



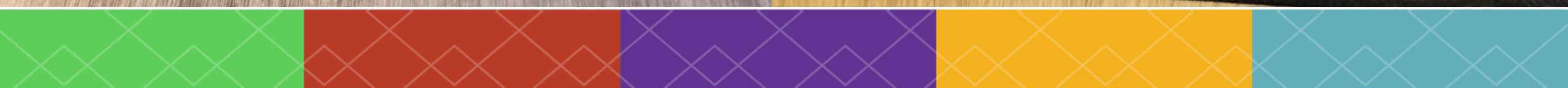
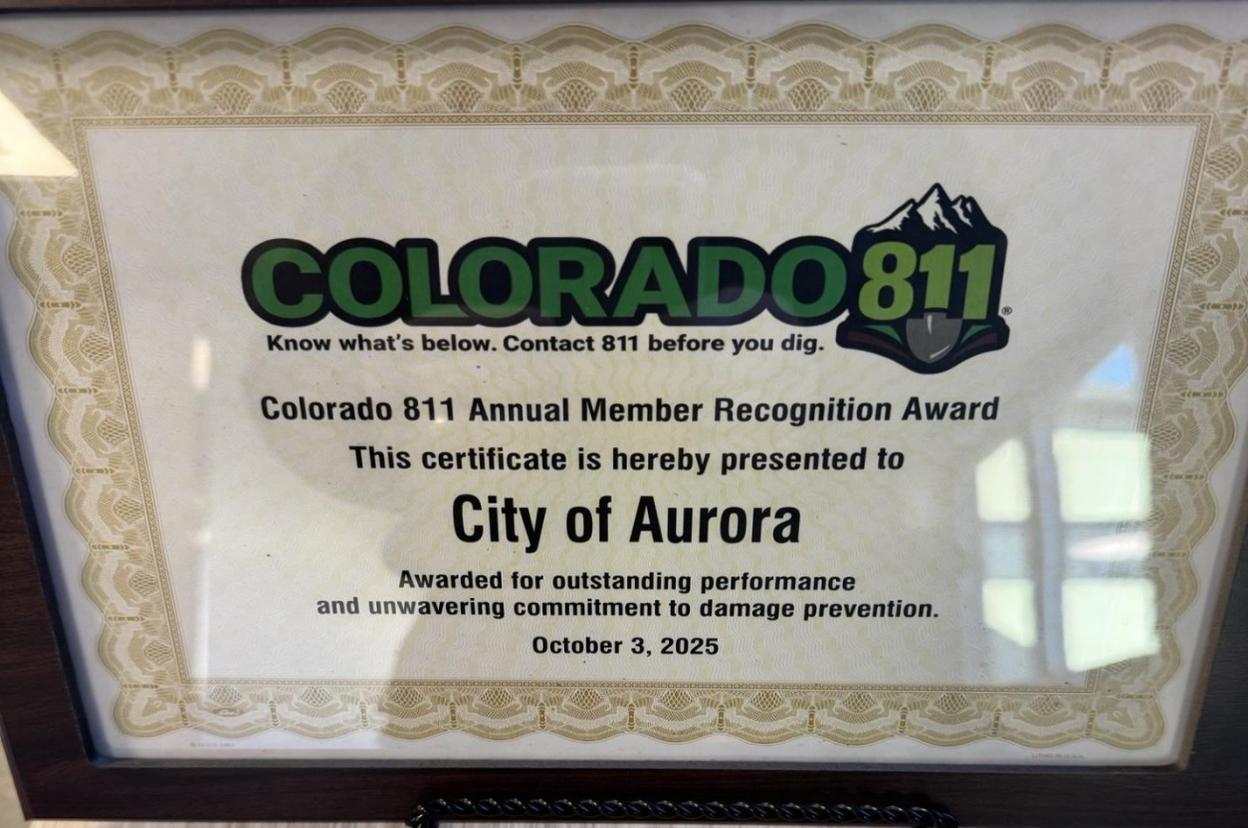
MISSION STATEMENT

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!





How

An electric current that reverses itself is?

Alternating Current

locate through the one call system

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**





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

It's the law & at no cost to you!

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



How deep are the 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

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/>.



PRIVATELY-OWNED LINES CAN BE LOCATED FOR A FEE

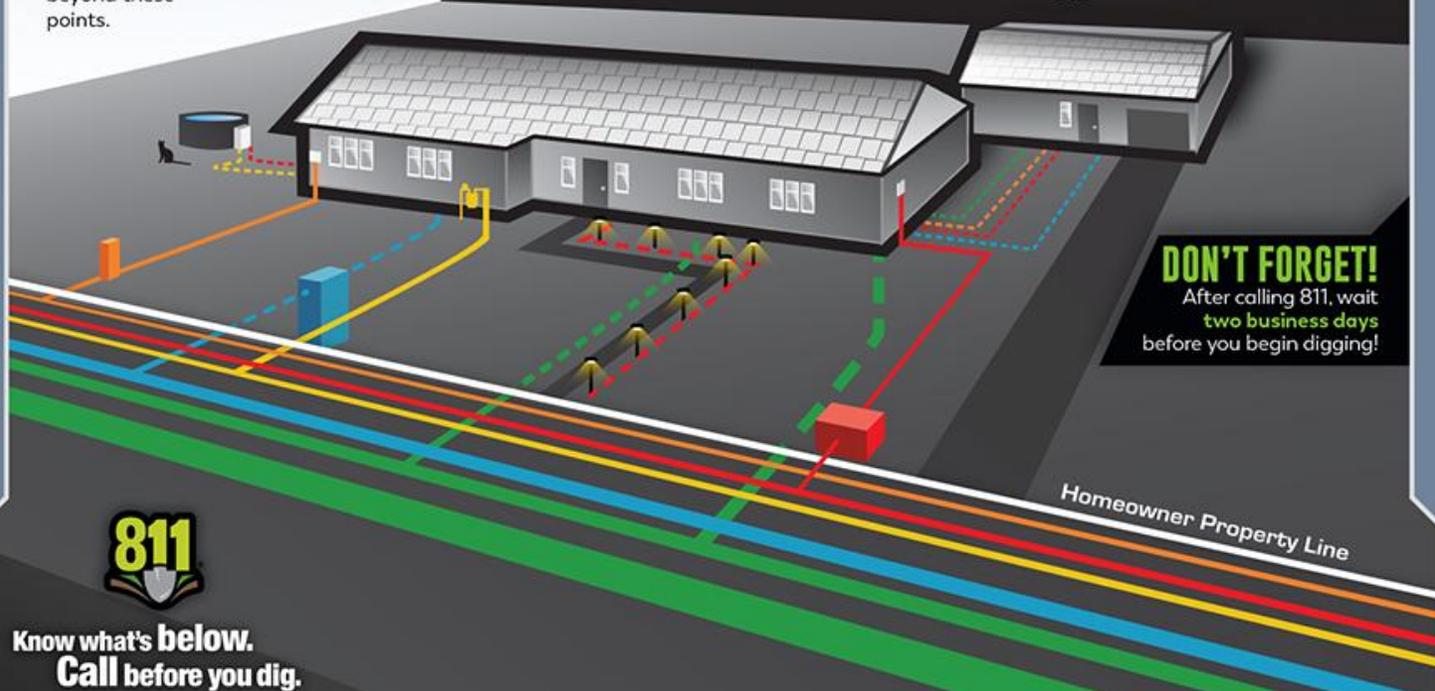
Water, natural gas, and residential electric lines are usually owned by the utility up to the meter. Some sewer districts own only the mains; others extend their ownership to laterals up to the property line. The customer typically owns everything beyond these points.

Customer-owned lines usually include any that serve outbuildings, hot tubs, security lighting, pools, and natural gas grills.

The free locating service available through 811 applies **ONLY** to facilities owned by utilities. The diagram below shows a variety of utilities, some owned by the utility and some by the homeowner.

Those utilities marked by dotted lines are typically owned by the homeowner. Private locating services will mark these for a fee.

	WATER		ELECTRIC
	SEWER		PHONE & CABLE
	GAS AND OIL		



Who locates Private utilities?

How much leakage
is acceptable for
packing glands?

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

20-60 Drops per
minute



Really?





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.**



**Explosion at Heather Gardens
Aurora, Colorado
November 16, 2018
Carol Ross**



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 first contact 811. 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?

Inflow & Infiltration

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:



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.



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.



4. RESPECT

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



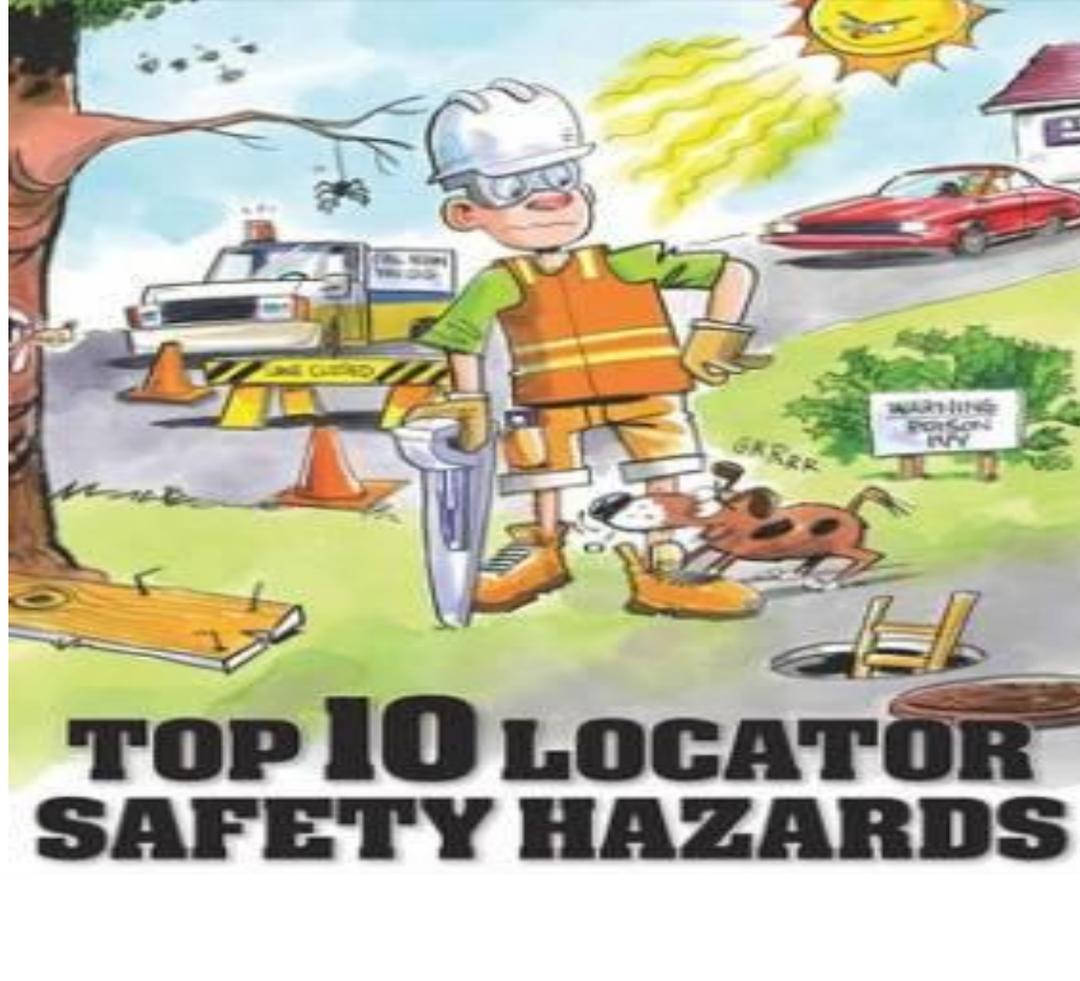
5. DIG CAREFULLY

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





1. Traffic
2. Threats to the eyes
3. Climate & Weather
4. Dog Bites
5. Punctures & Foot Trauma
6. Poisonous Plants
7. Insect Bites & Stings
8. Walking, Lifting, Bending & Squatting
9. Slips, Trips, & Falls
10. Time on the Road



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

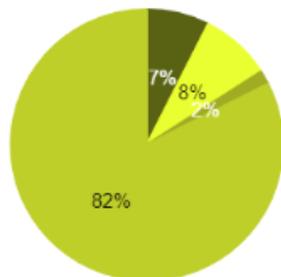
48,797

Excavator Renotifications

5.1%

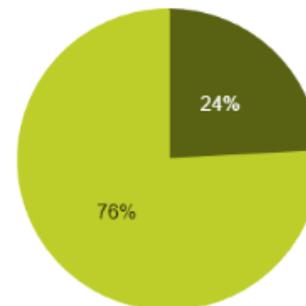
Excavator Renotifications % of Total Volume

Online Tickets



● iDig811 Tickets ● Ticket Express Tickets ● Update Lite Tickets
● Web Ticket Entry Tickets

Ticket Data



● Voice Tickets ● Total Online Tickets

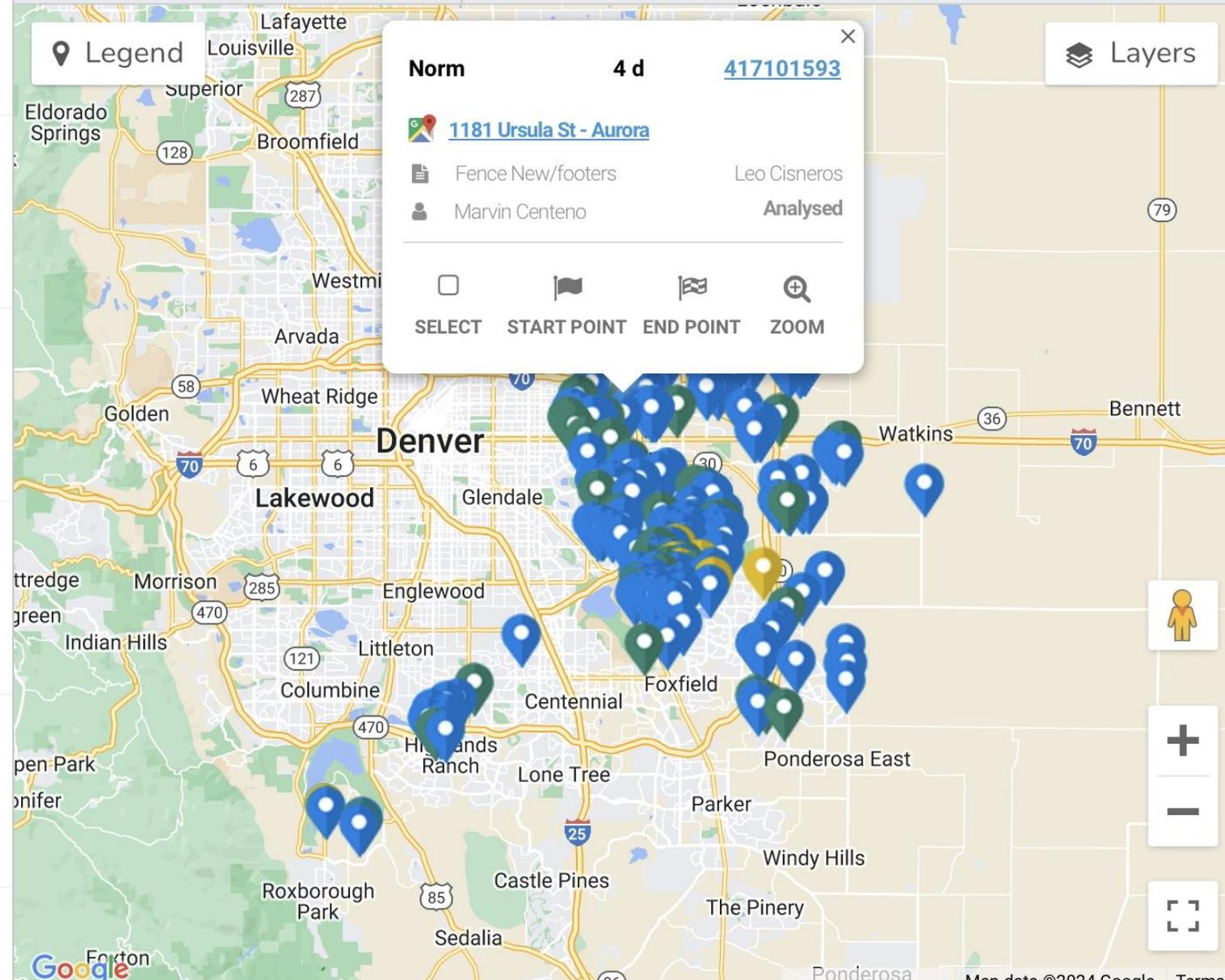


Tickets (527 records)

Order by... Filter...

<input type="checkbox"/>	Nonc	4 d	417100261	
	1563 S Biscay Ct - Aurora		Nick Weyand	
	Sump Pump New		Analysed	
	Groundworks			
<input type="checkbox"/>	Nonc	4 d	417100970	
	0 E 40th Ave - Aurora		Connor Neenan	
	Storm Install		Analysed	
	Fiore & Sons, Inc			
<input type="checkbox"/>	Nonc	4 d	417101134	
	6000 Catawba St - Aurora		Dylan Roby	
	New Com Gas Svc/Potholing		Analysed	
	Mears Group			
<input type="checkbox"/>	Nonc	4 d	417102134	
	2663 S Vaughn Way - Aurora		Gina Lofton	
	Fiber Conduit New/pothole		Analysed	
	Mainline Construction			
<input type="checkbox"/>	Rush	1 d	416500875	
	1918 S Coolidge Way - Aurora			

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



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:



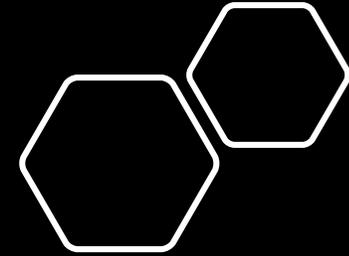
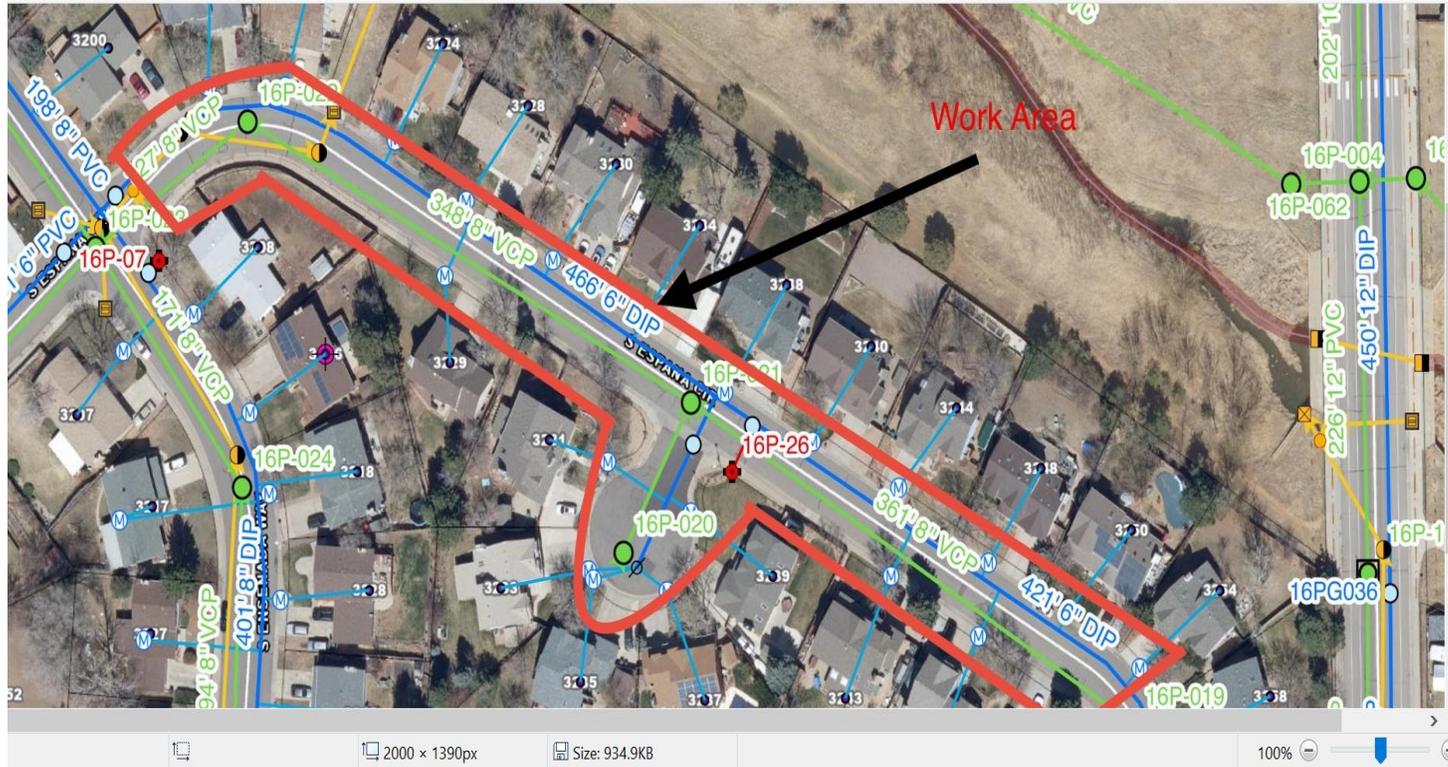


City of Aurora Water Service
Combination Underground Location Sketch

Request a locate ticket through Colorado 811 website (iDIG811) or call 811. **Emergency and Damage tickets cannot be processed through the website. Call 811 for all Emergency and Damage tickets.**



Service Request: 429200138		Date: 10/22/2024 23:59:00
Requested Location: 0, S ESPANA CIR AURORA		
Company Name: CITY OF AURORA WATER		
Contact: DARION BELT	Phone: (303)-815-4077 ext.	Email: DBELT@AURORAGOV.ORG
Request Type:	Completed:	



◆ Locates are within 18" from either side of locate mark. ◆

Color code: Blue for water, green for sanitary and storm lines, purple for reclaim water, irrigation, and slurry lines, red for electric, orange for fiber, pink for temporary survey marks and white for proposed excavating.
 The locate documentation provided by city of Aurora must remain on the job site throughout the excavation period. When working over or crossing Aurora's utilities the excavator must pothole and expose all Aurora owned utility lines affected and visually observe the safe crossing. The marking of underground facilities shall be considered valid so long as the markings are clearly visible, but not for more than thirty calendar days following the due date of the locate request.
CRS 2022, 9-1.5-101. Legislative declaration: The purpose of this article is to prevent injury to persons and damage to property from accidents resulting from damage to underground facilities by excavation. Anyone planning to dig in or near a public road, street, alley, right-of-way, or utility easement to notify Colorado 811 (two business days before you dig). If city of Aurora utilities are not found or located according to the documentation provided, you must notify Colorado 811 immediately for a re-locate.

Completing a locate ticket

Locator report (1 records)

Close ✕

<input type="checkbox"/>	Contract	Status	Units	Date start	Date end	Locator	3rd Party?	Note	Response code
<input type="checkbox"/>	CAU Water / AURH20	Marked	0	09/23/2024 00:00	09/25/2024 00:00	WISTER LIDE	No	Refre...	Locate Area Marked

Start date

End date

Curb box maintenance

+ Add

Locate information

+ Expand

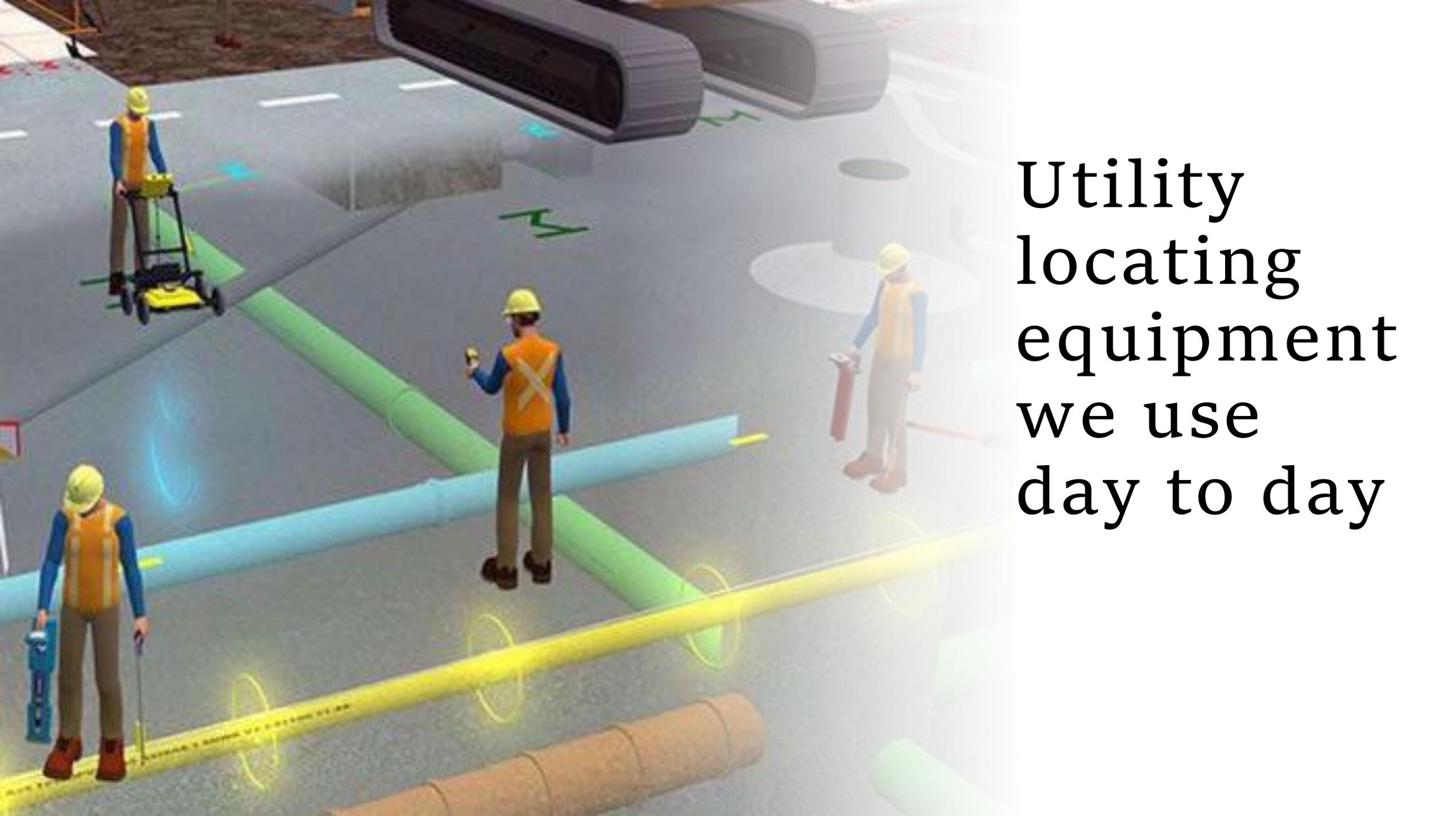
Drawings & attachments (11 records)

Close ✕

<input type="checkbox"/>	File name	Internal use only
<input type="checkbox"/>	 426701398_IMG_8200.jpeg	<input type="checkbox"/>
<input type="checkbox"/>	 426701398_IMG_8199.jpeg	<input type="checkbox"/>
<input type="checkbox"/>	 426701398_IMG_8198.jpeg	<input type="checkbox"/>
<input type="checkbox"/>	 426701398_IMG_8197.jpeg	<input type="checkbox"/>







Utility
locating
equipment
we use
day to day

What is one disadvantage of PVC pipe?



RADIODETECTION® 



Difficult to locate



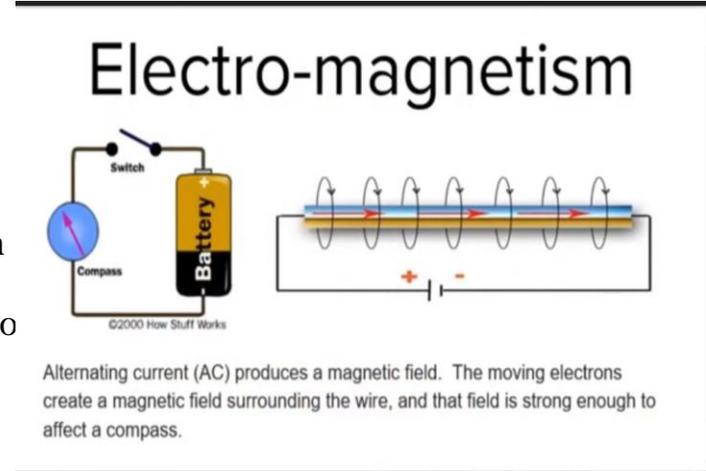
McLAUGHLIN

Providing Solutions Since 1921



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

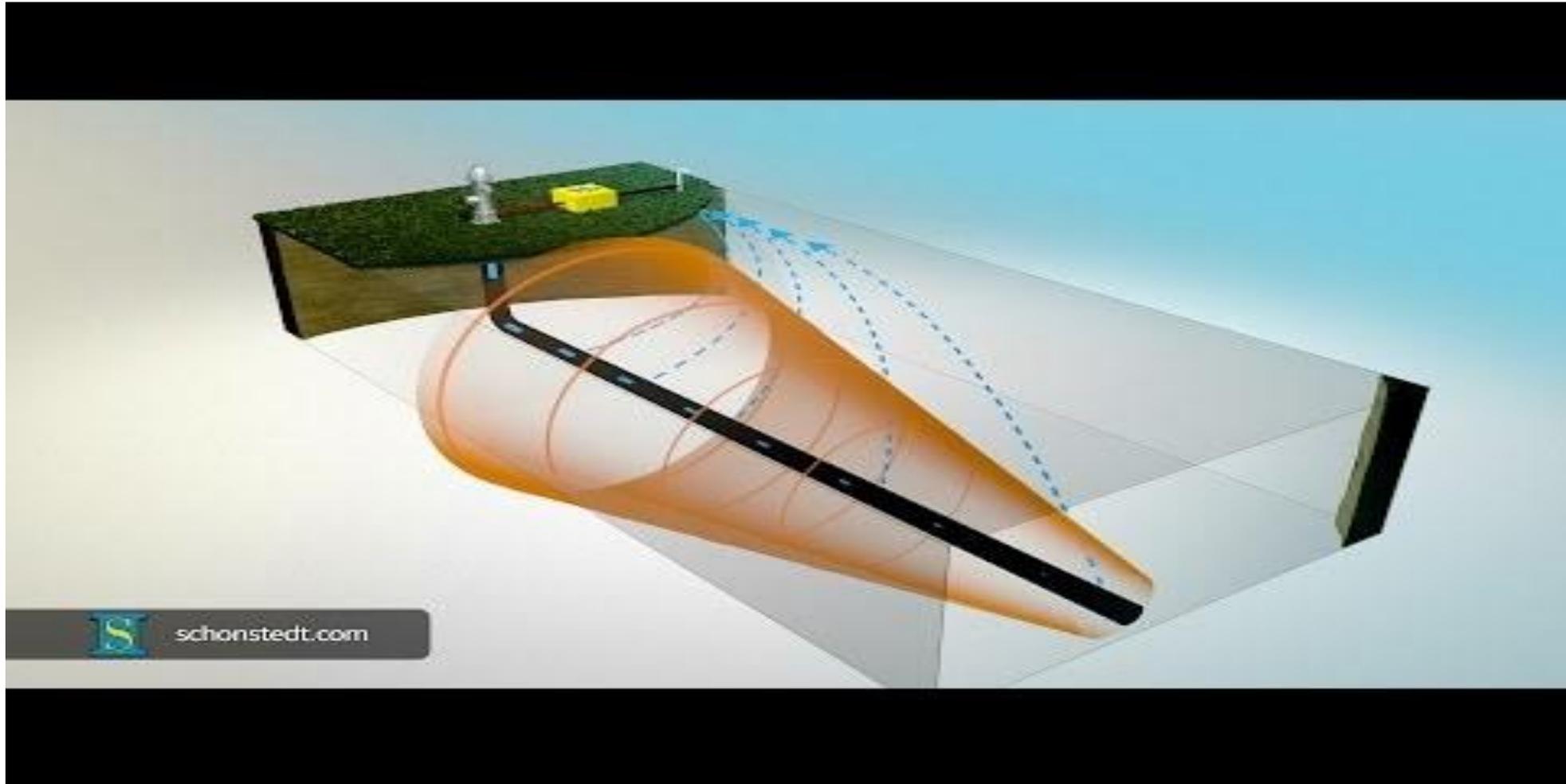
1. Locate through all soils and cement
2. Measure depth
3. Measure current
4. Current direction
5. Isolate your target line



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 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



Ohm's law is where it all begins.

Ohms are the resistance that restrict the amps passage.
Volts 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 ensure the receiver (wand) is on 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



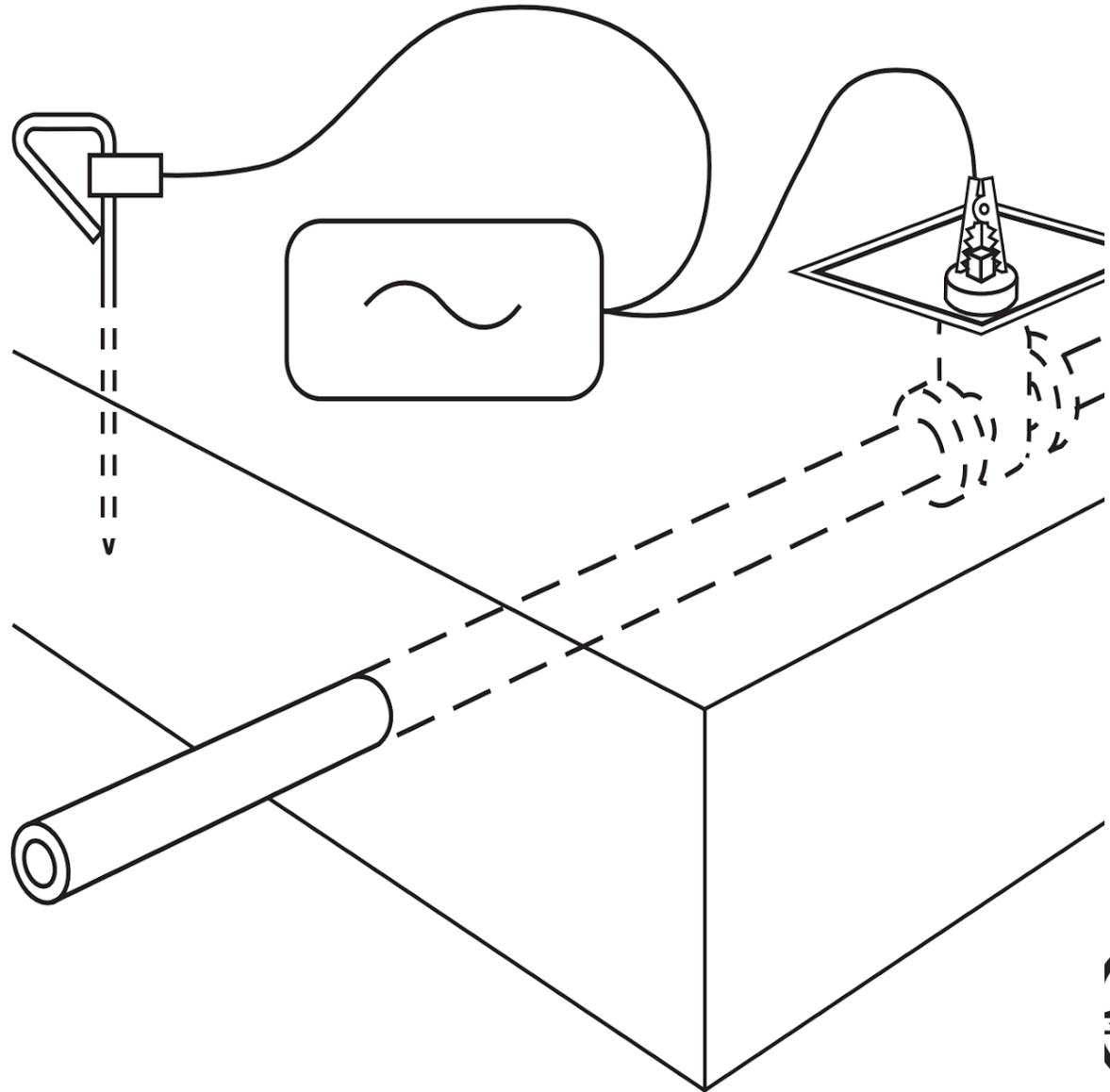
Determining which Frequency to use

- 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.

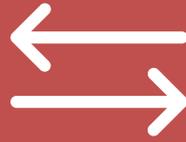
Poor ground connections or bad ground placement are two of the most common rookie errors in utility locating.

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

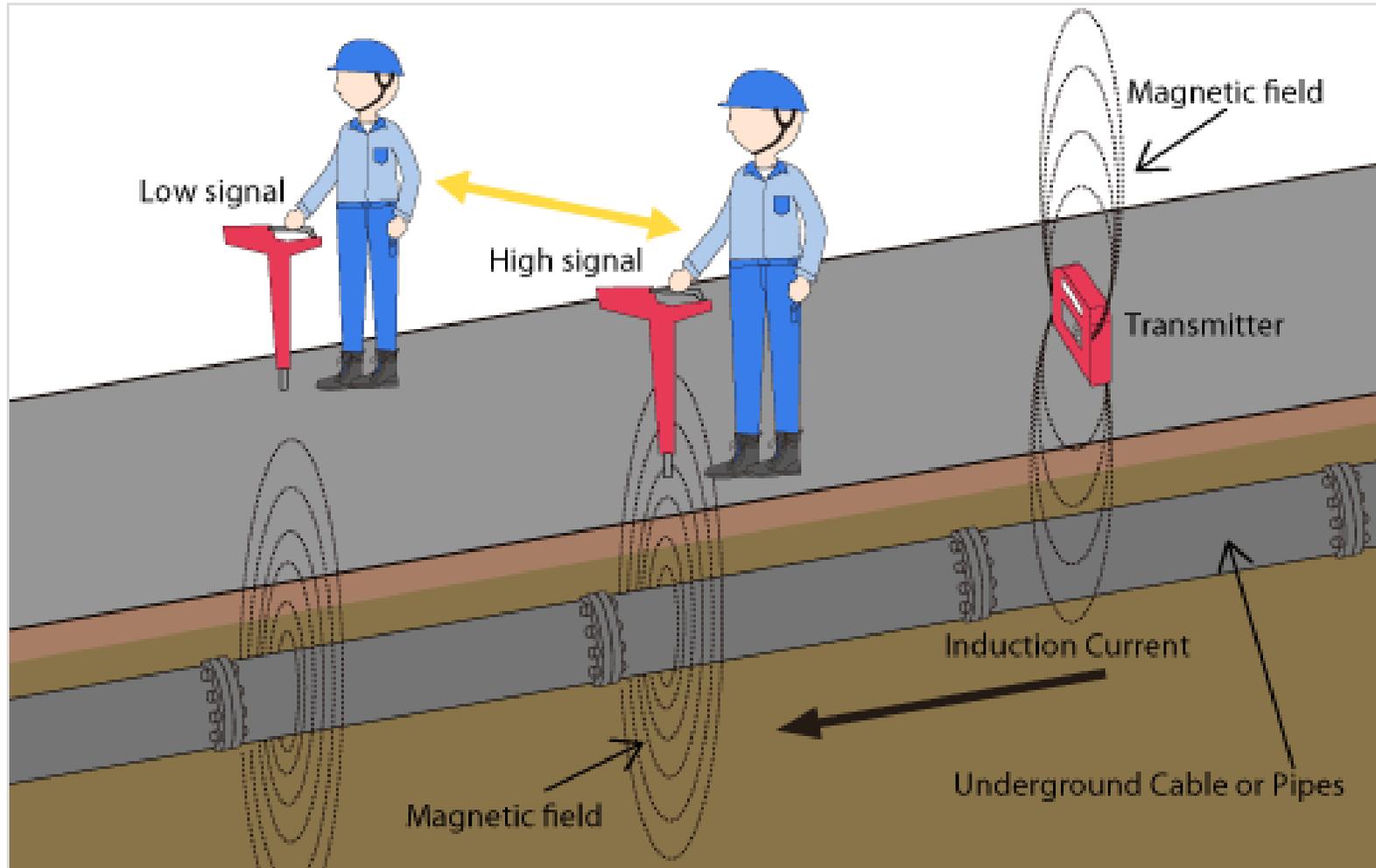
Restrained



- 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



 **Peak**
For accurate, clear locating

 **Peak+**
Combine the accuracy of Peak with:

- Guidance arrows to get to the Peak faster, then switch easily to
- Null arrows to check for distortion before marking

 **Broad Peak**
Detect deep or weak signals over a wider area

 **Guidance**
Rapidly trace the path of a buried utility.
Less susceptible to interference than Null

 **Null**
Rapidly follow a single utility through an uncongested area





Broad Peak

for deep or weak signals



Peak

most accurate mode



Null

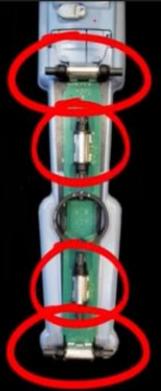
for verifying your Peak response



For users graduating from guidance mode



Peak+



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.



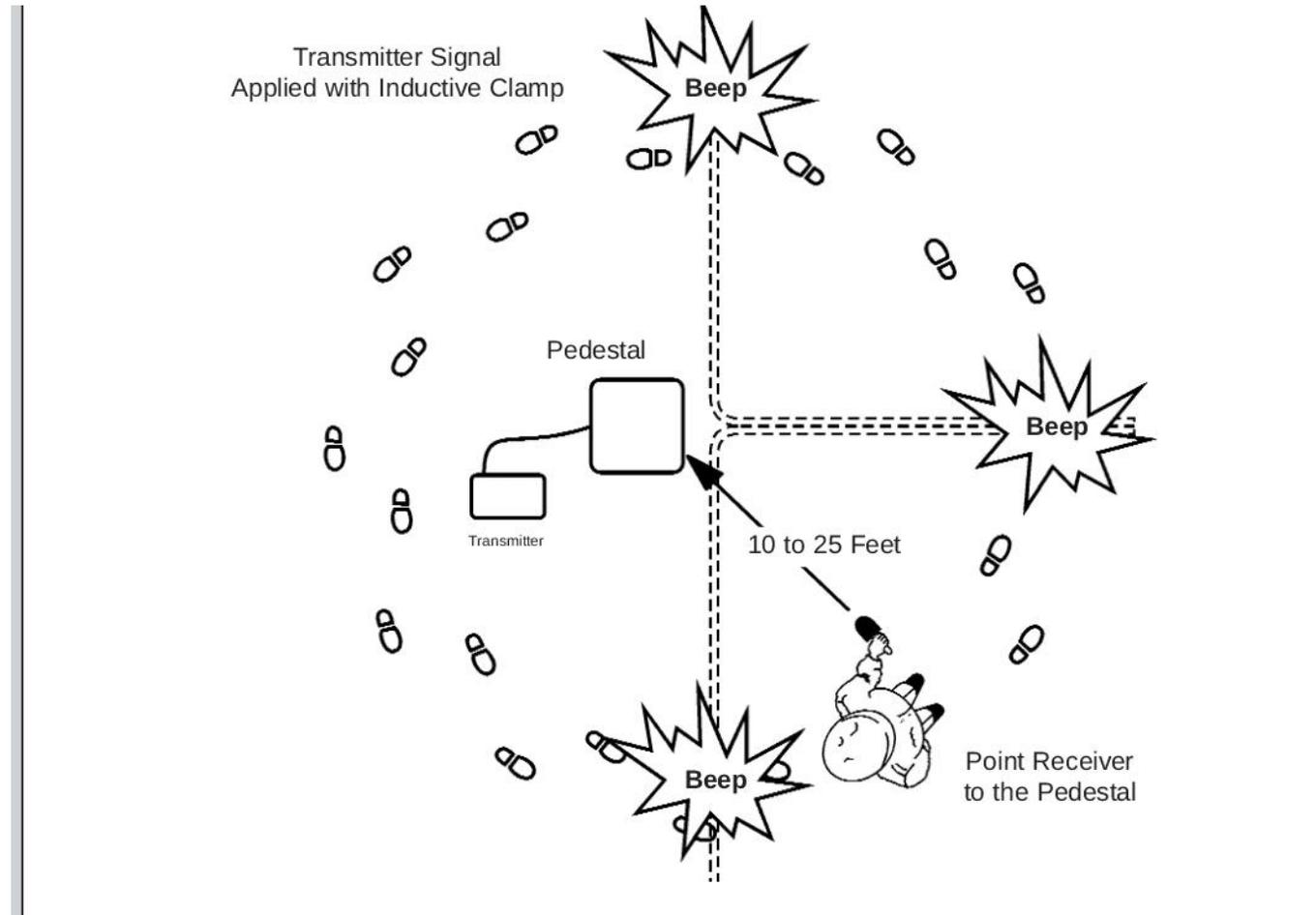
Verify Locate using Null Mode

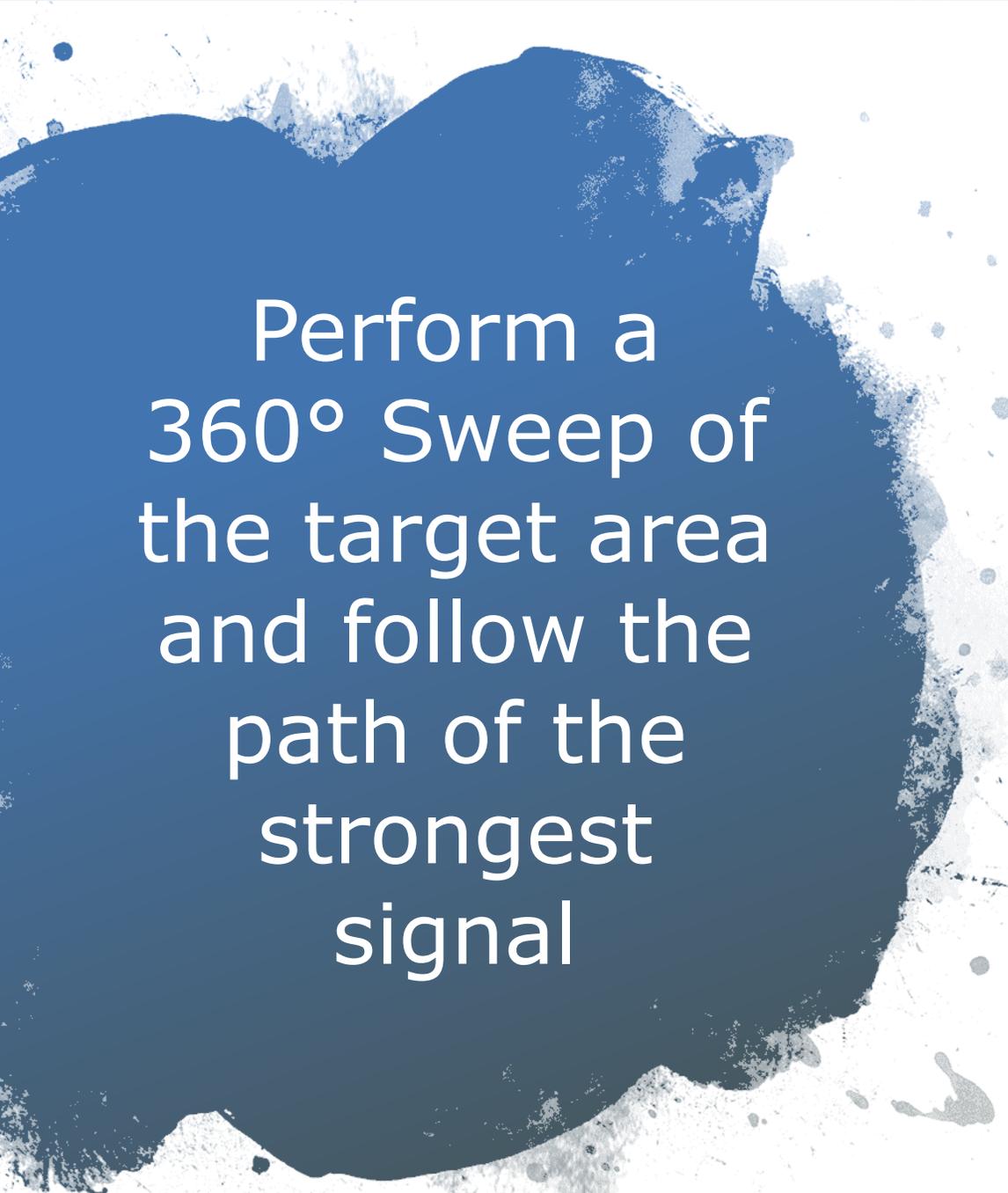
Null Mode

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?



Leak Detection

TEAM MEMBERS:

MARK RAMOS - FUENTES

KEVIN "TEX" KELLER

FISHER HOFFMAN

B'ELANNA SANDERS



Leak Detectives



Primary Roles of Leak Detection

- To consistently SURVEY the City of Aurora for the PREVENTABILITY of leaks in the distribution system.
- To be “First Responders” to water breaks to help accurately PINPOINT the location and minimize cost.
- To Assist Customer Service with citizen concerns and questions regarding water issues in and around their homes and neighborhoods.
- Chlorinate and De-chlorinate new and old Water lines as well as cleaning at the Treatment Plants and Pump Stations.
- To Prevent and Save the Loss of the valuable commodity we all enjoy, WATER!



Surveying: Hand Held

- Limitations to Using Ground Mics.
 - 1. Heavy Traffic Area
 - 2. Pipe is over 6 feet deep
 - 3. Poor Backfill
 - 4. Leak is too small



The Noise Factors

Leak Noise Factors



<i>Factors producing good quality leak noise</i>	<i>Factors producing poor quality leak noise</i>
--	--

High water pressure

Hard backfill

Small rupture

Clean pipes

Metallic pipes

Small diameter pipes

Low water pressure

Soft backfill

Split mains

Encrusted pipes

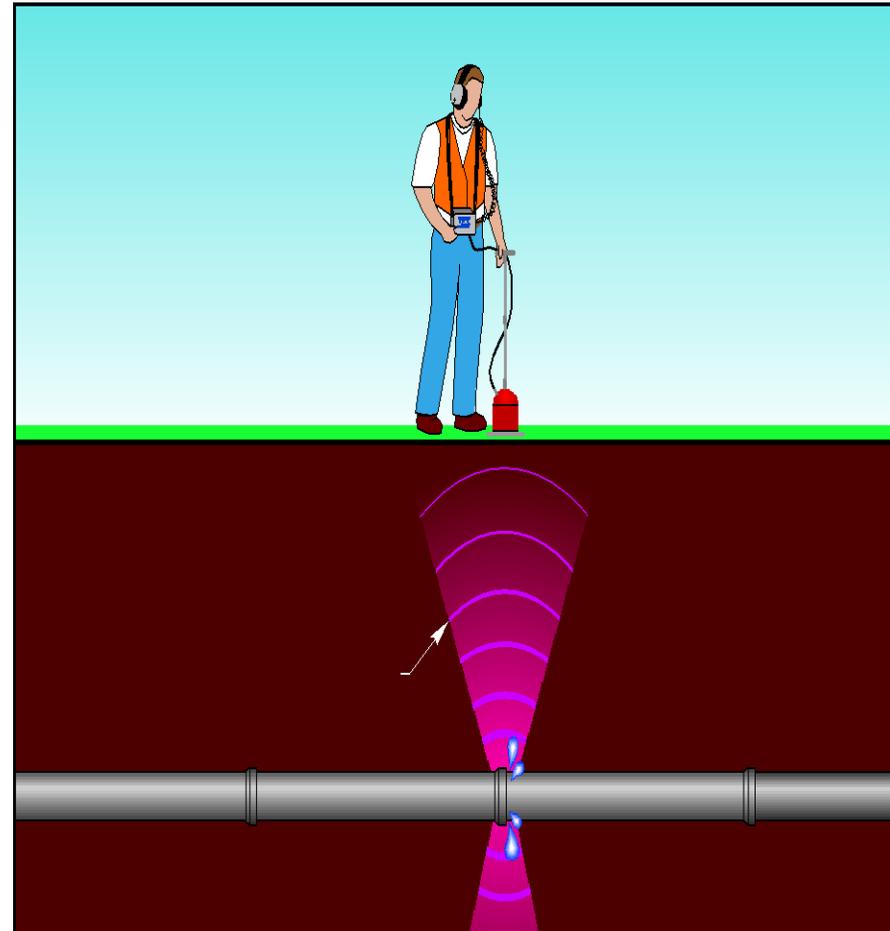
Soft / Lined pipes

Large diameter pipes

A HALMA COMPANY



Surveying: Hand Held



Surveying: Hand Held

Other Noise Sources



- Leakage
- Partial obstruction of pipe bore (presence of a foreign object)
- Usage
- Pressure Reducing Valves (PRV's)
- Partially closed valves (throttled or passing)
- Close proximity of main to sewer / culvert pipe
- Changes in pipe diameter
- Water pumping
- Electrical interference
- Pipe lining

Remember!
It is ONLY the skill and expertise of the leakage operative that can differentiate leak noise from other sources of noise.

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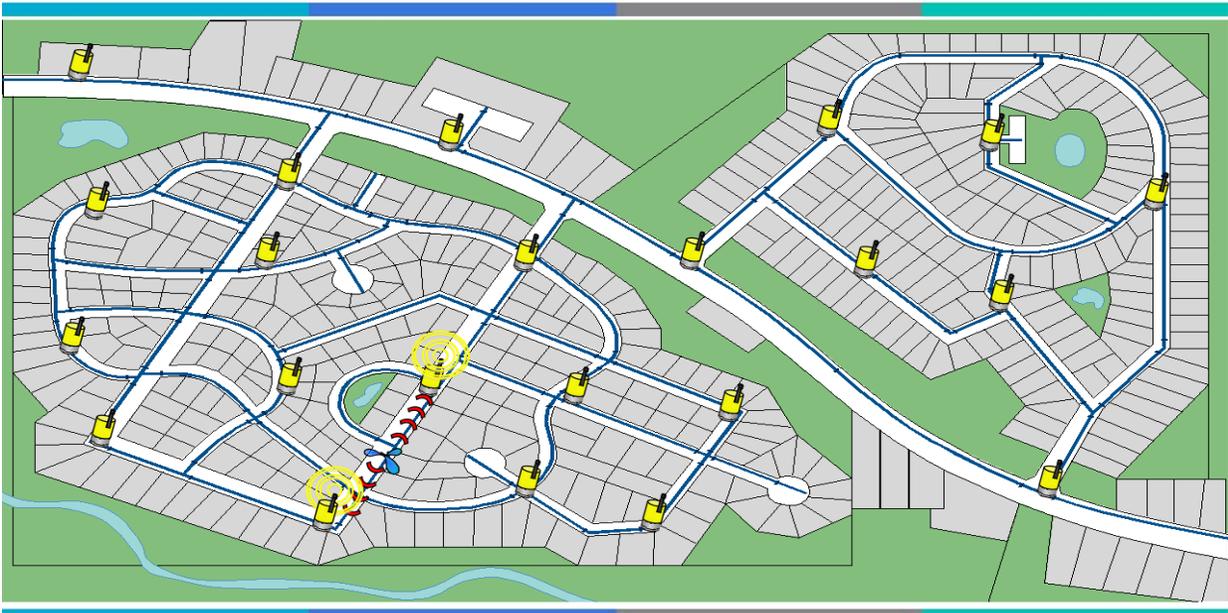
Surveying: Loggers

- Used during Non-Winter Months (Mid March – December, depending on weather)
- Deployed onto valves within a map area
- Loggers “Listen” during non-peak hours, i.e. 2 am and 4 am cycles
- “Lift and Shift” used in Aurora (looking to deploy permanents in areas in near future)
- PDA can be used to distinguish “Sound Ratio” for leak determination and programming.
- Have a radius of approx. 500-1000 ft.
- Paint top of Valve Box with orange dot and use debris cap to signal presence in valve box to prevent possible damage.



Surveying: Loggers

Permalog+ Patrolling



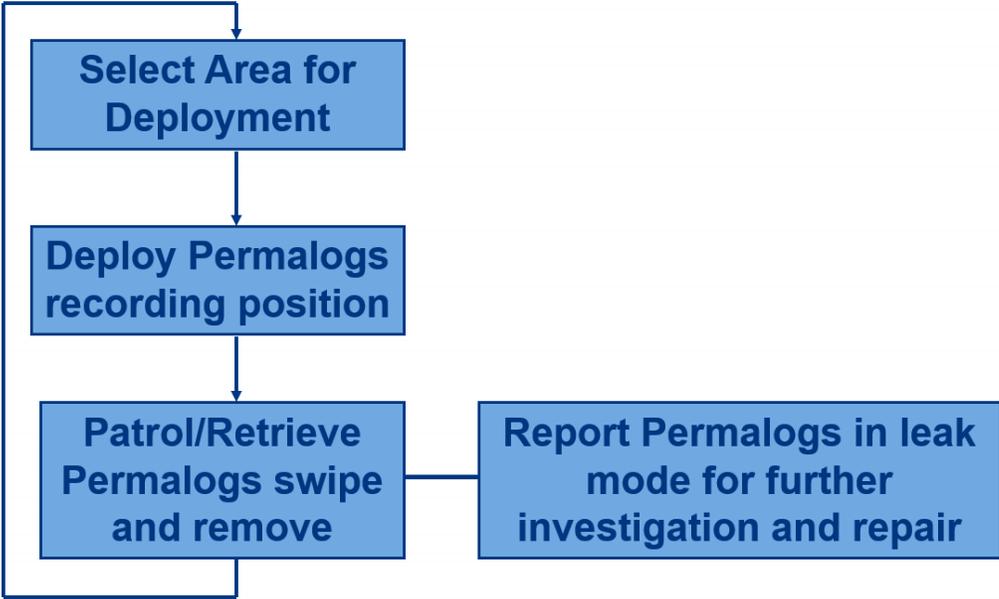
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Surveying: Loggers



Lift and Shift Operation



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Surveying: Loggers

- Limitations:
 - Battery Life (5 yrs)
 - Maintenance and Repair (Down Time)
 - Gives only “Big Picture” or general area, not for pinpointing.
 - Detects any noise in system. We Must determine the cause, i.e. water break, swamp cooler, electrical interference, etc....
 - Start for more in-depth investigation of area



Surveying: Loggers



Surveying: Loggers

Permalog+ Noise Logger



Permalog+®

Permalog+ is an intelligent noise logger designed for permanent deployment or tactical deployment to survey large areas of network quickly and effectively

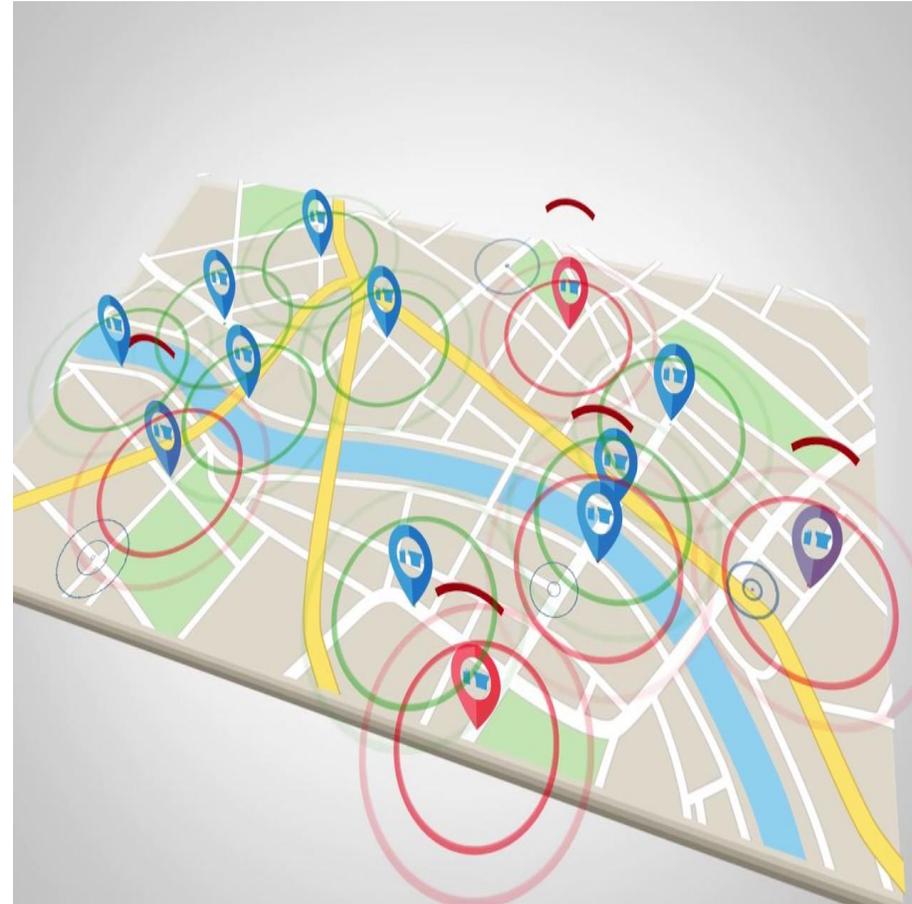
- Fully automatic intelligent logger
- Adaptable to all network situations
- Innovative design for rapid deployment
- Compact size
- Low unit cost
- Long battery life (5-7 years)
- Patent protected
- Aqualog extended logging mode
- Flexible Data Collection:
 - “Lift and Shift”
 - “Drive By Mode”
 - “PermaNet via Radio Network”
 - “PermaNet via SMS Repeater”



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Surveying: Loggers



What Now After Surveying?



What Now?

- You have completed your surveying, retrieved your loggers or heard what you suspect to be a leak....!?!
- Or you have been called to check on a possible leak, water running down the street, customer concerned about water pressure....!?!
- Time to PINPOINT!!



Leak PinPointing

- Confirmed leak found during survey or responding to a water break.
- Attempted Accuracy within a matter of a feet, preferably inches.
- This helps minimize cost
 - Asphalt removal and replacement
 - Length of time of service interruption
 - Crew time on repair.



PinPointing: Equipment

- Correlators are used to verify and pinpoint.
 - Combination of computer processors and sound amplifiers to pinpoint based on a Noise Algorithm.
- Two outposts and a processor are used.
- Data such as pipe type, length, diameter are entered with time relay and frequency.



PinPointing: Equipment

Fujitech LC2500



FCS Tri-Corr Touch Pro



Sewerin AC200



PinPointing: Equipment

- Correlators have an effectiveness up to 800 ft, depending on the environment.
- Best to connect to different locations to accurately pinpoint.
- Can be used with different sizes and types of pipe in same sequence, i.e. copper then DIP
- Able to adjust filters to eliminate interferences.



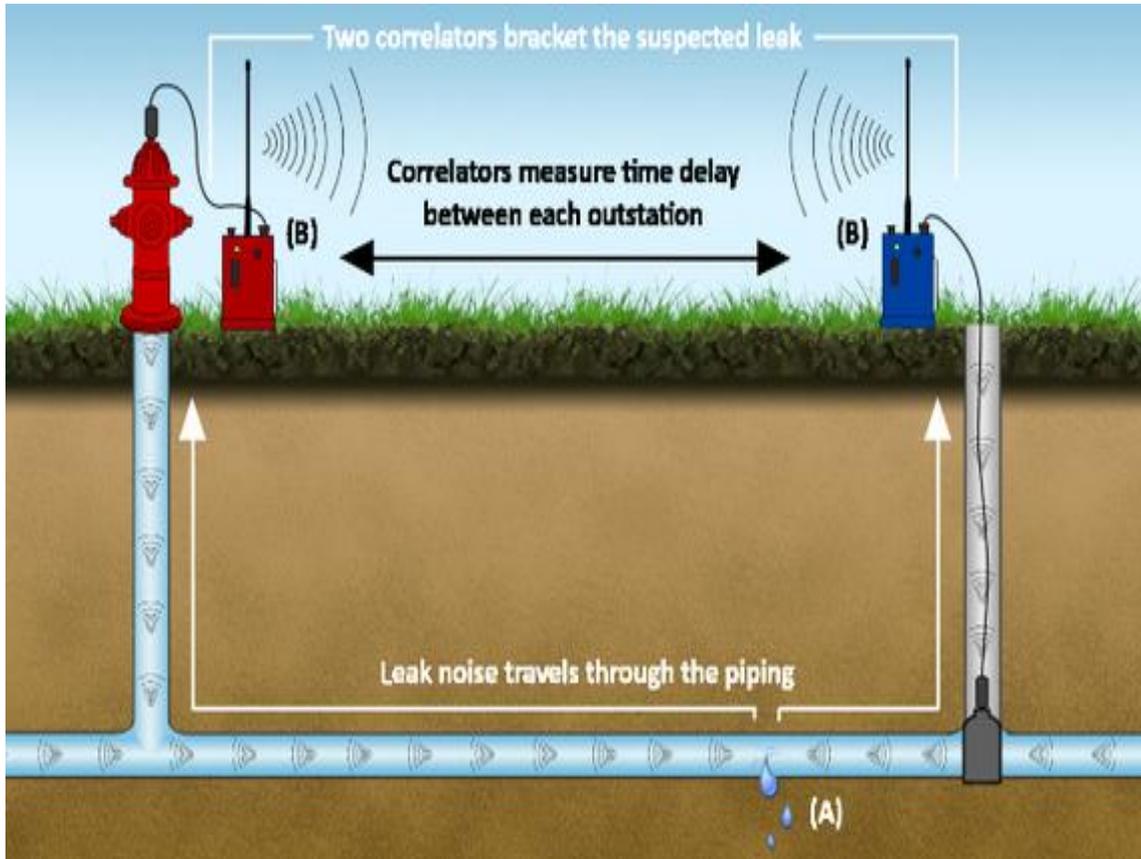
PinPointing



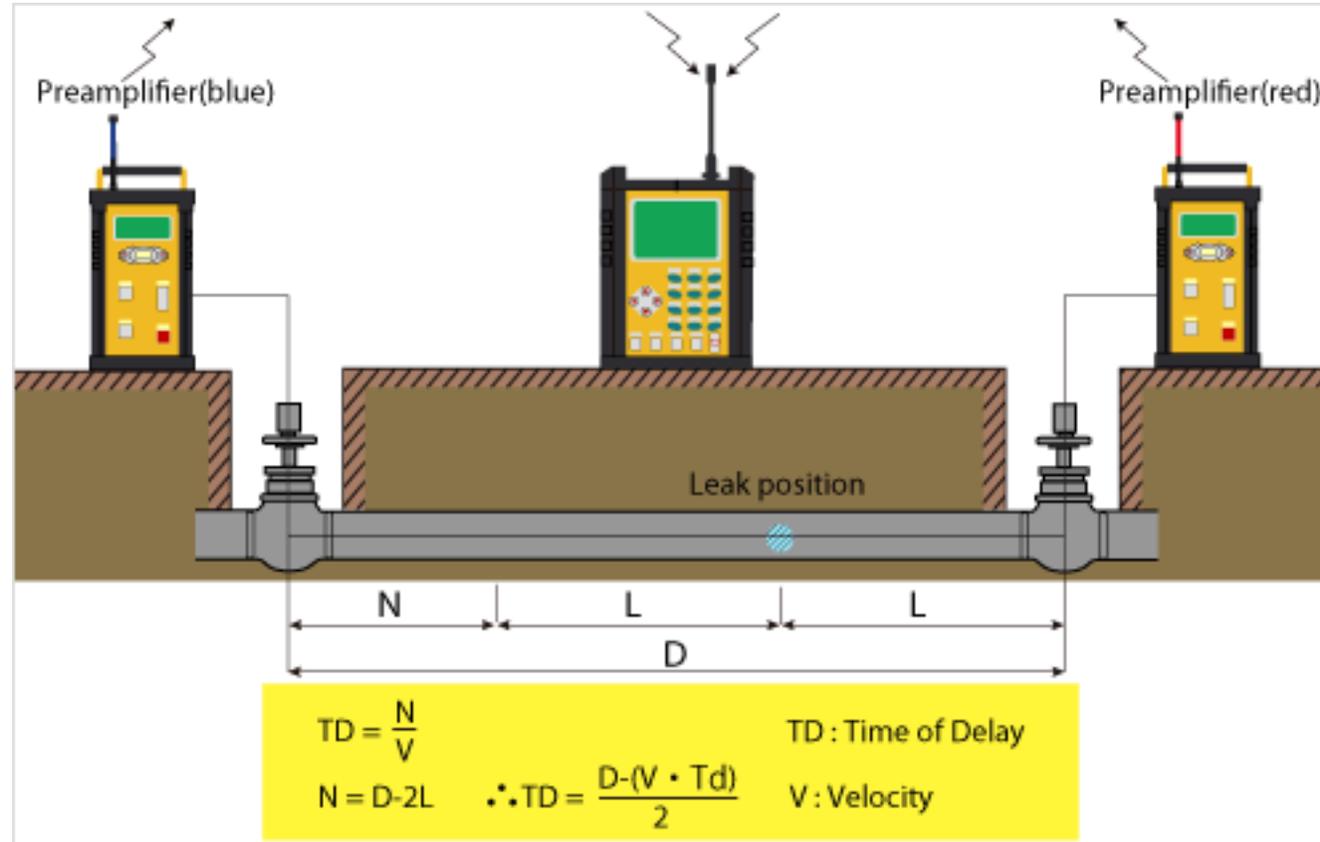
- Sensors are placed in contact with the pipe via valve, service, hydrant and sometimes directly on the pipe.
- However a broad range of sounds may be detected.
- By using the correlator filters, most noise can be eliminated.



PinPointing



PinPointing



PinPointing

- Limitations:
 - PVC and Plastic are not a correlator's best friend, but technology is improving!!!!
 - Type of break can affect results, i.e. beam break, leak at bell, location on pipe, etc.
 - Ground quality can affect accuracy as well
 - Backfill
 - Type of soil
 - Multiple Holes on the line
 - Heavy Water Usage
 - Loud PRVs
 - Need Locates of Water Lines to get correct footage for accurate detection



PinPointing



Pinpointing

- Sometimes, Drilling is necessary to help determine the exact location of a leak. We are then able to see if water comes up or able to have a probe touch the pipe for a more accurate reading with the correlator as well as direct listening to an area with the LMIC.



PinPointing



- **Exact** location of a leak for emergency repairs is **Priceless**
- Finding undiscovered main leaks saves the City and Customers **MONEY**
- Water main breaks or services can be repaired in a timely manner or isolated to prevent more water loss.



Leak Detection Extra Duties

- Chlorination per AWWA Regulations.
 - New Mains and repaired mains
 - Hydrants
 - Cleaning/disinfect of Water Treatment Plants
 - Pump Stations
- De-Chlorination per AWWA Regulations.
 - Mains and hydrants
 - Water Treatment Plants
 - Pump Stations



Extra Duties

- Assist with various projects such as SmartBall Operations
- Sent to assist other municipalities throughout the State with leaks in their system
- Contact 811 and necessary entities for locates
- Aid Supply Line and other departments with pinpoints and assessments.
- Help with clean ups or any task they need us!



Rock Creek Mesa Water District

- Rock Creek Mesa is located Southwest of Colorado Springs.
- On December 8th, 2020, we assisted a small water municipality with the location of possible leaks in their system.
- After surveying for the day over 14000+ feet, two leaks were discovered, one main break and one service line.
- We were within 6 inches of the leaks after pinpointing the spots thus minimizing their excavation cost, helping to save them \$1000s.



Rock Creek Mesa Water District
180 Rock Creek Mesa Road
Colorado Springs, CO 80926

Board of Directors:
Beth McCosken
Melinda Charlock
Billy Jay Neplewski
Currie Haze
Christine Carvosa

Business General Manager:
Kathy Olson
Water Foreman:
Glenn Batts

rockcreekwater@wildblue.net
Telephone: 719-576-0746
Facsimile: 719-576-0746
www.rcmwd.com

MEMORANDUM

December 10, 2020

Gary Edwards
David Galindo
Joe Newton
Aurora Water/City of Aurora
15151 E Alanada Pkwy #3500
Aurora, CO 80012

RE: Rock Creek Mesa Water District – Request Leak Detection Service

On December 7, 2020 I reached out through COWARN requesting anyone who has leak detection equipment to assist our district in finding a main water leak. As stated in the letter, the request was one only for assistance but a reduced or free service as the district has been hauling water since October 2020 and is temporarily short of funds.

Gary you were the first utility to reach out to us. You arranged for two members of your team and two trucks to come down the next day to help us find the leak. You also stated that a fee is not necessary at this time.

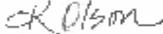
David and Joe arrived at 7:30am eager to get started and walked us through their process of finding the leak(s). They worked tirelessly with only a 20 minute break for lunch. After searching over 14,000+ feet of distribution line, they found two major leaks. One was more critical than the other so we began the process of contacting 811 for utility locates. They stayed with us and drilled a few more holes to give us an accurate area to dig.

Once the digger began in the area they marked, 4' down the mud and water began to surface. The leak was actually about 6" from the area they located and it was a service break not a main break. Everyone present could not believe the accuracy of the locate. A first for us. We know that locating is not an exact science, but David and Joe made it look that way.

David and Joe are two of the most friendly and knowledgeable gentlemen that I have met in a long time. Glenn and I said we have made new friends and colleagues.

Thank you all again for your support, kindness and expert knowledge of leak detection. If we ever need help again, you are the first we will call. Please send me an invoice for your services via email and the district will work toward paying as soon as possible.

Best Regards,



Kathy Olson
Business General Manager
Board of Directors
Rock Creek Mesa Water District



Some More Tools of the Trade



Vehicles



Chlorination Trailer



De-Chlorination Equipment



Video from Our Friends Next Door!

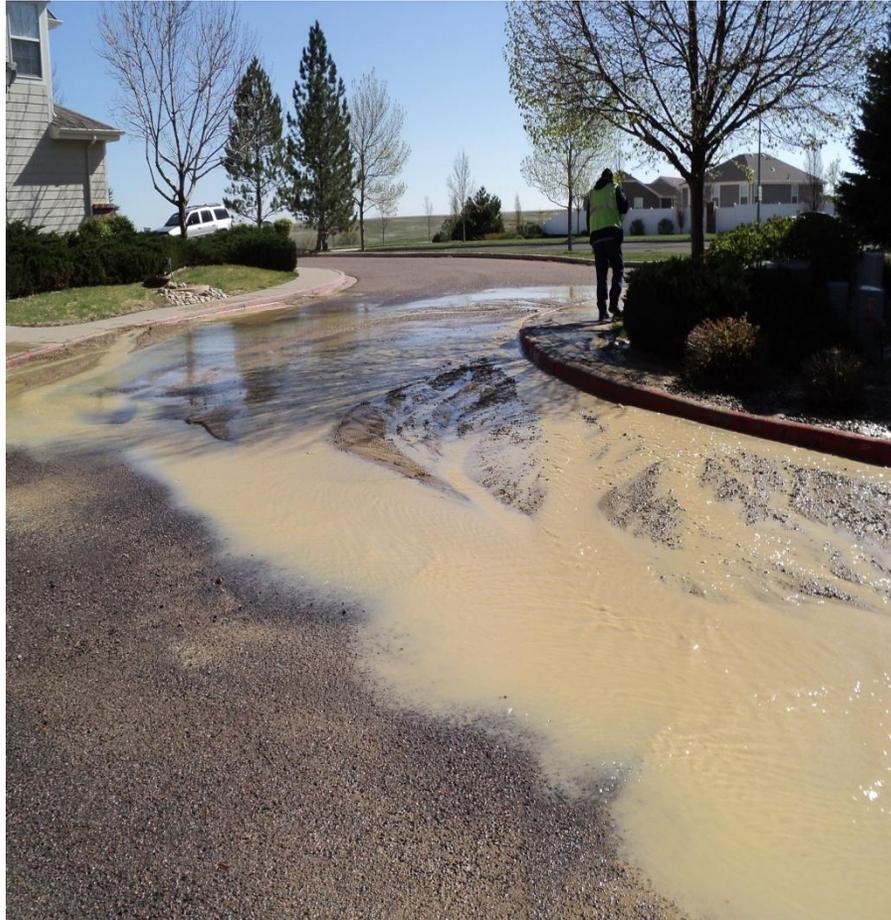


Water is a Fickle Beast

- **Water Does as Water Wants!**
- Water has surfaced over 3 blocks away in a random basement from a service break. It followed trenches all the way through the neighborhood.
- Another time, we assisted a neighboring municipality on a leak after several basements started filling up with water along our borders.



Fickle Beast



Summary



- One must develop a “trained” ear.
- One must be able to think outside the box
- Have an understanding of the equipment and infrastructure
- It truly is a never-ending learning experience as No Leak Pinpoint is ever the same and new variances and situations arise all the time.



Thank You for your time!

- X marks the spot
- Any questions? Email kkeller@auroragov.org or Corey Bell at cbell@auroragov.org
- If you are interested in learning more, speak with your supervisor about cross training with us or shoot us an email!!

