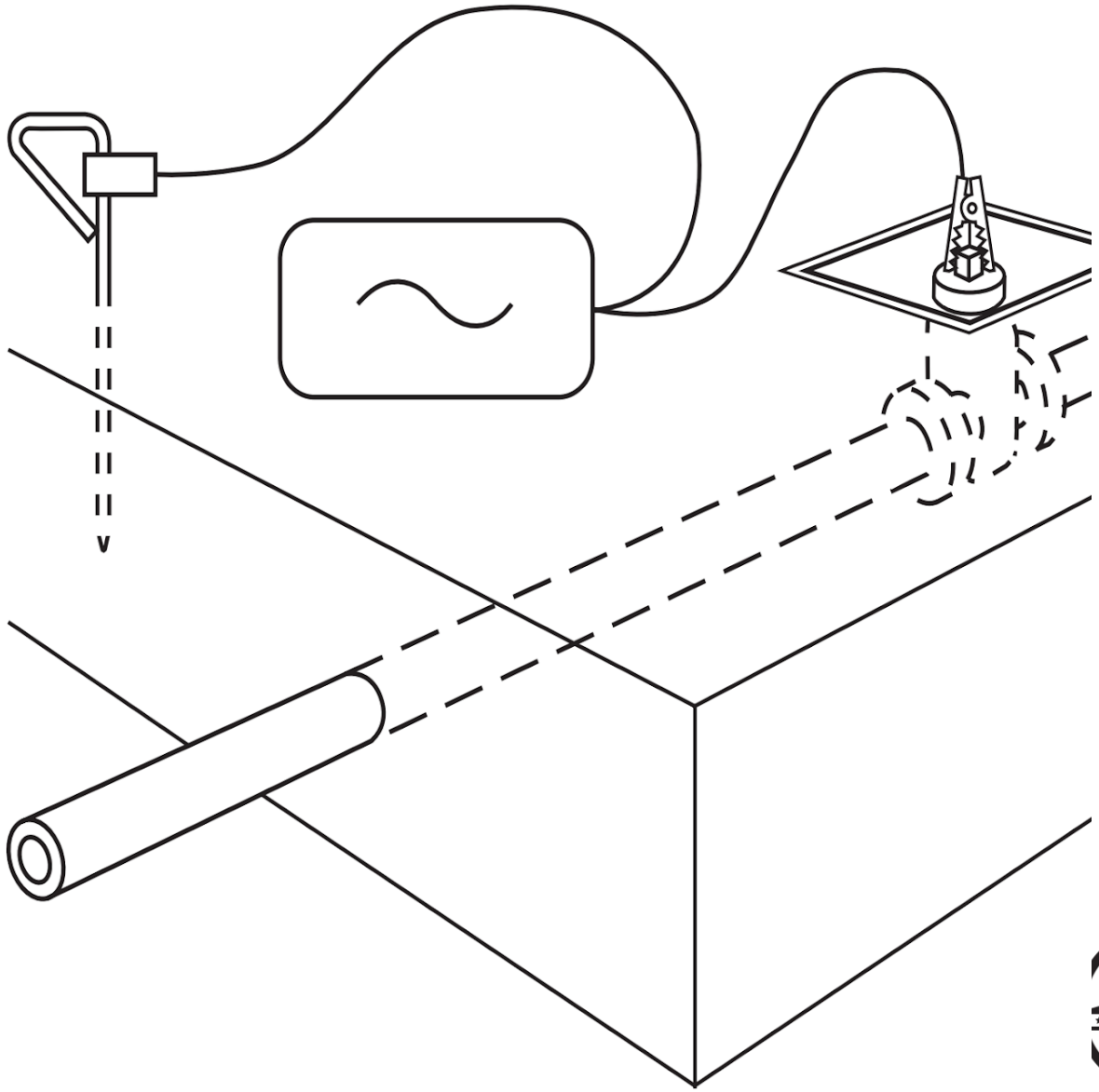
Determining which Frequency to use

- 8-9 kHz will travel further and less likely to bleed over to another utility.
- 33kHz will have a stronger signal, but it won't travel as far, and it is more likely to bleed off onto another utility.

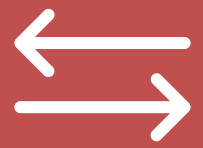
Poor ground connections or bad ground placement are two of the most common rookie errors in utility locating.

If you're working in an area with multiple utility lines and place a ground stake over a telecom line, the receiver may recognize both that line and the gas line you're looking for.

That will result in bleeding off — you won't isolate the line you're trying to find.



What can you do to improve your ground



Move your ground 90 degrees perpendicular from the target line.

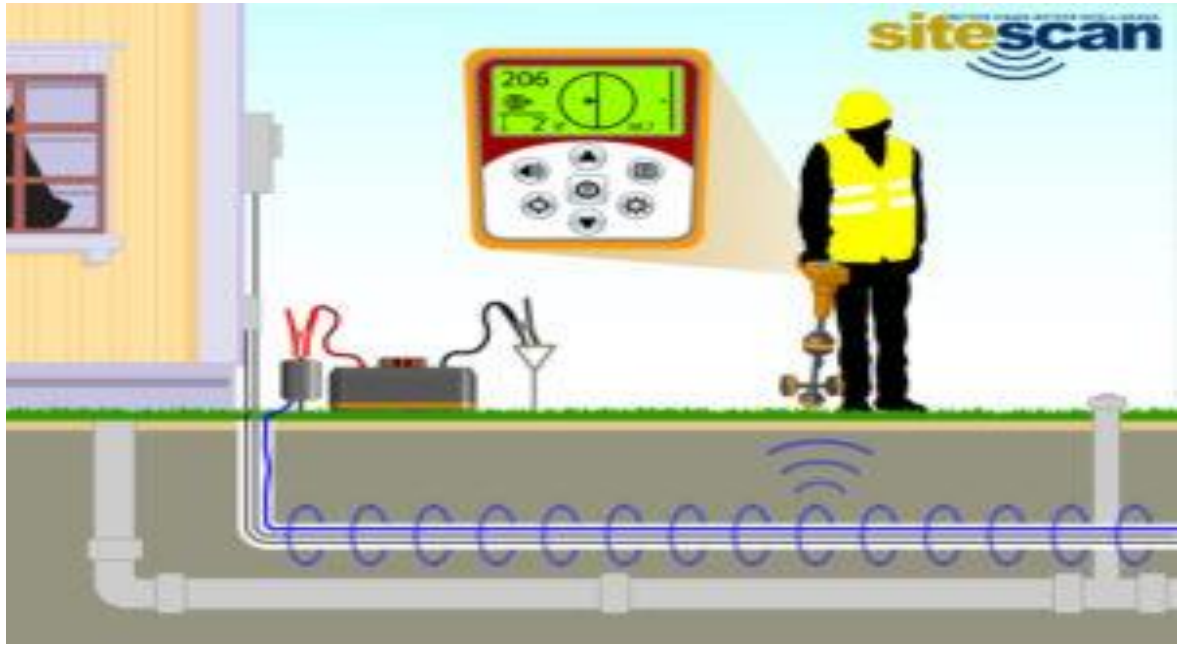
Your ground could potentially be placed on top of another utility. (move your ground to another location within the target area).

Adding water to dry soil will help your ground.

Ductile iron pipe (DIP) would use which type of joint?

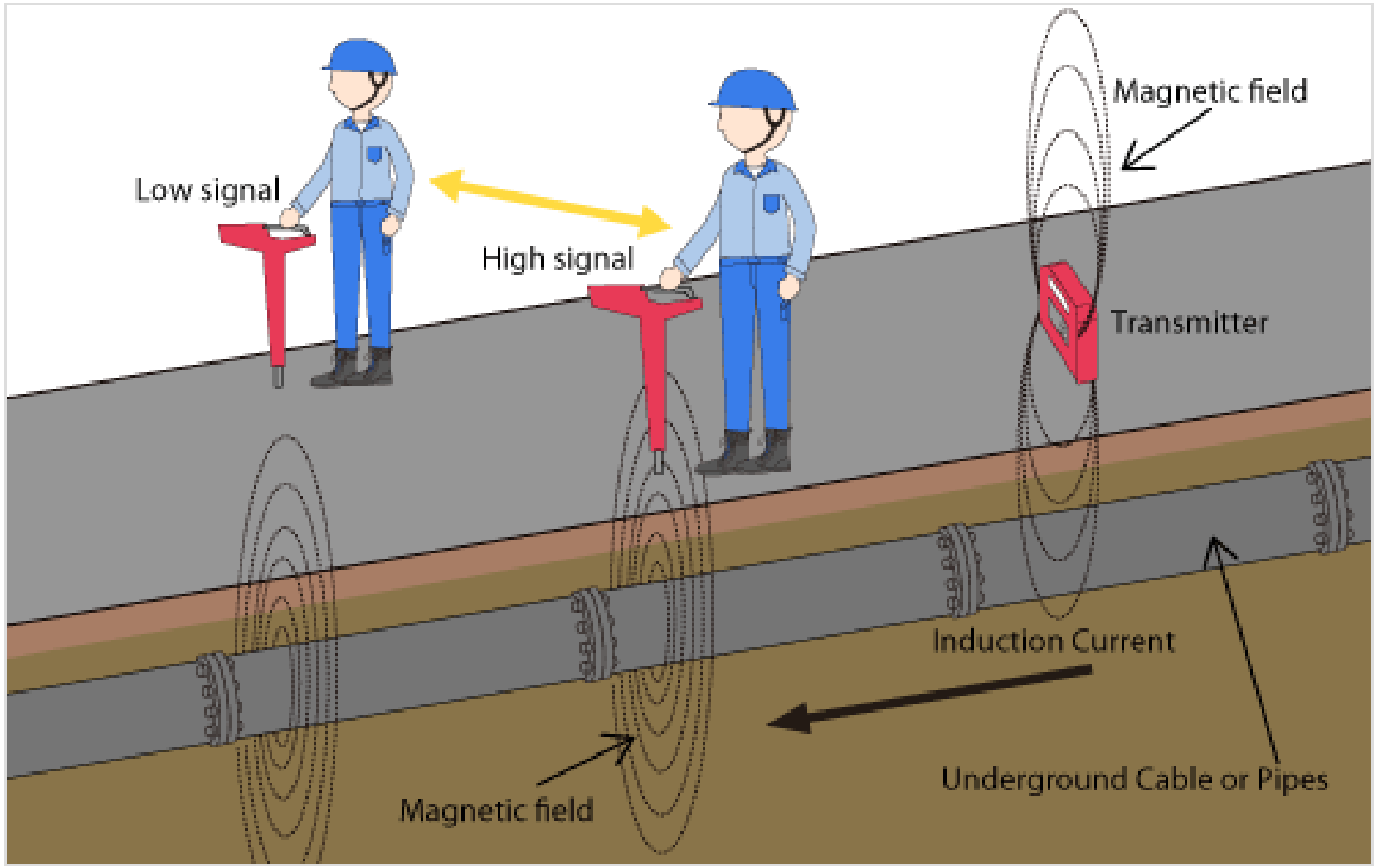
Conductive Locating

Restrained



- Direct connection or hookup made to a conductor (Utility, pipe or cable). This can be done with any locate machine.
- Connect the red lead to the target utility, and the black lead to the ground placed 90° and as far away as possible from the conductor and away from any known adjacent conductors.
- **Preferred method**

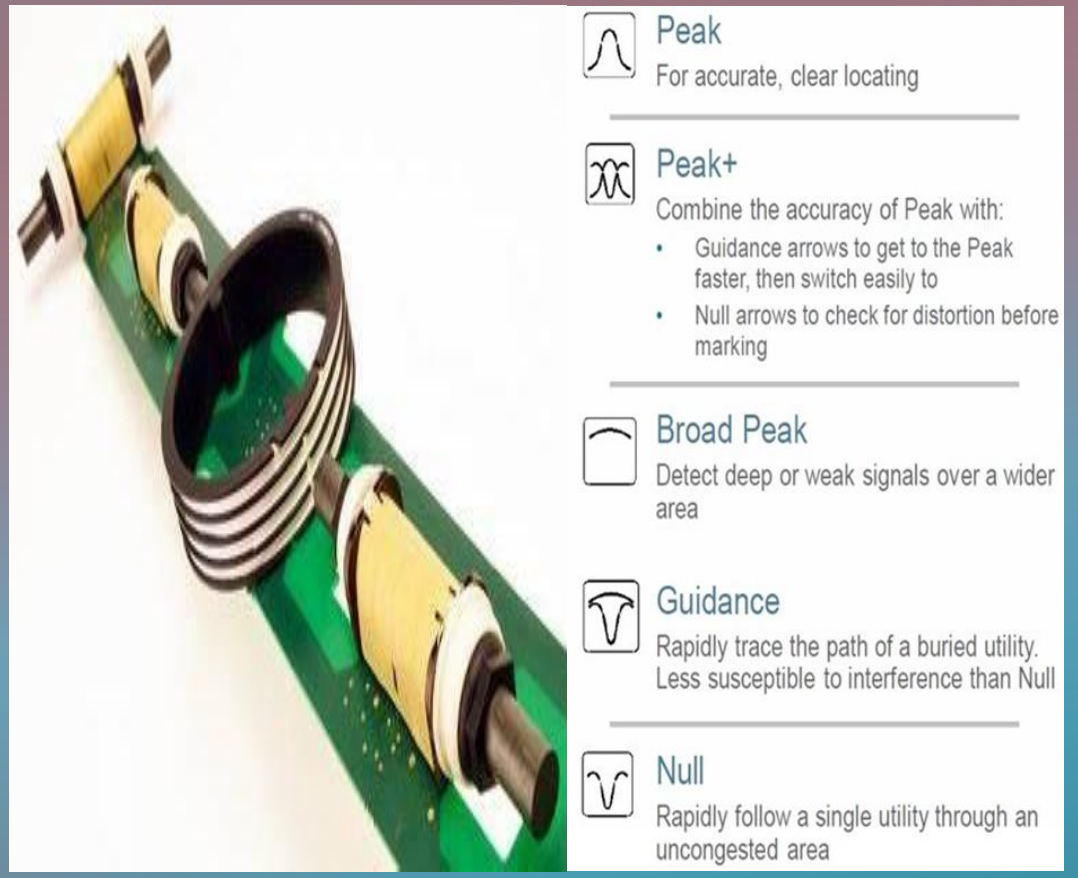
Inductive Locating



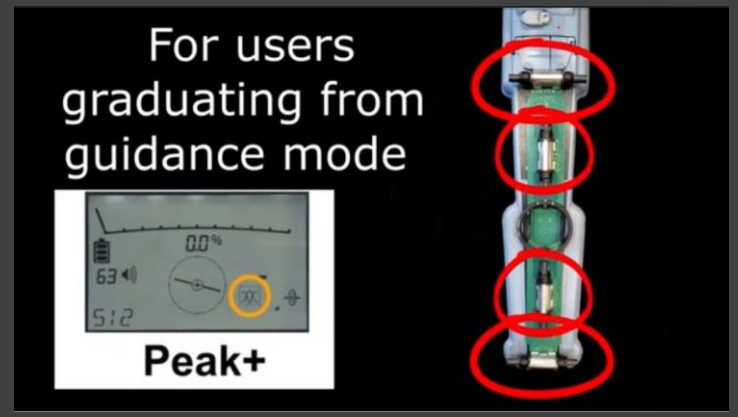
In an **inductive locating** method, energy from the transmitter's antenna is transferred to the underground utility without metal-to-metal connection. It is one of the best methods to make the current flow in the circuit when you are not able to make a direct connection to the utility.
This is one option if a Conductive locate fails

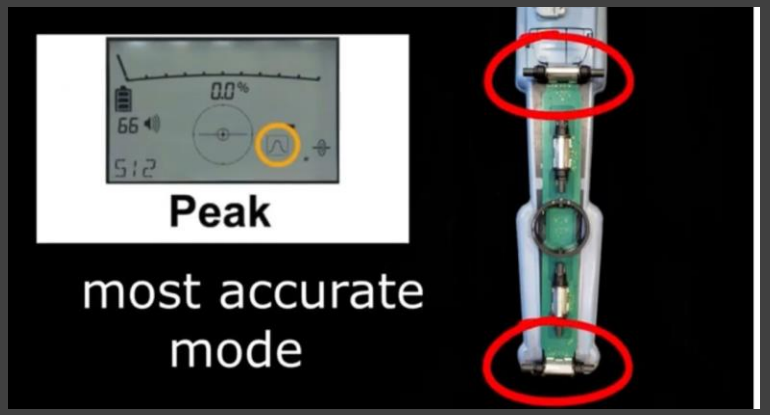
Locate Antennas

With a unique combination of 5 antennas, the RD8100 AND RD7100 offers a choice of locate modes, each of which is optimized for specific activities




Broad Peak
for deep or weak signals


For users graduating from guidance mode
Peak+


Peak
most accurate mode


Null
for verifying your Peak response


Cruise control best for new users
Guidance

Locate using Peak mode

Peak Mode

Antenna used to locate the utility, pipe or cable

- Peak mode provides the most sensitive and accurate mode for location and depth measurement.
- It provides a sharp Peak response with a corresponding small decrease in sensitivity.

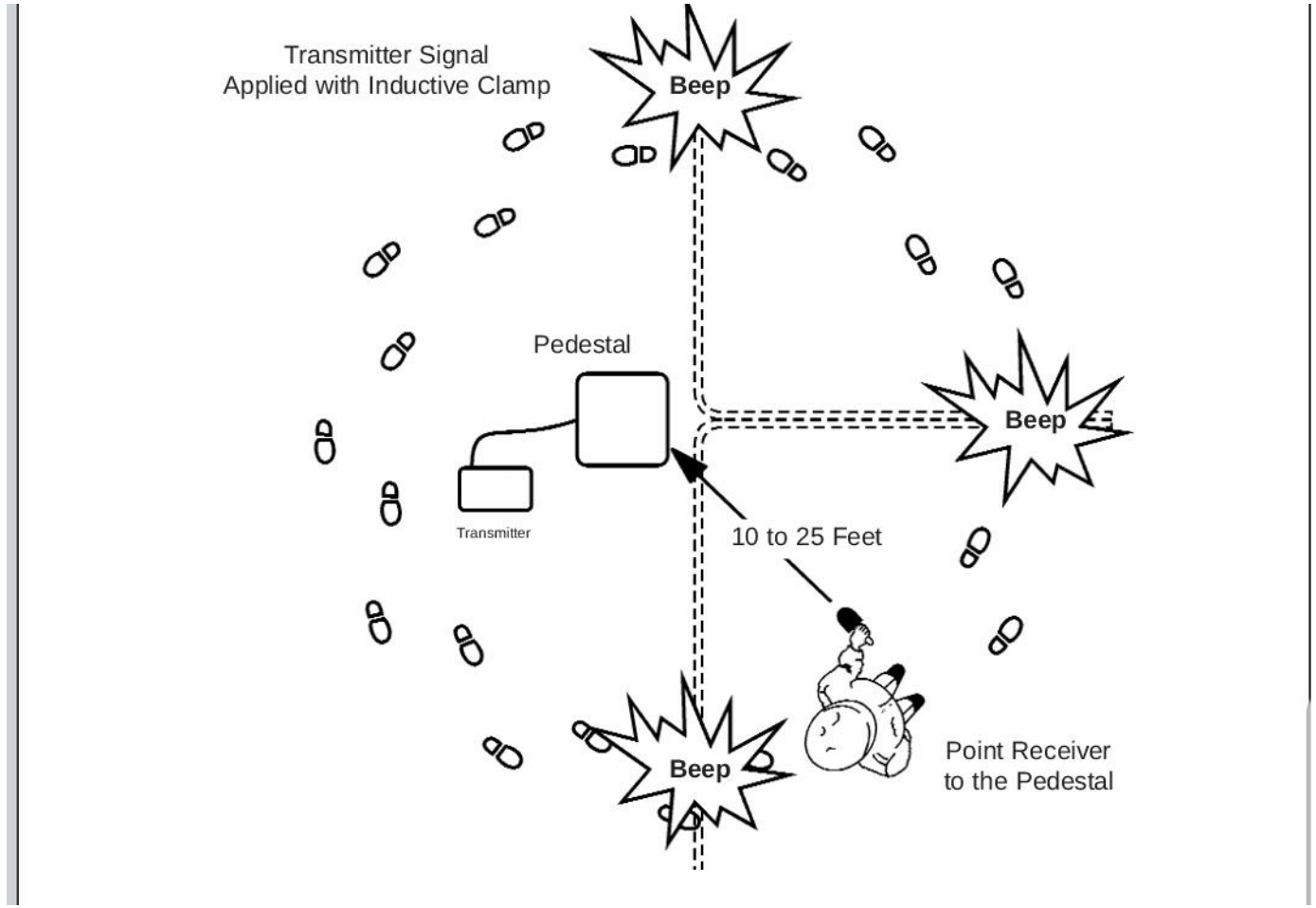
Verify Locate using Null Mode

Null Mode

Antenna used to verify the locate

- Null mode is used to verify a locate signal in environments with limited or no electromagnetic distortion.
- In null mode the following indicators Signal strength.

360° Sweep of the work area



Perform a 360° Sweep of the target area and follow the path of the strongest signal

- After choosing a frequency, move about 30 feet away from the transmitter and walk in a 360° circle. As you do so, look for a peak response on the wand, which is indicated both numerically and by a change in a tone emitted by the wand.
- The pitch goes higher when you're directly above the line you're seeking. After you find a peak signal spot, follow the expected trace path.
- Every 5 feet or so, move the wand from side to side to ensure you're following the peak signal path. Do this for as long of a distance as needed. If the signal suddenly weakens, the pipeline probably changed direction. Utilize the compass feature and directional on the wand's display panel to guide you back.

Bleed-off

- Bleed off happens when more than one utility is energized in the locating process. During a locate, you're essentially using a flow of current to create a magnetic field around a utility. When utility lines are close together, and you are using a high frequency it is easy to energize multiple lines at once. Bleed off reduces the quality of the readings on both the intended utility and the nearby utility the user wasn't trying to locate.

Common mistakes locators make in the field

The Problem:

Swinging the receiver excessively to the left and right. The swinging motion is so instinctive even the most seasoned locators will catch themselves doing it from time to time. It’s also the quickest way to mislocate.

The Fix:

Keep the locator level and parallel to the ground at all time. Move your arm from side to side in a smooth steady motion as you pass over the target signal. Avoid 'breaking the wrist' as you pass over the signal.

Mistake #2: Not being "well-rounded"

The Problem:

Trusting your gut during the locating process is something that comes with experience. Relying too heavily on a reading from the receiver doesn't always lend itself to an accurate locate. If a user doesn't trust his or her gut and take the time to create a round signal, they might end up with an occurrence called bleed off.

The Fix:

There's nothing wrong with confirming a gut feeling to ensure a round signal and eliminate bleed off. Where users do a level sweep of the suspected top of the cable or utility while utilizing the Peak Mode which will show you a percentage. When the highest percentage is shown, you should stop and paint that area. Then walk to the left until the percentage reaches 0% and paint a line. Do the same thing on the right. The distance from your center point (high percentage) to your left and right marks should be equal —this indicates a round signal on the intended utility

Mistake #3: Fixating on one frequency

The Problem:

In any trade, it's easy to learn a process one way and stick to that method because it works — and why complicate things? If you're a locator, you likely have one or two frequencies that have become your bread and butter over the years. But what happens when you're on a jobsite and you can't get an accurate reading using those tried-and-true frequencies?

The Fix:

Experienced locators know the importance of utilizing every tool in their tool belt. This means venturing outside the frequencies they're most comfortable with in order to provide the most accurate locate. Sometimes a frequency you swear never works for you will be the exact one to get you the most precise locate. Think outside the locate box!

ANY QUESTIONS?