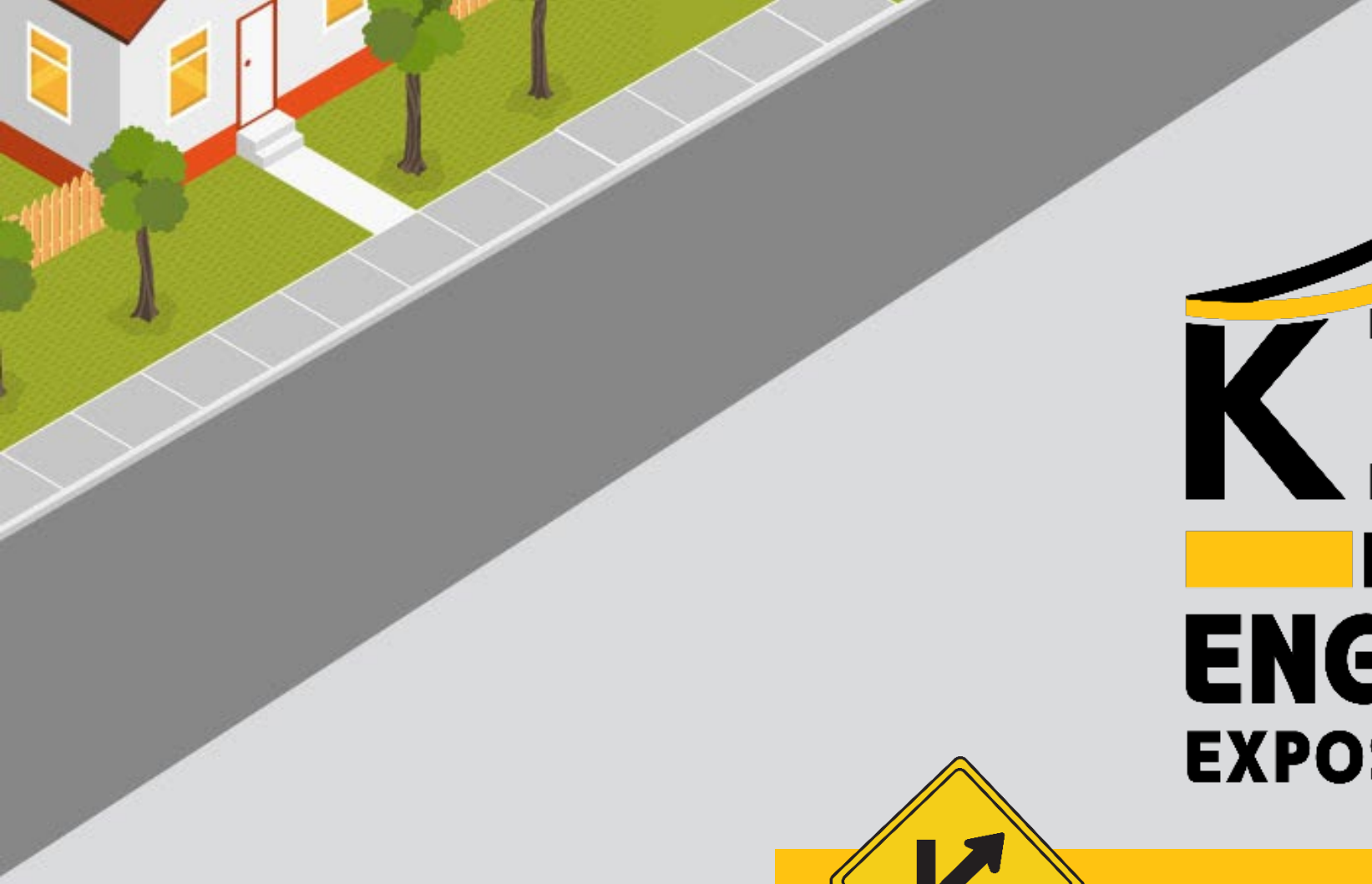
KENTUCKY ENGINEERING EXPOSURE NETWORK

High School
UNDERGROUND UTILITY DAMAGE PREVENTION
Locating Utilities

Presentation by: On

Month Day 2022



KENTUCKY
ENGINEERING
EXPOSURE NETWORK

KENTUCKY TRANSPORTATION CABINET

An education initiative by the Kentucky Transportation Cabinet

in partnership with:

COMMONWEALTH OF KENTUCKY
Fair, Just, and Reasonable
Safe and Reliable
PUBLIC SERVICE COMMISSION

ATMOS energy®

- What are utilities?
- Occupying road right of way
- Locating utilities before excavating
- Utilities layout
- Utilities test equipment

What are utilities?

- Electricity
- Gas
- Crude oil
- Water
- Sewage
- Other fluid
- Phone and Cable

**Conveyed to or for the public, for compensation*
Kentucky Revised Statute KRS 278.010

Why are utilities in a row?

- Utilities may construct and maintain lines in the road right-of-way
- They can’t interfere with the road
- The Department of Highways regulates access via a permitting process
- If the lines interfere with the road, the utility has to relocate or remove it

Kentucky Revised Statute KRS 416-140

NAME THAT UTILITY

Name that Utility

Name that Utility

Name that Utility

WATER

SEWER

Name that Utility

Name that Utility

SEWER PUMP STATION

Name that Utility

Name that Utility

TELECOMMUNICATION
(UNDERGROUND PHONE)

PEDESTALS

Name that Utility

Name that Utility

TELECOMMUNICATION

(UNDERGROUND PHONE)

WATER FIRE HYDRANT

UG FIBER OPTIC

Name that Utility

Name that Utility

AERIAL POLE ROUTE

ELECTRIC

CATV W/ SLACK

TELECOMMUNICATION (PHONE)

Locating utilities before excavating

- Locating underground utilities is becoming more of a challenge as the amount and variety of underground lines increase.
- As the ground under our feet becomes more congested, it’s vital to identify the location of utilities to ensure safety and reduce cost.

Locating utilities before excavating

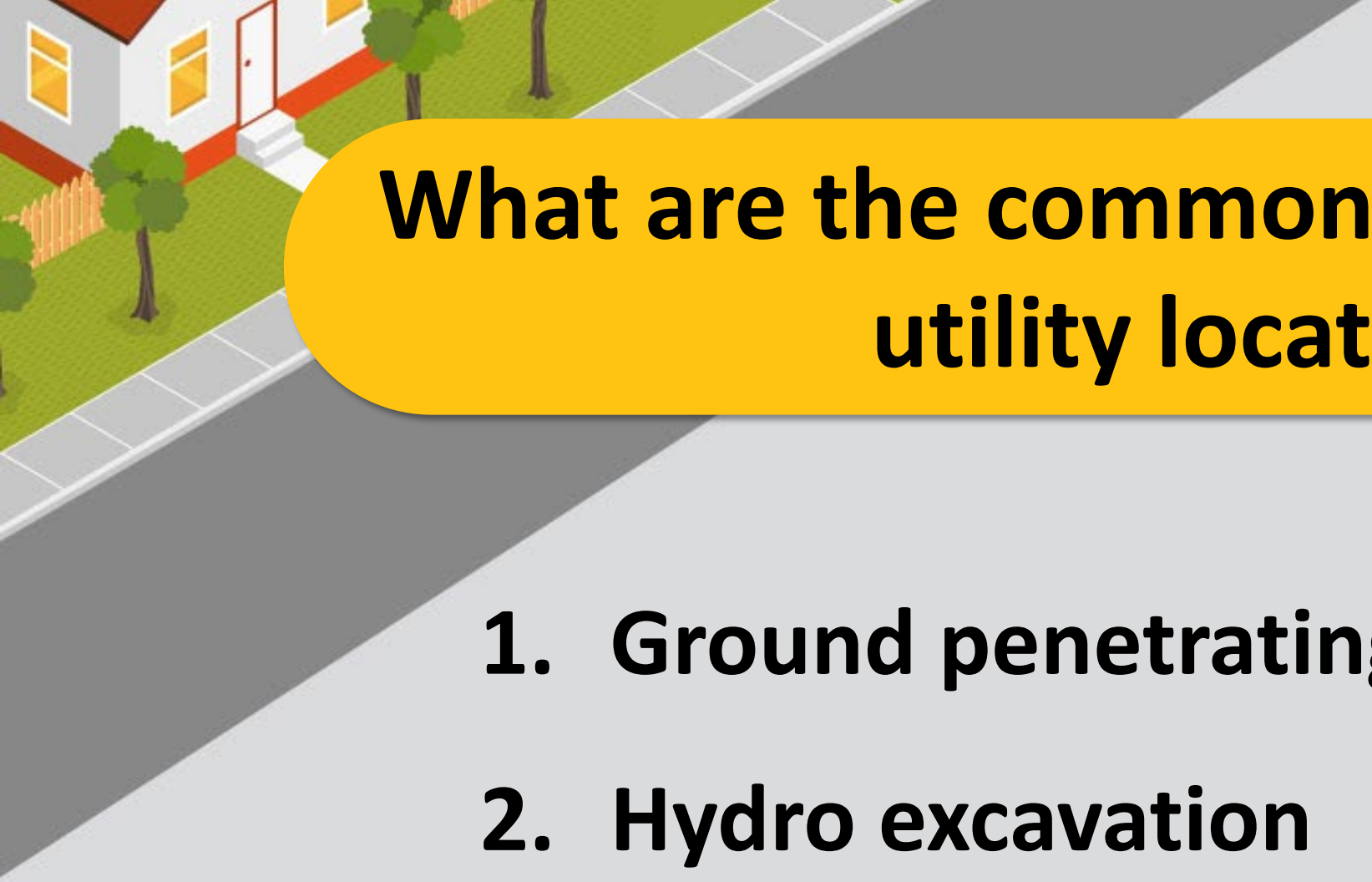
CAMBY IND, NEAR INDIANAPOLIS

Locating utilities before excavating

DALLAS FORT
WORTH TX AREA

Locating utilities before excavating

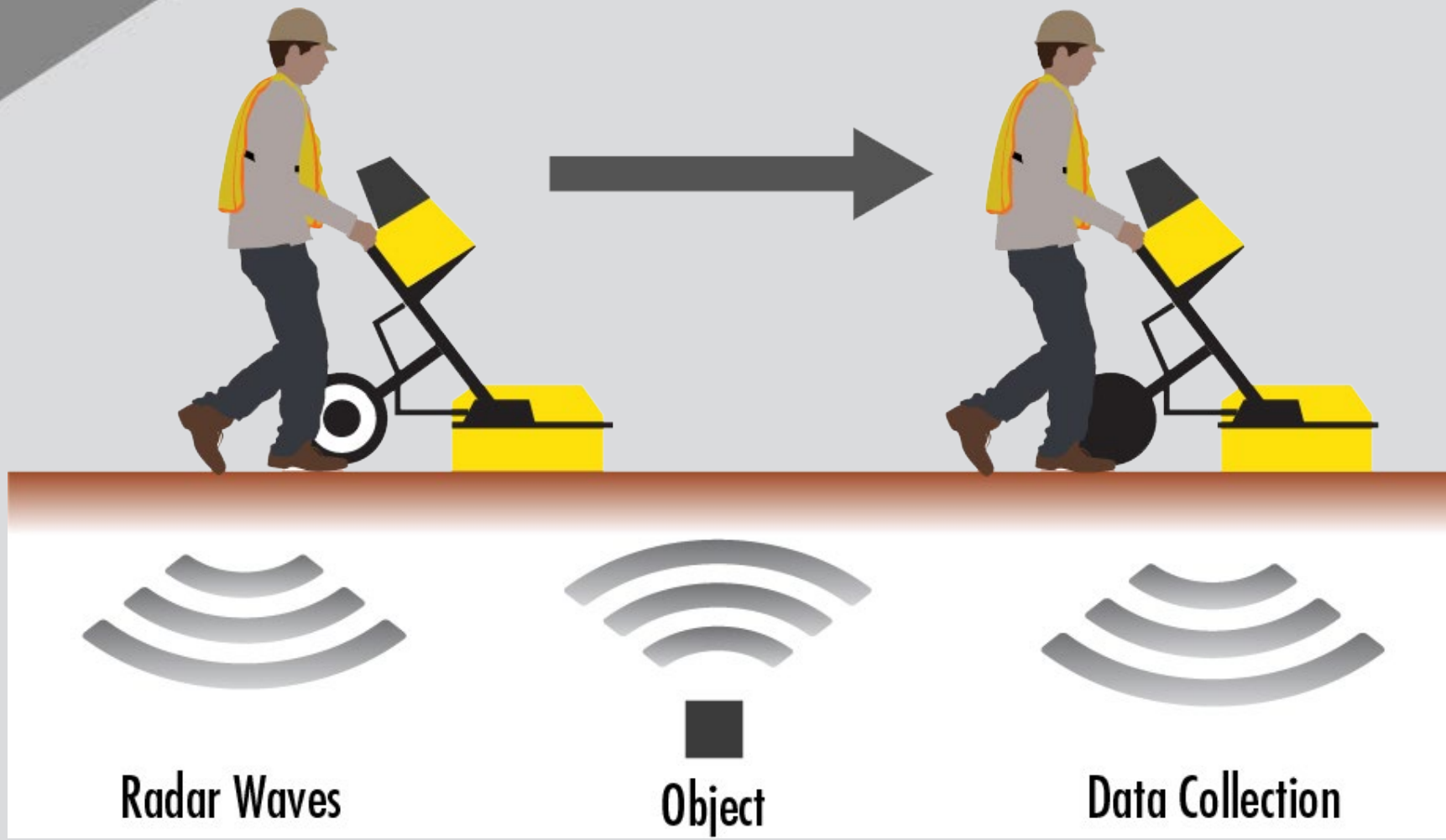
SAN ANTONIO, TX



What are the common underground utility location methods?

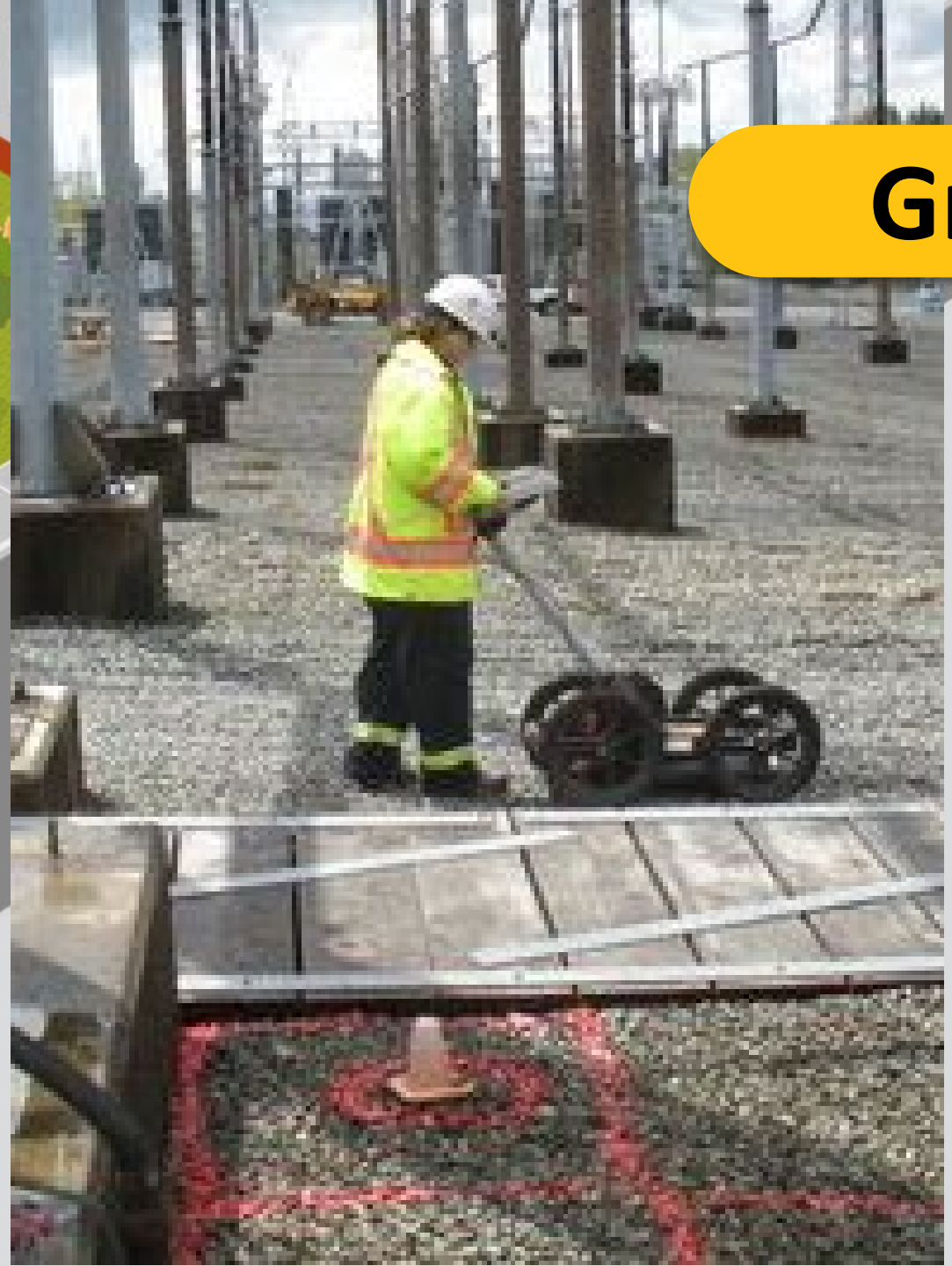
1. Ground penetrating radar
2. Hydro excavation
3. Electromagnetic utility locating

Ground Penetrating Radar



Ground Penetrating Radar

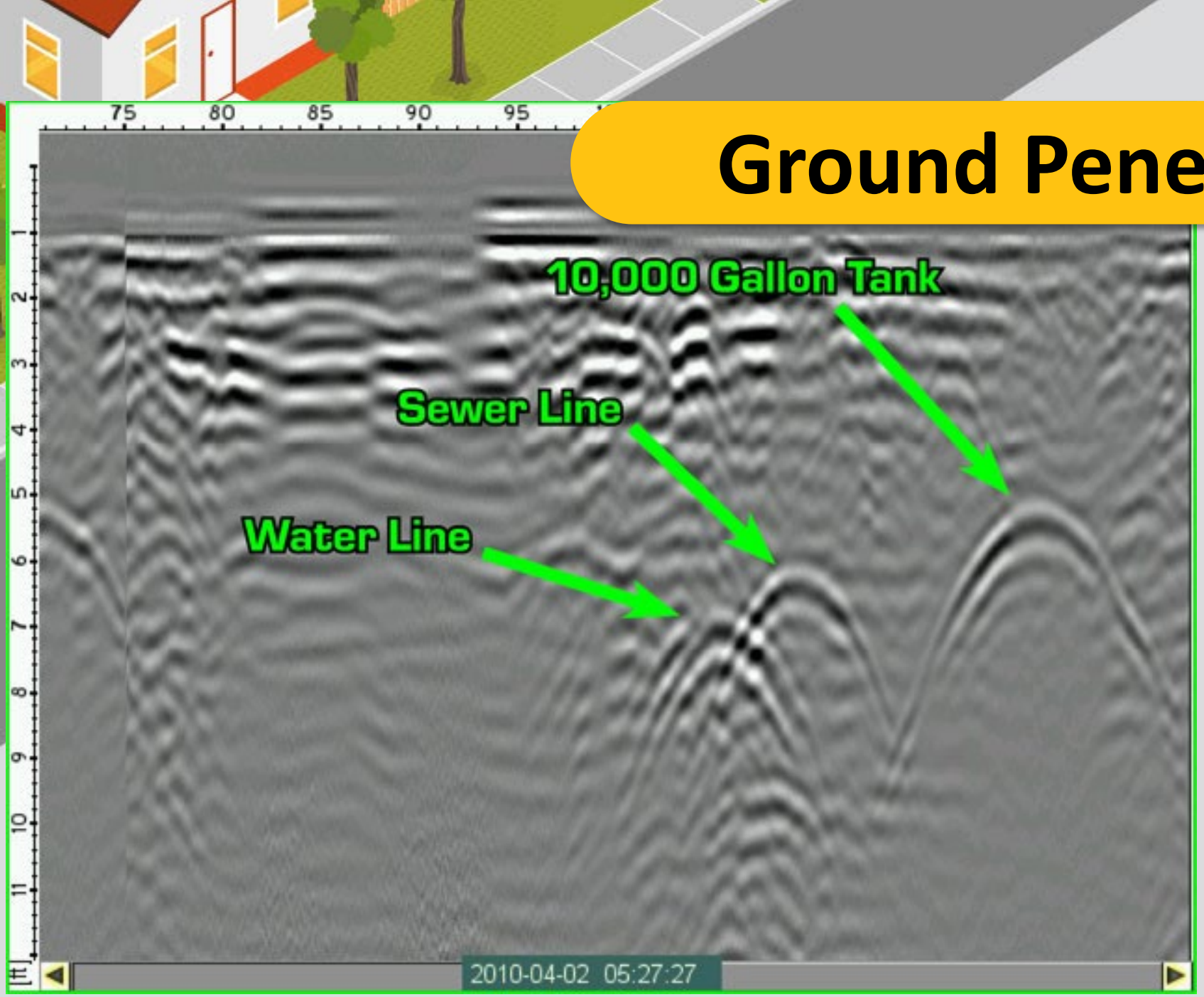
- Uses high frequency pulses
- Radio waves are emitted into the ground
- Underground utilities deflect the radio wave back up
- Requires experience and training



Ground Penetrating Radar

- Best imaging solution for both metallic and non-metallic targets
- Both position and depth can be found
- Detects changes in underground conditions by reflecting off any disturbance:
  - Wet soil
  - Rocks
  - Metal
  - Plastic

Ground Penetrating Radar



Limitations:

- Some soils like shale or clay
- Only for shallow utilities
- Dense soil
- Crowded utilities

Hydro or Vacuum Excavation (potholing)

- Fast and non-destructive
- High pressure air or water is used to break up the soil,
- Soil is then vacuumed into a tank
- Precisely locates the utility but only at this specific location

**Also known as potholing, hydro-digging, hydro-trenching or soft digging*

Electromagnetic Utility Locating

- Most common method
- Generates an electromagnetic signal
- Commonly used to detect gas, electric, telephone, cable, propane, water, sewer, storm and irrigation lines

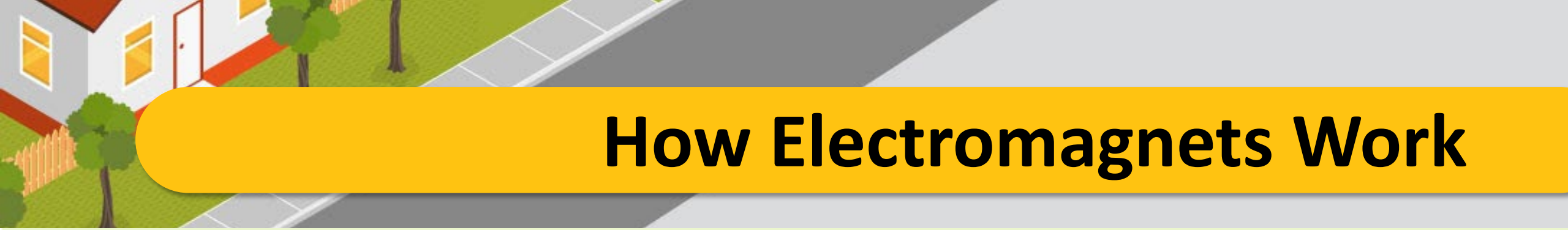
Electromagnetic Utility Locating

Limitations:

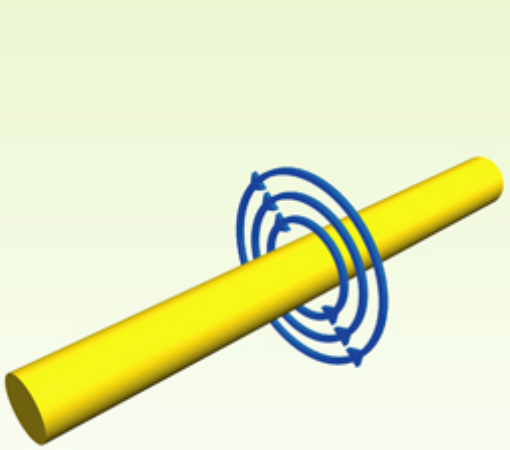
- Cannot locate plastic, concrete, clay or other non-ductile pipes
- Doesn’t perform well beyond the depth of 10-15 feet

How Electromagnetic Locating Works

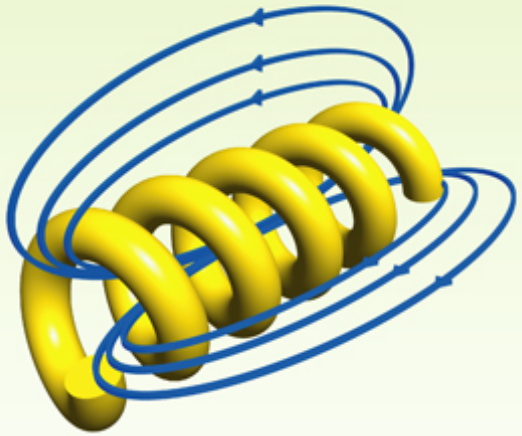
- Two parts: a transmitter and a receiver
- The transmitter places a “signal” onto the line then
- The signal is located with the receiver
- The signal placed on the line is an electromagnetic frequency



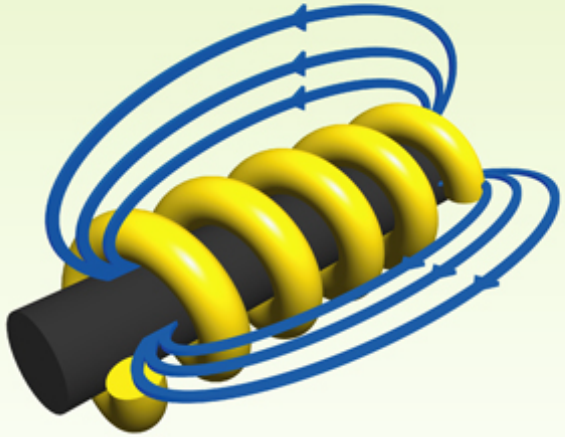
How Electromagnets Work



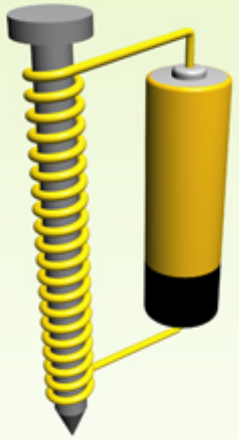
When electric current runs through a wire it generates a magnetic field around it. The magnetic field around a single wire very weak.



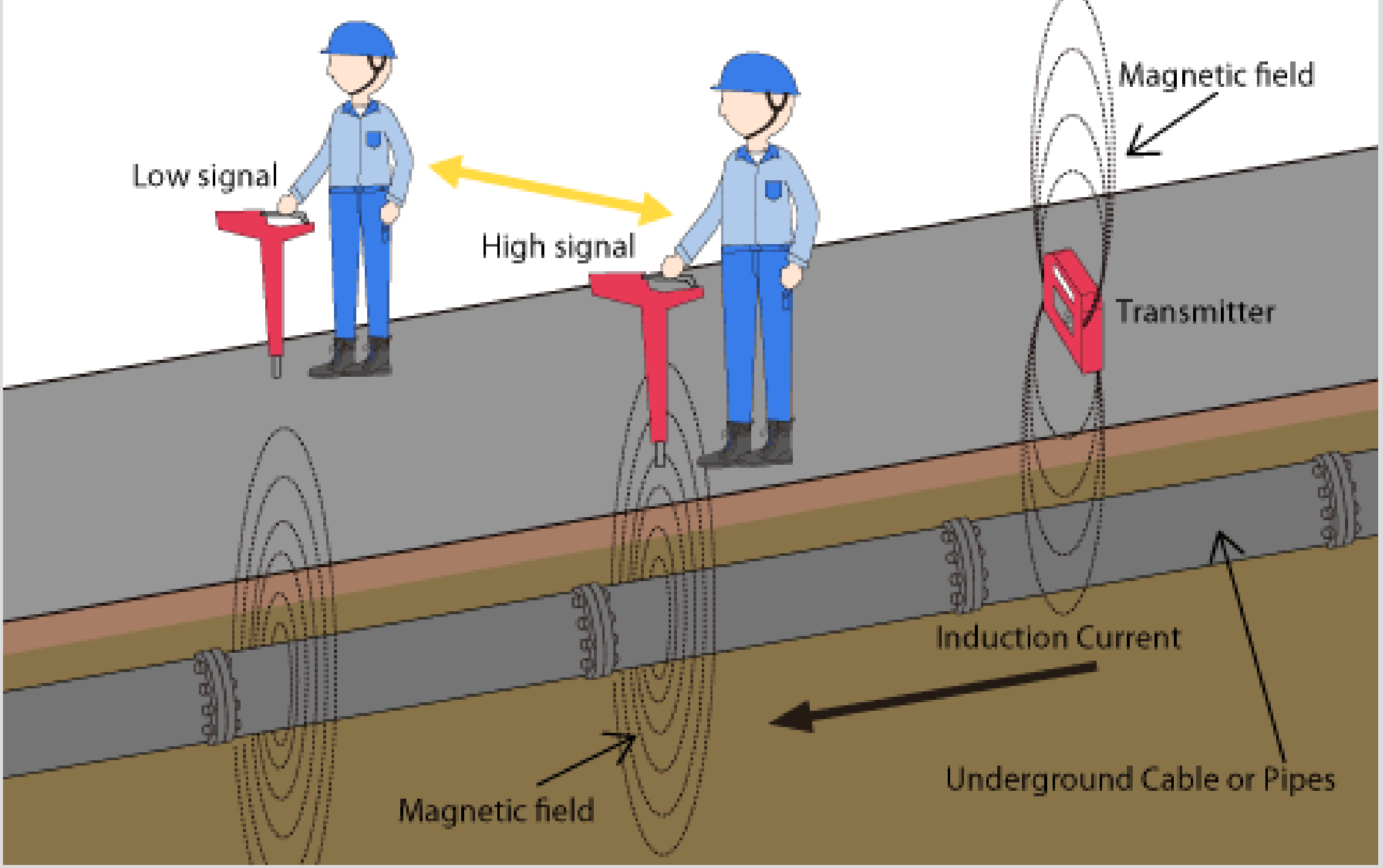
By wounding the wire into a coil and concentrating the magnetic field it produces a stronger field. More electrical current produces a stronger magnetic field.



The magnetic field can be made even stronger by placing an iron bar in the centre of the coil. This have a big effect on the electromagnets power.



Try it your self by coiling a copper wire around a nail. Then connect the wire to a 1.5V battery. See how many staples you can pick up by changing the numbers of loops. You can also see what happens if you connect it to two batteries.


Low signal
High signal
Magnetic field
Transmitter
Induction Current
Underground Cable or Pipes
Magnetic field

Pipe Types

Plastic Pipe:

PVC (polyvinyl-chloride) is a type of plastic pipe. It is a commonly used pipe for drain and water lines. It’s strong, untouchable by chemicals, and seems to last forever!

https://www.acmeplastics.com/what-is-hdpe

Pipe Types

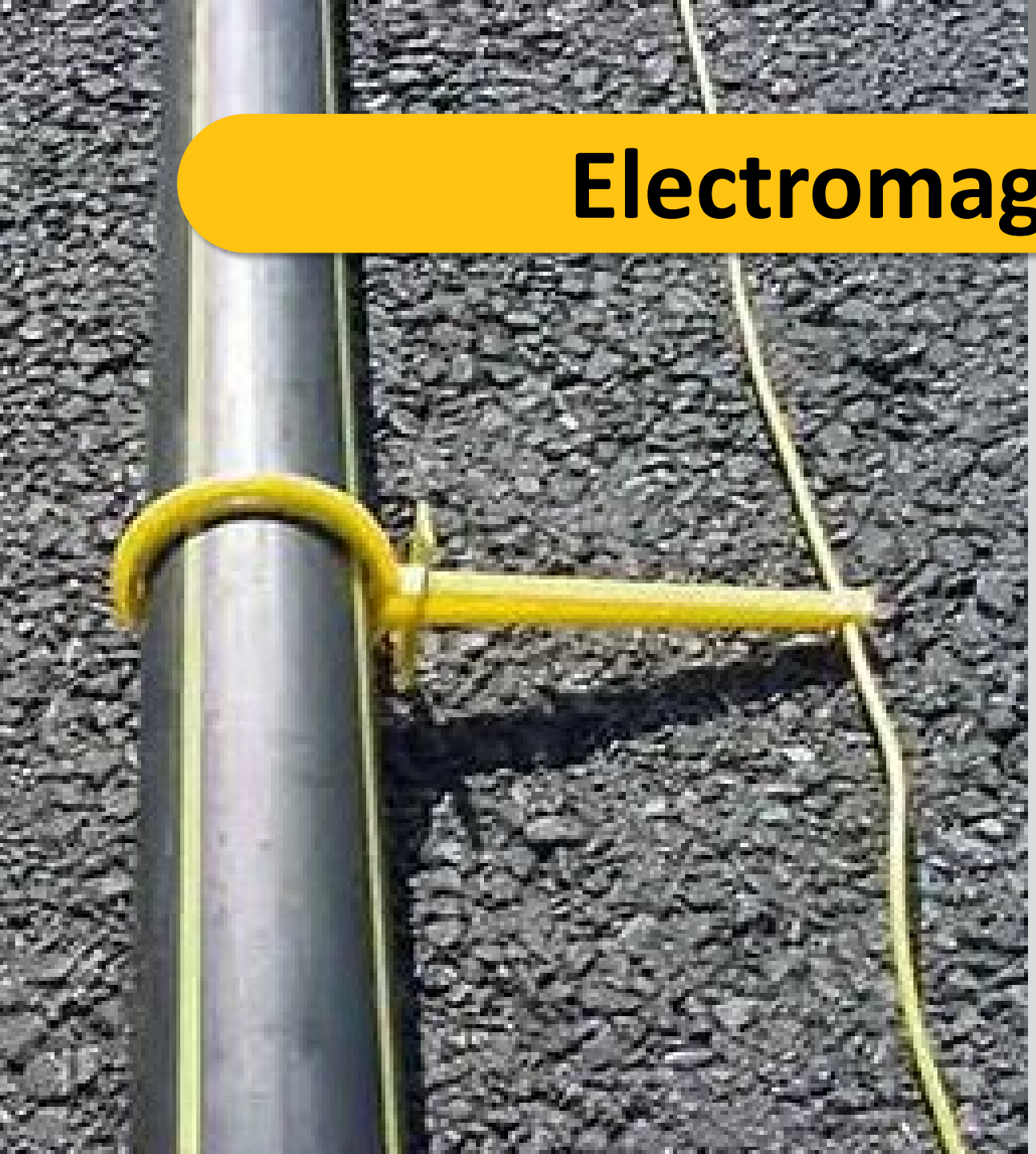
HDPE high density polyethylene pipe:

HDPE pipe is commonly used for sewer and storm water. It is more durable than standard PVC pipe and has become a popular material for underground piping systems.

Pipe Types

Steel:

Steel pipe is strong, and can be used to transport liquids and gases including water. It can have a useful lifetime of about 50 years.

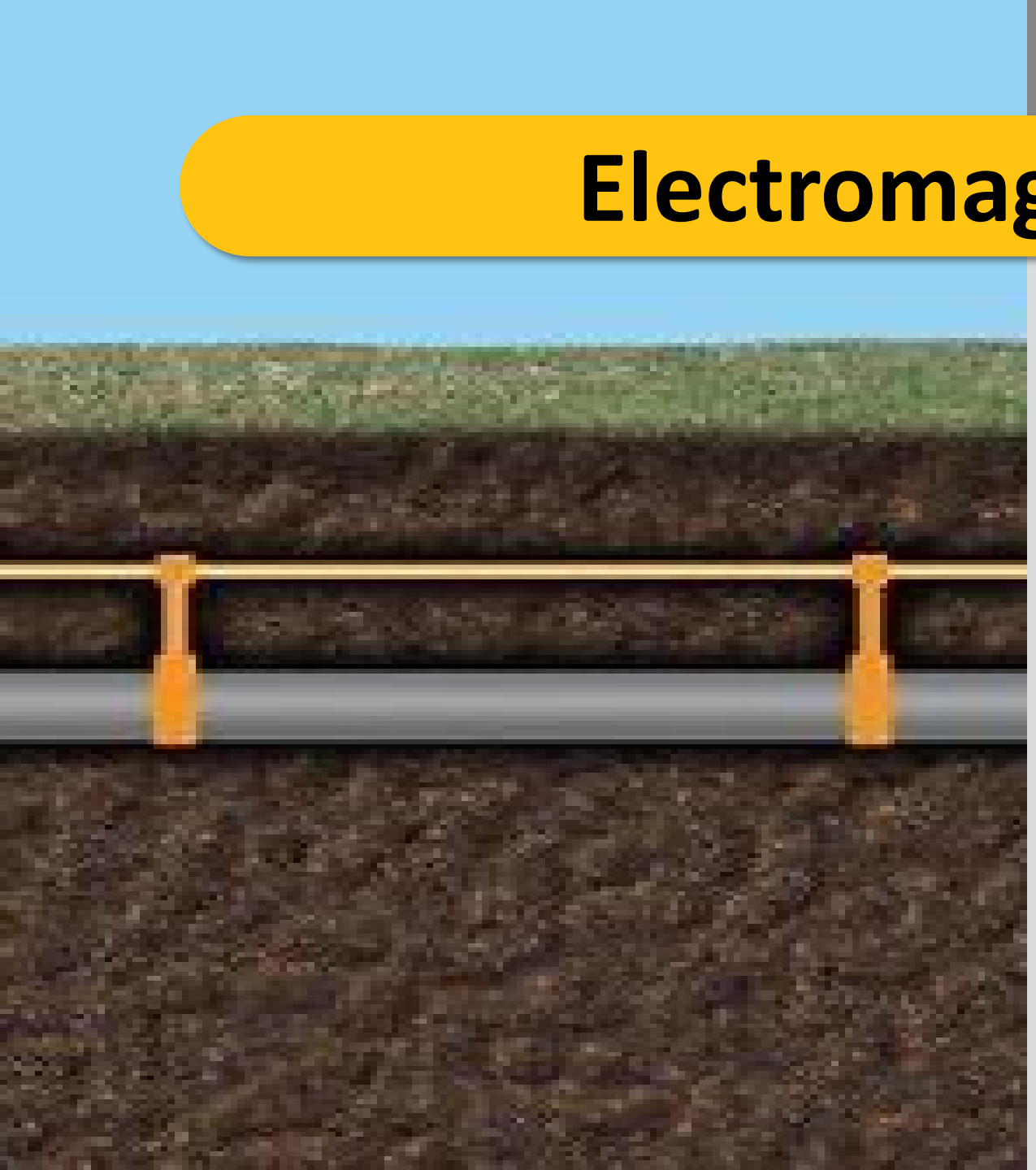


Electromagnetic Utility Locating

Utility lines like gas lines are generally constructed plastic pipe.

So, tracer wire is run alongside or on top of the pipeline to make the line “locatable.”

Electromagnetic Utility Locating



In these situations by having access to the system (e.g. a tracer wire box), a current can be induced on the tracer wire and the tracer wire can be located.

Electromagnetic Utility Locating

DIG SAFE KENTUCKY!

811®

2 business days before you dig, call

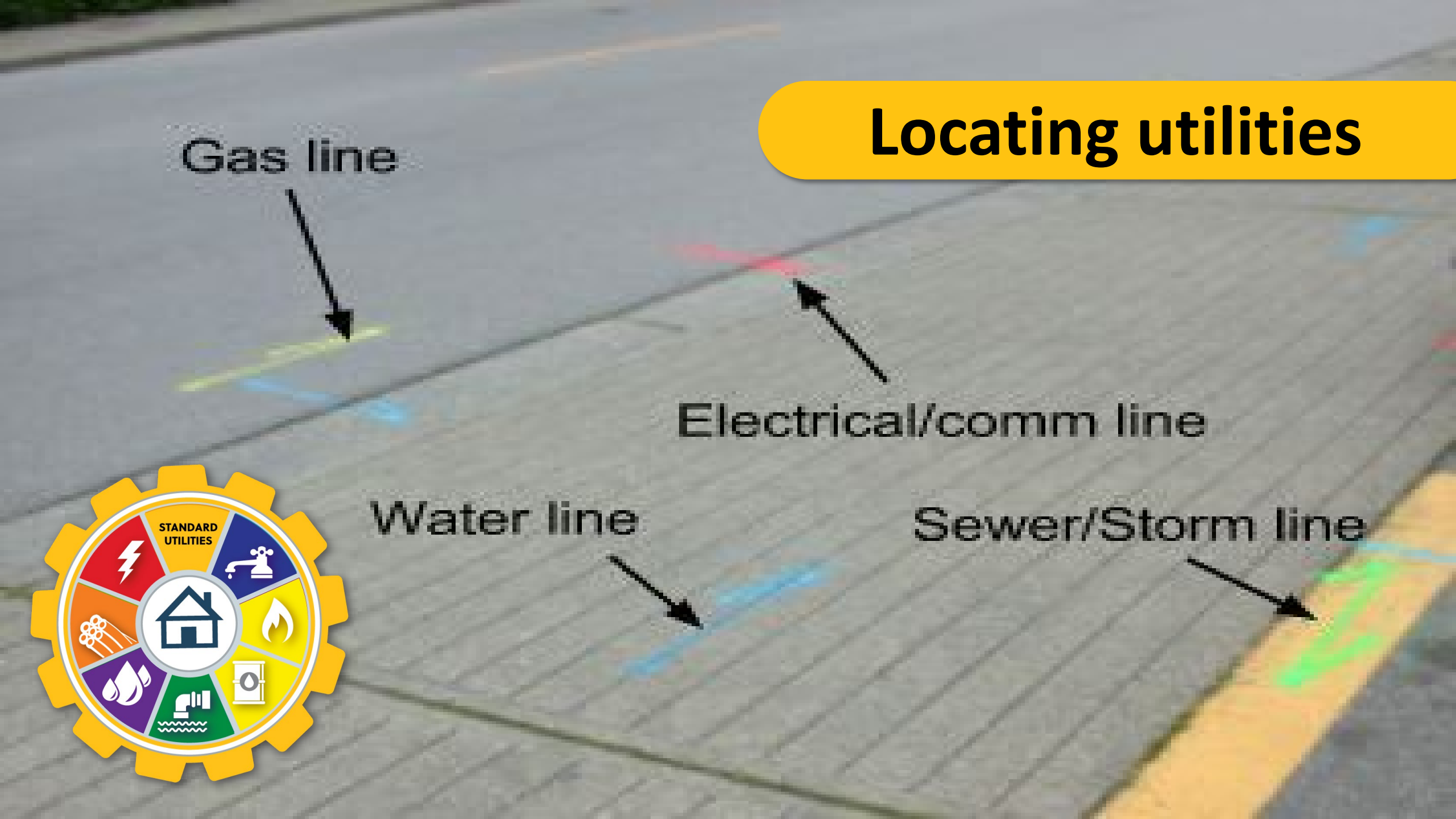
811

Or (800) 752-6007

www.Kentucky811.org

Locating utilities

Locating utilities



Ways to induce field

1. Connect to the metal tracer wire
2. Connect to the metal facility
3. Lay the transmitter over the line and induce signal onto it

Ways to induce field

First two methods are best, but require us to actually be able to touch the facility.

1. Connect to the metal tracer wire
2. Connect to the metal facility
3. Lay the transmitter over the line and induce signal onto it

Ways to induce field

Last method puts signal onto everything in the ground and is imprecise, but sometimes the only option.

1. Connect to the metal tracer wire
2. Connect to the metal facility
3. Lay the transmitter over the line and induce signal onto it


Time to be locators!

Time to be locators!

There are three lines in the project area:

1. Schedule 40 PVC Water Line
2. Polyethylene (PE) Sewer Line
3. Steel Gas Line

Time to be locators!

We've been called to locate them, where are they?

1. Hook onto their exposed tracer wire or metal pipe
2. Locate them
3. Mark them


510

THANK YOU!

KENTUCKY ENGINEERING EXPOSURE NETWORK

in partnership with:

COMMONWEALTH OF KENTUCKY PUBLIC SERVICE COMMISSION

ATMOS energy®

KYTC.KEEN@ky.gov

transportation.ky.gov/Education/Pages/KEEN.aspx