



# **High Confidence Cross Bore Inspection Programs and Gas Utility Data Integration**

**NASTT Northeast Chapter Technical  
Forum Thursday, November 16th, 2017  
Cooperstown, New York.**



**By: Mark Bruce, President  
Cross Bore Safety Association**

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

# System Integrity

- Cross Bores is now recognized as a key element to address for gas distribution system integrity
- All aspects of operations can utilize cross bore, leak survey, new installation and maintenance activities to drive enterprise value and increase safety

# Cross Bore Definition – Not Just Gas & Sewers

“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.” \*

# What is the Problem - Cross Bore Risks Factors

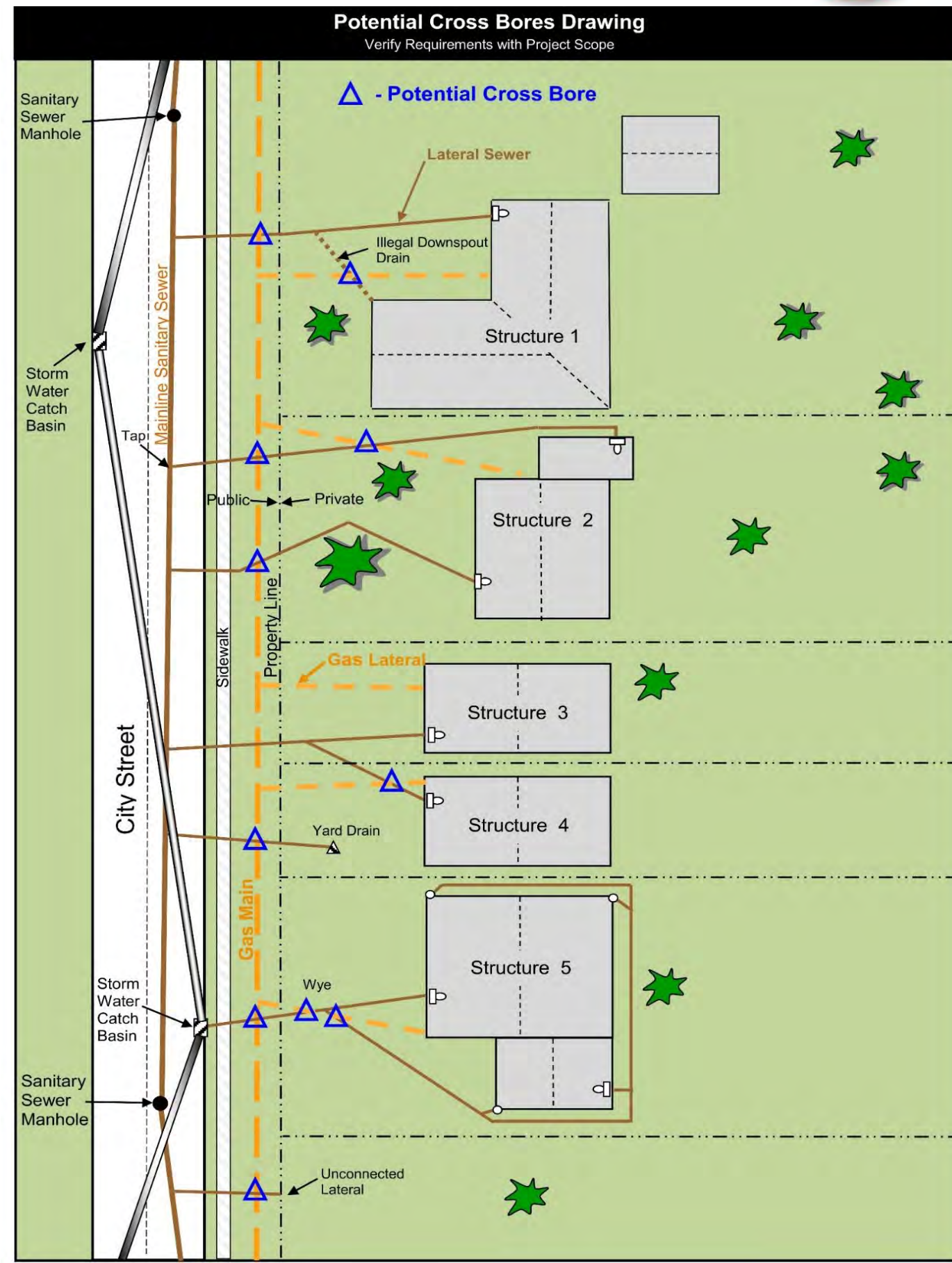
- Sewer utilities are unknown or unmarked
- Depths of utilities are unknown
- Trenchless does not “see” the pipe
- Trenchless installers need information that is not always available through 811 locates
- Trenchless construction methods used without verification



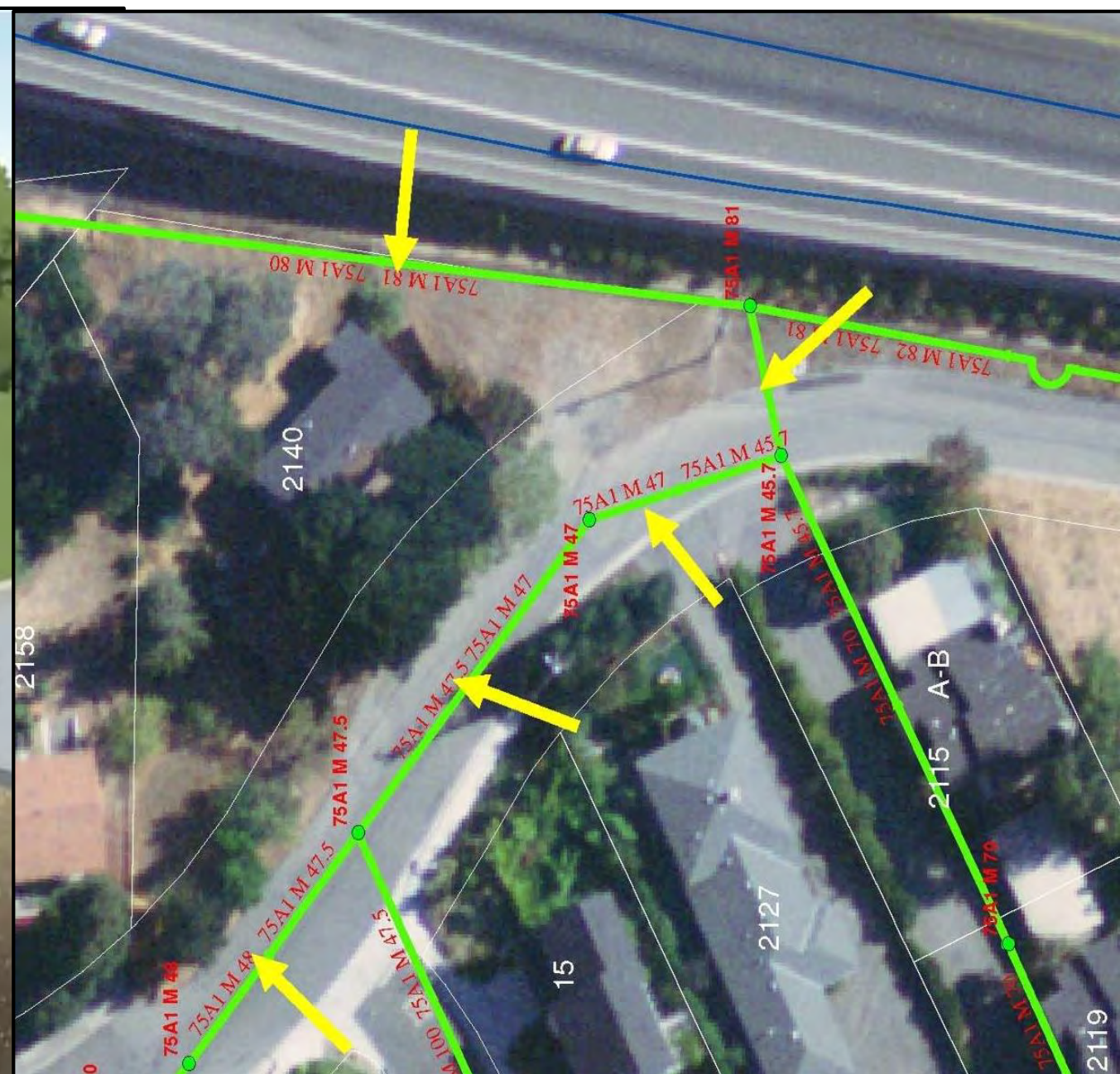


# Potential Cross Bores Gas In Sewer

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





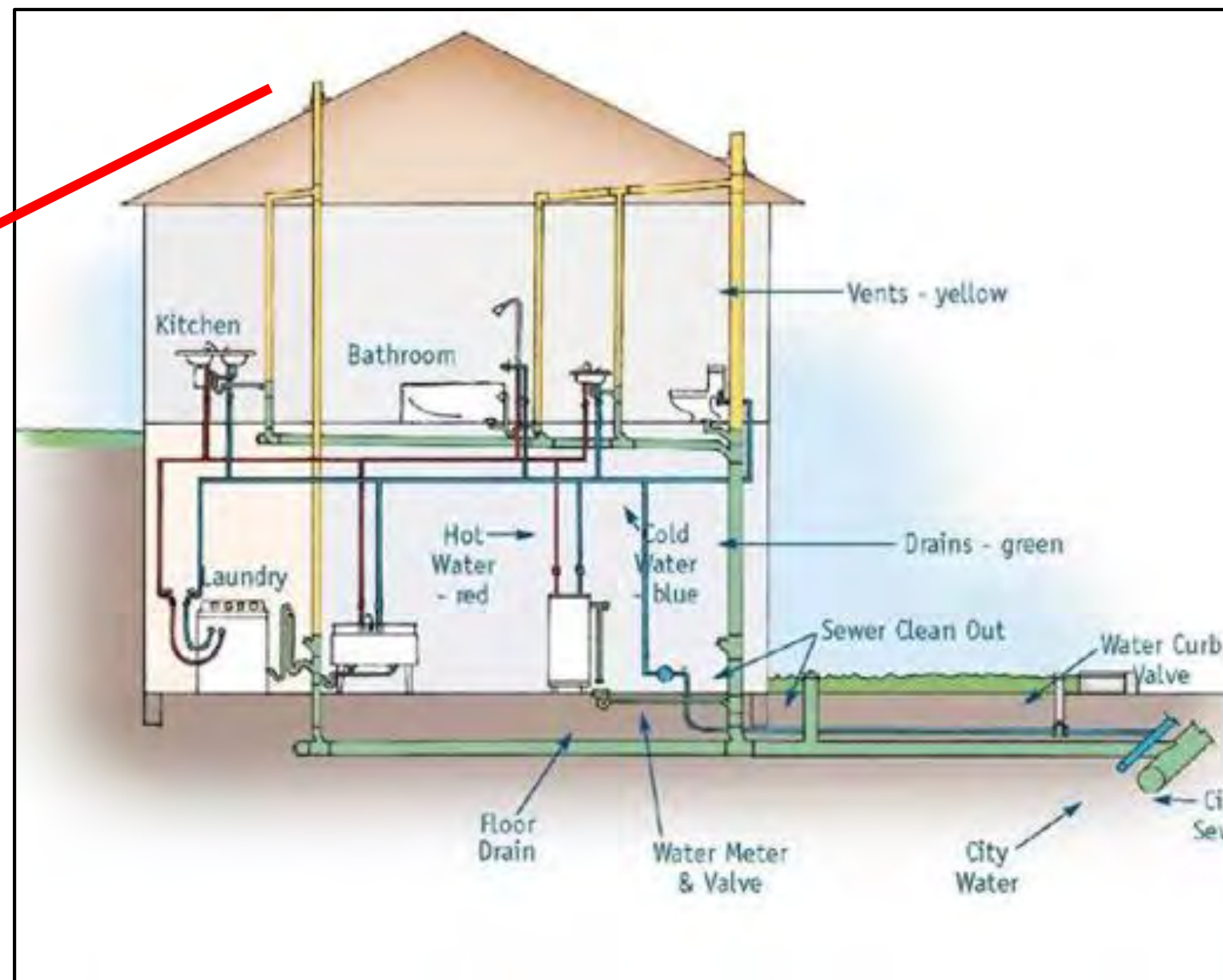


## House with 5 mainline sewers on perimeter



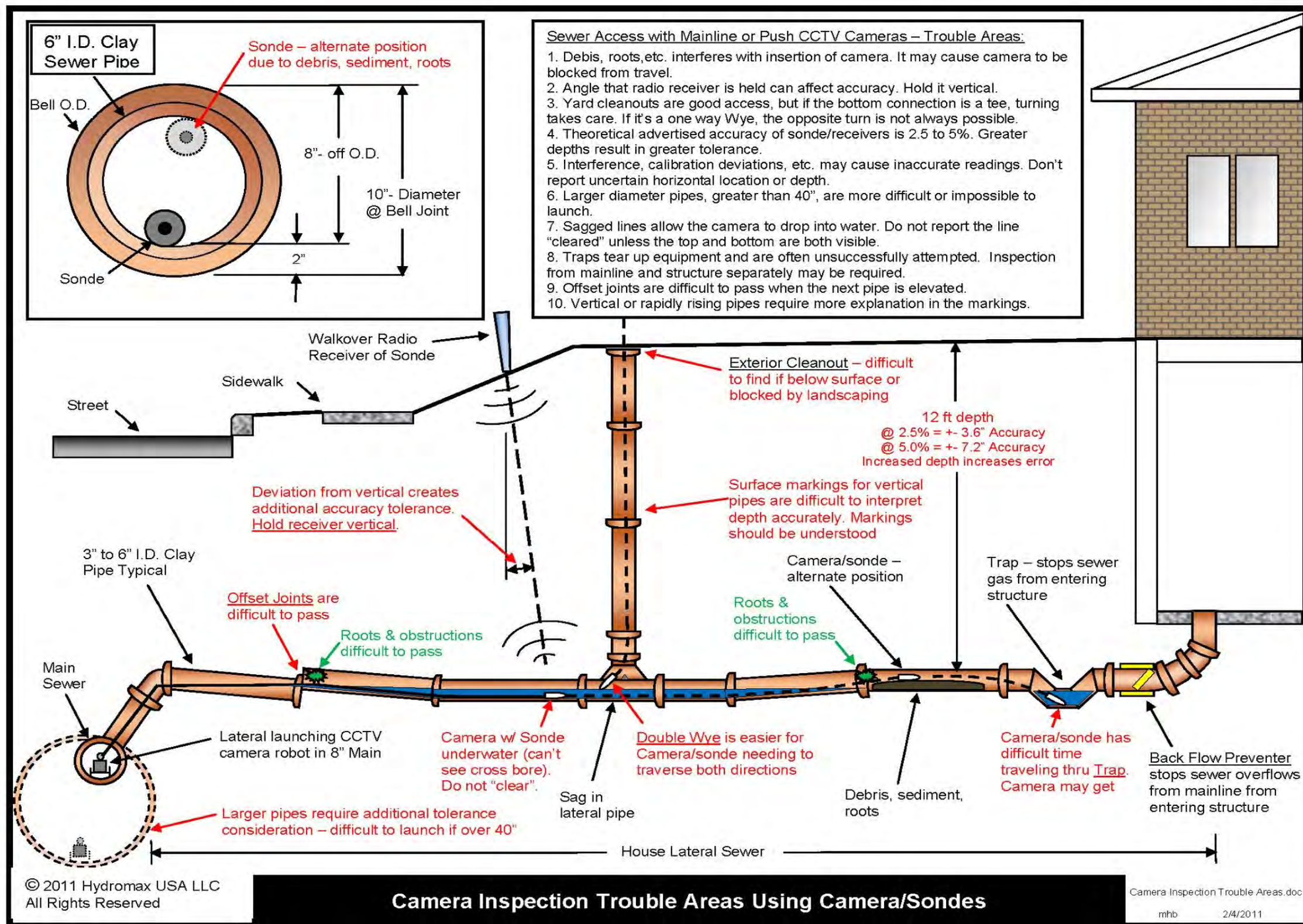
# Roof Vent Access

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





# Camera Inspection Trouble Areas





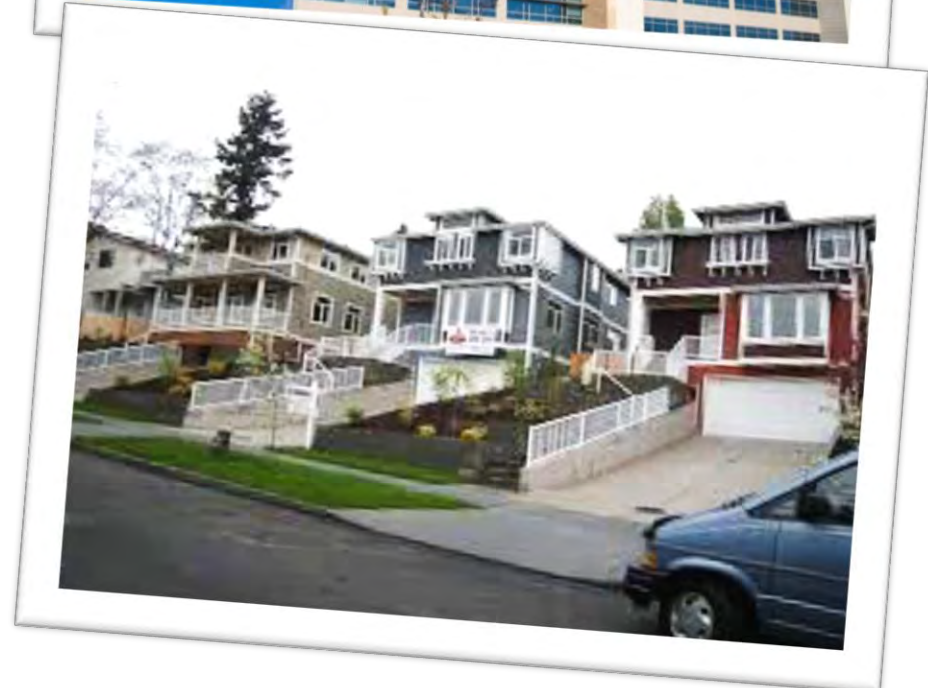
# Cross Bores





# Quantifying Cross Bore Risk

- Expected national estimate = approx.  
0.4 gas cross bores / mile
- Large projects have had up to 3 per mile
- Small project 12 cross bores of 147 inspections
- Found at a hospitals and at schools
- Most expensive cross bore explosion = \$30 million, **2 girls extensively burned**





# Cross Bore Explosion

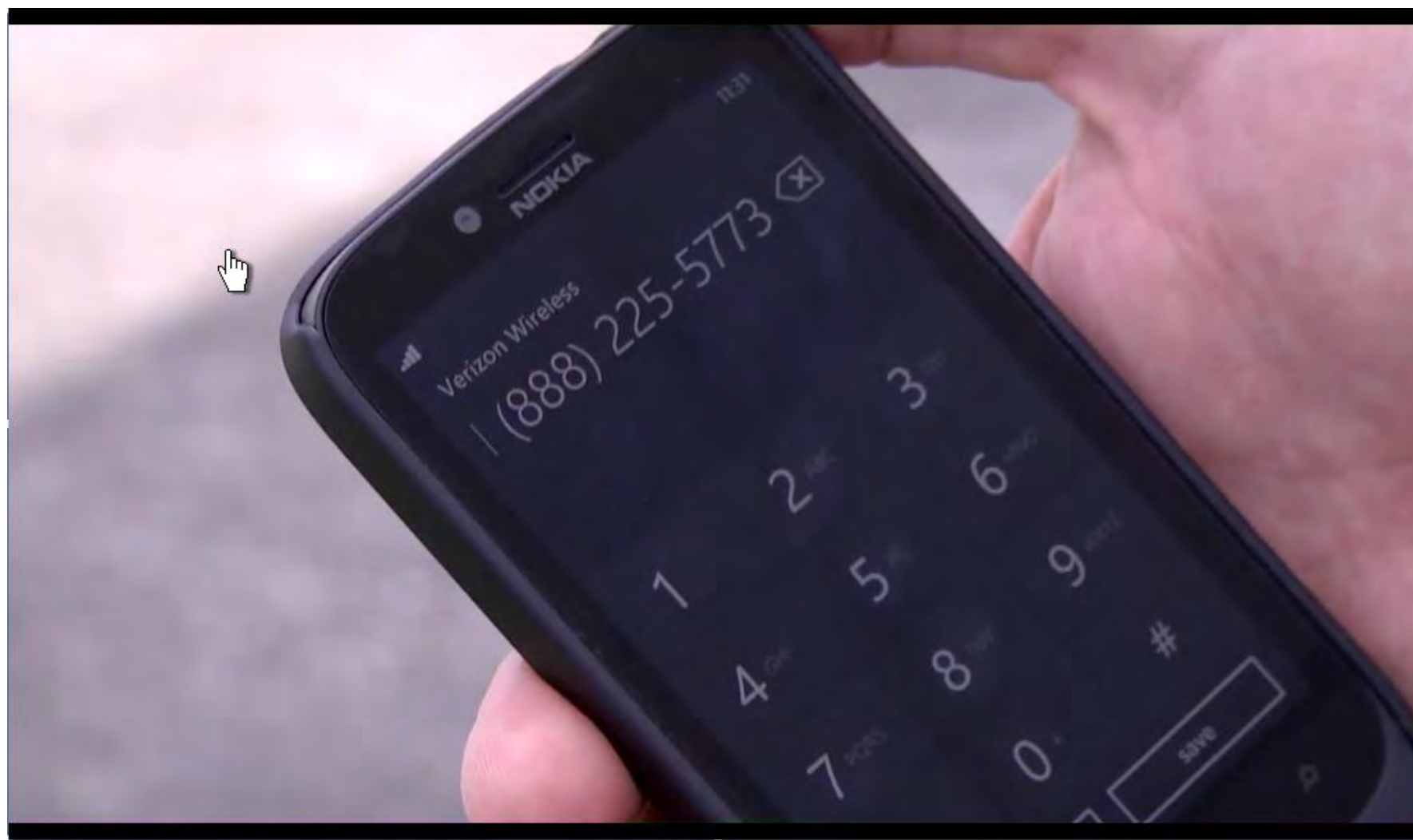


# Community Outreach

- Integrate community outreach program early
  - Include residents
  - Include plumbers & drain cleaners
  - Include drain cleaning rental companies
  - Include municipalities & sewer utilities
- Media methods
  - Door hangers, meetings, mailings, TV news, website, social media
- Emphasis safety efforts for newly recognize risk



# Community Outreach - Web, Radio Spots, Letters, Videos, Sandwich Boards, Theatres




Online Links to Video:


<https://www.pse.com/safety/NaturalGasSafety/Pages/Blocked-Sewer.aspx>

<http://www.youtube.com/watch?v=jPAR-3YiSEM&feature=youtu.be>

# Cross Bore Info Online




...to minimize the risk for injury, loss of life and property damage from utility cross bores .....



- Home
- History
- News & Articles
- Best Practices
- Leading Practices
- Participating Organizations
- Committee Registration
- Legacy Cross Bores
- New Construction
- System Integrity
- Risk Evaluation
- Drain Cleaner Safety
- Videos/Webinars
- Photos-Cross Bores+
- State Regs and Rulings
- Papers and Presentations
- Tools and Technology
- Information Sources
- Join Now - Membership
- Contact Us

### Photos - Cross Bores and Explosions




**Traditional Techniques**

Excavate an area manually, by hand or by trencher. These techniques allow for inspection of the bottom and any intersected utilities. Repairs can be made at the time of inspection if needed.

**Trenchless Techniques**

Moles can be used by their initial design. If rocks, roots or other objects are hit, percussive action moves the mole forward.


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**Electric safety**

**Natural gas safety**

- Natural gas leaks
- Call before you dig
- Gas safety tips
- Blocked sewer & septic lines
- Maintain your piping
- Carbon monoxide
- Gas shutoff
- Gas inspections

**Get prepared**

- Tree Trimming
- Emergency Ops

## Blocked sewer and septic lines

### Call PSE first to prevent cross bore danger

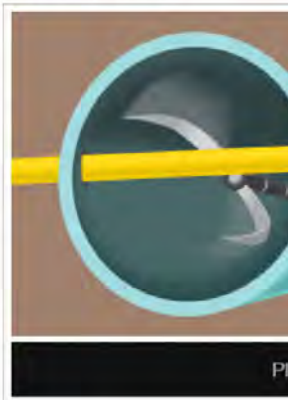
When you have a sewer or septic line blockage outside the walls of your home, call PSE to meet your plumber on the scene and check for potentially dangerous cross bores.

If you are contacted by Hydromax USA regarding a sewer or septic line inspection, be sure you are an authorized PSE service partner working to ensure your safety.

#### What to do

To safely clear a blocked sewer or septic line:

1. Determine if the blockage is within the walls of your home. Only outdoor blockages pose a risk.
2. If you think the blockage is outside, ask your plumber to call PSE at 1-888-225-5773 at least one hour before attempting to clear it. We'll immediately dispatch a technician, who can usually arrive at your location within 60 minutes.
3. Working with your plumber, the technician will locate the sewer and gas lines and make sure it's safe to proceed. This service is free of charge.



**Your plumber can help**


Your plumber or drain-cleaning professional may recommend inserting a camera in your sewer to look for cross bores. In practice, and if a cross bore is found, PSE will reimburse you for the camera inspection. You should always call PSE to work with your plumber to precisely locate both your sewer and gas lines, because a cross bore may be concealed behind other obstructions to the plumber's camera.

**Safety tips for sewer clearing professionals**

[Read these safety tips for professionals](#) working with sewers in the PSE service territory.

[Cross bore facts](#)

[About Hydromax USA](#)


**American Gas Association**

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## AGA White Paper: Natural Gas Pipelines and Unmarked Sewer Lines - A Damage Prevention Partnership

AGA White Paper: Natural Gas Pipelines and Unmarked Sewer Lines - A Damage Prevention Partnership

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- Pipeline Safety Act Reauthorization
- Distribution Integrity
- Transmission Pipelines
- Other Advocacy Issues
- Agency Notices
- AGA Comments
- Technical Reports/Papers
- Industry Practices for Gas



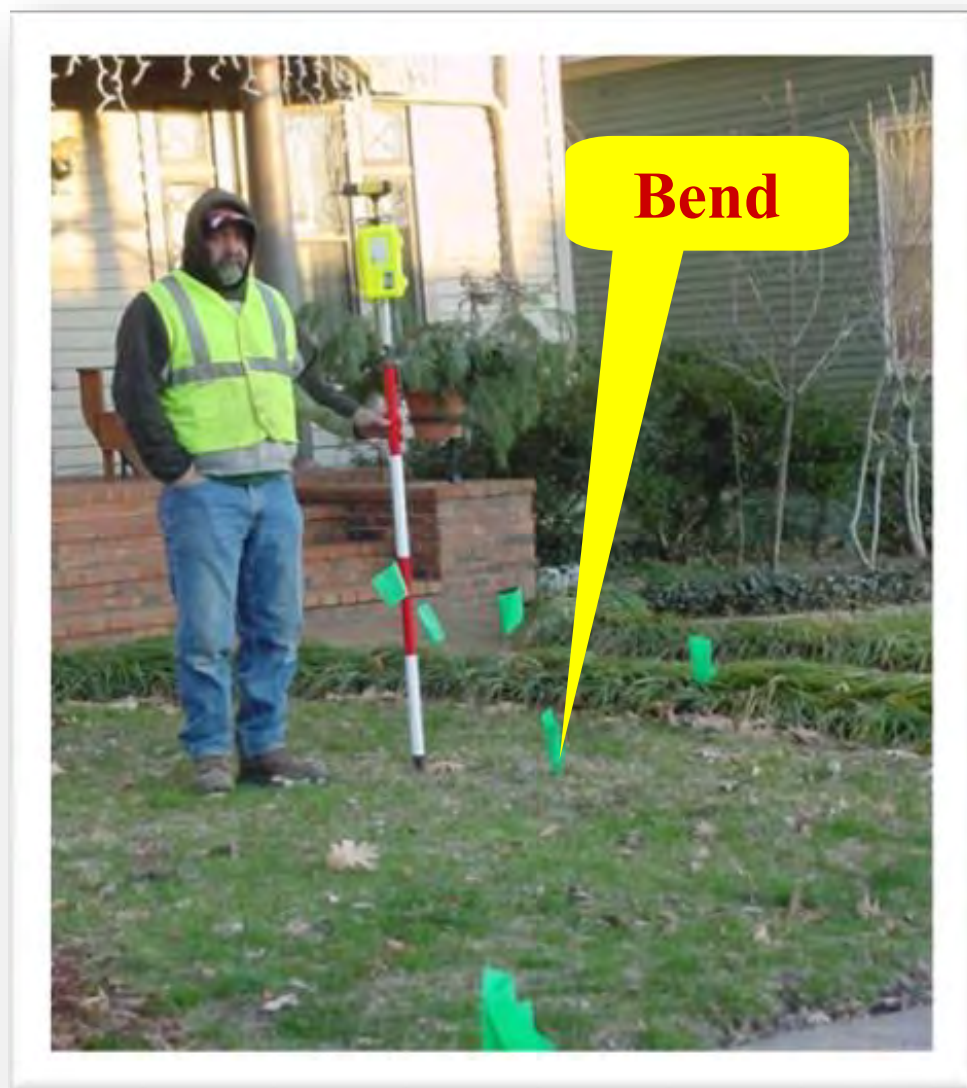
# Tools for Locating - Depth, Latitude & Longitude Mapping

- **Locator** – horizontal position and depth
- **Sonde** - (in camera head) transmits to above ground walk over Locator
- **GPS** - records location for GIS mapping
- **Frequency Generator** - (energize gas line)



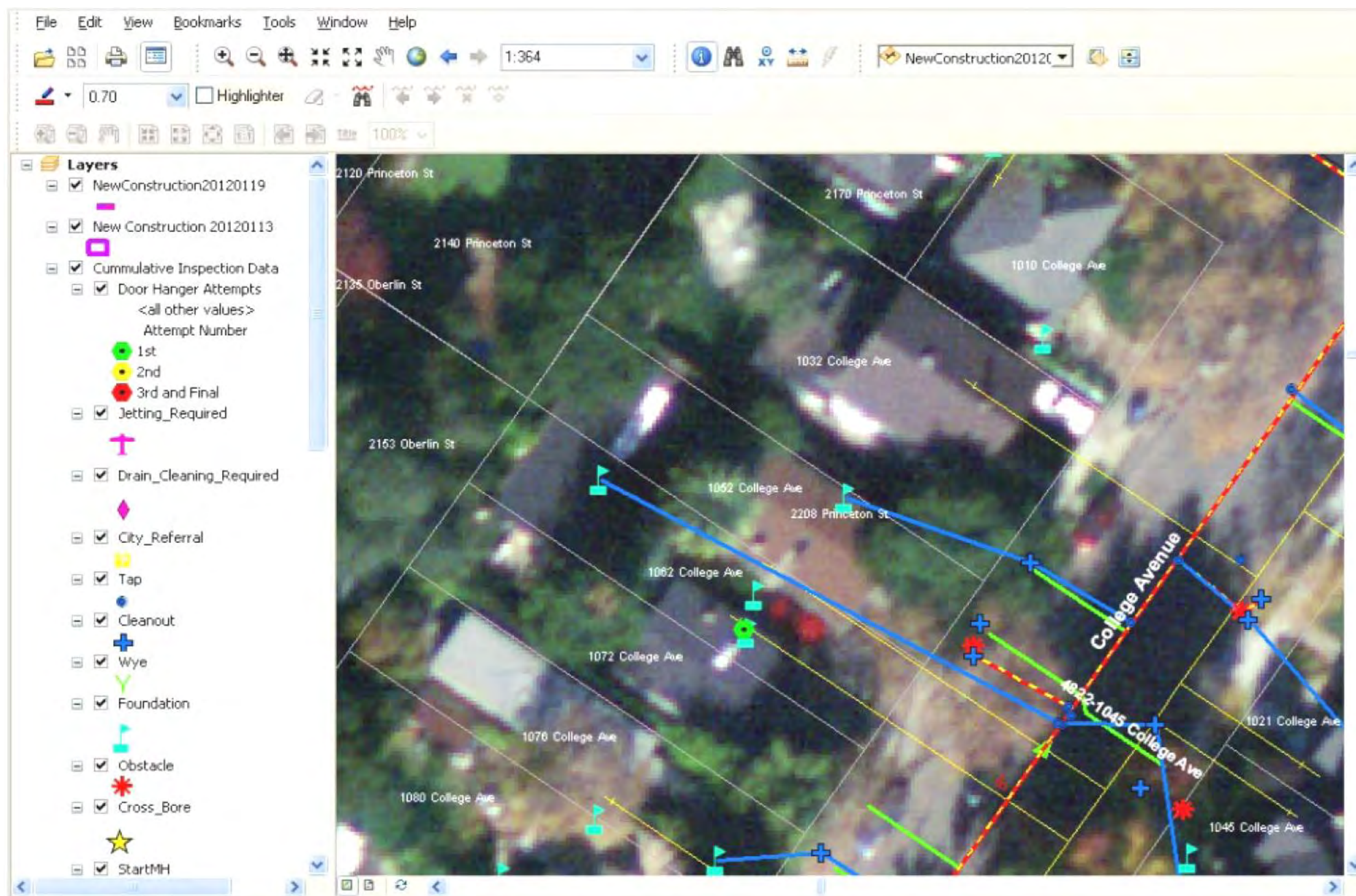
# GPS and GIS Mapping – Allows QA/QC and Georeferenced Data

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





# GIS Mapping – Visual Data





# Sample Cross Bore Report

HYDROMAX USA

## Cross Bore Report

**Date:** 2/5/2014

**Address:** 222 3th Ave W  
City, ST 88888

**Parcel Number:** 69175  
**Claim Number:** 88701351  
**Crew Operator:** Jarred Stull Sewer  
**Asset Type:** Service Lateral Distance from Mainline Tap (for lateral sewer cross bore): 25' upstream from mainline tap.  
**Distance from Manhole (for main sewer cross bore):** NA  
**Sewer Diameter:** 4"  
**Sewer Pipe Material:** Concrete Pipe  
**Gas Mapping Review:**  
**Gas Asset Type:** Mainline  
**Gas Line Diameter:** 6"  
**Gas Line Material:** MPE  
**Gas Installation #:** 95385  
**Gas Installation Date:** 1/1/1996  
**Yrs/Mos Since Install:** 18yrs/1mos  
**Installation Method:**  
**Hole Hog** ☒ HDD ☐ Unknown ☐

**Type of Inspection:**  
☐ Emergency (if checked fill in below)  
     Time Call Received \_\_\_\_\_  
     Arrival Time \_\_\_\_\_  
☐ New Construction  
☒ Legacy


**Cross Bore Type:**  
☐ New Construction  
☒ Legacy

**Job Type:**  
☐ Simple Service  
☒ Main & Service  
☐ Main with Test & Ties


**Primary Equipment Used:**  
☒ Mainline Lateral Launch CCTV  
☐ Push Rod CCTV  
☐ Other (specify): \_\_\_\_\_

**Additional Equipment Used:**  
☐ Mainline Lateral Launch CCTV  
☐ Other (specify): \_\_\_\_\_


**Additional Notes:**



**Aerial Photo**



**Above Ground Site Photo**



**Interior Pipe Photo**

Pipe and Install Data

Located on GIS Map

Photo of Surface above Cross Bore

Photo of Inside Sewer Pipe Showing Gas Cross Bore



# Cross Bore Program Data

- 100% Review all field videos
- Verify video inspections traversed to the limits past gas risk using GIS mapping
- QAQC to Verify adjacent parcel risks – lines from other parcels which may cross targeted parcel
- Use proximity determinations only with good processes – separately QAQC all decisions
- Install cleanouts and pothole when other methods are not successful

# Cross Bore Program Data, continued

- Create risk model – perform highest risk first, continually adjust with new data
- Use GIS maps and database queries for program management
- Integrate data from cross bore, leak survey, maintenance, installation from across multiple departments. Use GIS data structure.
- Share the information to other silos for efficiencies– consider call center, installing contractor use

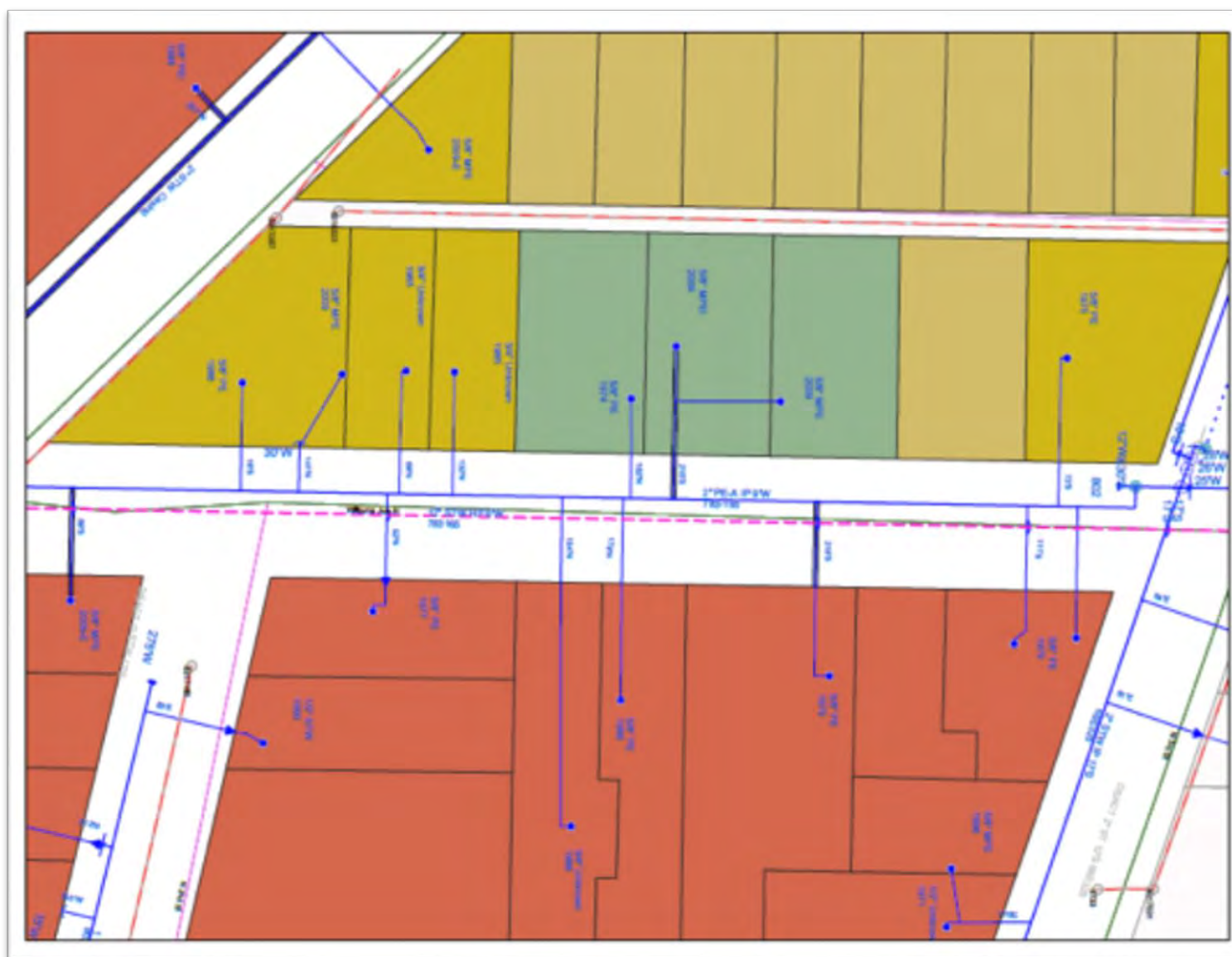


# Geo-Referenced Data – the Future is Now

- **Integrated** data to exchange with GIS, Accounting & Other Utility Databases Integrating traditional data Silos
- **Financial Planning** enhancement w/ refined asset data
- **Construction** – easy accessible location & data for sewers and gas assets can save design, create as-builts & track installed assets.
- **Risk Evaluation** updates for **DIMP** and other uses.
- **Track** projects, maintenance and install projects w/ GPS locates
- **Combine** cross bore, leak survey, maintenance and install data to “sharpen” location accuracy and asset condition.

# Risk Analysis – Report Digitally & Drive Priority

- Provide customers and public drain cleaners GIS web based maps to show cleared and at risk parcels.
- Drill down for detailed info



Cross Bore Risk  
Status



Clear



Not clear,  
data



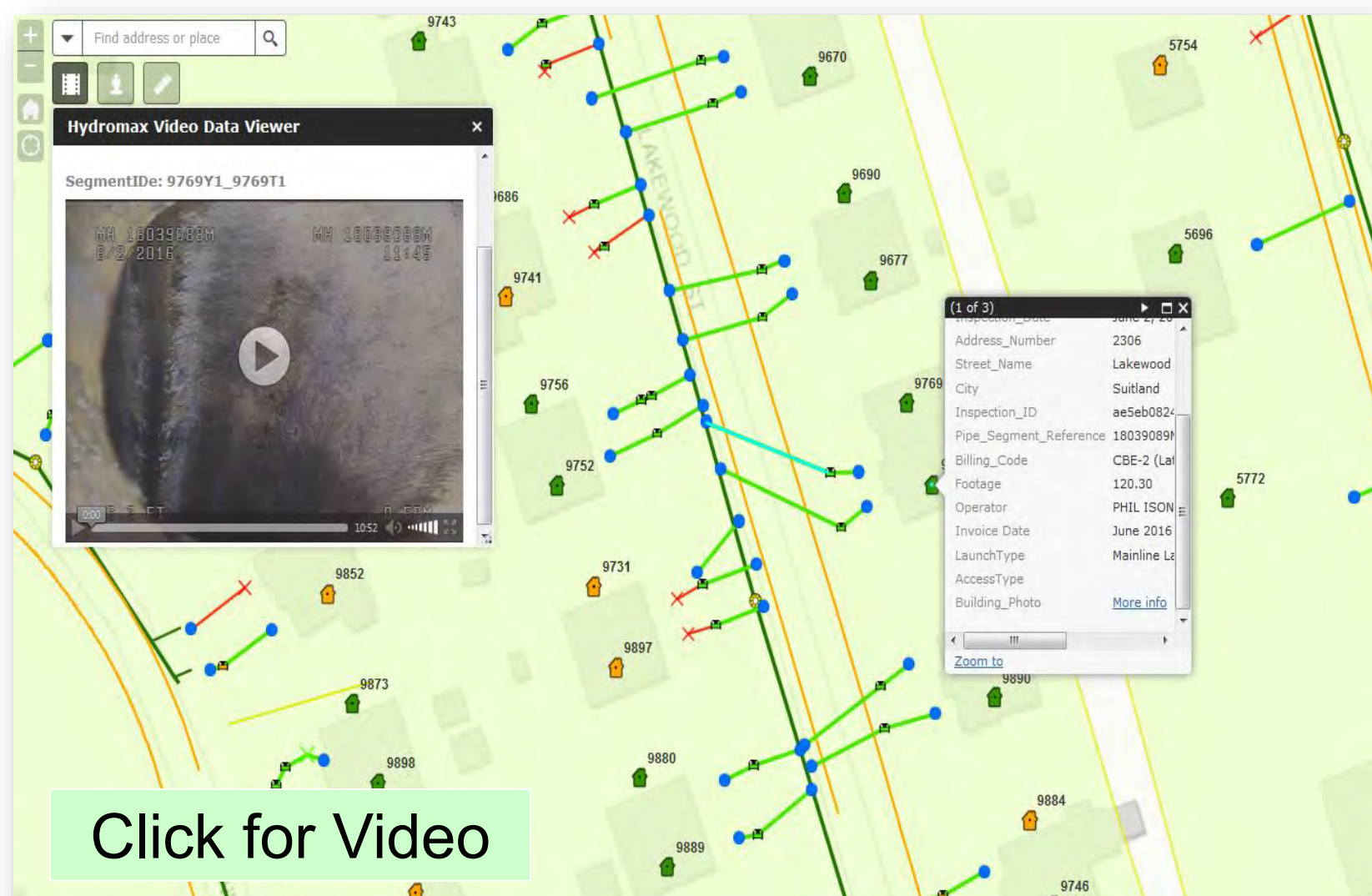
available  
Not Clear

[Click for Video](#)



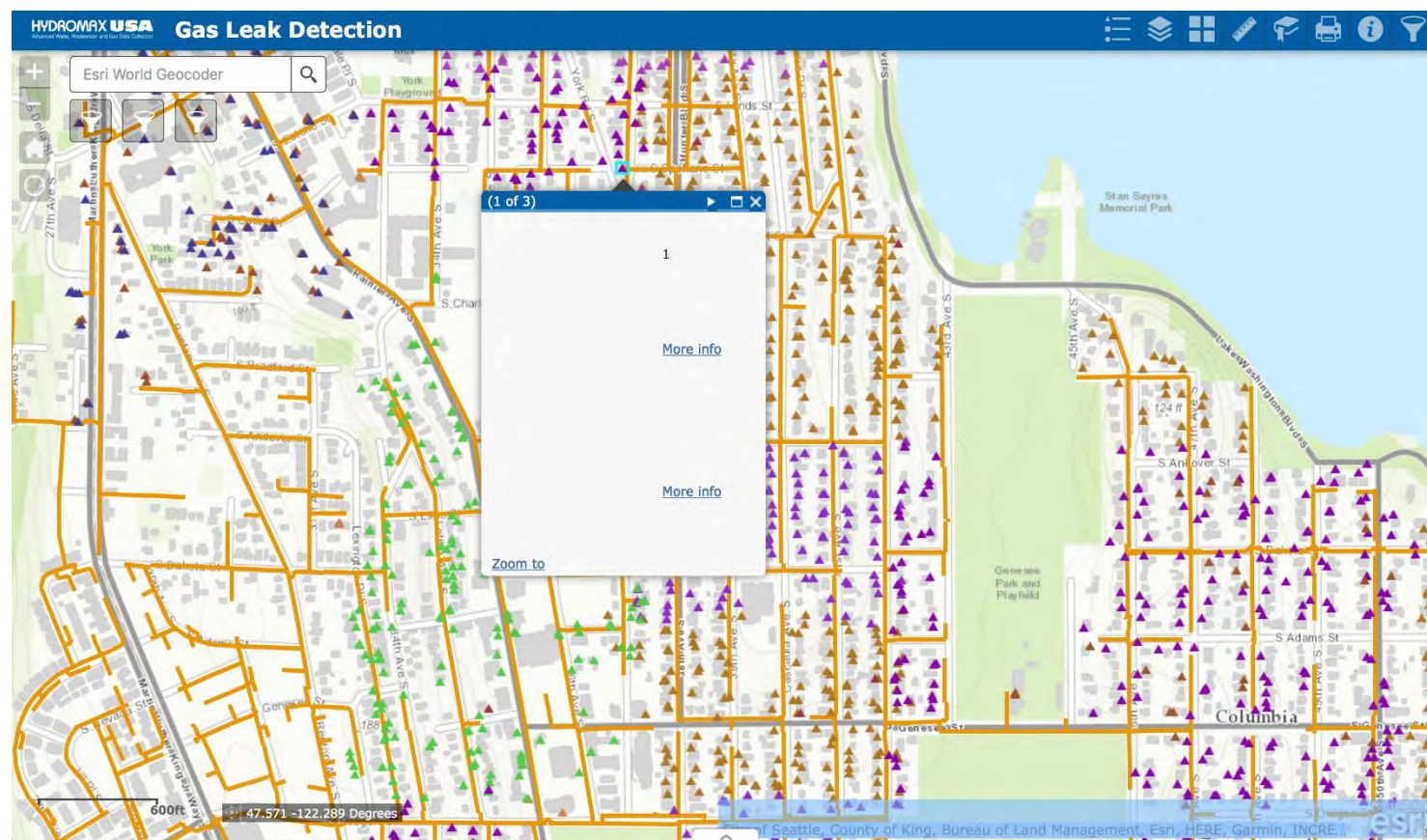
# Future Data Integration – Utility Database

- Use data of GPS locates from installation, cross bore and leak survey to improve and build solid asset GIS database.
- Use web based data in office and field to improve operations and reduce costs
- Integrate data from multiple sources.



# Future Data Integration – High Accuracy, Low Cost Devices

- Multi-constellation GNSS for the masses is coming
- Recent miniature boards (2 centimeter, 1 inch, accuracy)
- Only seconds to acquire signal
- Lowering cost expected in the future (<\$500)
- Accuracy will be ubiquitous with mobile phone and tablet interface



Click for Video



# Future Data Integration – 811 Locates

- Use integrated data from cross bore, leak survey, construction and other internal sources.
- Continue to gather high confidence data for several years, then
- **811 Locates** can be Generated with GIS maps
- **Fortiss BC** presented the average time to respond to a request was **18 minutes**

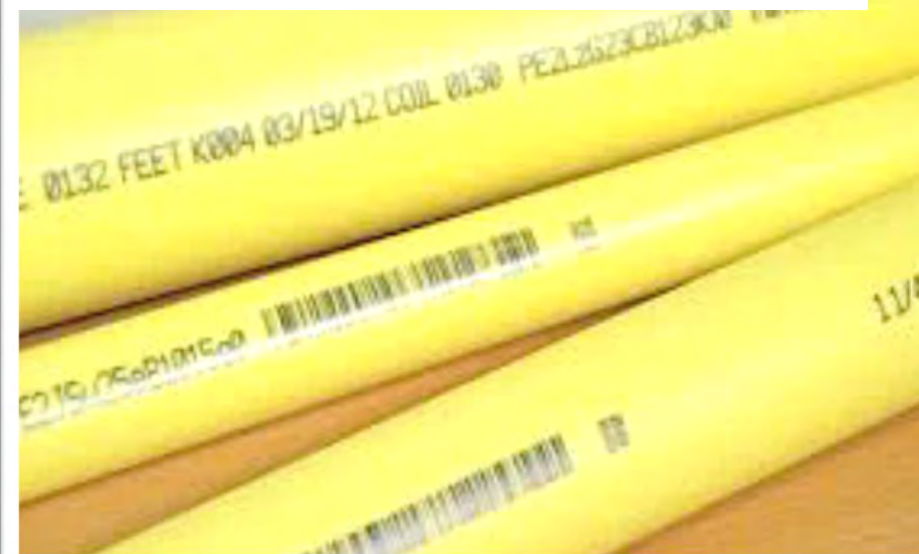
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# Future Data Integration – Track Installation of Gas Pipe Lines and the Materials

- **ASTM F2897 - 15a, Standard Specification for Tracking and Traceability Encoding System of Natural Gas Distribution Components (Pipe, Tubing, Fittings, Valves, and Appurtenances)**
  - Track materials with GPS location, time, date
- **Record HDPE pipe Fusion**
  - temperatures, OQ operator and location
  - Create as-built drawings

**HDPE Material & Tracking Barcode**



**HDPE Fusion Record Locations –**



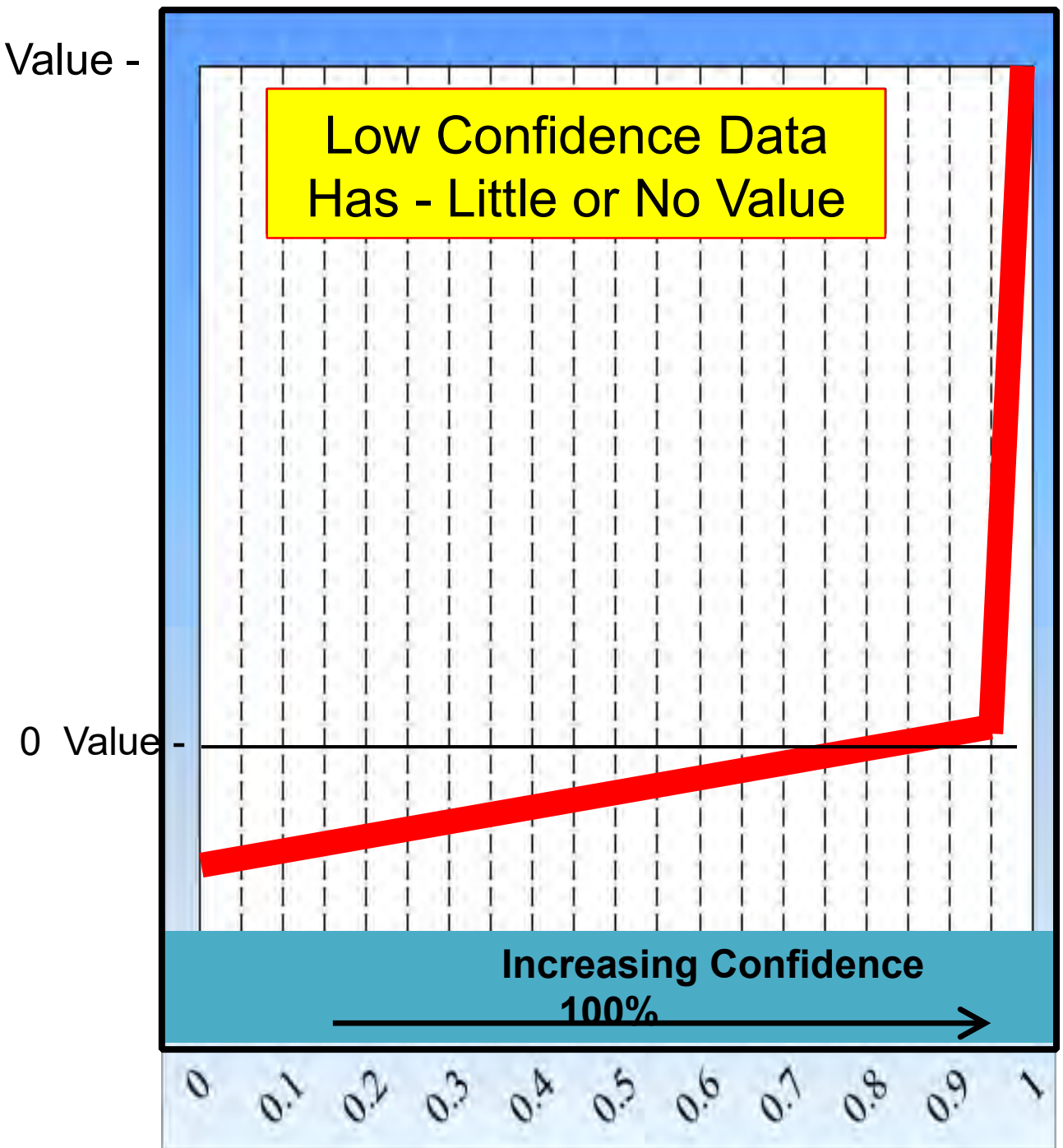
Courtesy McElroy Manufacturing, Inc.



# Value Increases with Higher Confidence Processes

- Low confidence results create false security
- Low confidence results may have negative value
- Low quality work may have to be completely reworked.
- Requirements may be in excess of >99.97% Accuracy.

100% Value -



# Summary of Data Collection

- Gas Assets & Field Data should be stored in GIS systems with connection to SAP, etc.
- Cross Bore & Leak Survey projects should require high accuracy GPS (12" capability or better)
- New Construction Installation & Maintenance should require high accuracy GPS mapping for as-built drawings
- Data should be accessible in the field by the Gas First Response
- Low cost high accuracy (4"-12") GPS receivers are available now
- Mobile phones and mobile APPS are a good interface



# Enterprise Benefits from Data Integration

- Valuable data is used in multiple ways across traditional silos within the utility
- Safety is enhanced
- Knowledge is maintained
- Costs are lowered
- Planning is better
- Safety is increased
- Enterprise value is increased
- Customers and shareholders win



**Thank you!**

**Discussion / Questions?**

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