



# Beginning the End of Cross Bores

## Focus: Gas Distribution Lines in Sewers

Presented by Mark Bruce:

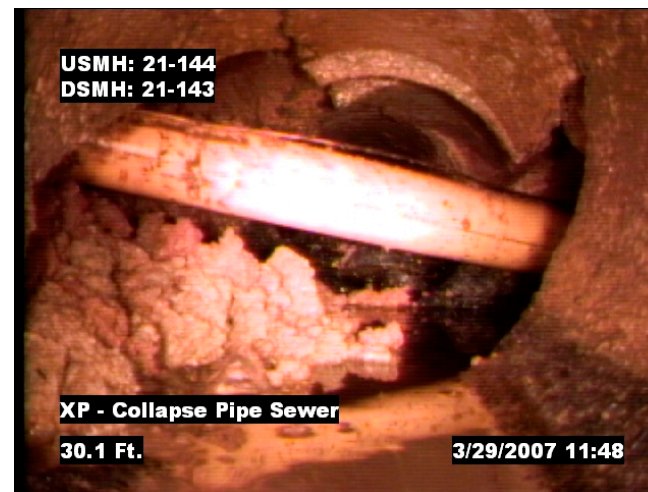
- President of Cross Bore Safety Association, [www.crossboresafety.org](http://www.crossboresafety.org)
- President – Can Clay Corp., sanitary sewer pipe
- Vice Pres. - Hydromax USA, data acquisition for sewer, water and gas utilities



# Cross Bore Definition

- Utility cross bores are defined as:
  - “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



# Cross Bores





# Cross Bore Basics

- The existence of 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 risks is both morally and financially prudent.**



# CBSA Progress

- Increased awareness
- *Guidelines for Elimination of Legacy Cross Bores* are available on line.
- Procedures for instructing drain cleaners to reduce their risk from gas line cross bores of sewers are on line.
- New construction using advanced techniques and procedures to both provide better planning and post verification are under development.

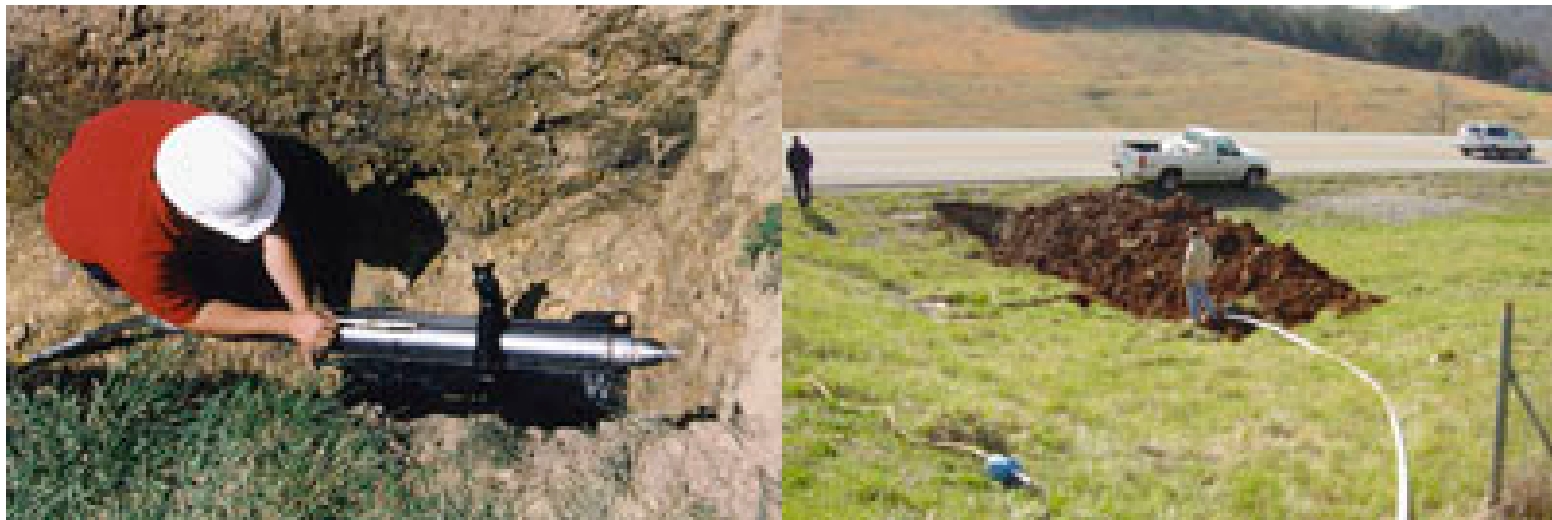


# Historical Perspective

- Gas distribution lines have been installed by trenchless methods for over three decades
- Trenchless Methods Include:
  - Moles
  - Plowing (yes, it is considered trenchless)
  - Horizontal Directional Drilling

# Moles/Piercing Tools

## Pulling a utility behind the piercing head

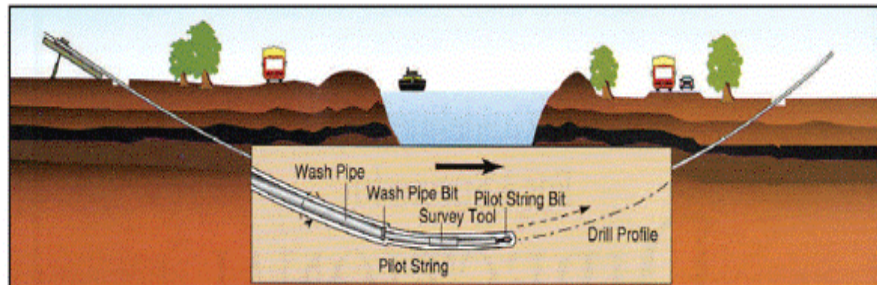




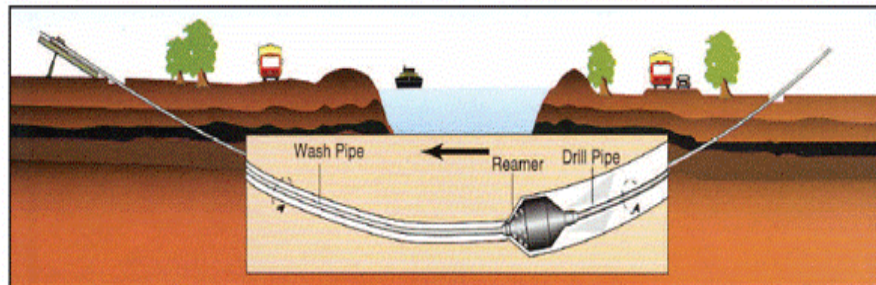
# PLOWS ...



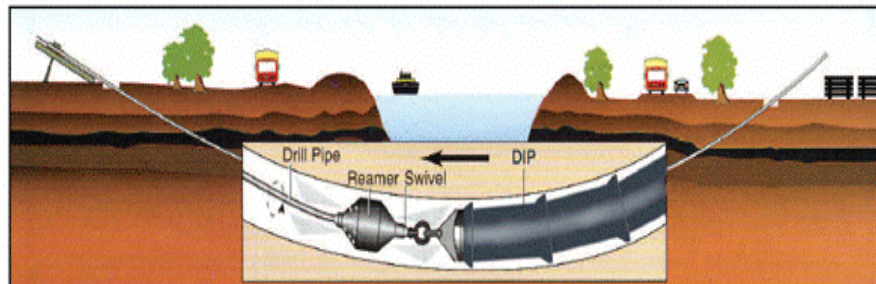
# HDD Process



PILOT HOLE



PRE-REAMING



PULL-BACK

Horizontal directional drilling is a trenchless technology that minimizes impact to the surface, streets and driveways.

Larger pipes are installed after the reaming of the pilot bore.





# Trenchless Advantages

- Less disruption to surface
- Less disruption to traffic
- High acceptance by the public
- Often more cost effective



# Trenchless Disadvantages, as Related to Gas Distribution

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



# Cross Bores Recognized Since at Least 1976

- Cross bores exist.
- Experience indicates an approx. avg. of two per mile
- Solutions for prevention of damage from cross bores are available.
- Gas distribution utilities have continuing active programs for locating gas cross bores.
- However, the methods are not uniform.
- Standardized methods and procedures will help insure high confidence results.



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/

In July 1975 the Wisconsin Natural Gas Company (Wisconsin) employed a contractor to construct the gas main parallel to the



# Kentucky Public Service Safety Hearing - 1999

- A dispute between two utilities
  - LG&E, gas distribution
  - Goshen Utilities, sewer
- Sewer lines were backing up from cross bores
- Moratorium was ordered
- Installs re-started after:
  - Sewers were marked
  - LG&E had developed a visual verification that cross bores did not exist



# Sewer Lines Blocked

- Shortly after LG&E began its extension to Lakeview Subdivision, three residents complained to Goshen of sewer stoppages.
- These stoppages were the result of the gas main installation.
- 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.





# Serious Safety Problem

- The blockage poses a serious safety problem.
- Homeowners' efforts to remove a sewer line stoppage may result in the rupture of the gas main.
- Natural gas could then seep into the home through the sewer and create the potential for a gas explosion.
- Recognizing the potential safety hazard, Goshen contacted all homeowners in the area and advised them to contact the utility before attempting to clear their sewer lines.
- It also reported the problem to LG&E's contractor.
- LG&E subsequently provided written notice of the problem to the affected customers.



# Findings

- Goshen shall file with the Commission a written plan for locating and mapping its existing sewer facilities....This plan for such mapping shall enable Goshen to determine the approximate location of its sewer facilities.
- .... sewer facilities shall be located and mapped within 180 days of the date of this Order.
- LG&E shall cease its use of directional boring for gas main extensions in Goshen's service area until Goshen's sewer facilities have been located and mapped.
- When using HDD to make gas main extensions, LG&E shall henceforth visually inspect the intersection of each sewer service facility and gas main to determine if any damage to either facility has occurred.

Done at Frankfort, Kentucky, this 24th day of August, 1999, By the Commission



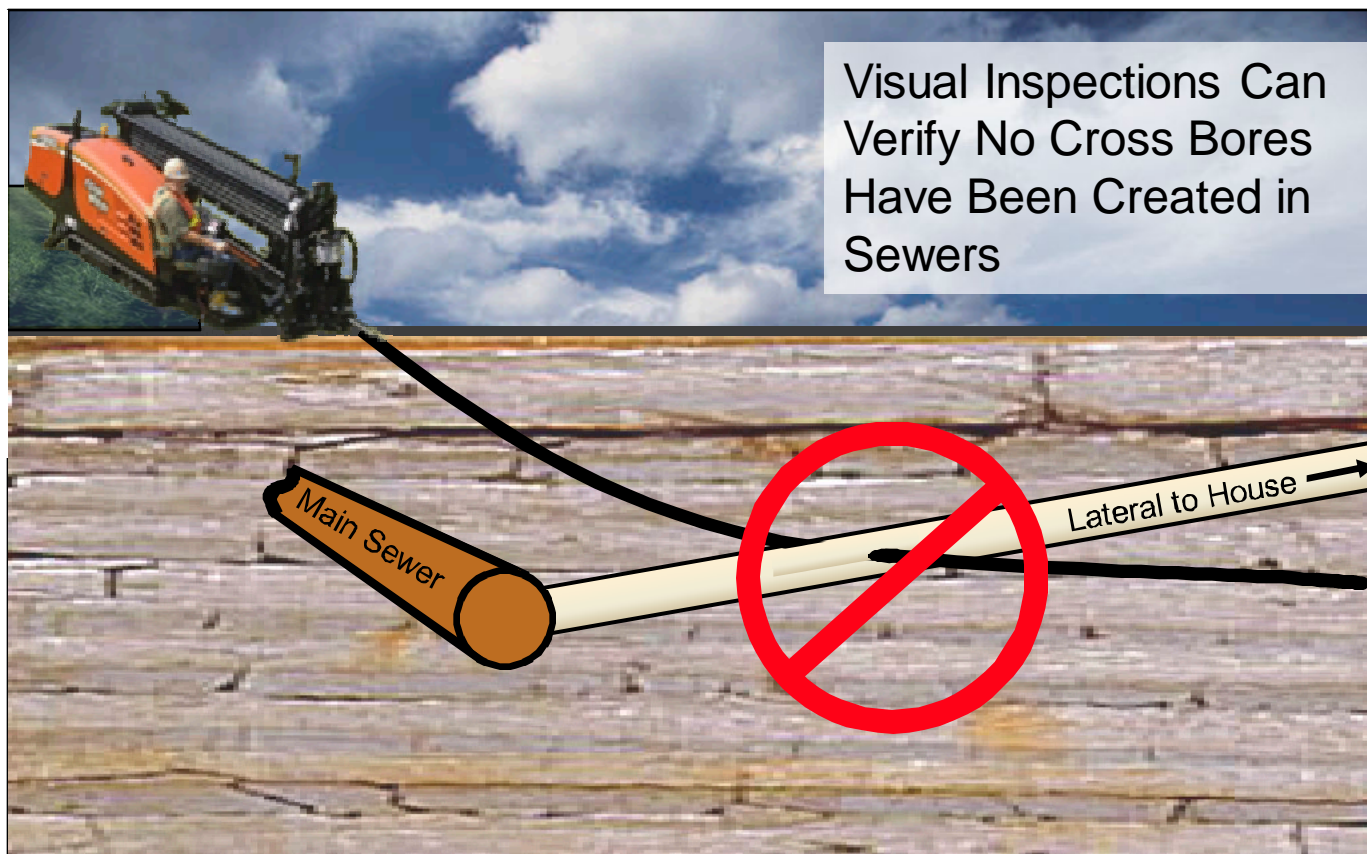
# Jeffersonville, IN Moratorium

Excerpt from City Council Meeting – April 9, 2008

## DIRECTIONAL BORING

“Engineer Miller said someone called him that wanted to do directional boring He said some cities don’t allow directional boring and he doesn’t think Jeffersonville should either. He said when mistakes are made it is too costly to repair the damage. After some discussion, Engineer Miller made the motion to put a six month moratorium on directional boring starting on this date seconded by Councilperson Wilson and carried unanimously.”

# Cross Bores & Explosions Can Result From HDD Installations





# 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 can easily cut the plastic gas line if it intersects the sewer
- Damages reportedly have been as much as \$30,000,000 for a single instance.

# Residential Gas Explosion and Drain Cleaner Injury





# Gas Explosions

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



# Gas Explosion – Who Pays?

- Contractors have limited ability to pay large judgments
  - Limited liability coverage
- Gas Utilities have often been found at fault
  - Some states have statutes that set a limit on maximum judgments against utilities
- Are Sewer Owners Liable?
  - Sewer utility?
  - Home owner of the lateral?





# Legislation

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



# Technology Provides Solutions

- Identification of legacy cross bores took a leap in 1999 with the introduction of lateral launched main line cameras combined with;
- Push rod cameras, combined with.;
- Pot holing
- GPS
- GIS mapping
- GPR, Acoustic and combinations are under development



# Pilot Test for Wastewater Locating

## Technology & Procedure Validation

Location: Lexington KY

Date: January 26<sup>th</sup> & 27<sup>th</sup>, 2007



# Robotic Transporter; GIS & GPS; Electromagnetic Sonde = Accurate Locates, Documented for the Future



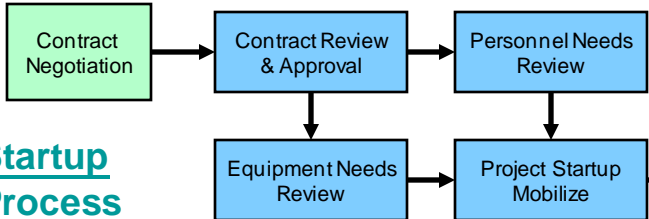
*Locating method & technology Patent Pending, CUES, Inc. 2007*

# Cross Bore Inspection Process Chart

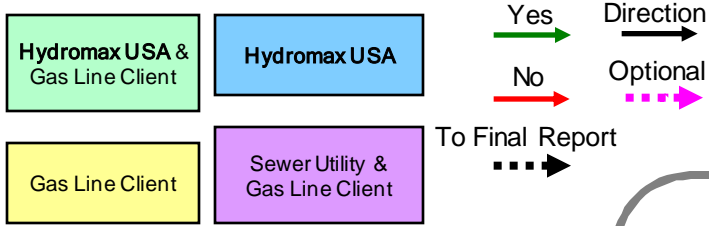
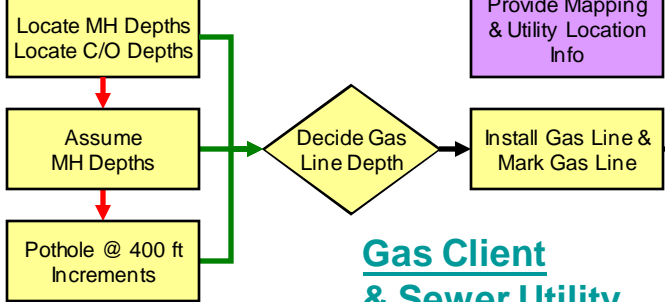


(Go to overview)

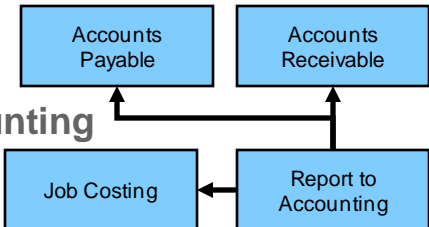
## Startup Process



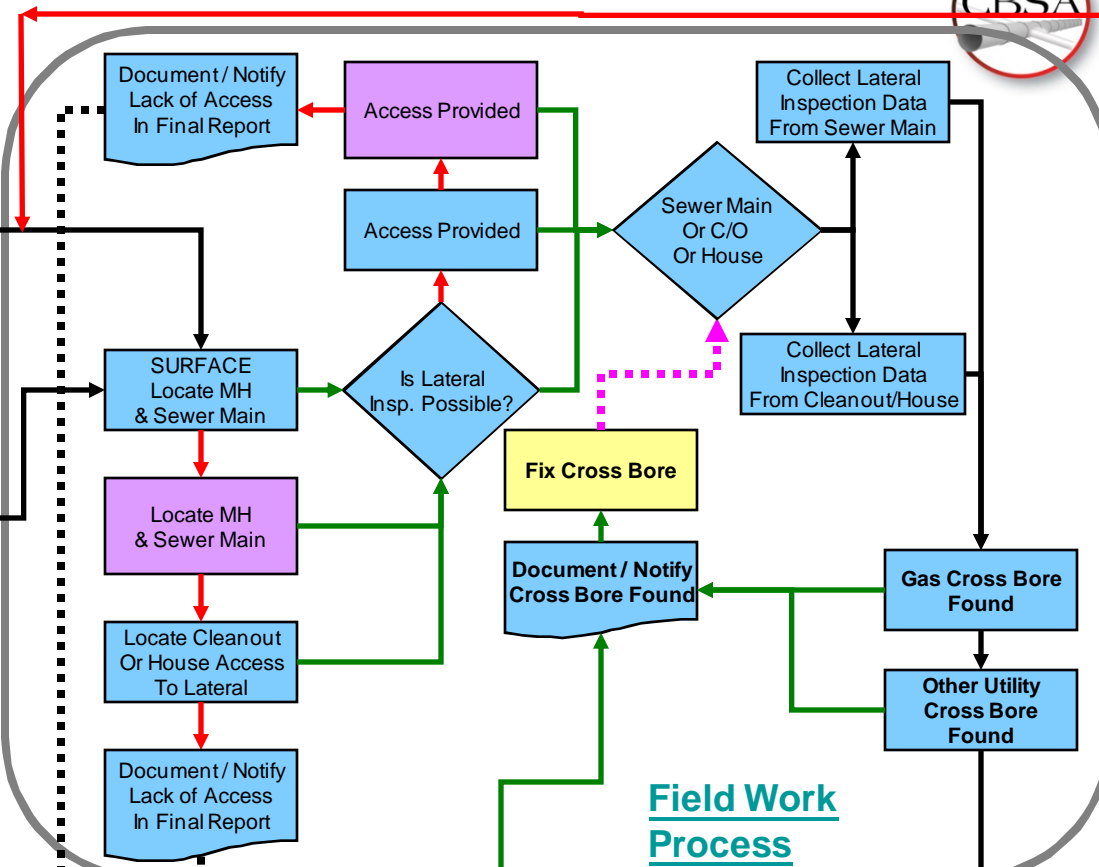
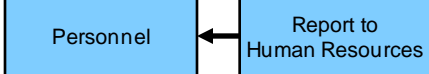
## Gas Client & Sewer Utility



## Accounting

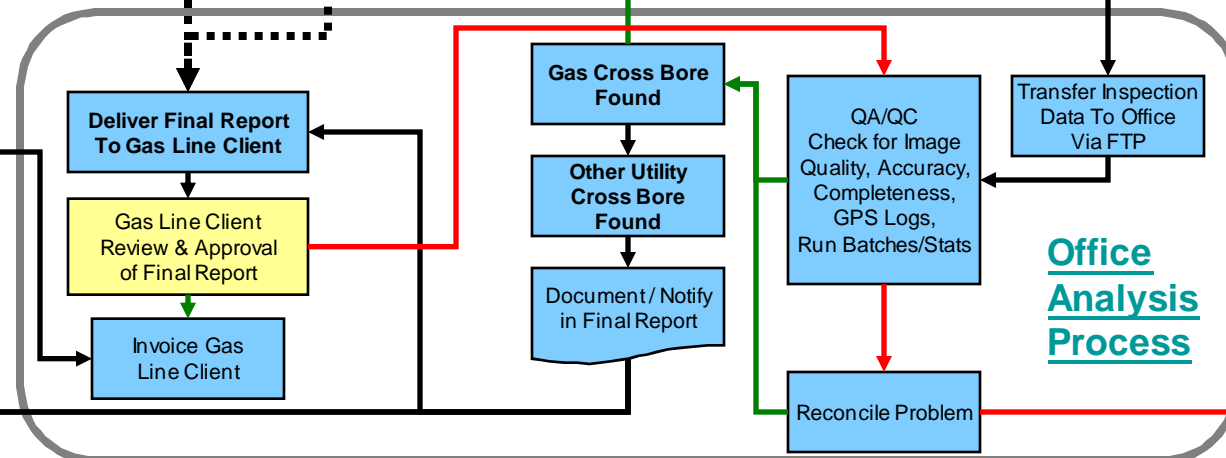


## HR



## Field Work Process

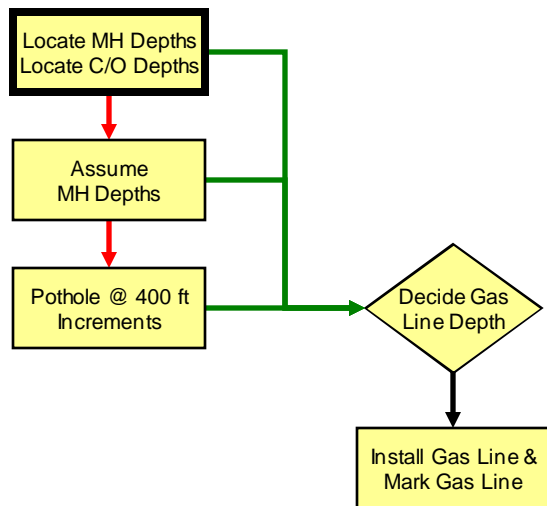
## Office Analysis Process



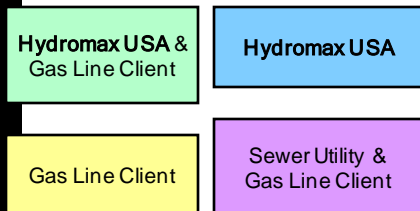
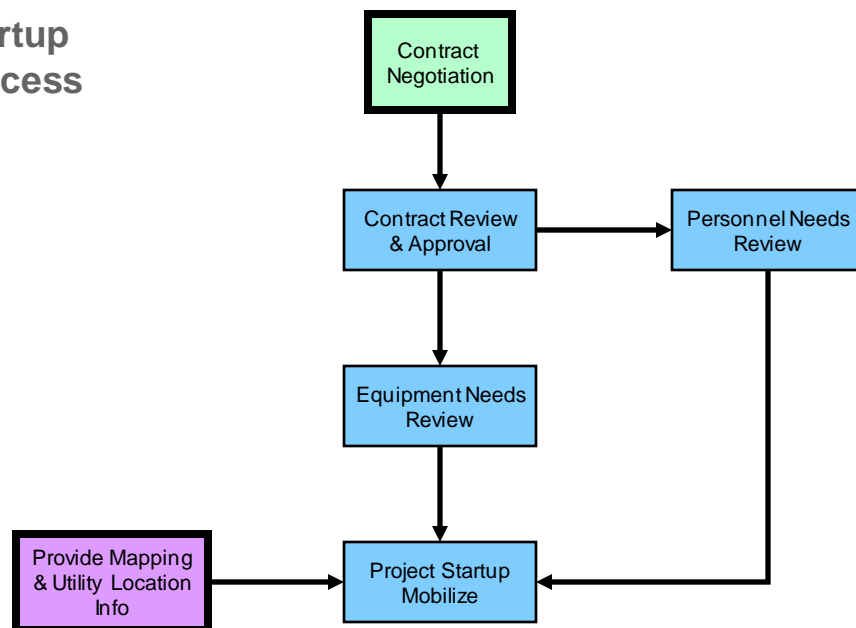


# Cross Bore Inspection Process Chart - Startup Processes for Inspection co. and Gas Client

## Gas Client & Sewer Utility



## Startup Process

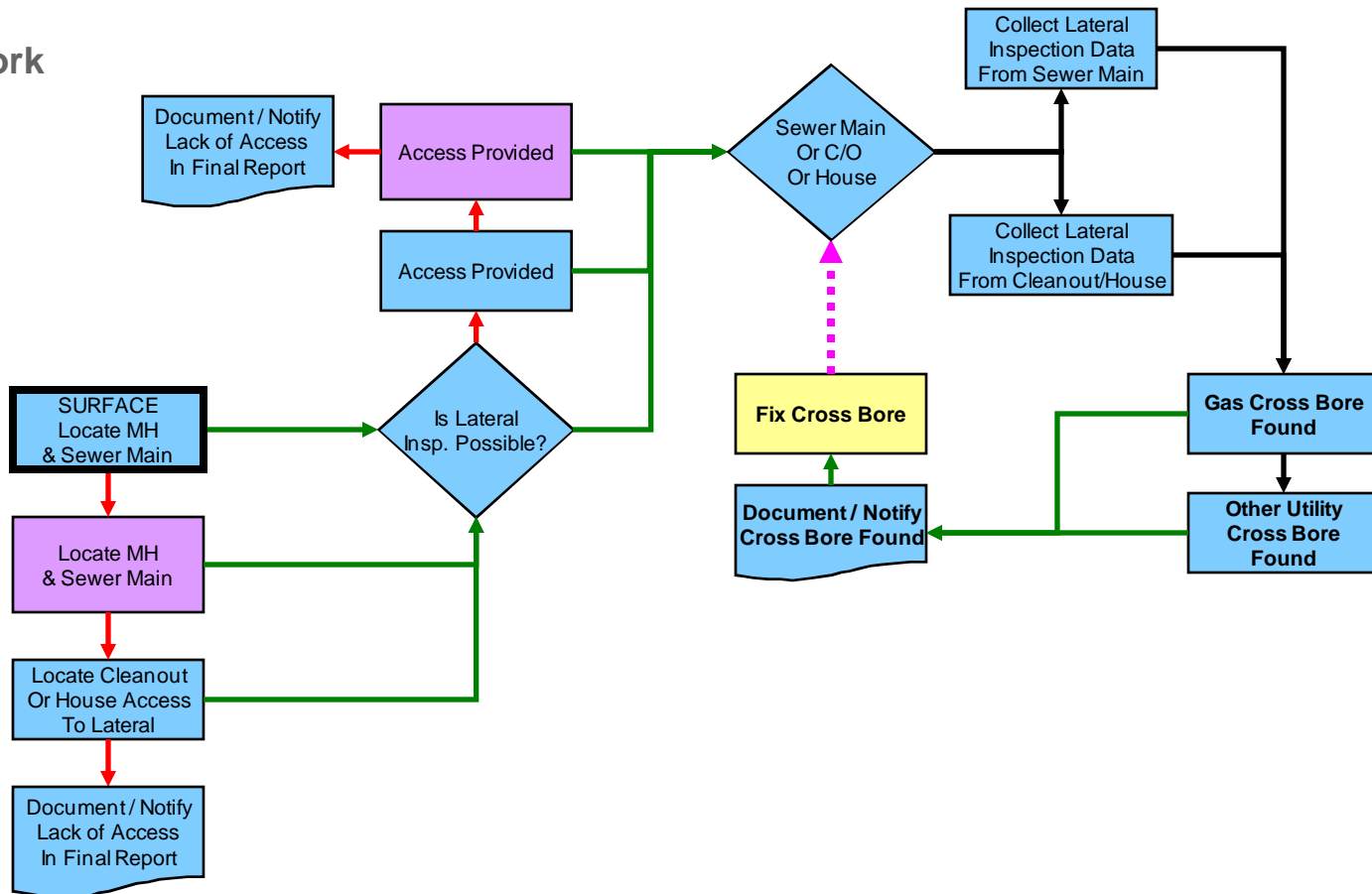


[Back to complete chart](#)



# Cross Bore Inspection Process Chart - Field Work Process

## Field Work Process



Hydromax USA & Gas Line Client

Hydromax USA

Gas Line Client

Sewer Utility & Gas Line Client

Yes → Direction →

No → Optional →

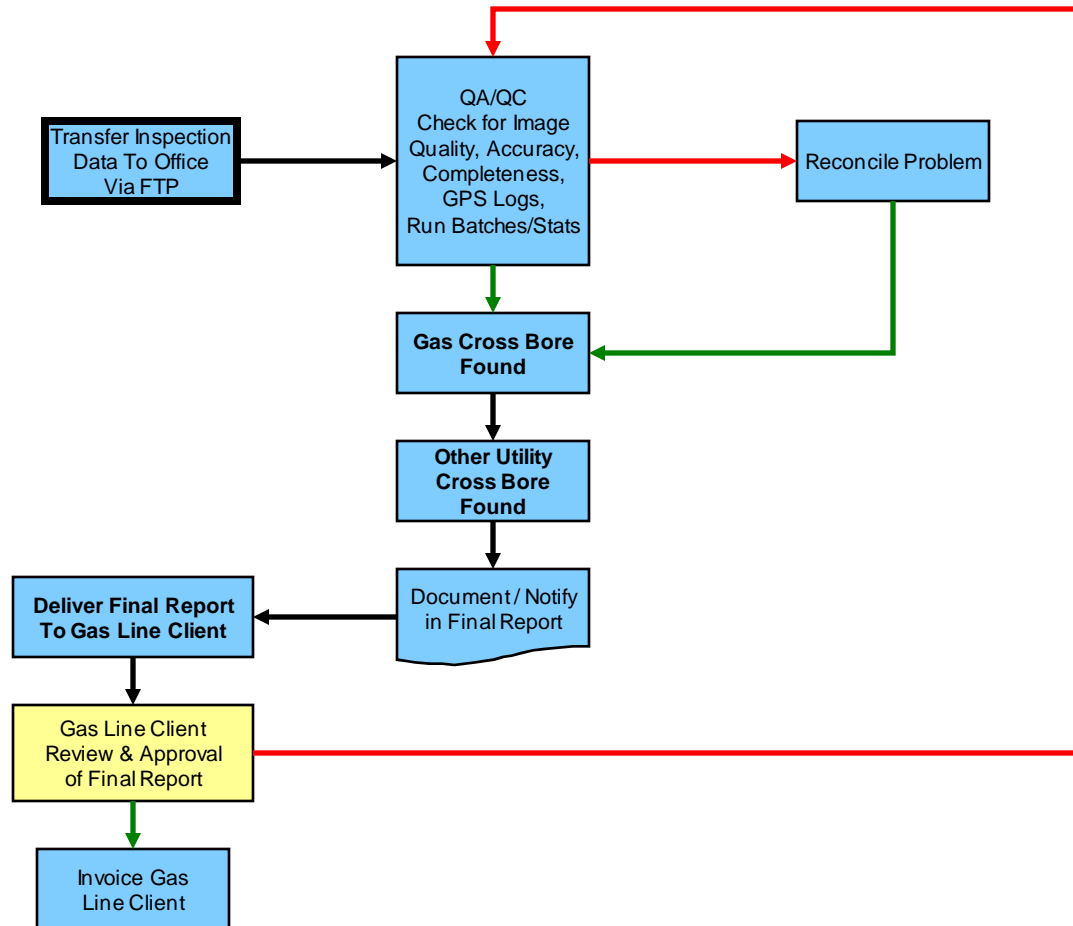
To Final Report  
••••→

[Back to complete chart](#)



# Cross Bore Inspection Process Chart - QA/QC Data Analysis

## Office Analysis Process



Hydromax USA & Gas Line Client

Hydromax USA

Gas Line Client

Sewer Utility & Gas Line Client

Yes →

No →

Direction →

[Back to complete chart](#)





## Requirements Locating Method:

- Cooperative utility(s)
  - both Sewer & Gas utilities participated in Lexington
- Availability of specific CCTV hardware, software and experienced operators
  - Hydromax USA & CUES were available in Lexington
- Access to a High Pressure/Vacuum Truck
  - where dirty sewers exist
- Permission to access easements as needed
- Good GPS signal communications

# ateral Locating underway....

Launch



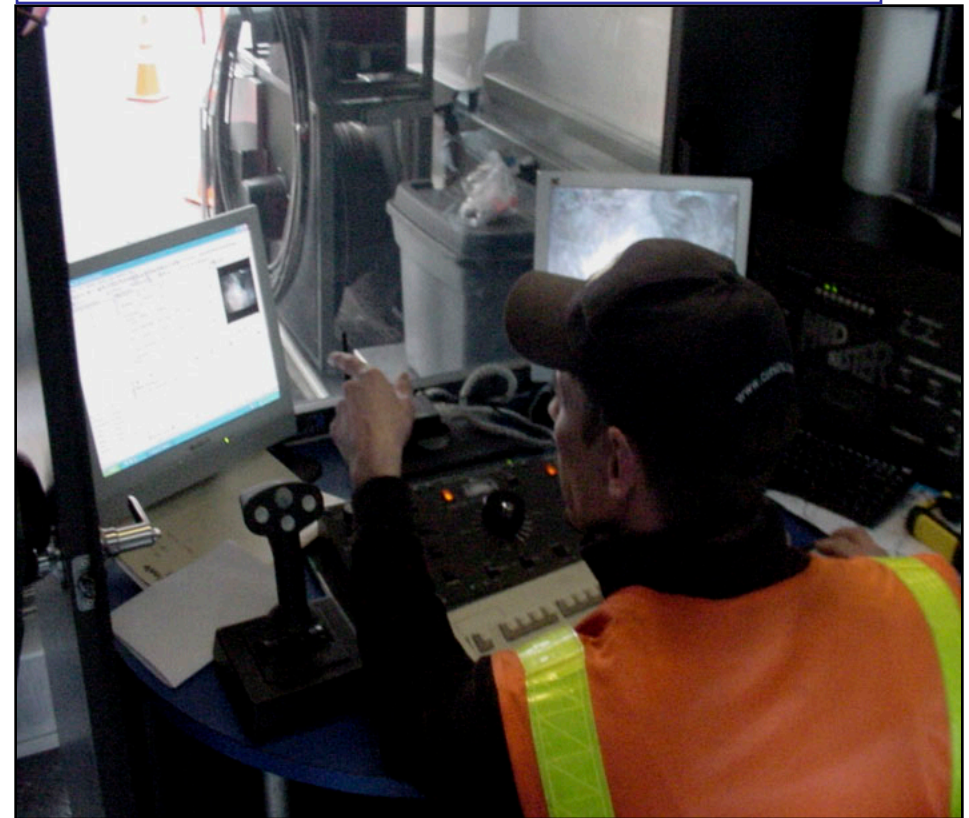
Traveling in Sewer Line



Verification is made for Lateral's X, Y, and Z\* coordinates...

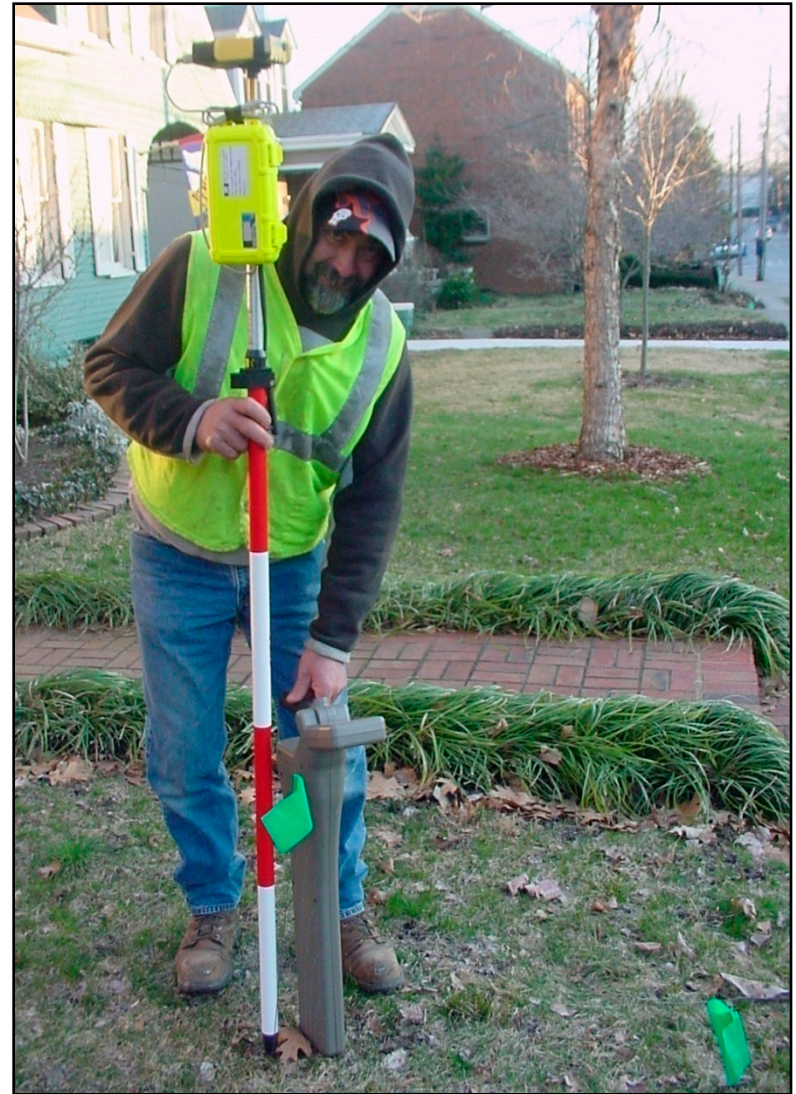


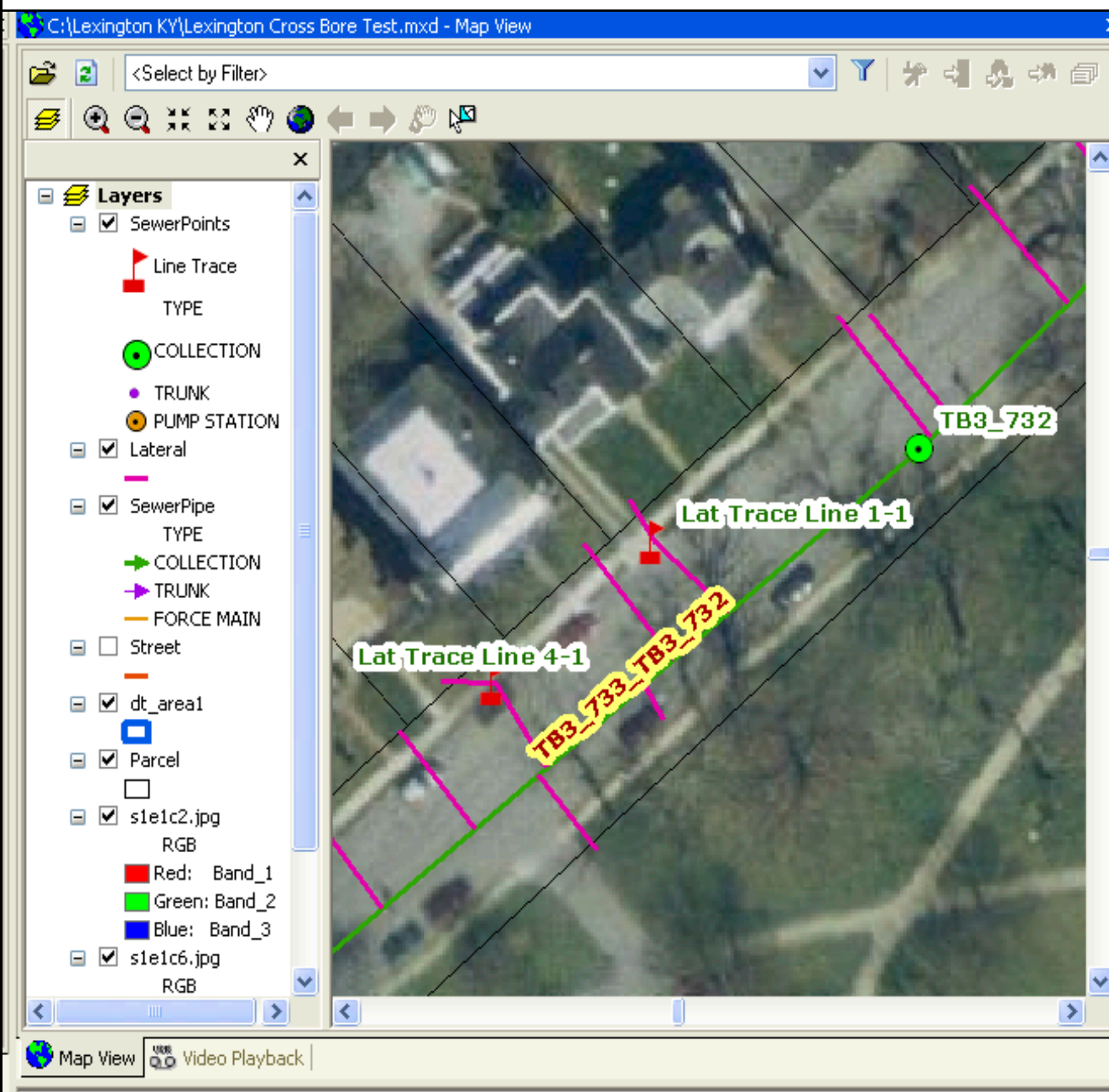
Lots of data communication... robot operator sees real-time 'cookie crumb' in the software to pinpoint the trace line



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



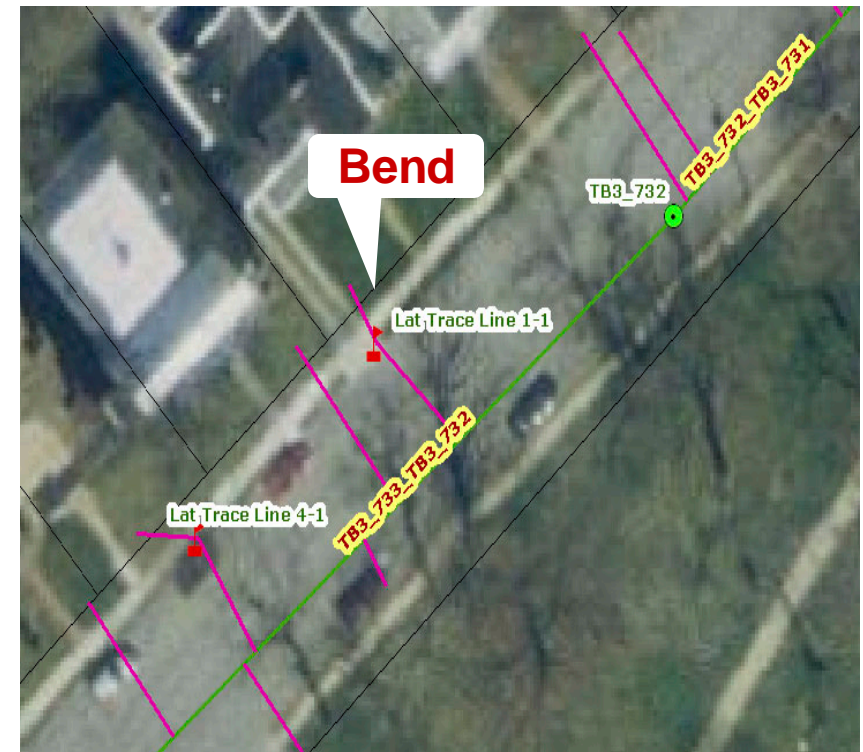


As seen in the truck, each buried wastewater asset is made available in GIS 'Layers': Laterals are added as "*Lat Trace Line*" and given a unique ID#...

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





Middletown, Ohio, March 13, 2006

Gas in Sewer Cross Bore Connection ruptured during drain cleaning<sup>55</sup>



# CBSA Purpose

- “...is to bring persons and organizations together to create comprehensive high quality standards, guidelines, best practices, means and methods, courses, training, instructional materials and other related resources for the education and training of owners, installers, regulators, users, inspectors, maintainers and others who can benefit from such so as to minimize the risk for injury, loss of life and property damage from utility cross bores in an effective and efficient manner.”





# Quantifying the Problem

- Projects for identifying and eliminating legacy cross bores have resulted in a range of 2 to 3 hits found per mile.
- Individual projects have exceeded 400 miles of mainline sewer investigation in high risk areas
- There are millions of miles of sewers in US
- Cross bores have been found at a hospitals and a school



# CBSA Literature

- Guidelines for Identification of Legacy Cross Bores – available now
- Contract for Legacy Cross Bore Projects – available now
- Drain cleaner recommendations



# Legacy Cross Bore Guidelines

- This standard guideline covers the planning, execution, data format and quality control of projects to verify or determine if cross bores of sanitary sewers exist.
- 23 Pages



# Legacy Cross Bore Elimination Sample Contract

- Developed to provide a starting point for legacy cross bore projects
- 22 Pages
- Editable



# Literature – Under Development

- Guidelines Locating prior to construction and Verification Post construction – under development
- Equipment manufacturers – notices
- Sample ordinances
  - Requiring Drain Cleaner training
  - Requiring Accessibility to Sewer Maps
  - Requiring new construction to have post verification process



# Participation Welcomed

- Join the CBSA
  - Individuals \$100.00 / year
  - Corporations \$350.00 / year
- Help develop guidelines / standards
- Help direct the priorities
- Benefits the public
- Benefits the related construction and utility industries



# Current Board and Officers, Spring, 2008

- Mark Bruce – CanClay.com
- Walt Kelly – CEO, Walt Kelly Ent., waltkelly.com
- Mike Kemper – CEO, NPLCC.com
- Steve Lacy – Managing Director, HydromaxUSA.com
- William Letzler – V.P., AquaIndiana.com
- Brian Mattson – GTI, gastechnology.org
- Joe Purtell – Dir. of Software Dev., CuesInc.com
- Mark Wallbom – CEO, UIT-systems.com



Thank you!

Questions ???

**Join The Effort!!**

[www.crossboresafety.org/membership.htm](http://www.crossboresafety.org/membership.htm)