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Getting out of the Trenches: Design and Construction Considerations for Potable Water CIPP Projects




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Overview

1. Illustrative Case Study
2. Drivers
3. Design Aspects
4. Bid Documents Considerations
5. Construction Points
6. Available Resources

Focus on engineering elements

Illustrative Case Study

- Potable Water CIPP, Montgomery, AL
  - Approximately 17,000 feet of CIPP
  - 6”/10” Diameter
  - 2 Highway Crossings
  - Bid May 31, 2012
  - $ 2.3 Million for Approx $ 140/ft
  - Open Cut Approx $ 110/ft

Project Background

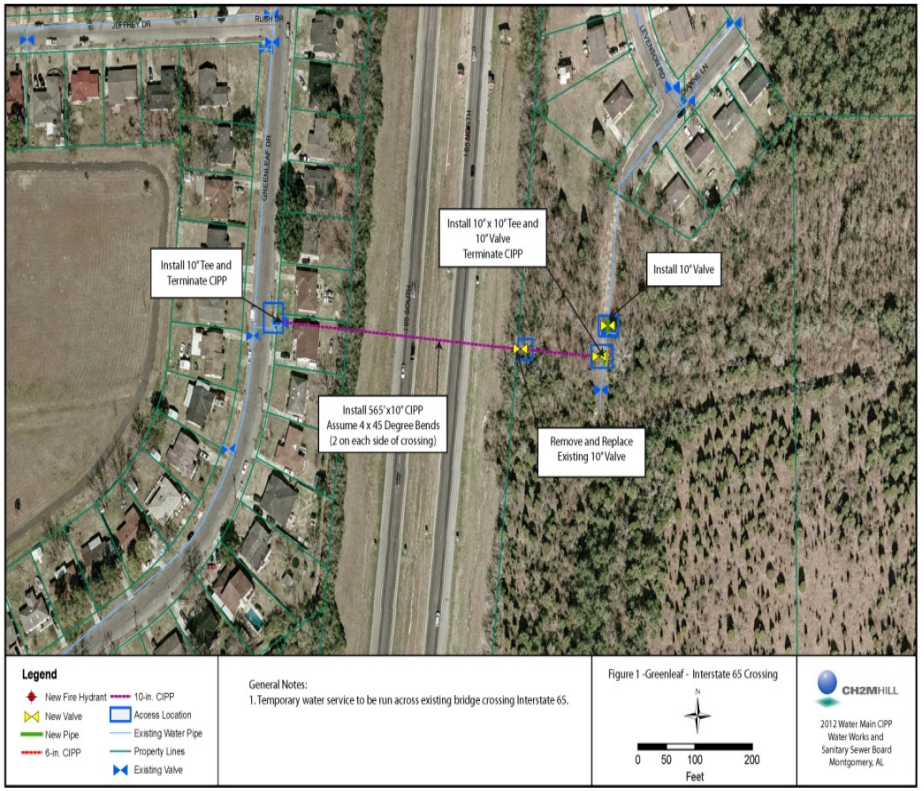
- Project Divided into 3 Main Areas
  - Subdivision, Most work was in a subdivision where have had numerous breaks and red water complaints; Needed Structural Repair.
  - 2 Highway Crossings
    - One crossing was in a casing but was old and the only feed for subdivision.
    - One crossing uncased and recently shut down due to leak near connection point.

Drivers

- Structural Rehabilitation
  - Owner experienced with epoxy lining and CIPP for sewer
- Problems with these 3 areas all converged at the same time and owner needed project bid quickly
  - No time for conventional open-cut design schedule, surveying, etc.
- Owner decided to evaluate CIPP for these problem areas.

Drivers

- Schedule
  - CIPP project could be bid in a much shorter time period as no significant surveying would be required
  - Drawings cut from owner GIS data, no significant time to produce drawings
- Disruption to public
  - CIPP much less disruptive compared to open-cut
- Construction schedule could be compressed compared to open-cut

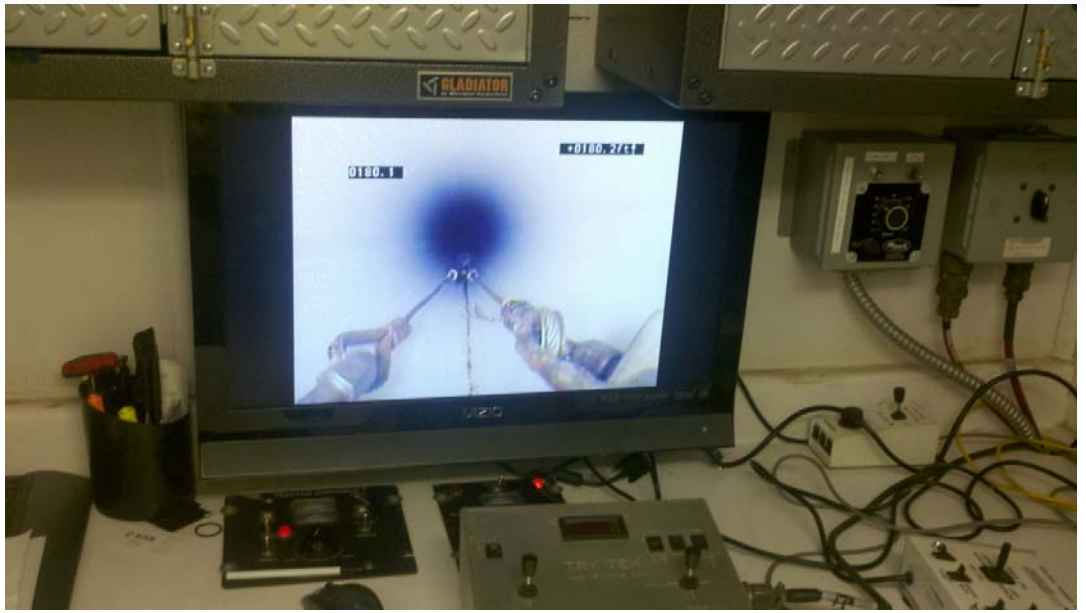


Cured in Place Pipe (CIPP)

- Process for Potable water is very similar to CIPP for sewers, but with NSF 61 approved materials/resins.
- Flexible Tube saturated with resin is inserted in cleaned host pipe, expanded and cured with heat to form new structural pipe.
- Main technical issues are:
  - How to terminate liner and transition to existing pipe
  - Service Connections.

CIPP for Potable Water

- New to USA, 2005, Canada 2000
- Generally Suitable for 6-36” Sizes
- To Date: Between 20-30 installations in US.
- Three Main Products
  - Sanexen – Aquapipe
  - Insituform – Insitumain
  - Sekisui – Nordipipe
- Aquapipe has 1,500,000 feet installed in North America- primarily Canada



Design Data

- Pipe Information
  - Diameters, lengths, depths, materials, fittings, location and condition of valves
- Design Criteria
  - Pipe fully/partially deteriorated
  - Service connection reinstatement (internal/external)
  - Location of temp hydrants required PE design submittal

Specifications for Project

- Normal standards for open-cut connections, pipe, valves, hydrants, etc.
- New specification for CIPP for Potable Water
  - Combination of CIPP for sewers and epoxy lining for water
  - Have local CIPP manufacturers review specifications
- ASTM F-1216 covers CIPP, combined with AWWA M28

Contract Bid Items/Issues

- Access Pits
  - Number/Payment
- Demolish vs. Abandon-in-place existing valves
- Temporary water items
- Maximum length of liner per diameter
  - Can vary per Manufacturer
- Maximum amount of temporary water installed at one time

Regulatory Approvals for CIPP for Potable Water

- Contact State Agencies, Environmental, and DOT
- NSF 61/ ANSI 61
  - Wording is important- Some products are Certified by NSF to meet NSF 61
  - Other products are Certified by other laboratories “to NSF 61 standard.”
  - Certified by particular resin and components.

Construction Sequencing

- Sequence of Work:
  - Set up temp water (Sub)
  - Temp hydrants (Sub)
- Prepare Sections
  - Locating/Pits (Sub)
  - Cleaning, Locating Fittings, Plug Services.
- CIPP Lining Installation
  - High pressure main test
  - Reopen Services
  - Line pressure test services
  - Physical Samples
- Site Restoration/Asphalt

Construction Issues

- Inaccurate water records
  - unknown fittings discovered
- Temporary water setup
  - Consider limiting number of customers on Temp Water – Risk review of consequence if it breaks
- Some services had to be excavated to be connected
  - Located in folds or wrinkles, cut hole in wrong place, clogged by resin

Construction Issues

- Traffic Control/Accidents
  - Work areas and traffic control signs moving almost daily = confusing for traffic
- Pipe must be able to be drained, must be dry when lined for epoxy to bond
- If find unknown fittings, may cost an additional excavation, delay
- Pavement patches vs overlay
  - may have to overlay entire street if more pits than expected

Water Service Connections

- Location of Water Laterals
  - If located at top of pipe, prevents resin clogging
- Depth of Corporation Stop
  - Must protrude into pipe to be seen on post tape. Otherwise, tap must be excavated
- Abandoned taps
  - No way to tell from CCTV, must reopen both
- Saddle taps
  - Cannot locate in post-CCTV (no protrusion), must be excavated

Summary

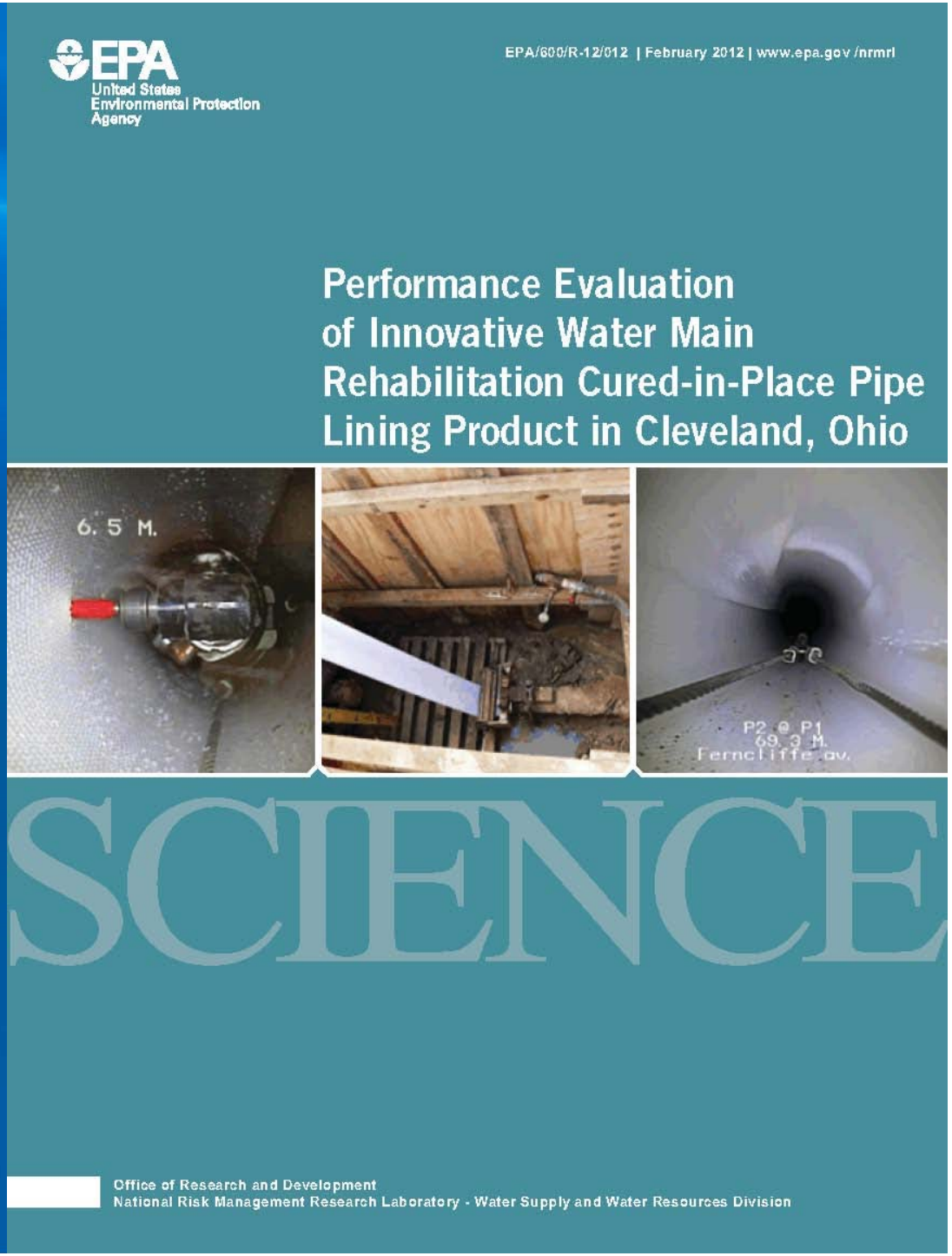
- Potable water CIPP is a viable option for relining water mains
- Few projects in US to date
- Different bid document strategies: bid items for contingency work (e.g. pits) vs. change orders for specific situations
- May not be less expensive than open-cut, depends on pavement, depth of mains
- Few contractors at this time
- Ideally suited for rehab of highway crossings or high traffic streets where can't open-cut
- Future liability TBD

Key Reference:

EPA/600/R-12/012

Feb 2012

www.epa.gov



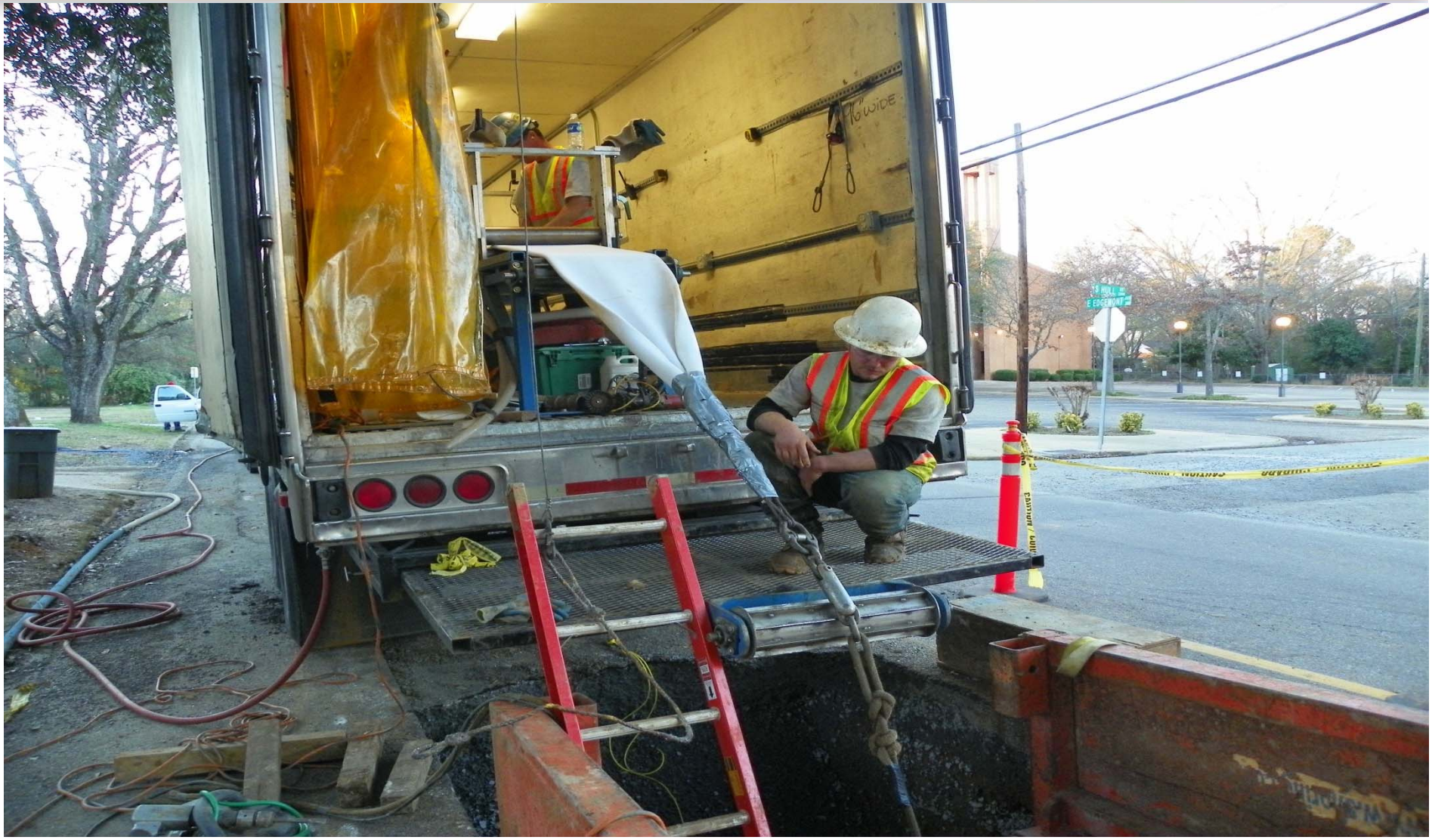
Photos

Photos

Photos


Temporary Hydrant- Make sure to get approved by Local Fire Department.
11/07/2012

Photos



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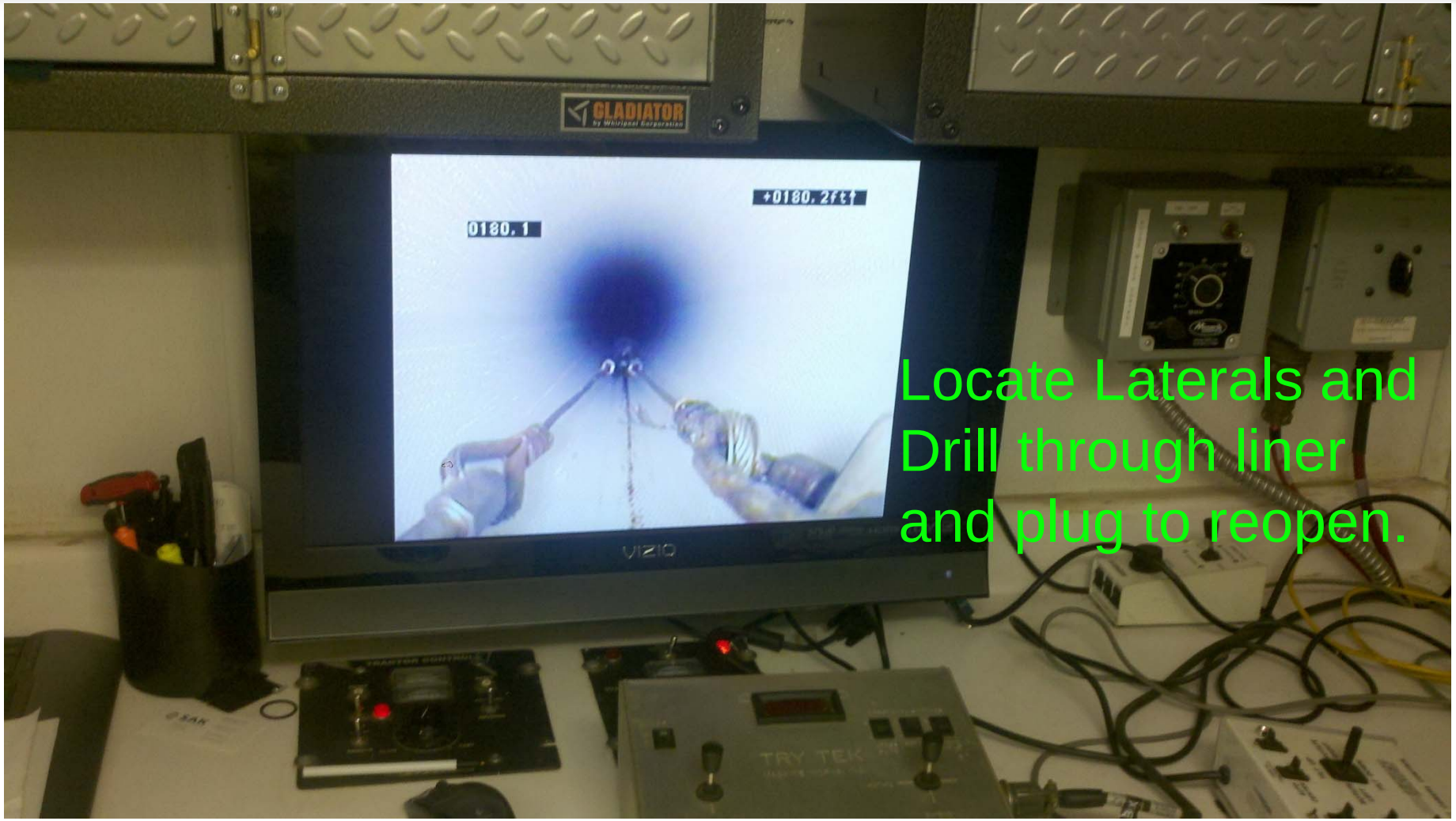
GLADIATOR
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VIZIO
Locate Laterals and
Drill through liner
and plug to reopen.

Photos


Pressure Testing for Leakage
Physical Samples for Properties

Questions?