Solutions for Cross Bores

Focus: Gas Distribution Lines in Sewers

Minnesota Office of Pipeline Safety Summit

March 9, 2010

Cross Bore Safety Association

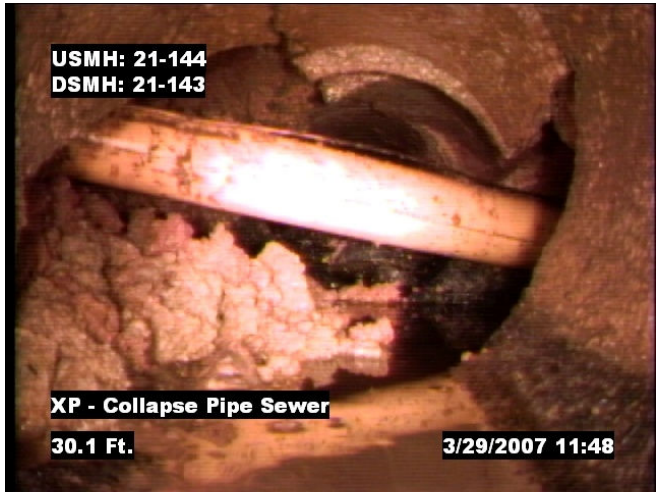
Mark H. Bruce, President

Cross Bore Definition

"an intersection of an existing underground utility or underground structure by a second utility resulting in direct contact between the transactions of the utilities that compromises the integrity of either utility or underground structure."

Cross Bores


USMH: 0016S0197
DSMH: 0016C0393
9/22/2008
8:49:09 AM
HSV - Hole Soil Visible
9.4 ft.


USMH: 21-144
DSMH: 21-143
XP - Collapse Pipe Sewer
30.1 Ft.
3/29/2007 11:48


29.07.08
LC1: 001.10 ft
LC2: 033.00 ft
10:31

Cross Bores


0674MH175 -->> 0674MH174


USMH: WB416
DSMH: WB430
4/7/2009
1:19:09 PM
MSA - Abandoned Survey


LATERAL
11/28/01 11:46
19.3 FT.

Cross Bore Basics

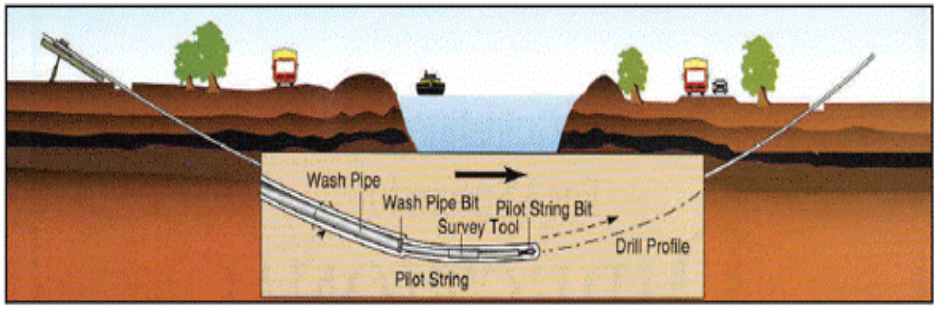
- Gas distribution lines in sanitary sewers creates a potential for injury, death and property damage.
- Reduction of risk can be achieved with the use of relatively new techniques and methods for both new construction and existing legacy installations.
- Minimizing the risk is both morally and financially prudent.

Historical Perspective of Trenchless Utility Installations

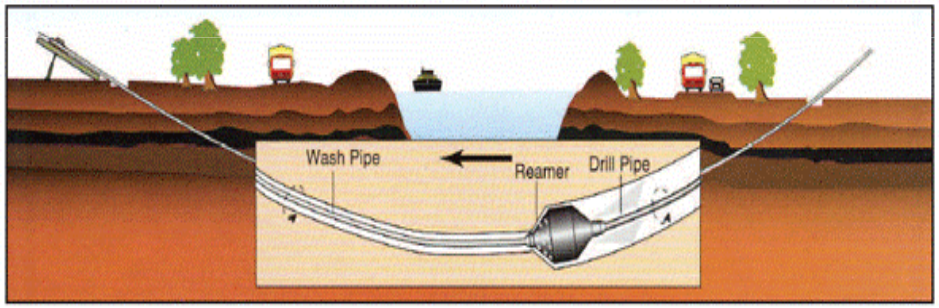
- Gas distribution lines have been installed by trenchless methods for over three decades

- Trenchless Methods Include:
  - Horizontal Directional Drilling
  - Moles
  - Plowing (yes, it is considered trenchless)

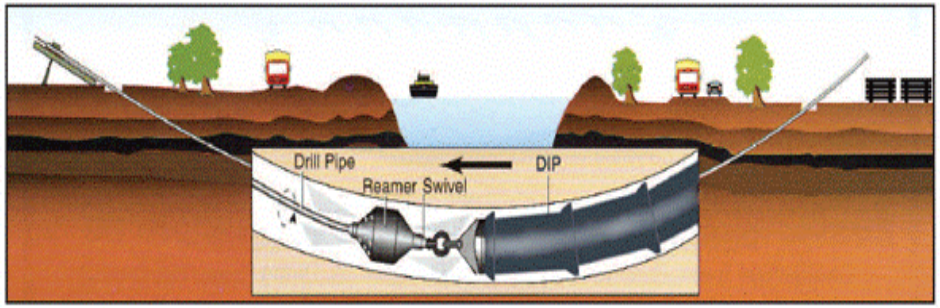
HDD – Horizontal Directional Drilling



PILOT HOLE



PRE-REAMING



PULL-BACK

Horizontal directional drilling minimizes impact to the surface, streets and driveways.

Moles / Piercing Tools

Pulls a utility behind the piercing head

Plows

Creates void and allows for placement

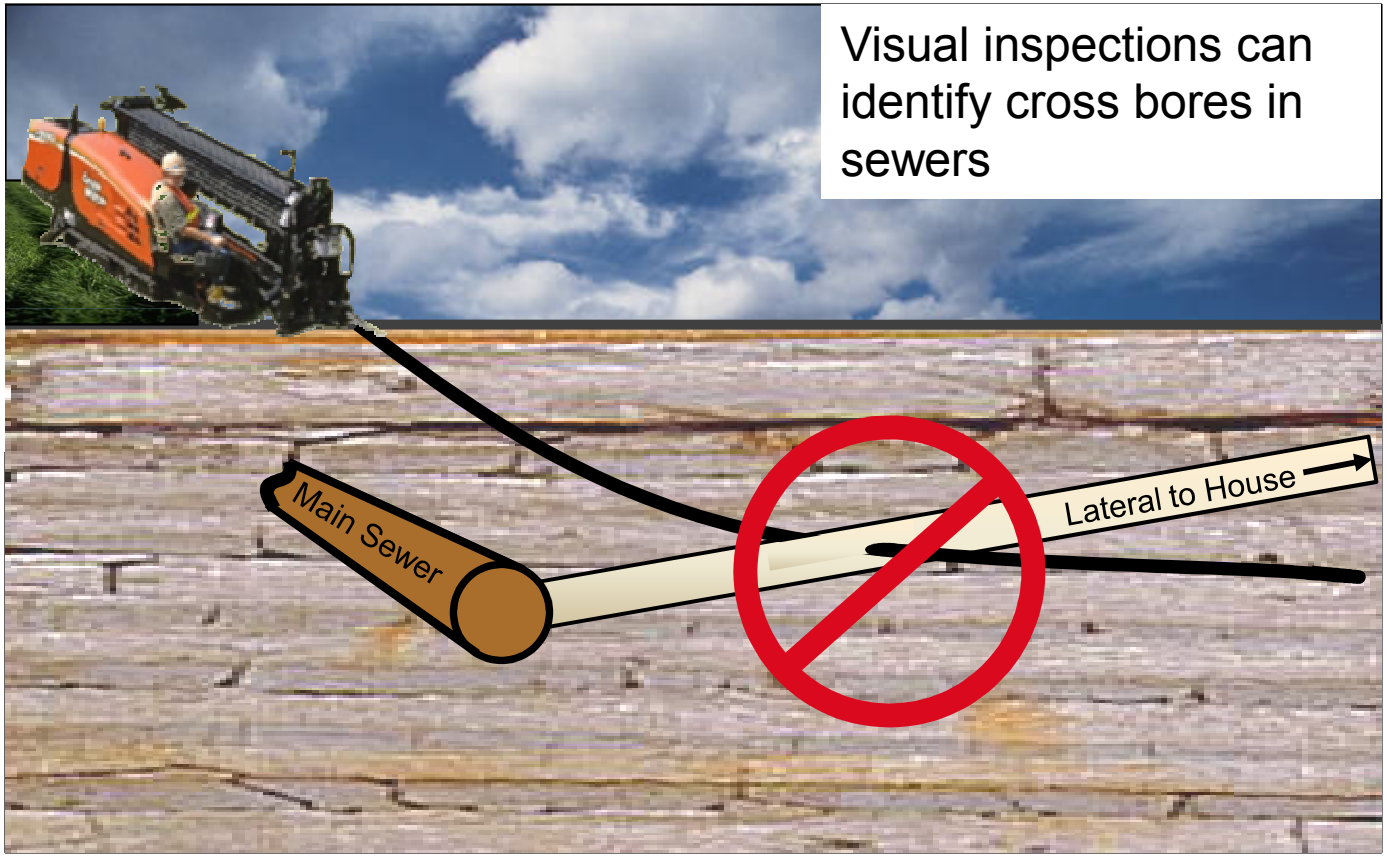
Advantages of Trenchless Installation Techniques

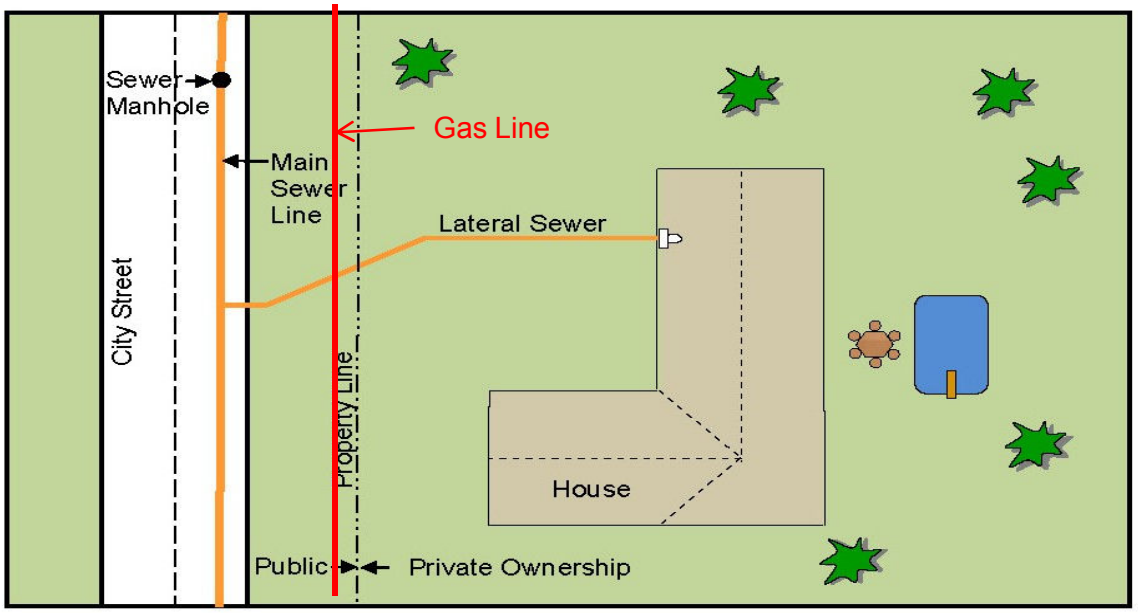
- Less disruption to surface, yards, driveways, shrubs and trees
- Less disruption to traffic
- High acceptance by the public
- Often very cost effective

Disadvantages of Trenchless Installation

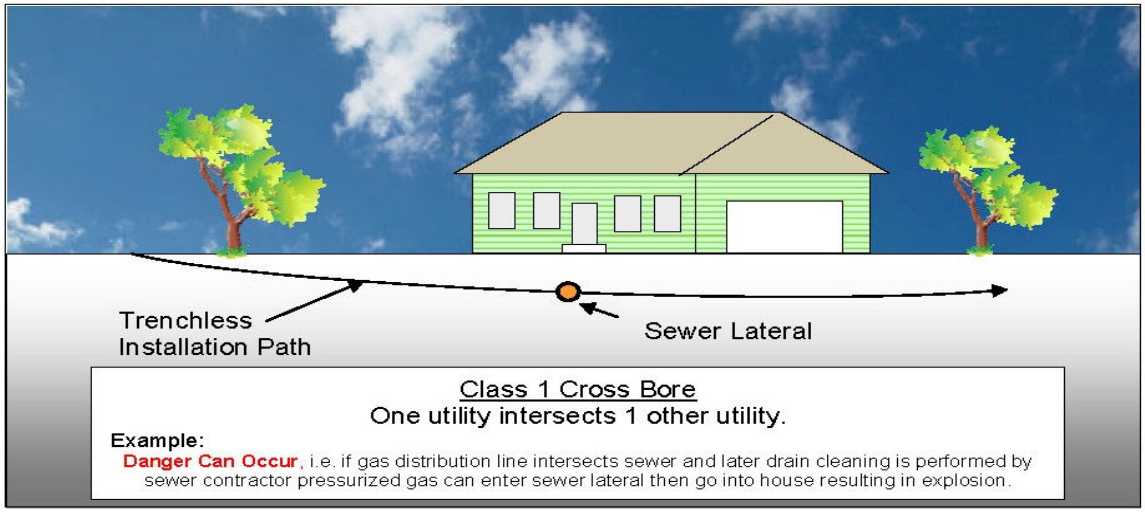
- Moles are not guided
  - Use “Point and Pray” method
- Plows
  - Vertically well controlled, but
  - Do not provide visual inspection of the subsurface
- Horizontal Direction Drilling, HDD
  - Depends on radio sondes that have accuracy challenges, depth dependent
  - Does not provide visual inspection of the subsurface

Cross Bores Can Result From Trenchless Installations





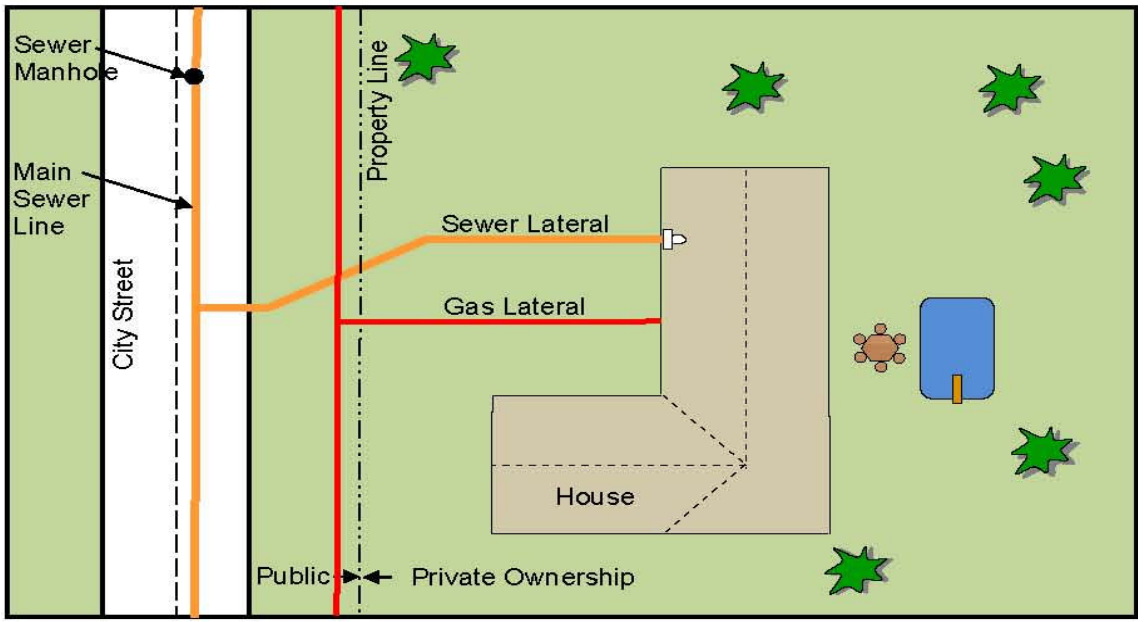
Class 1 Cross Bore Illustration



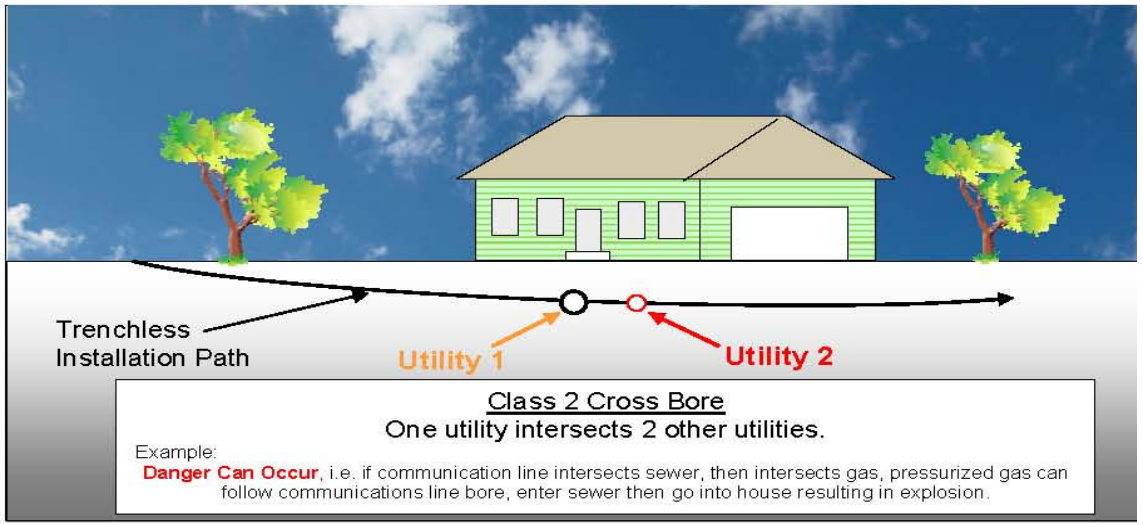
Class 1 Cross Bore, new utility directly into existing utility:

Sewer drain cleaning / plumber can cut line if sewer is cleaned.

Explosion can result when pressurized gas flows into house and contacts ignition source.



Class 2 Cross Bore Illustration



Class 2 Cross Bore, new utility directly in two utilities.

Pressurized utility 2 could flow around bore path annulus space to Utility 1.

If utility 1 is a gravity sanitary sewer lateral, and utility 2 is gas distribution utility, gas can enter home immediately.

Cross Bores - Recognized in 1976

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

FOR RELEASE: 6:30 A.M., E.S.T., NOVEMBER 12, 1976
(202) 426-8787

ISSUED: November 12, 1976

Forwarded to:
Mr. C. S. McNeer
President
Wisconsin Natural Gas Company
233 Lake Avenue
Racine, Wisconsin 53401

SAFETY RECOMMENDATION(S)
P-76-83 through P-76-86

At 8:53 a.m., on August 29, 1976, an explosion and fire destroyed a house at 6521 20th Avenue in Kenosha, Wisconsin. Two persons were killed, four persons were injured, and two adjacent houses were damaged. The destroyed house was not served by natural gas. However, natural gas, which was escaping at 58 psig pressure from a punctured 2-inch plastic main located 39 feet away, had entered the house through a 6-inch sewer lateral. The gas was ignited by an unknown source. After the accident, the National Transportation Safety Board's investigation disclosed that the gas main had been installed by boring through the bottom of the sewer tile; the gas main was perpendicular to the sewer tile. 1/

Sewer Lines Blocked in Kentucky – 1999 Complaint

- Shortly after LG&E began its extension to Lakeview Subdivision, 3 residents complained to Goshen of sewer stoppages.
- These stoppages were the result of the gas main installation.
- Sewers were not marked
- When installing the gas mains, LG&E's contractors had unknowingly pierced Goshen's gravity fed sewer lines. The newly installed gas main blocked these lines.

Kentucky Public Service Safety Hearing – 1999 Ruling

- A dispute between two utilities
  - LG&E, gas distribution
  - Goshen Utilities, sewer
- Sewer lines were backing up from cross bores
- Sewers were required to be marked by sewer utility
- LG&E had required to visual verification that cross bores do not exist after construction

Potential Damage and Injury from Cross Bores

- Gas cross bores can be considered a “ticking time bomb”
- The cross bore may lay dormant for decades
- Drain cleaners/plumbers can unknowingly cut the plastic gas line if it intersects the sewer
- Death, damage and injury can result

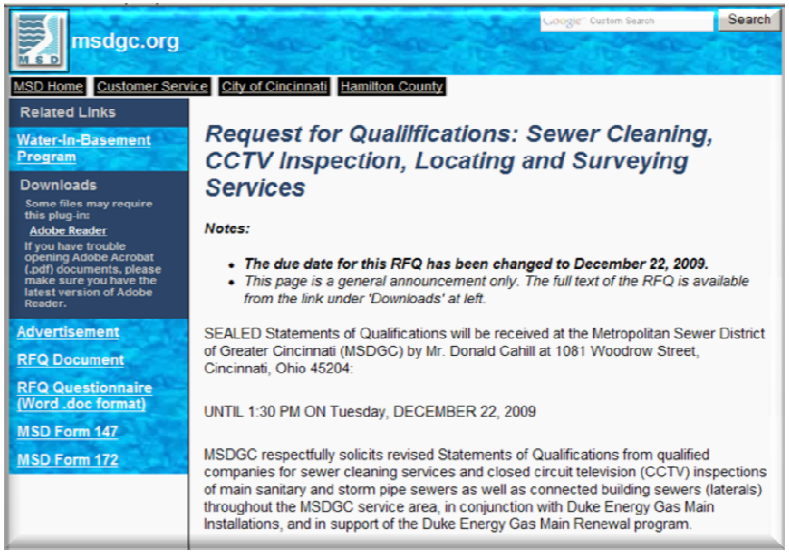
Residential Gas Cross Bore Explosion - Ohio

Gas Cross Bores Responsibility

- Who is responsible?
  - Sewer operator?
  - Gas installation contractor?
  - Gas distribution utility?
  - Drain cleaner?
  - Home owner?

New Cooperation of Sewer and Gas Utilities - 2009

- Cincinnati Metropolitan Sewer Department (MSDGC) joins efforts with Duke Energy to inspect sewers for deterioration and for gas cross bores.



- First known joint cooperation.
- Several years before, MSDGC was reluctant to provide sewer maps to Duke Energy.

Legislation

- Most states' legislation requires some level of locating to be provided by sewer operator.
- A few states exempt sewers/laterals if they are gravity sewer lines.
- All states need to require sewer locations.
- More education and guidance is required to adequately address cross bore safety.

Locate Issues

- Depths of existing utilities are required for safe new trenchless installation
- Depths are not required by most state laws
- Duplicate locates can be wasteful
- Costs are ultimately borne by the rate payer
- Locate information can be stored and retrieved for drain cleaners and installers

Solutions Using New Technology

- Lateral launched main line robotic cameras , since 1999
- Push rod cameras
- Pot holing using vacuum excavation
- GPS, sub foot accuracy mapping longitude & latitude
- GIS mapping provides permanent data base that is easily retrievable
  - Drain cleaners could access prior to work

Potential Technology on the Horizon

- Ground penetrating radar, GPR
- Forward looking drilling tools
- Combined acoustic, magnetic and radar sensors

Pilot Test for Gas/Sewer Locating

Technology & Procedure Validation

Location: Lexington KY

Date: January 26th & 27th, 2007

Courtesy: Cues, Inc and Hydromax USA

Combined GPS Integration
- First Introduction Lexington, KY 2007

- Robotic camera transporter
- Piggyback lateral camera
- GPS, wireless link to camera software
- Electromagnetic sonde/receiver for depth
- GIS Software on CCTV Camera Truck
  - Accurate Locate
  - Documented for the Future


GPS Coordinates for underground and above ground
Depth measurements can be estimated using an electromagnetic sonde built into a CUES camera
Moves wirelessly into computer
Store data permanently in GIS

Lateral and Mainline Cameras Placed in the Sewer Pipe Manhole

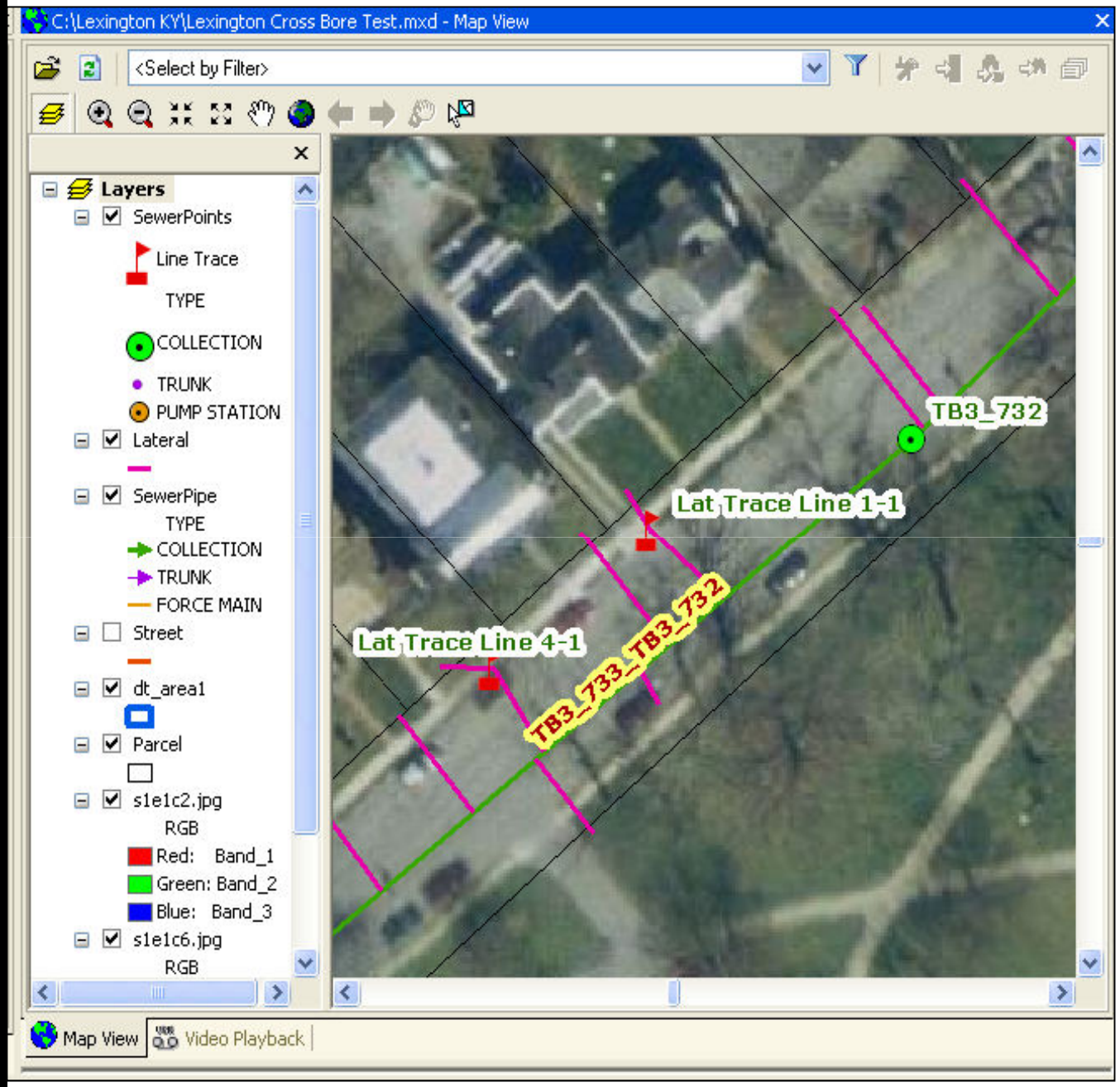
ateral Locating underway….

Launch

Traveling in Sewer Line

The Line Trace is completed up to the homeowner's service connection….

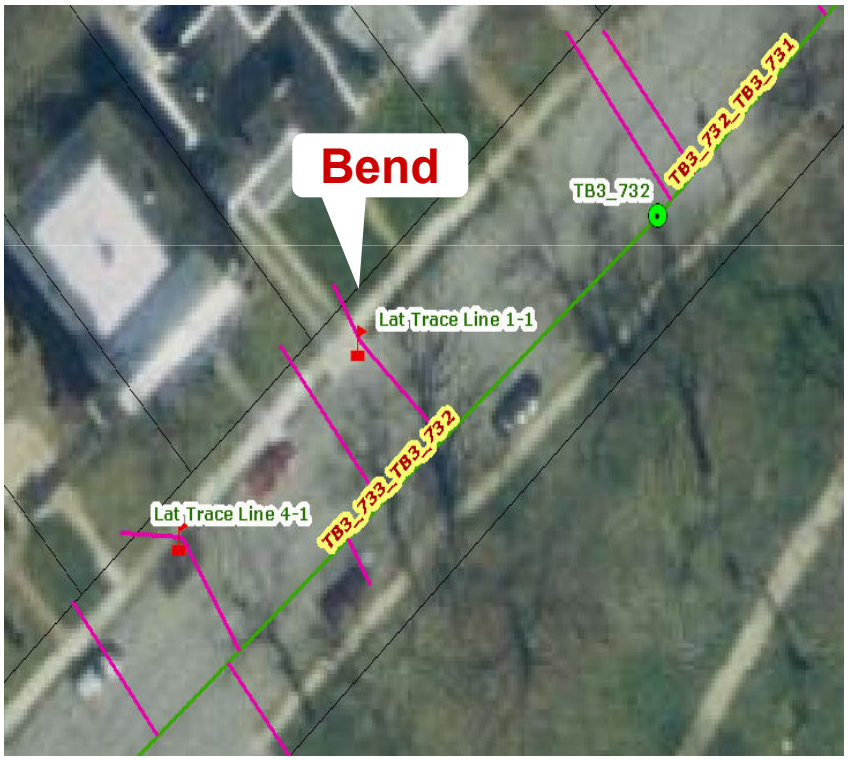
Here is the combination of the "Wireless Mapping Stick" from CUES and the Sonde locator used above ground to trace



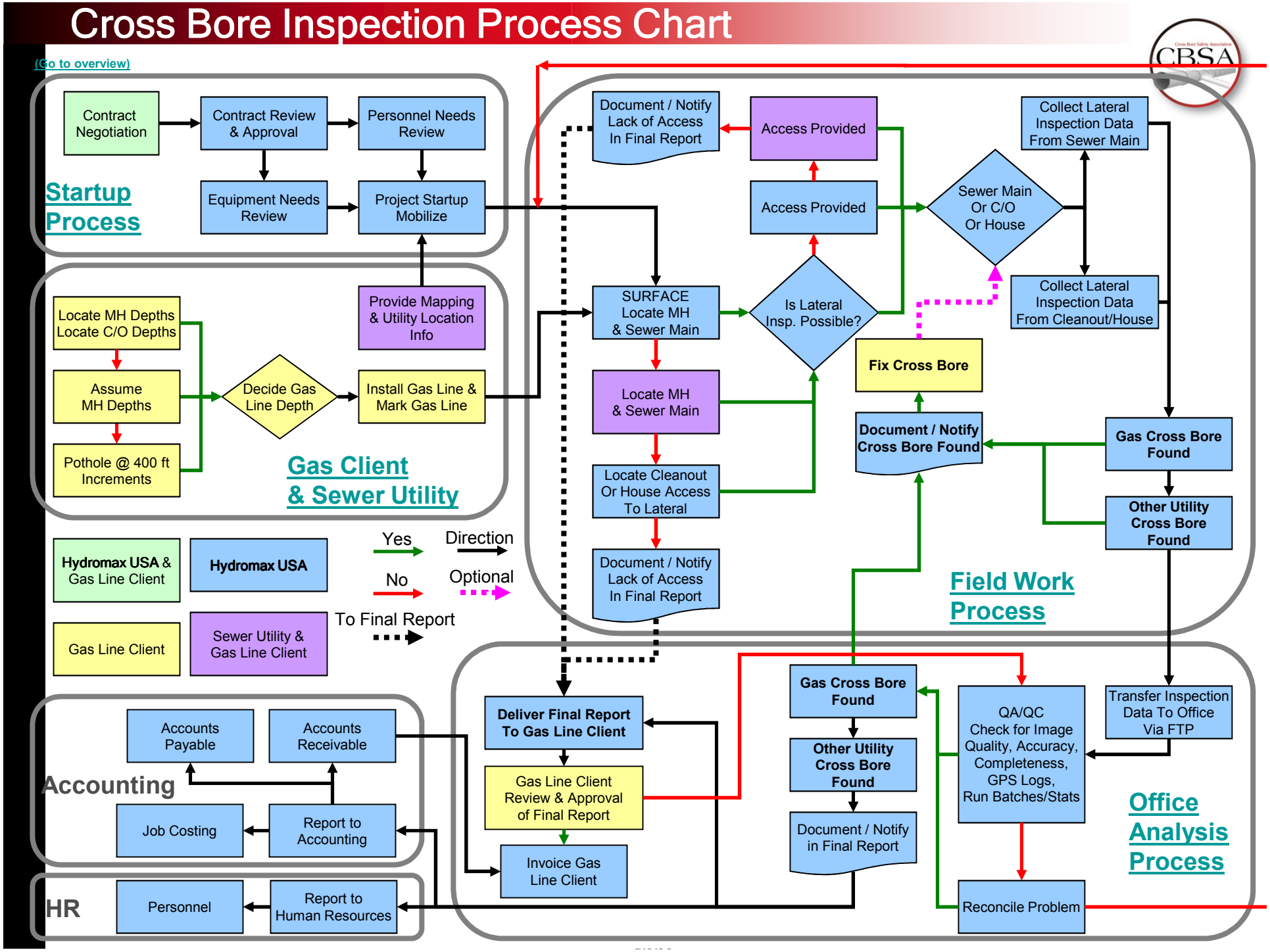
As seen in the truck, each buried wastewater asset is made available in GIS 'Layers': Laterals are added as "*Lat Trace Line*" and given a unique ID#...

Lateral Line Traces could remain flagged / spray painted until Gas Line installation crews arrive…

This trace line has bends in the line…which are now reflected in GIS



Cross Bore Inspection Process Chart



Quantifying the Cross Bores Problem

- Legacy projects for identifying and eliminating cross bores have resulted in a range of 2 to 3 hits found per mile.
- There are millions of miles of sewers in US
- Cross bores have been found at a hospitals and a school

Solutions

1. Identify existing utilities
2. Pre construction locate existing utility's horizontal and depth to allow avoidance
3. Verify new cross bores have not been created after construction is completed
4. Inspected legacy installations that used trenchless methods
5. Confidence can be restored and convenience of trenchless installations can be maintained safely

"…to minimize the risk of injury, loss of life and property damage from utility cross bores in an effective and efficient manner."

Thank you!

www.crossboresafety.org