Inspections for Eliminating Cross Bores

(Focus: Gas Distribution Lines in Sewers)

July 23, 2012

Southern Gas Association Conference

Ft. Worth, TX

By: Mark Bruce, President,
Cross Bore Safety Association

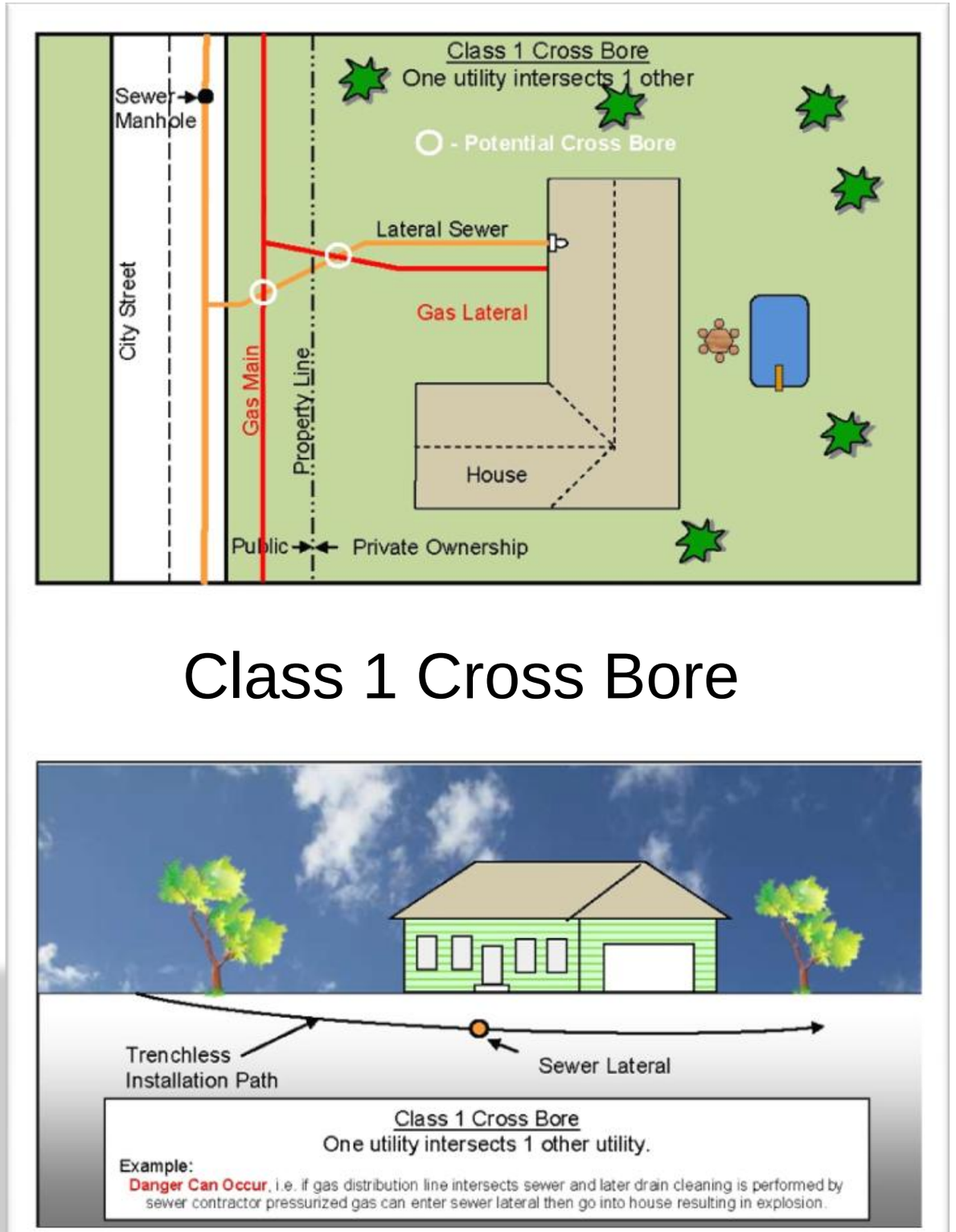
Definition

"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." *

Class 1 Cross Bore

New utility directly into one 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.



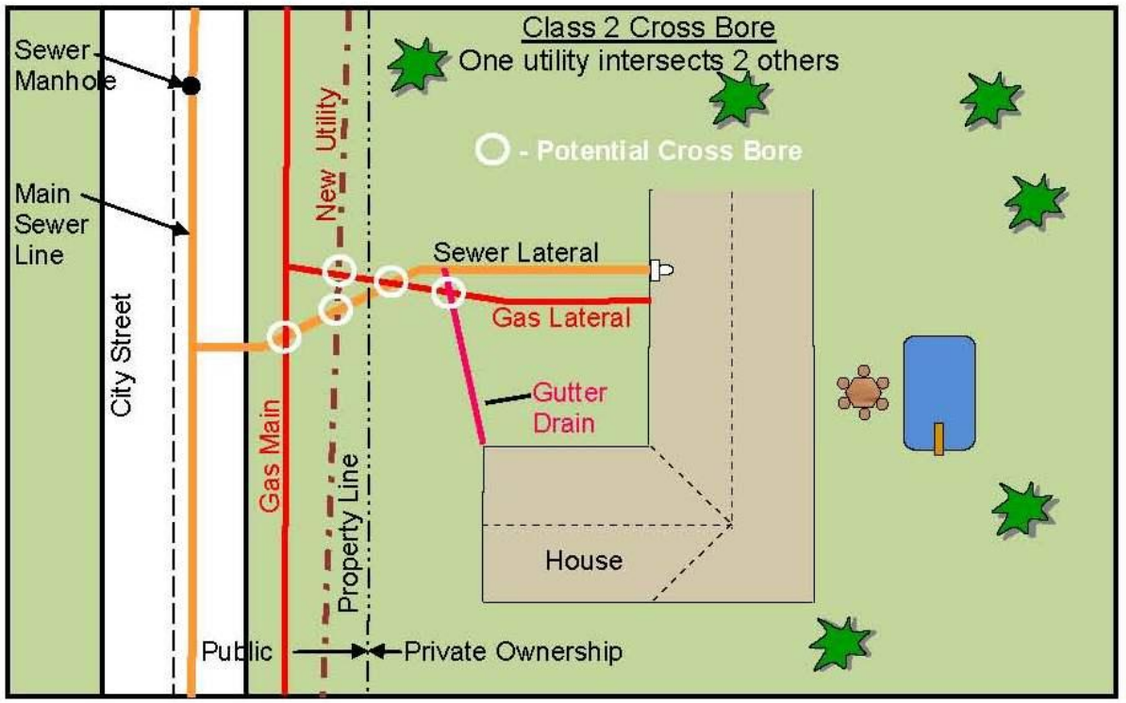
Class 1 Cross Bore

Class 1 Cross Bores

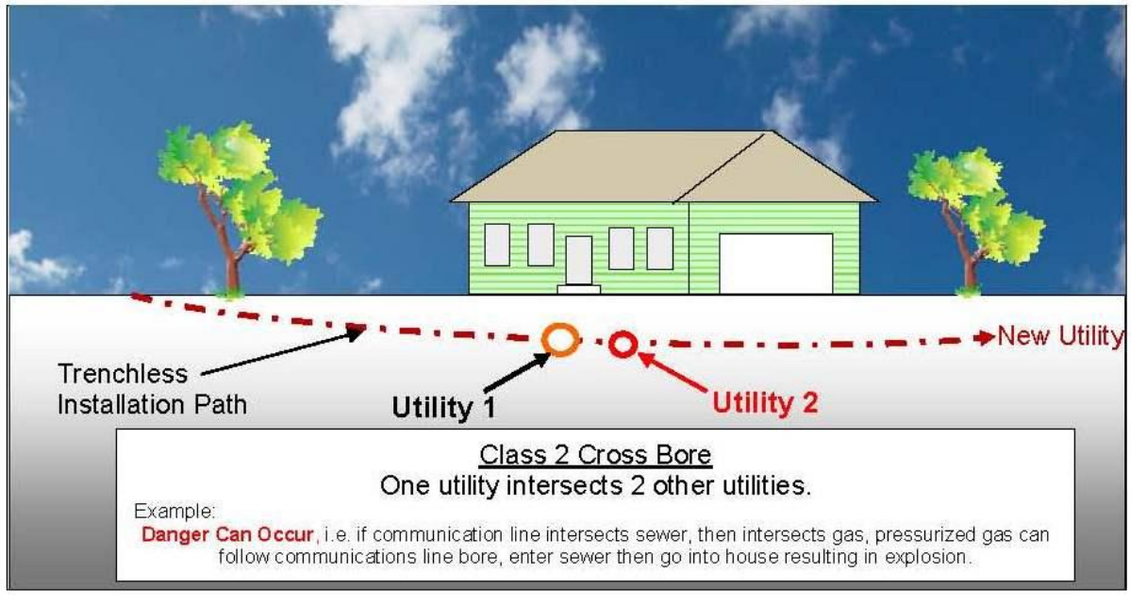
Class 1 Crossbore Explosions

Class 2 Cross Bore

- New utility intersects two utilities
- Cross feed between intersected utilities
- Can cause immediate leakage / explosion



Class 2 Cross Bore

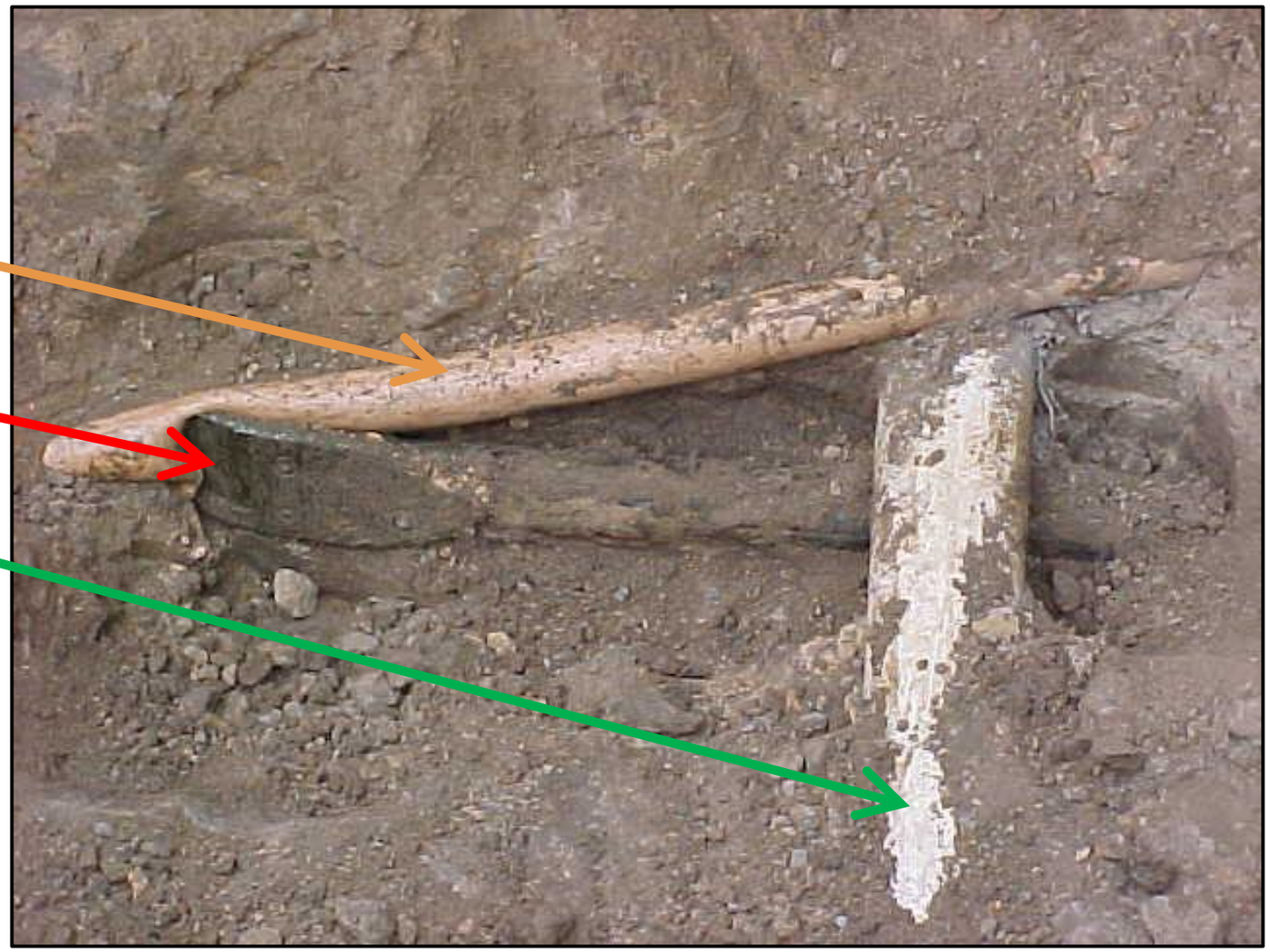


Class 2 Cross Bore

Gas line

HDD tool

Sewer to house



Class 2 Cross Bore Explosion

Cross Bore Repairs

Repairs to sewers shown on this slide were >$150,000

Quantifying the Cross Bores Problem

- Legacy elimination projects have resulted found a maximum of 3 / mile in high risk areas.
- Expected average is estimated at 2 every 5 miles = 0.4 / mile.
- Cross bores have been found at a hospital and at schools
- A single inspection project found 430 cross bores in 200 miles.
- Another found 15 of 147 sewer laterals, 12 gas.
- Most expensive cross bore explosion = $30 million

Determining Cross Bore Risks

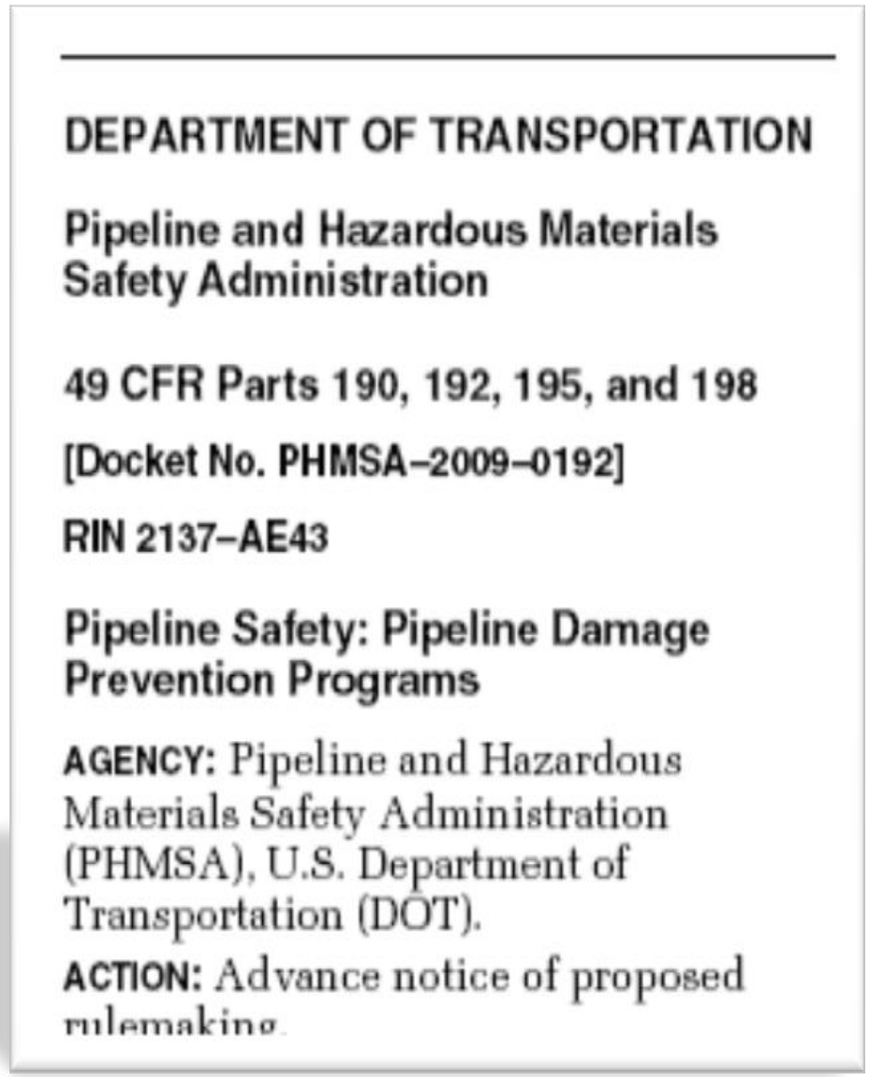
- Have trenchless construction methods been used?
  - Lining gas laterals - reduces cross bore risks
- Do all utility system owners mark all facilities in the bore path including sewers?
- Do trenchless construction specifications require exposure of 100% of crossing utilities?
- Are post construction video inspections required for all sewers adjacent to construction?

Steps for Initiating a Gas Crossbore Safety Program?

- Determine the history of trenchless utilization
- Investigate construction records (do they indicate method of construction?)
- Evaluate current construction practices to see if the program is legacy or ongoing
- Establish potential quantity of crossbores and estimate cost/timeframe
- Convince management of the need to minimize risk associated with crossbores
- Track crossbore discoveries

Considerations of Gas Utility Crossbore Program

- Distribution Integrity Management Program (DIMP) requirements
  - Does significant risk exist?
- State regulatory requirements
- Funding & budgeting
  - Pilot program funding
  - Full scale program funding
- Making the case for regulator approved rate adjustments



DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

49 CFR Parts 190, 192, 195, and 198

[Docket No. PHMSA–2009–0192]

RIN 2137–AE43

Pipeline Safety: Pipeline Damage Prevention Programs

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA), U.S. Department of Transportation (DOT).

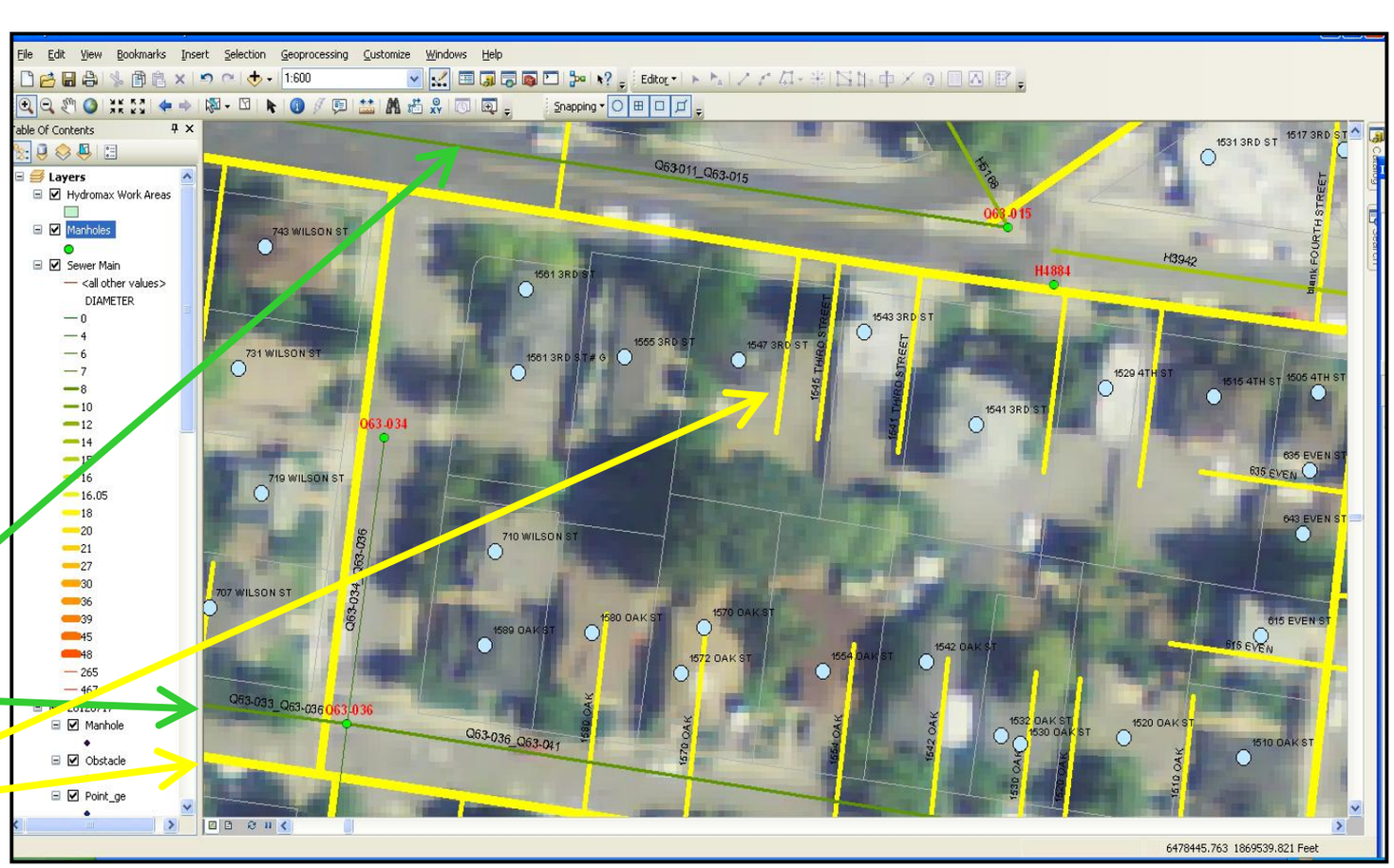
ACTION: Advance notice of proposed rulemaking.

Determining Significant Risk

- Gas installation records
- Does gas line mapping accurately delineate installation method and location?
- Can maps be overlaid
  - Gas installs
  - Sewer locations
- Intersections are at risk

Sewers

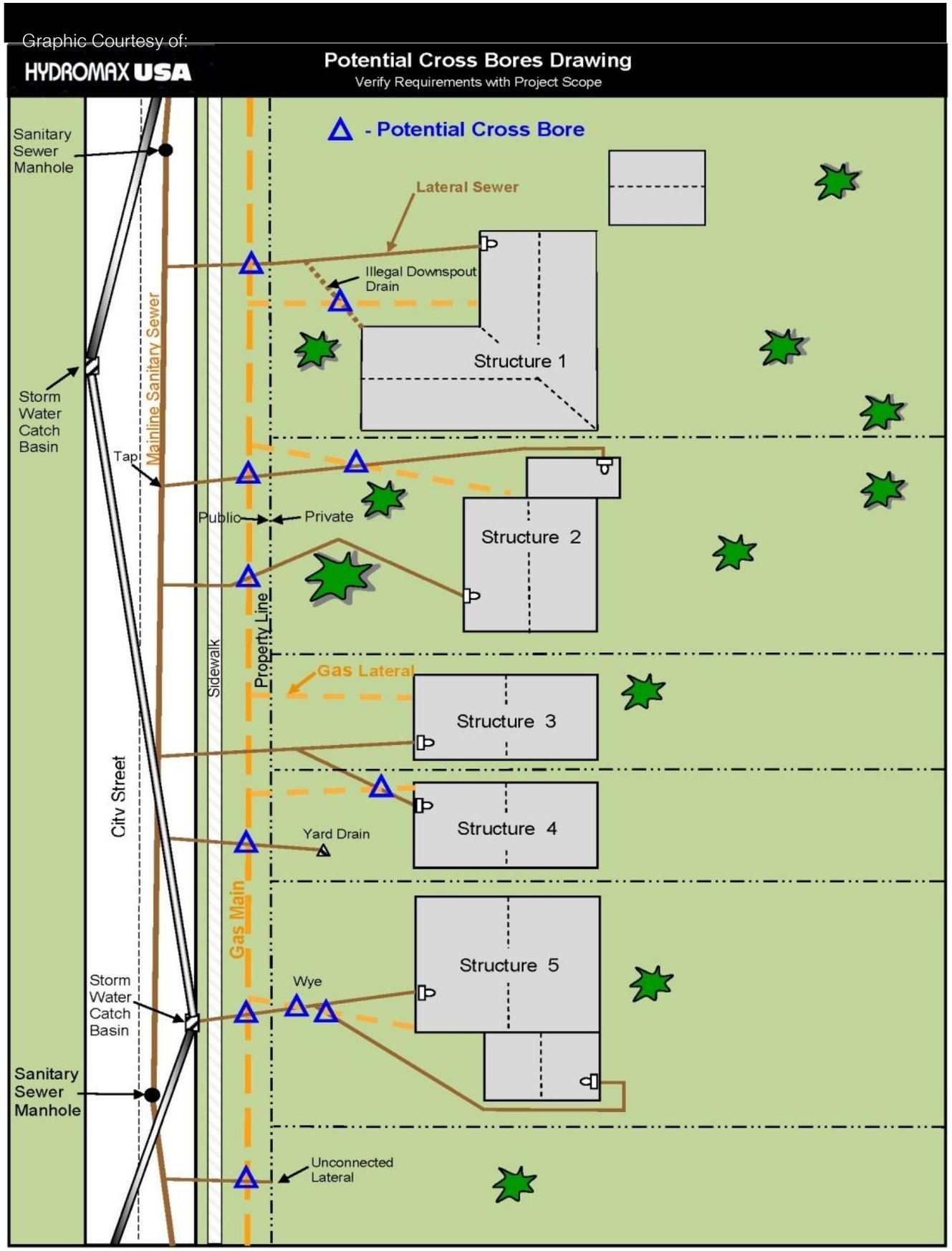
Gas lines



Potential Cross Bores

- Sanitary sewers
- Storm sewers
- Gutter drains
- Yard drains
- Cleanouts
- Offset cleanouts
- Branched laterals

Graphic Courtesy of:



Crossbore Inspections

- Delineate areas of high risk
  - First inspect multiple occupancy structures
    - Schools, hospitals, etc.
- Differentiate type of work
  - Individual laterals
  - Gas main replacement (GMRP) with laterals
  - GMRP w/o laterals
- Customize inspections methods to need
- QA/QC thoroughly in separate processes

Accepted Methods for Cross Bore Inspections

- Records review
- Pot holing using vacuum excavation
- Visual inspections using lateral launching mainline robotic CCTV cameras, with sonde & GPS locations
- Visual inspections using push rod CCTV cameras, with sonde & GPS locations

Cross Bore Project Steps

- Develop detailed processes
- Evaluate and identify areas of high risk
- Use high confidence verifiable methods
- Correlate inspections to full limits as required
- QA/QC in separate processes - 100% video, etc.
- Securely save data in a long term secure and easy to distribute format
- Share information to all that can benefit

Inspection Tools

- Good sewer and gas mapping
- GPS receivers, sub foot accurate (remote antennae)
- Mainline launched cameras
  - Inspects mainline sewers from manholes
  - Inspects laterals from mainline sewer
- Push cameras
- Sondes & receivers, attached to cameras –
  - 33 Mhz and 512 Khz
- Sewer cleaning equipment

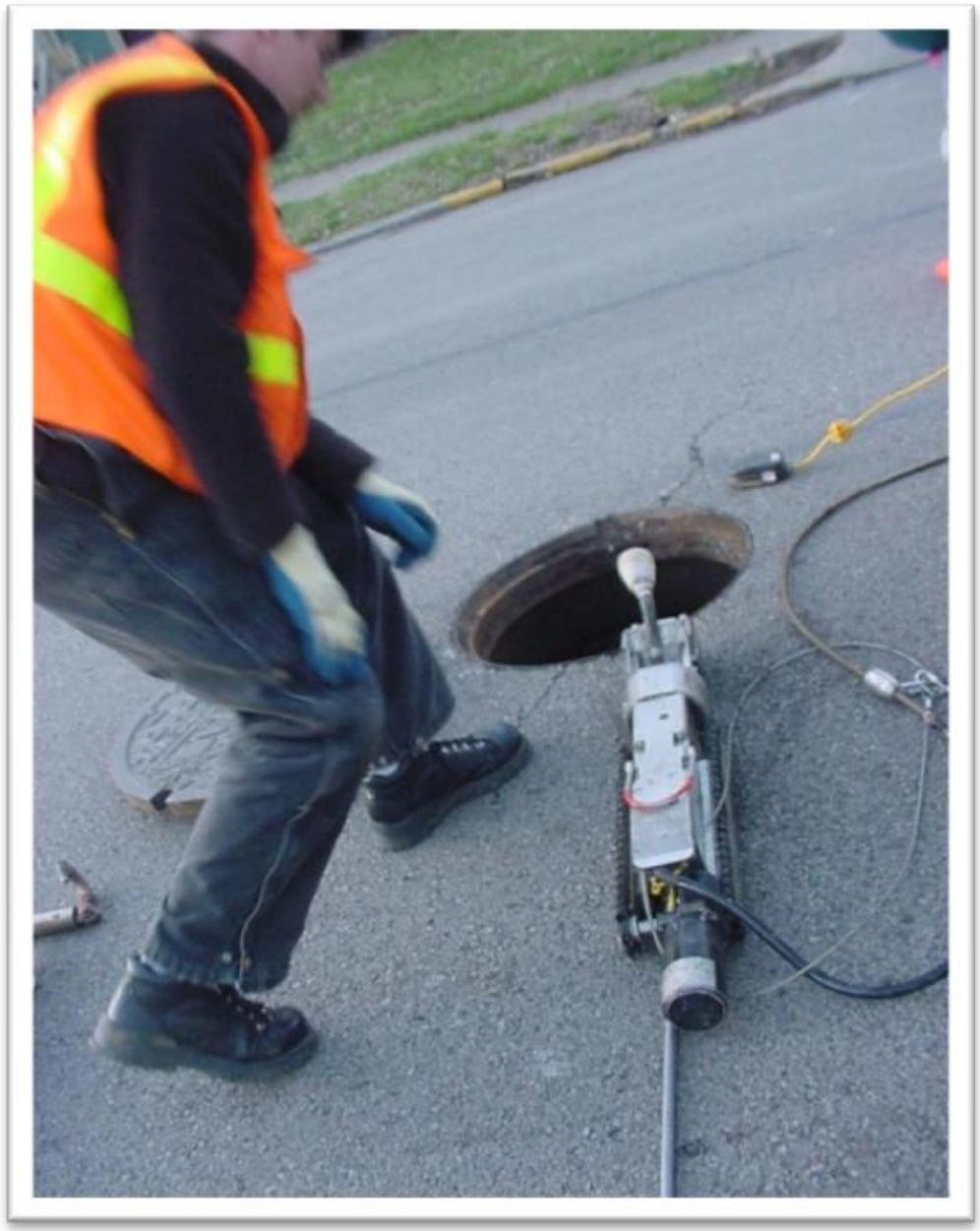
GPS Receivers, Sondes and Sonde Receivers

- Sondes transmit signal from inside sewer
- Surface locater determines depth and horizontal position
- GPS receiver records surface point
- Data base allows for GIS mapping and attachment of videos directly to lines on GIS map

Mainline Cameras w/ Lateral Launch Camera

- Mainline Lateral Launching Robotic
    - Identify mainline cross bores
    - Count number of laterals, some structures have more that 1 lateral
    - Sonde, counter, computer
- Lateral camera (piggyback)
    - Lateral distance to 120 ft
    - Sonde, counter, recorder

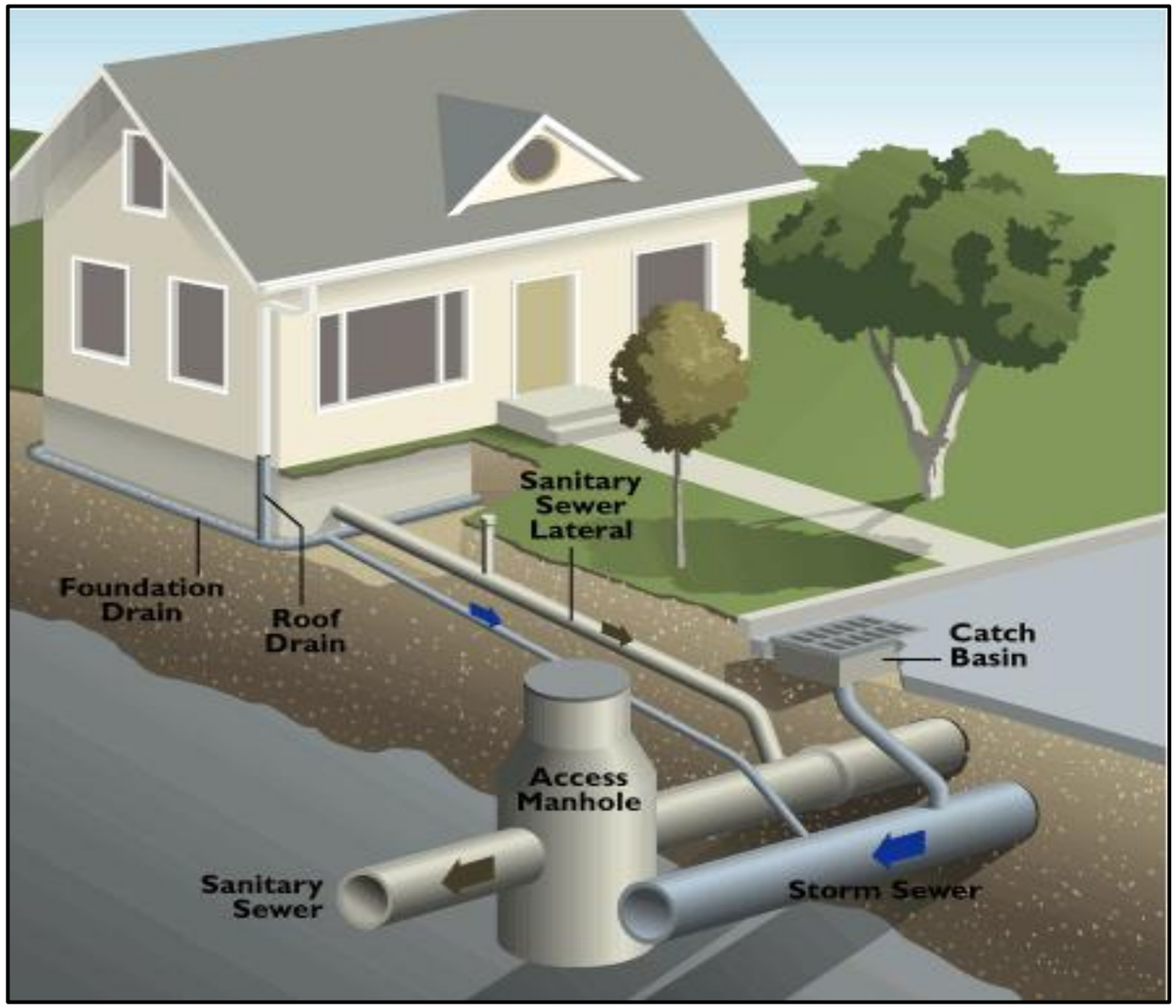
Accessing Sewers Manholes with Robotic Cameras

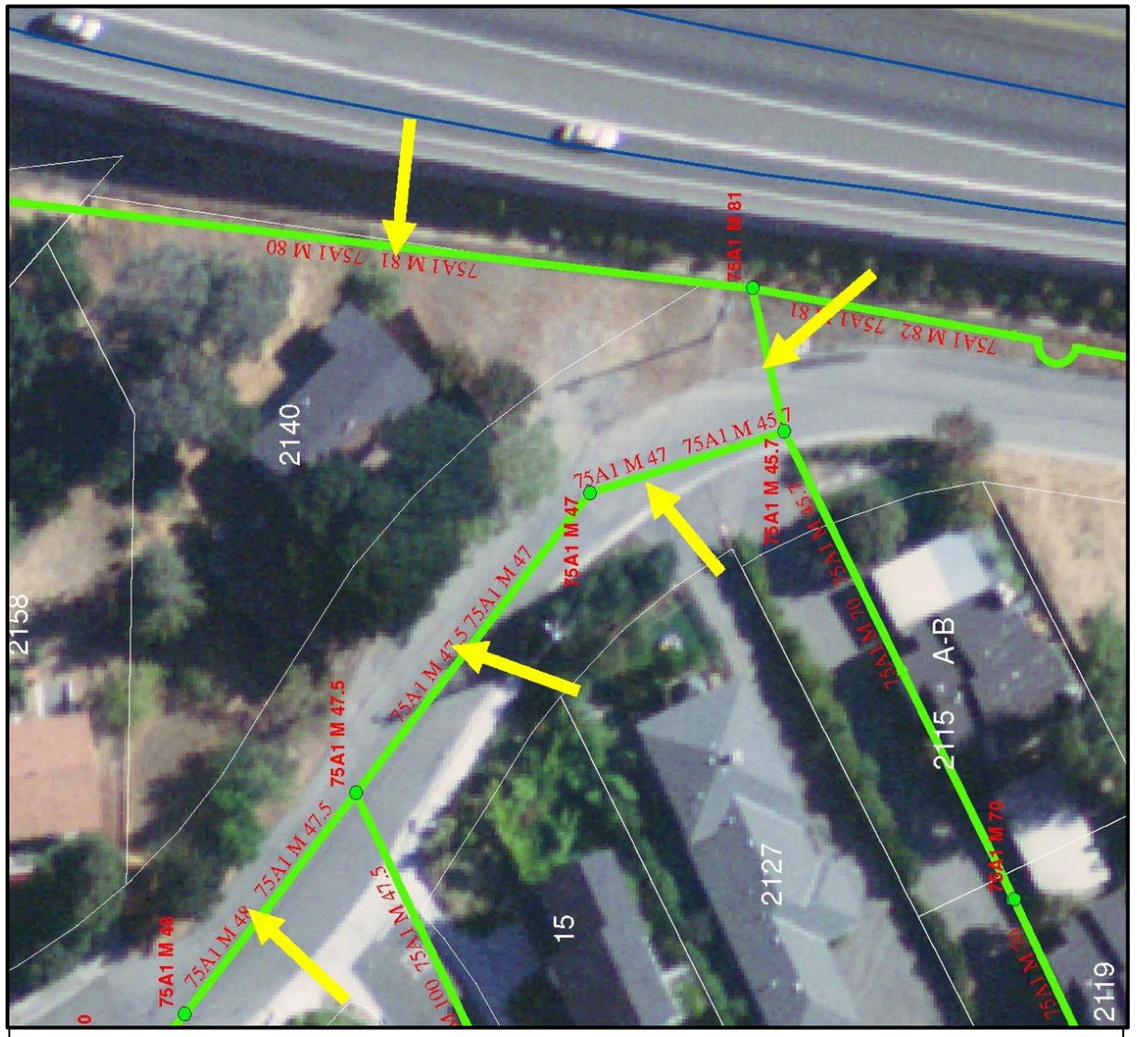


Push Cameras

- Manual push camera on stiff cable
- Distance to 200 ft or more of cable on open reel
- Diameter < 1.5” typical
- Sonde
- Lights
- Recorder & computers for adding details
- Used from exterior cleanouts, interior cleanouts, roof vents, pulled toilets

Residential Plumbing Connection to City Sewers

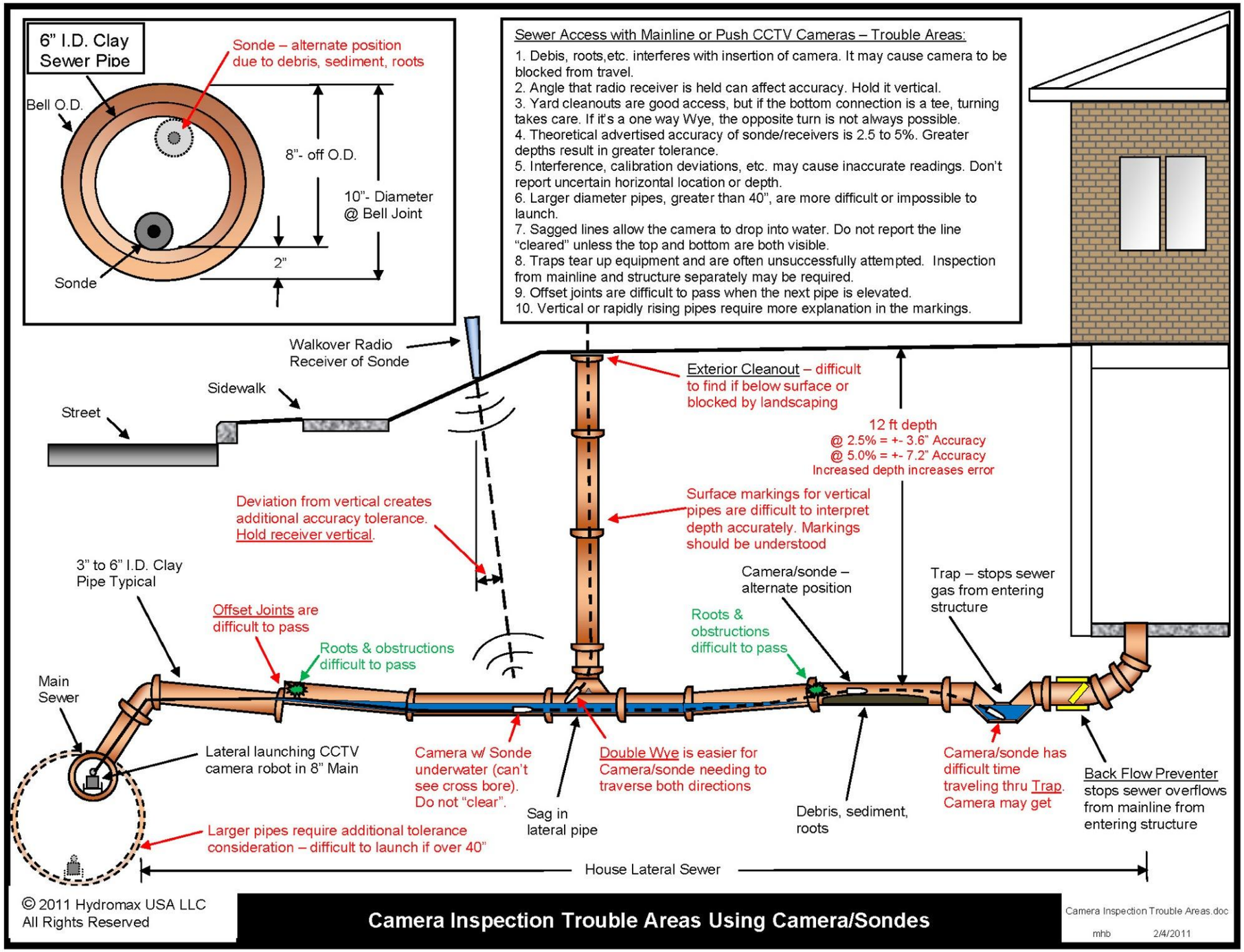




House with 5 mainline sewers on perimeter

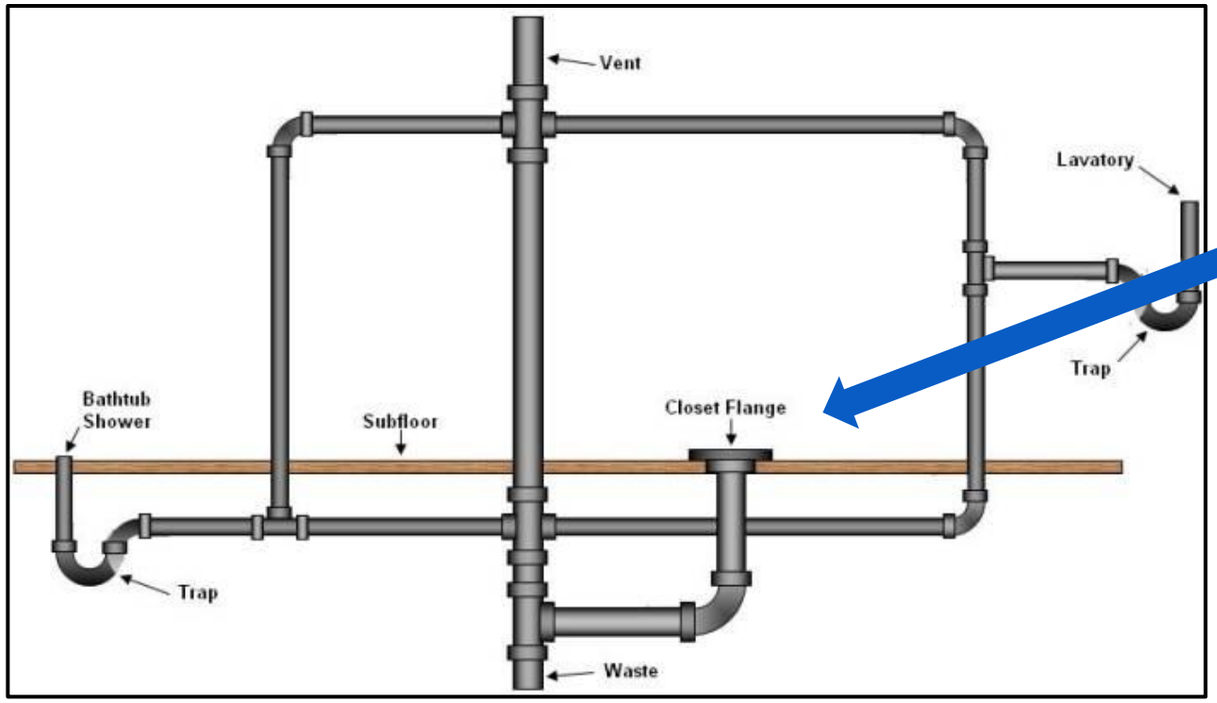
Camera Inspection Trouble Areas

- *Water in sags*
- *Roots*
- *Sonde Angle*
- *Sonde Position*
- *Traps*
- *Back flow preventers*



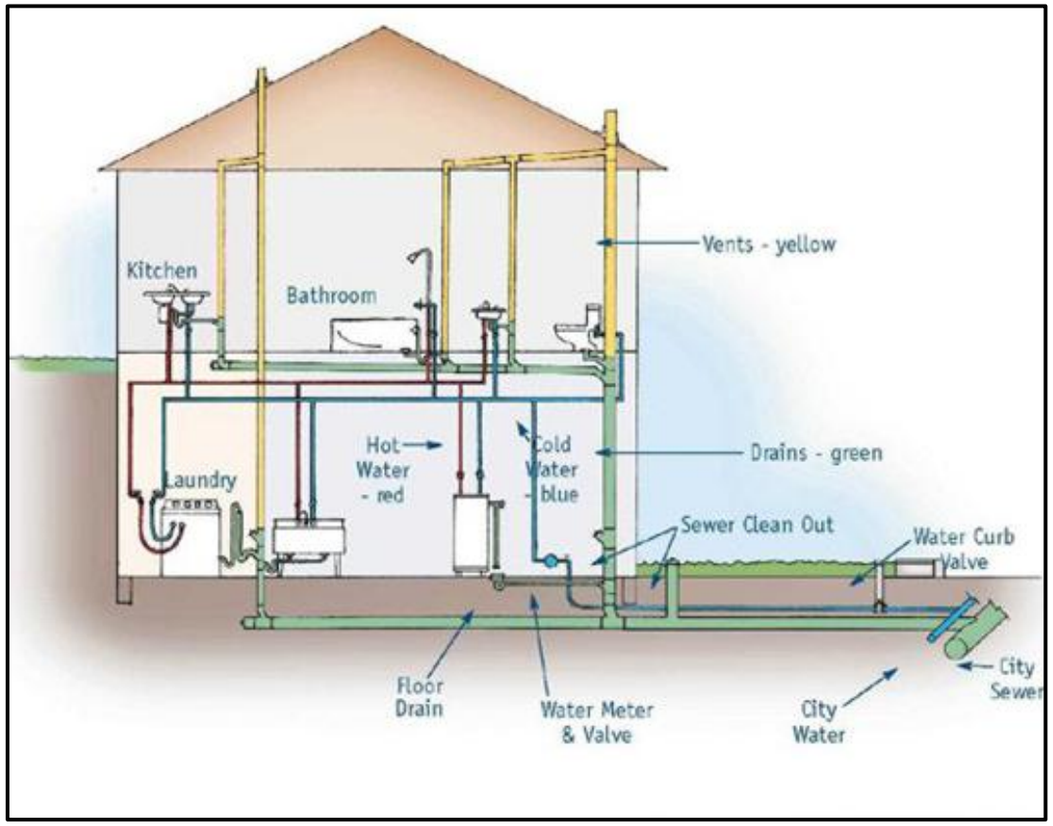
Inspection Access from Structure Interior

- Store data in readily ac

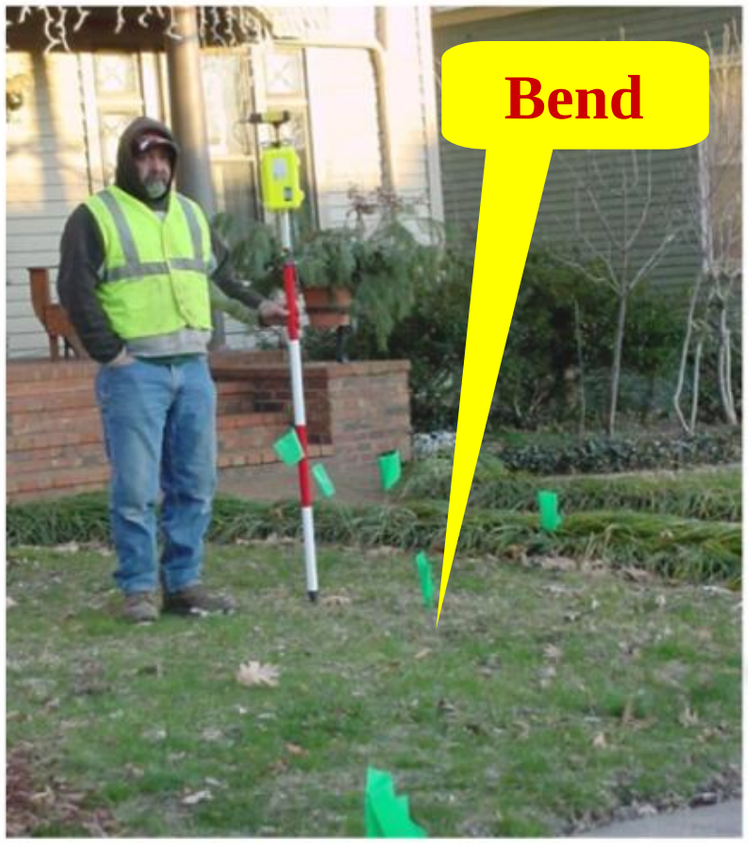


Roof Vent Access

- Usually only 1 story houses
- Permission from owner
- Protect from falls

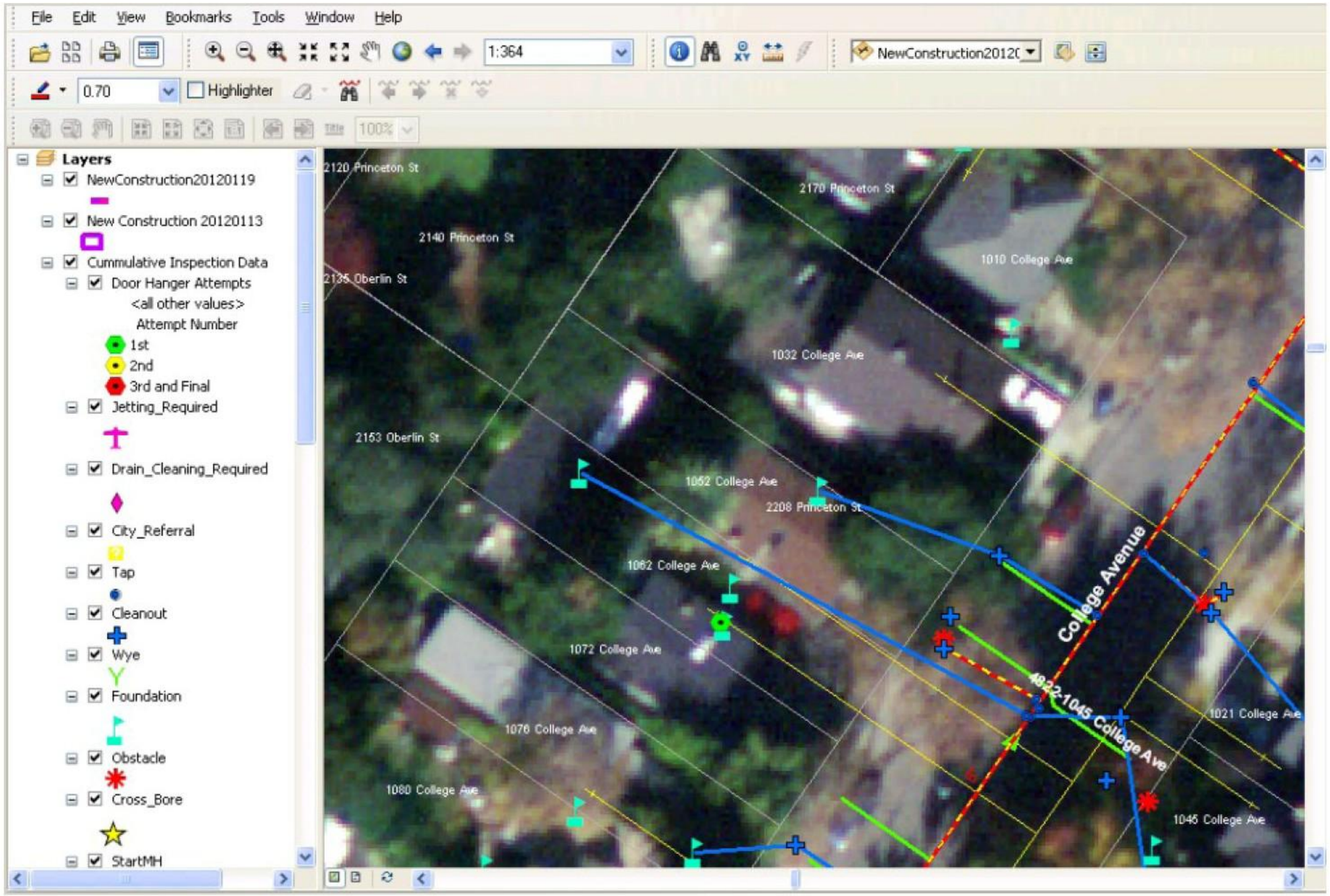


Lateral Line Located by Sonde, Mapped from GPS



GIS Mapping shows lines located from Sondes and GPS.

GIS Mapping – Visual Data Results



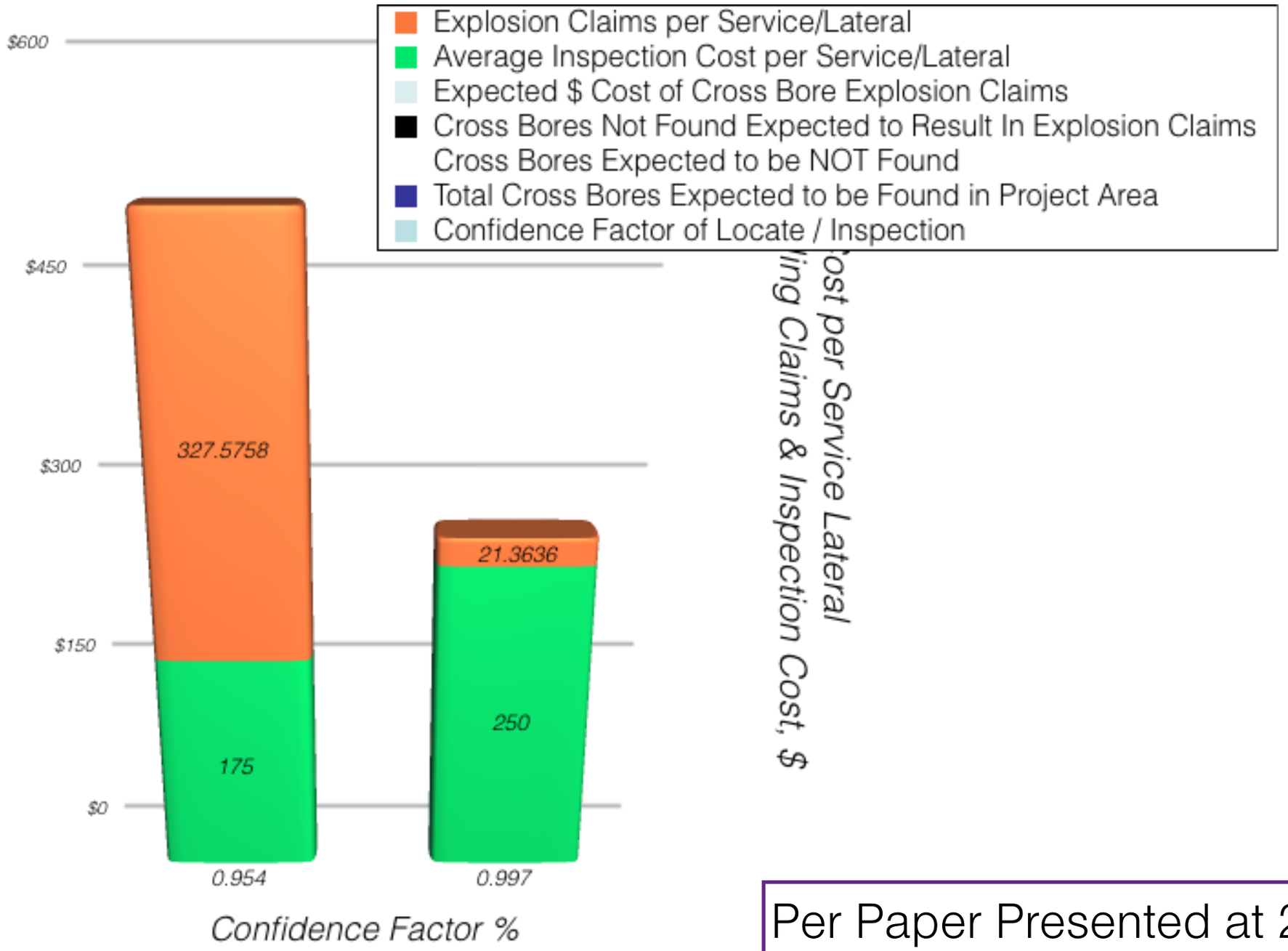
Access & Sharing Data

- Store data in readily accessible method, i.e. GIS
- Allow for access by management and operation personnel for greater efficiencies
- Share “cleared” and “uncleared” areas with installers and service technicians, including drain cleaners
- Use data to plan and manage inspection projects

Good Practices

- **Design** high confidence processes
- **Train managers** to understand sewer and utility conflicts
- **Train operating** personnel
- **Qualify and retrain** periodically
- **Verify** data collection is complete with an independent process (GPS with GIS mapping)
- **QA/QC all data,** independent review of each process
- **Store** data electronically for long term ease of use
- **Share** information internally and externally

High Confidence Process Saves $



Per Paper Presented at 2012 NoDig Conference

High Confidence System Elements

Good Process Design

+

Good Data Collection

+

Good QA/QC, Verify

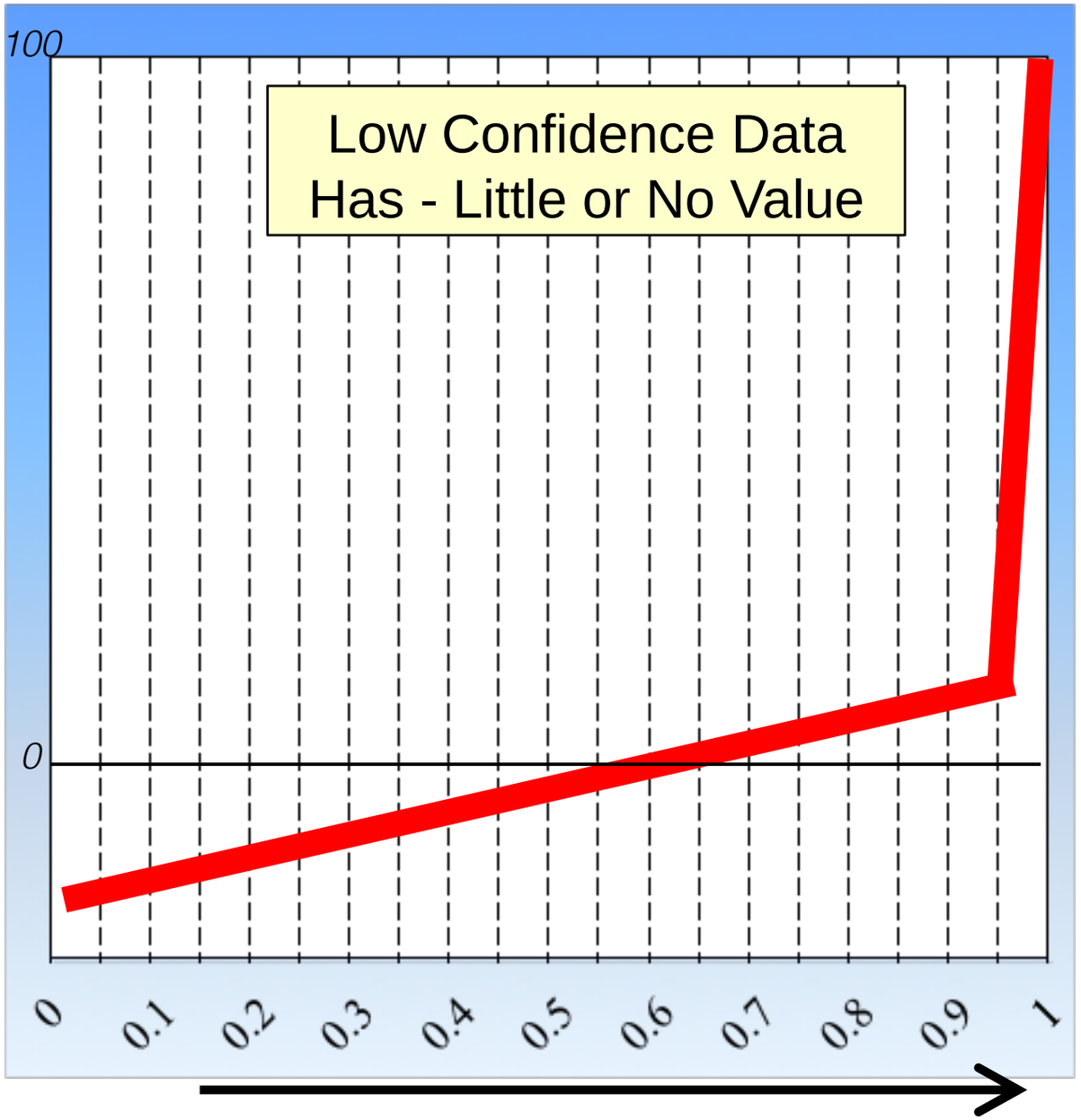
+

Good Data Management

=

Value Increases with Higher Confidence Processes

- High confidence data has increasing value
- Low confidence results <u>create false security</u>
- Low confidence results <u>may have negative value</u>
- Low quality work may have to be <u>completely reworked</u>.



When Risks Are Very High …..

…..And Errors Are Costly….

…. It Pays to Do It Right!

Thank you!

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

www.crossboresafety.org