Key Fundamental Steps to Locating and Marking

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Locating Fundamentals Course Index:

KEY FUNDAMENTAL STEPS OF A LINE LOCATE

- Locator Safety
- Visual Site Inspection
- Reviewing Maps, Records and Site Data
- Applying Line Locating Equipment
- Trace and Mark
- Document, Document, Document
- Restore & Retrieve

2

SAFETY FIRST !!!!!
You are responsible for your decisions.

- Realize that safety is foundation of damage prevention.
- Have the self discipline to use your company's safety policies and procedures.
- Always follow safety procedures.
- Take responsibility for your actions and live the safe life.
- Your actions impact the safety of others in the work area

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There is no job so urgent that we can't take the time to do it safely.

- Take a moment and make a safe plan of approach and departure from your worksite.
- Remember that everyone wants you to go home safely after the job.
- Please don't create an incident trying to prevent an incident!
- Look for any hazards or **potential hazards** like obstructions, traffic, physical site conditions that may impact your safety on your worksite.
- Most line locators are doing the job solo, never be afraid to call for help if you need someone to watch your back.

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PPE is useless if not used!

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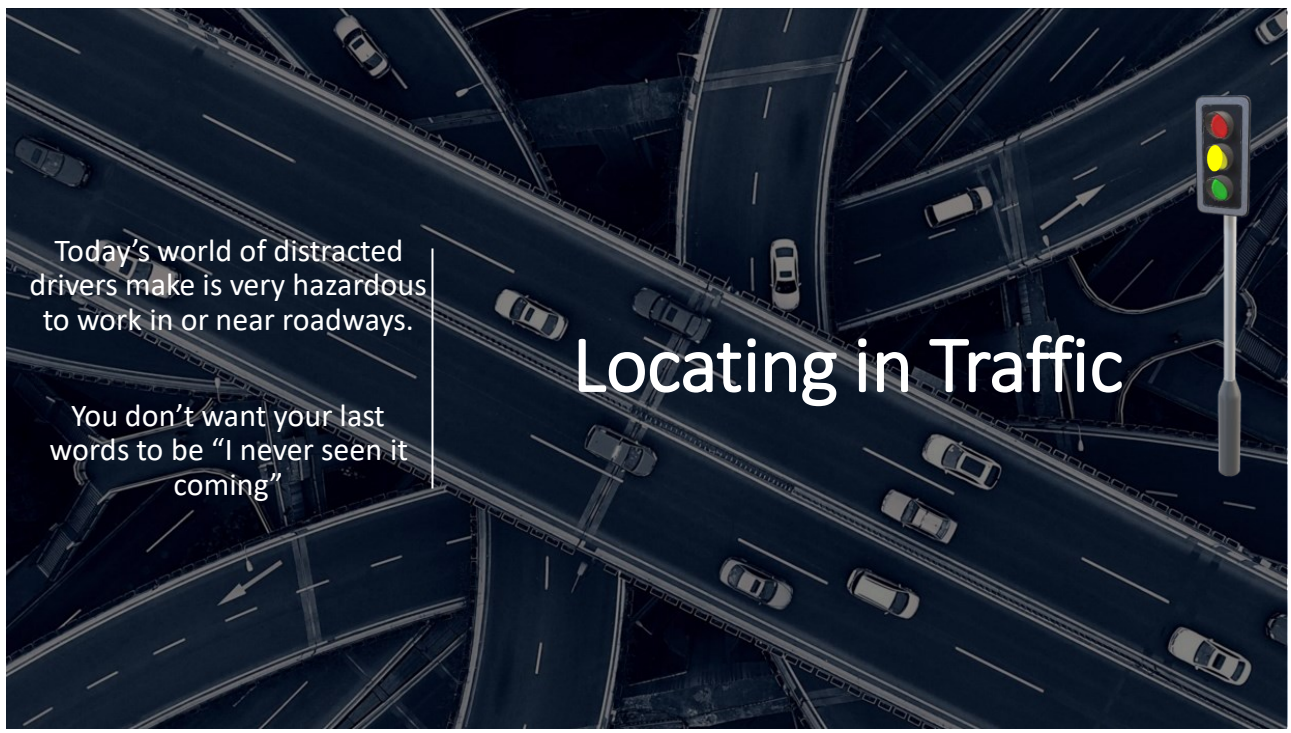

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Locating buried utility lines in or near a roadway?
Keep your head on a swivel and make a safety game plan. A lucky person doesn't always win!
LOOK BEFORE YOU LEAP!!!
CAUTION! YOU ONLY HAVE ONE LIFE LEFT!
YOUR SCORE: 0000

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Dig Area

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Locating Lines under or near a roadway can be hazardous to you, drivers and pedestrians.

Observe pedestrian and vehicle traffic conditions on site and make a safety plan.

A few things to consider

- Is this the best time of day to be working in the road?
- Which lane is driving towards the sun
- Identify the shady areas that would make your high visibility safety vest less effective?
- Where will you need to place your <u>vehicle and pedestrian traffic control devices</u> to make a safe worksite for yourself and everyone else?

Stay off your cell phone while driving and working in traffic and assume all drivers are distracted by theirs. Be prepared!

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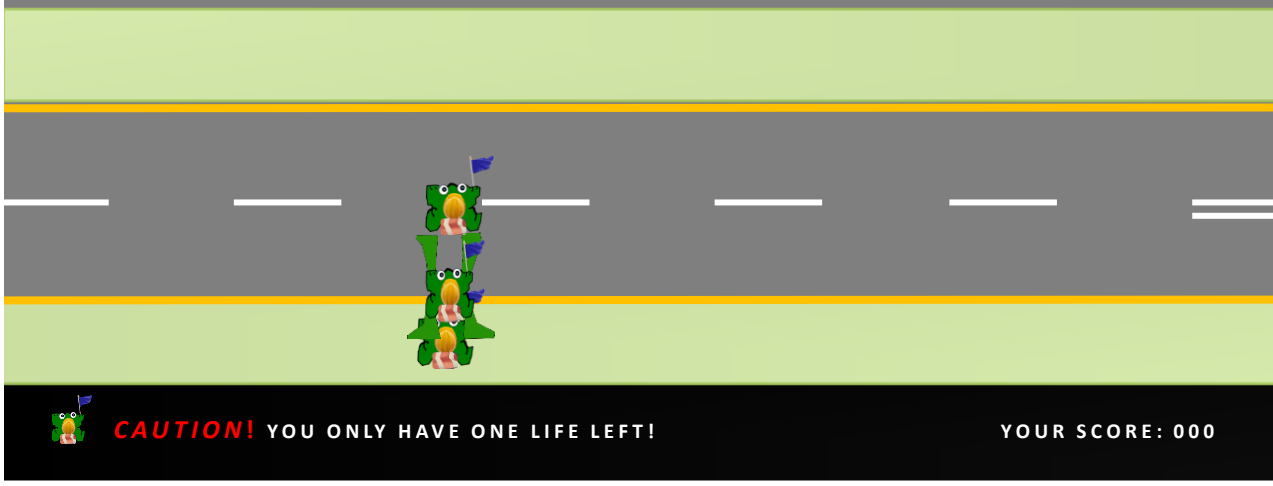
Working in Highway Passing Zones

- In passing zones you must be ready for vehicles coming from both direction in either lane.
- Never assume that a driver sees you in or near the roadway.



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Look up in traffic and expect the unexpected

911 CALLER:

" It was a locator, and he was on the road, and we witnessed him get hit by a truck behind us."

The truck mentioned in the call was attempting to pass on a two-lane highway at high speed. This happened to be at the location of a water leak repair emergency 811. The truck hit and killed the locator who was in the road marking a natural gas line in response to the emergency excavation to repair a water main.

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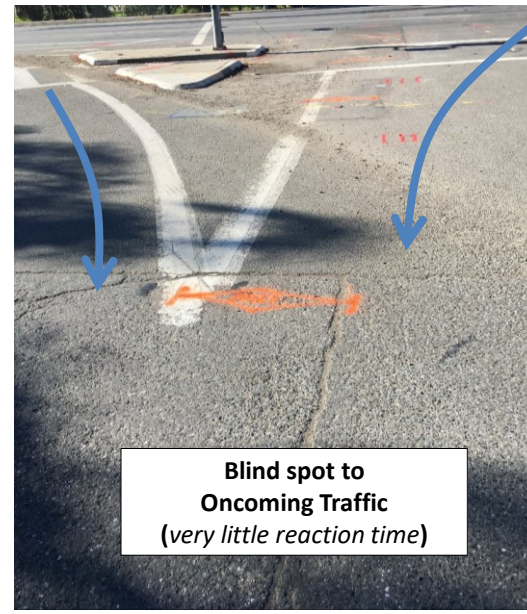
ALWAYS PROCEED WITH EXTREME CAUTION WHEN WORKING ON OUR NEAR A ROADWAY

A blind spot represents very little response time for you to see oncoming traffic and for traffic to see you?

- Use traffic equipment upstream to eliminate or manage blind spots downstream.
- If you know you will need to locate lines under the street, pick a time of day with the lightest traffic.
- Make yourself and your worksite as visible as possible>>>



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ALWAYS PROCEED WITH EXTREME CAUTION WHEN WORKING ON OUR NEAR A ROADWAY

- Don't trace buried lines with your back to traffic.
- Look up and use a paint wand while marking.
- Utilize the signal receivers audio tone for tracing line between markings.
- Walk upstream while marking the line to keep traffic in front of you as much as possible.
- A safety vest is much less effective when you are standing in shade. Extra caution should be taken in these areas.
- Distracted drivers are everywhere so be prepared!

Shade makes you much less visible to drivers in your worksite

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ALWAYS <u>PROCEED WITH EXTREME CAUTION</u> WHEN WORKING ON OUR NEAR A ROADWAY

Look out for road rock and debris in roadway

- A vehicles tire can cause road debris and rocks to become flying debris.
- Kick debris to the curb if possible, to reduce the chances of projectiles.

Obstructions & Road Debris Can become flying objects!

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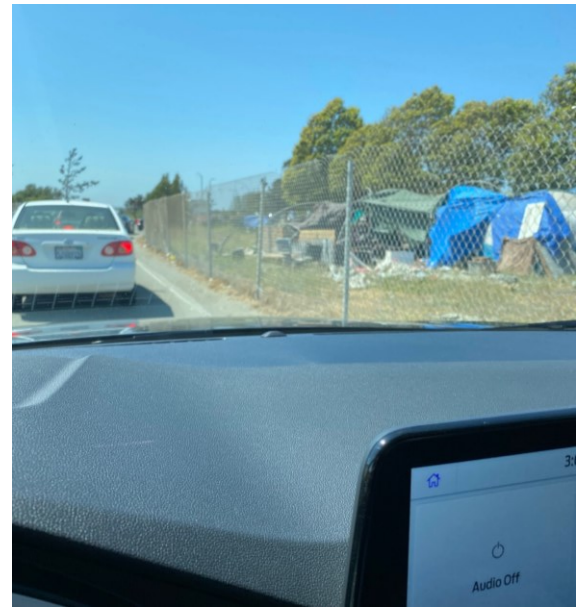

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ALWAYS PROCEED WITH EXTREME CAUTION WHEN WORKING ON OUR NEAR A ROADWAY

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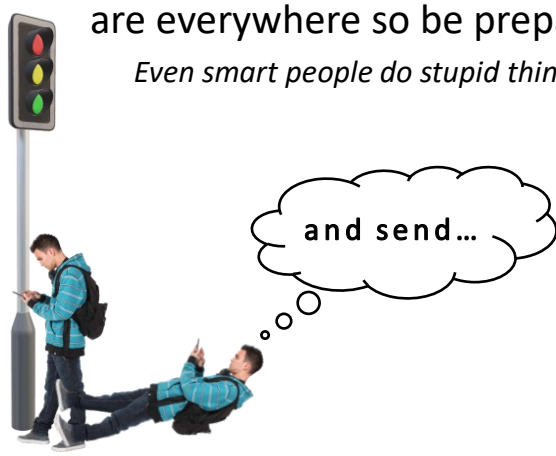
Distracted drivers and pedestrians are everywhere so be prepared.

Even smart people do stupid things!



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Excavation Site Hazards

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A Few Potential Site Hazards

- Construction Site Hazards
- Heavy Equipment
- Open Excavation
- Tripping, falling and overhead hazards
- Lots of sharp objects that can cause puncture wounds
- Confined Spaces
- Damaged Utilities
- Observe any safety signage on the jobsite

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A Few Potential Site Hazards

- **Electrical hazards – overhead power lines, conduits, underground power lines, and equipment that has not been properly de-energized using Lockout/Tagout (LO/TO) procedures.**
- **Falling objects – tools and equipment dropped from roofs, equipment, ladders, lifts, and more.**
- **Crush hazards – swing zones of heavy equipment (excavators, drilling equipment, etc.), crush zones under lifts, between equipment and fixed objects, and much more.**

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Construction Site Hazards

Respect and Obey the Signs

DANGER A DANGER sign represent the most serious hazards, where special precautions must be taken. This type of sign indicates that death or serious injury is almost certain to occur if the hazard is not avoided.

WARNING This sign describes a hazard that may result in death or serious injury, but where the overall risk is not severe enough to need a danger sign. A safety alert symbol precedes the "WARNING" signal word, which is printed in black on an orange background.

CAUTION The hazards described on a caution sign may result in minor or moderate injuries if not avoided. These typically caution about variable risk that may be present on the site or warns against unsafe practices on site.

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Confined Spaces
There are many dangers on the other side of the lid.
✓ Toxic Gasses *Poison Air
✓ Explosive Gasses *Locating equipment is not intrinsically safe
✓ Oxygen Deficiency *Suffocation Risk
✓ Slips, Trips and Falls *The ladder and floor are very slippery when wet!
✓ Electrical Shock Hazard are present in many confined spaces

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SHOCK HAZARDS
Dangers on the other side of the lid!

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MARK ACCORDING TO SITE CONDITIONS
811 Locators place marks in all weather and site conditions
EXCAVATORS SHOULD PROTECT THE MARKINGS
If marks are no longer visible notify 811 to get the lines relocated.

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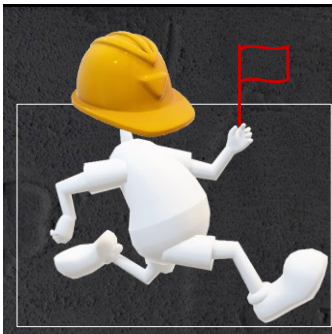

Physical Demands of Locating

- Millions of miles of pipe, cable and wires are buried beneath public and private property. These buried facilities run through brushy thickets, swamps and woodsy areas. This creates a lot of opportunity for trips and falls. There is also many opportunities for scratches, scrapes with a risk of getting poked in the eye by a random branch or stabbed in the foot by a nail.
- Line locating involves a of walking, squatting, bending, ducking, and dodging involved in the hunt for buried lines.
- Locating can also involve much lifting, pulling, bending under and stepping over objects on the jobsite site.
- There are many heavy lids that could cause back injury while lifting as well as pinch or crush a foot or other body part caught beneath it.

Tips:

- Stretch like your getting ready to play a sport.
- Wear your PPE to keep your head, eyes, ears, fingers and toes safe.
- Use proper lifting techniques and tools when necessary to keep the back healthy.

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Physical Demands of Locating

- Lifting: Confined spaces are often a point of access to the underground facility. Some lids and covers are quite heavy and require lifting to gain access to buried lines.
- Climbing: Locator often required to climb up and down slippery ladders to gain access the targeted facilities.
- Repetitive Actions and movements: Repetitive movements range from carrying a loaded paint stick in one hand and a piece of locating equipment in the other. Movement of the locating machine and pulling the trigger of the paint stick.
- Callous and Blisters: Many locators have calloused trigger finger

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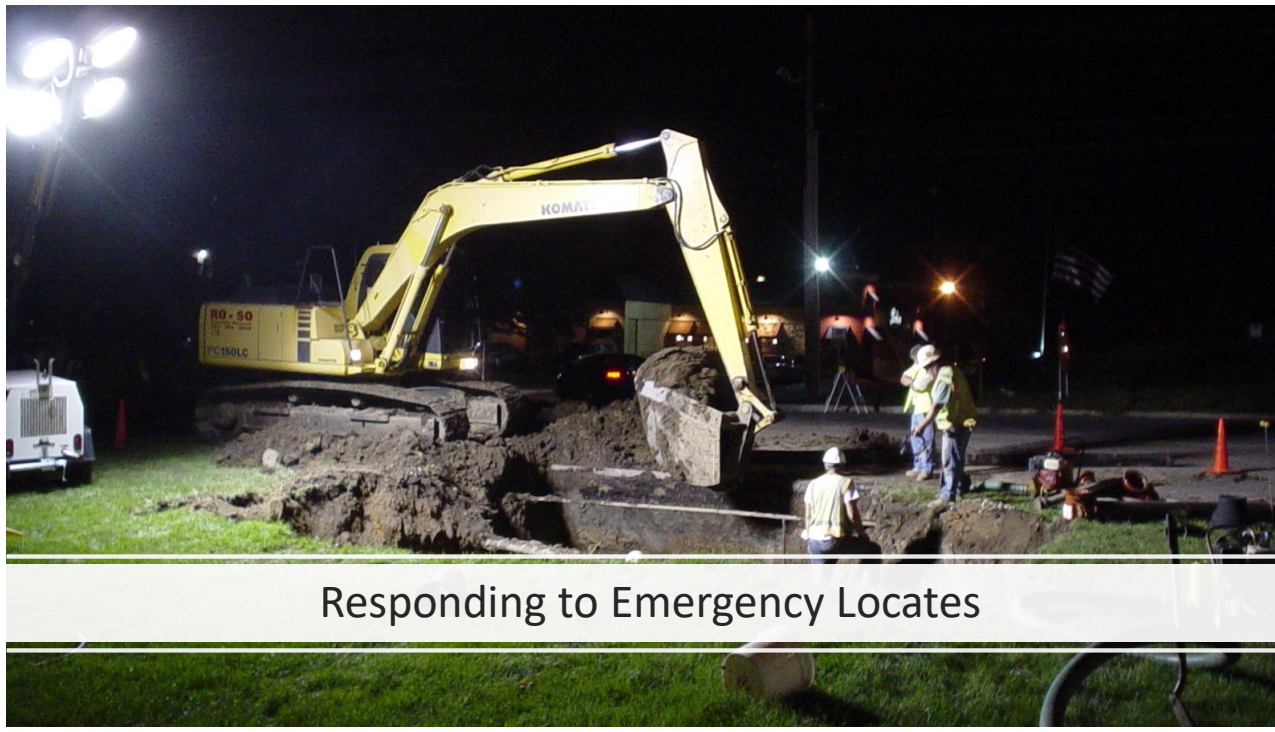

Responding to Emergency Locates

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Responding to 811 Emergency Locates involving Damaged Natural Hazardous Products

- Many emergency 811 tickets come in after a 911 call is made first. Read the ticket, make some calls and know what you are getting into.
- If gas is escaping the in area, do not enter the site until it is determined safe by proper gas or emergency response personnel.
- Line locating equipment is not intrinsically safe!
- Communicate and coordinate with the excavation crew before performing the locate.
- Do not proceed until area has been made safe.

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Responding to 811 Emergency locates involving water system damages.

Ruptured water lines :

- can wash out soil under grass and roadways
- can cause cave-ins
- can create flying debris

- Do not drive through standing water on site.
- Be vigilant about the possibility of post leak sink holes and cave-ins. proceed with caution.
- Speak with excavation crew for their take on the situation

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Broken poles during an ice storm creating a domino effect.

- **Question:** Would your hard hat help if you where standing beneath these power lines?
  - ✓ **Answer**: What are you doing standing beneath those power lines?

- Wait until area is made safe before entering the area
  - ✓ Communicate and coordinate a plan of action with excavation crew.

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Site Investigation

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Visual Site Inspection

Locator/ Tracker/ Investigator

- *Safety First:* Look for any **potential hazards** like obstructions, traffic, physical site conditions or Abnormal Operating Conditions or (AOC's)
- Identify the **scope of work**
- Search for any visible **signs of other facilities**
- Search for all **topside metallic structures** that may impact your signal.
- Search for any **visible signs of trench lines or past excavation surface scars.**
- **Cracks or cuts in pavement patches in asphalt or newer slabs of concrete**
- Look for any **old marks** or flags from past locates including **off set markings** on pavement
- Look for a **good place to place your temporary ground stake**

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AOC
Abnormal Operating Condition

Some typical AOC's when locating

- fire
- vapor cloud or odor report
- leaking gas or liquid product
- dead vegetation
- component failure
- unauthorized excavation on right of way
- washout on Right-of-Way
- missing or damaged pipeline markers

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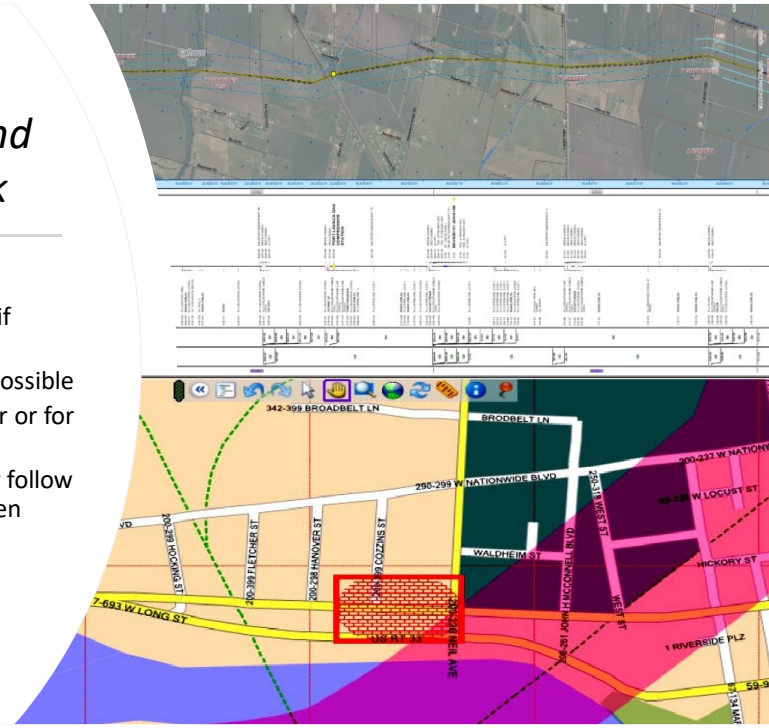
Read Ticket Carefully and Identify Scope of Work

- Read and Understand Scope of Work
- Identify caller contact and site contact if different
- Communicate with site contact when possible
- Contact caller if instructions are unclear or for specific site location details
- Contact using digital communication or follow phone call with confirmation email when possible to document any and all communication.



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Visual Site Safety Inspection
Identify the scope of work

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- Search for any visible signs of other facilities
- Search for all topside metallic structures that may affect the quality of your signal *fence, metal building, above ground pipe etc..
- Look for a good place to place your temporary ground stake

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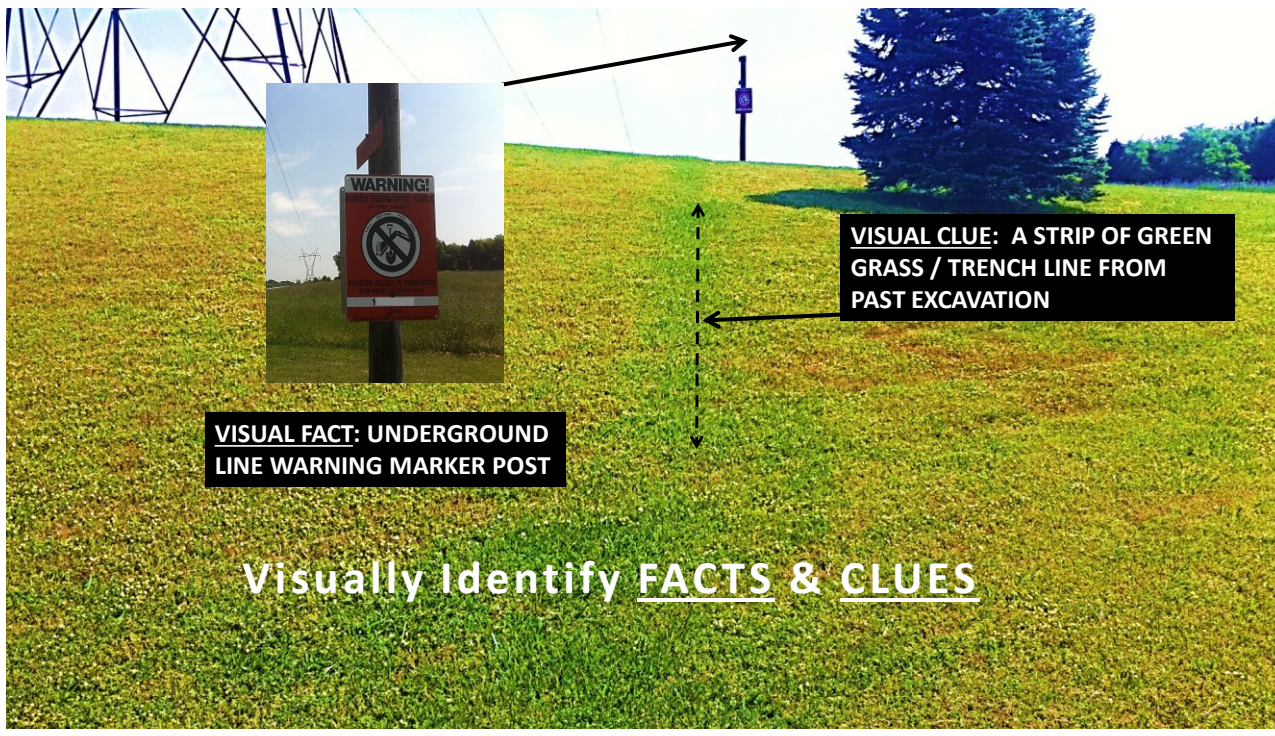

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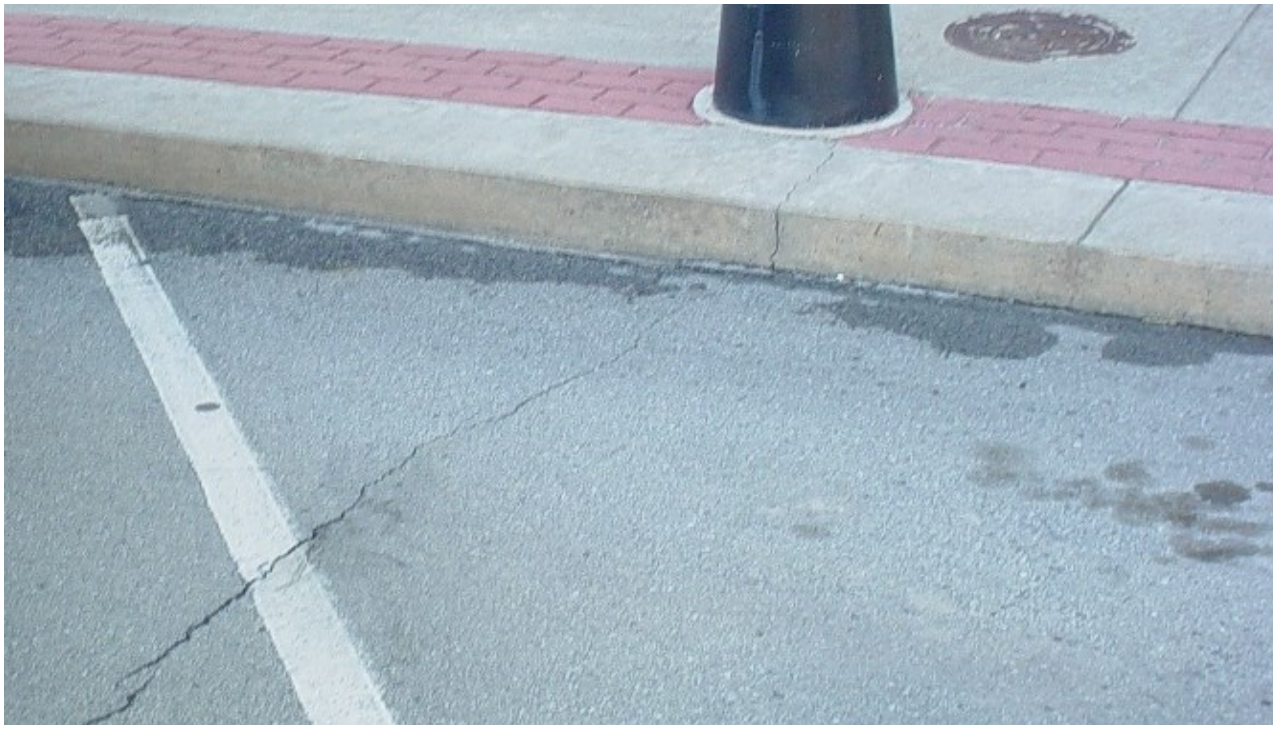

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Research and Review Facility Maps and Records

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Open Excavation shows
Pipe repair using PVC to repair Ductile Iron Pipe.
Map will always show water main to be 6 inch Ductile Iron unless corrections to map are made.

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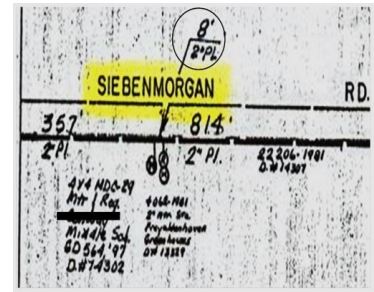
Site Investigations & Record Research

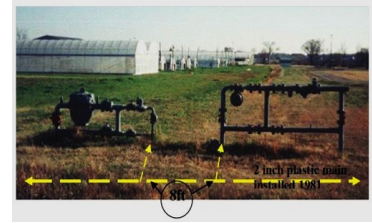
Gathering Evidence in a search for facts and clues

- **Read ticket carefully and identify the scope of work**
- **View existing maps and records off the job site**
- **Visual site inspection to search for facts & clues**

Combine the evidence to create a locating plan

- **Deductive Reasoning** is a process of reasoning in which a conclusion is reached by piecing together all of the known facts and clues to determine what appears to be true. The conclusion is assumed to be correct if the combined facts and clues are true.





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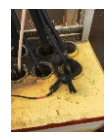
Utilize available detection equipment to locate conductive lines



Transmitter

- Select the best method for transmitting
  - clip *direct connect
  - clamp *close induction ring clamp
  - induce *using transmitters internal signal broadcast antenna

Receiver

- Choose your signal detection mode
  - peak
  - null
  - combination
- Passive sweep of area
  - 60Hz/Power, Radio, CP120Hz/**C**athodic **P**rotection **S**ignal etc.
- Consider using a minimum of two methods of locating for verification when identifying high profile or critical facilities

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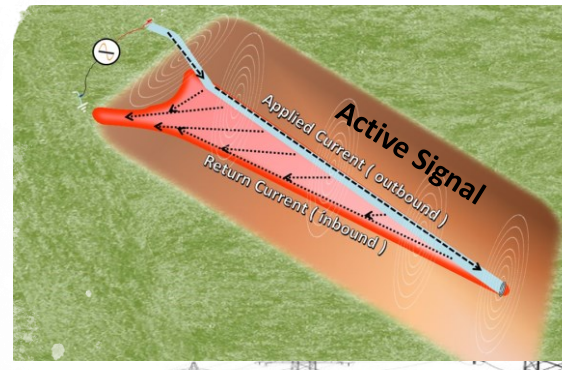
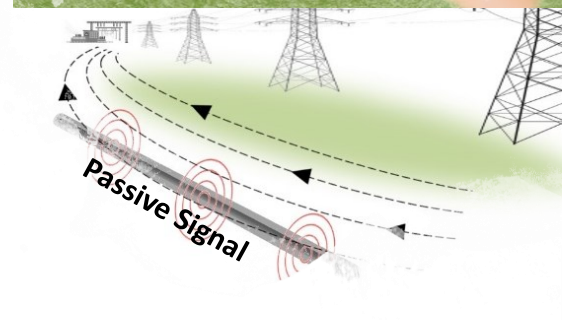
2 Types of Detectable EM Signals





- Active Signals are applied by transmitter
- Passive Signals are already present on many buried conductors and are detectable by a signal receiver programed to detect their specific frequencies.

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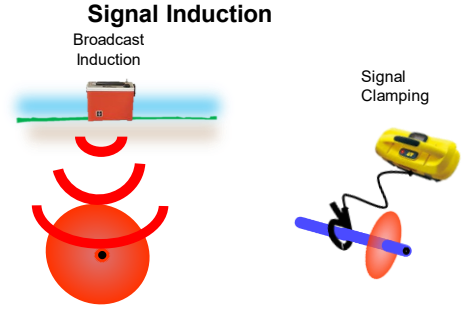
Active Signal Transmitter

Active Signal Application Methods

- Direct Connection: (metal to metal contact) is made between the transmitter's wire leads attached to the conductor and the ground stake
- Utilizes the signal wave as the force that creates the current. Signal induced by ring clamp or using the transmitter to broadcast signal to buried conductor.

Direct Connection

Signal Induction



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Mark Facility Appropriately

White	.....Proposed Excavation
Pink	.....Temporary Survey Markings
Red	.....Electric Power Lines, Cables, Conduit and Lighting Cables
Yellow	.....Gas, Oil, Steam, Petroleum or Gaseous Materials
Orange	.....Communication, Alarm or Signal Lines, Cables or Conduit
Blue	.....Potable Water
Purple	.....Reclaimed Water, Irrigation and Slurry Lines
Green	.....Sewers and Drain Lines

Golden Rules

→ **Pinpoint before Painting!**
→ **Paint on Peak !**
→ **Mark private property as if it where your own*!***

- **Consider Site Conditions** when choosing marking method
- Use the correct APWA paint color for marking facilities.
- Clearly mark turns, tees are clearly defined
- Outline underground vaults and concrete thrust blockers.
- Use appropriate procedures to mark facilities accurately.
- Make sure all bends and tees are clearly marked.
- Use flags, whiskers, and stakes as needed.
- Ensure all of your lines are marked for entire scope of work.
- Refer to Appendix B of the CGA Best Practice Guide

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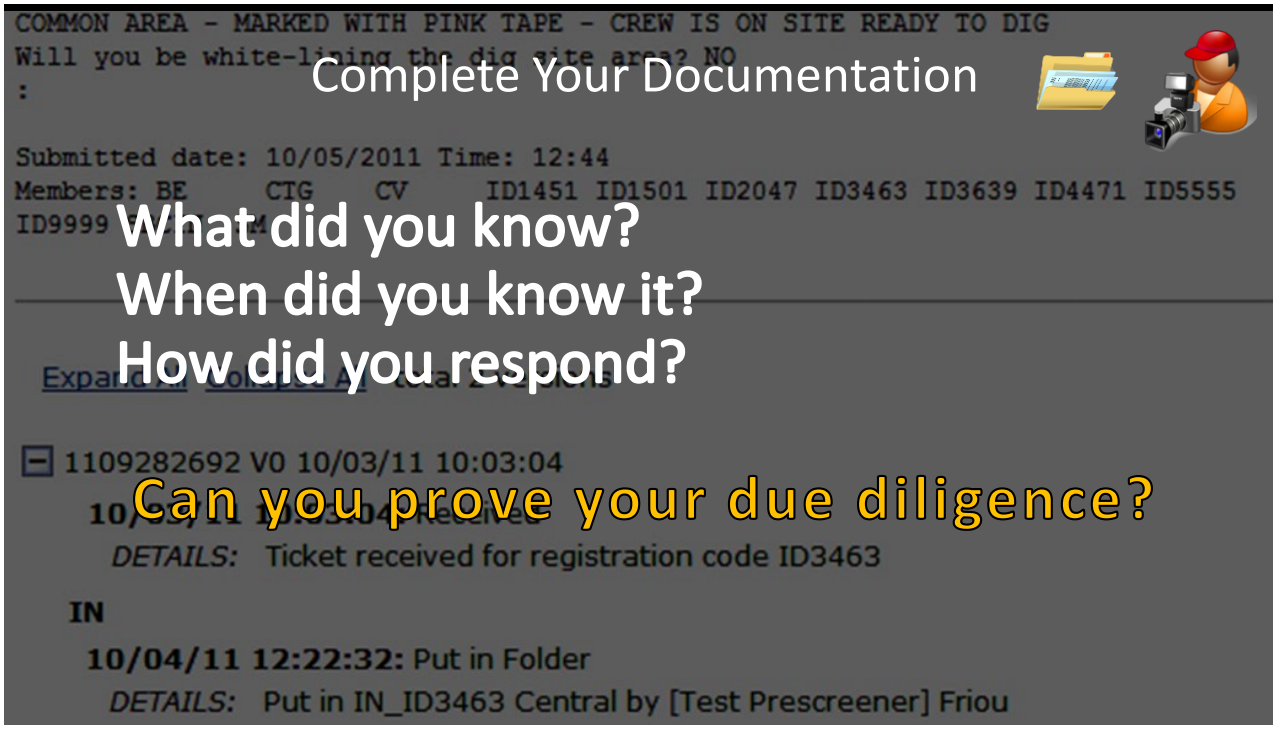

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Document, Document, Document

811 Notifications are legal documents and should be treated as such. The entire process needs to be documented with a time and date stamped from the time it leaves the 811 center.

- Document Marks, *pictures, sketch, gather GPS data etc..
- Document all conversations related to the specific job including time, date and content of any voicemails you leave
- Make note of non-conductive lines located by measurements or line of site note map number or reference to measurement *consider notifying excavator of non-conductive line
- Document and communicate any discrepancies on mapping data and records
- Any change in the scope of work should be documented.
- Notify excavator and schedule meet if high priority or critical line is buried in or near site and document schedule for follow up.
- Document any unusual circumstances or occurrences that could be noteworthy if an incident should occur. *plan for the worst and hope for the best

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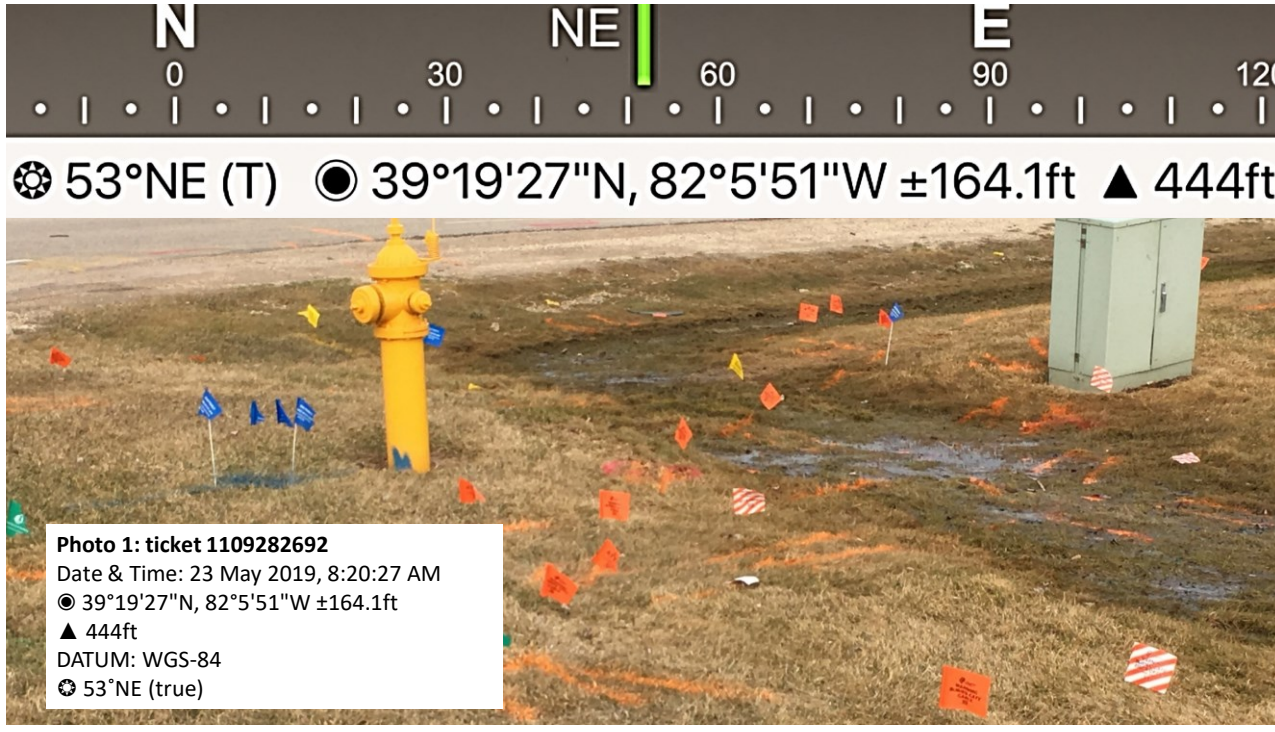
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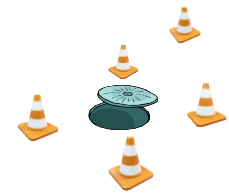
Restore the Job Site
Retrieve Safety Equipment

- Close everything that you have opened! *panel, lid, cap, door, gate etc..
- Retrieve and load all hand tools and accessories
- Retrieve and load your locate receiver and transmitter
- Pick up any empty paint cans or your trash
- Do a 360 around your vehicle before leaving looking for potential hazards and to ensure everything is safe and secure.

Plan your retreat from the site

Retrieve Safety cones and barricades last.



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ANY QUESTIONS ?

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