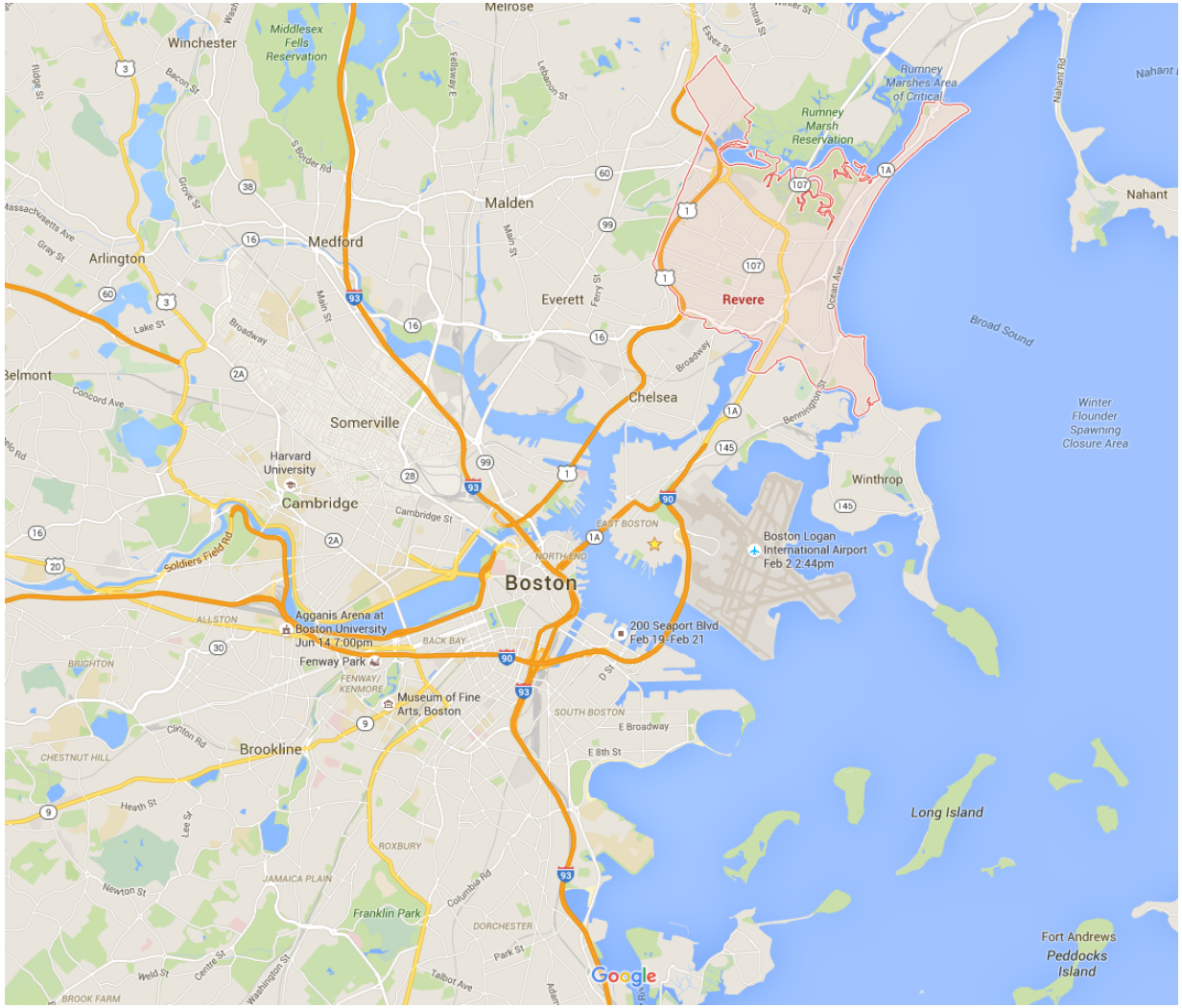
Design/Build for Lateral Rehabilitation

Find and Fix: Lessons for Success

CDM Smith

NASSCO National Association of Sewer Service Companies

City of Revere, Massachusetts

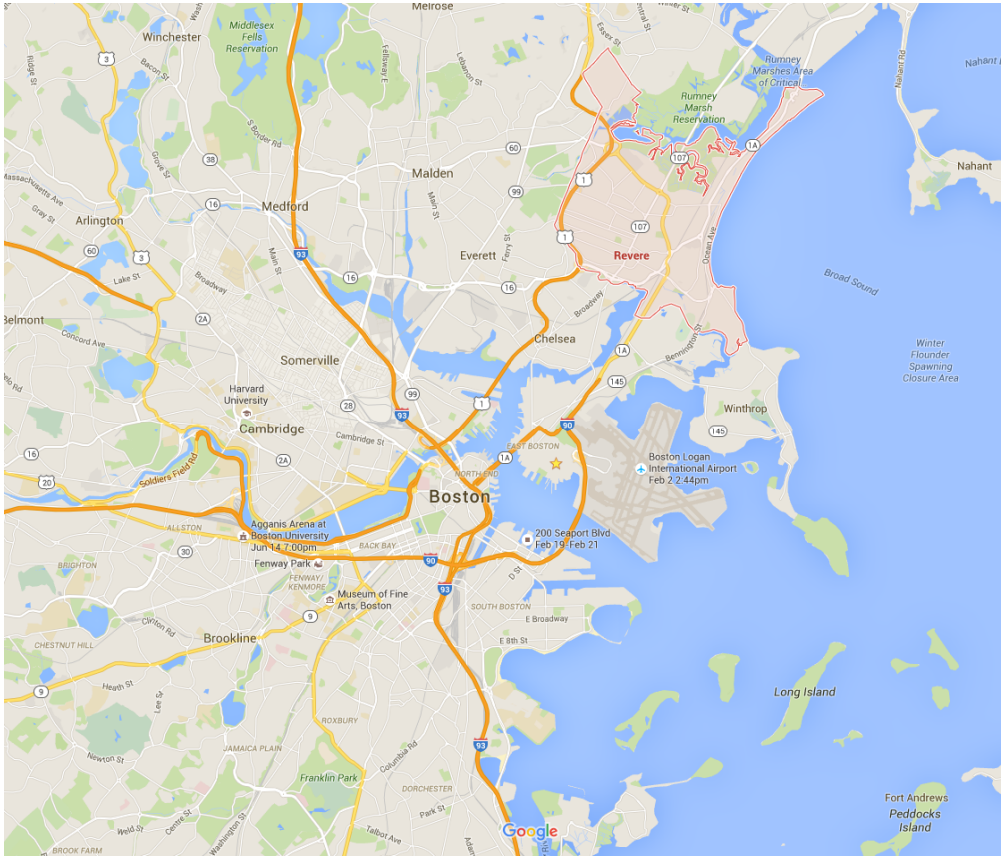


City of Revere, MA

Population: 55,000
Land Area: 10 mi²

99 Miles of Sanitary Sewers
- Clay Pipe
- 100 Years Old

12 Pumping Stations



Consent Decree (CD)

Civil Action No. 1:10-cv-11460

- Entered into in 2010 with MassDEP & USEPA
- Violations of Clean Water Act
- Compliance Requirements
  - Eliminate sanitary sewer overflows (SSOs)
    - Capacity Assessment
    - Sewer System Evaluation Survey (SSES)
    - Comprehensive Wastewater Management Plan (CWMP)
    - Comprehensive Stormwater Management Plan (CSMP)
    - Illicit Discharge Detection & Elimination Plan (IDDE)

Capacity Assessment

- Flow Metering Program
- Delineate Flow Meter Areas
- Prioritize Areas to Investigate
- Perform SSES

Sewer System Evaluation Survey (SSES)

- Accelerated Timeline
  - Flow Isolation
    - 4,000 gpd/idm
  - CCTV Inspections
  - Manhole Inspections

Sewer System Evaluation Survey (SSES)

- Widespread Defects Found
  - Sewer Pipes
  - Manholes
- Due to Material & Age
  - 100 Year Old Clay Sewers

Comprehensive Wastewater Master Plan

- Based on Metering & SSES Results
  - Large Portion of System to be Rehabilitated
  - Private Inflow Removal
  - Drainage Improvements
- Meet Requirements of Consent Decree

Comprehensive Rehabilitation Program

- Effectively Address Widespread Defects
- Consists of:
  - Cured-In-Place Pipe (CIPP) Lining
  - Service Lateral Connection Lining
  - Manhole Rehabilitation
  - Private Inflow Removal
  - 25,000 – 30,000 LF Areas

Comprehensive Rehabilitation Program

- Proven to Remove High Percentages of Infiltration/Inflow
  - 50% - 75%
- Successfully Implemented in Various Municipalities Throughout the Country
- Recommended and Initiated in the City of Revere, MA.

Key Component in Comprehensive Rehabilitation Programs

Service Lateral Connection and Full Length Service Lateral Lining

Traditional Lateral Lining Design Approach

- Perform Sewer System Investigations
  - CCTV Inspection
- Develop Design Drawings & Specifications

Traditional Lateral Lining Design Approach

CCTV Inspection Costs

Pipe Size (inches)	CCTV Inspection & Preparatory Cleaning	CCTV Inspection & Heavy Cleaning
8”-10”	$1.65/ft	$3.65/ft
12”-15”	$1.75/ft	$4.75/ft
24” – 36”	$3.00/ft	$12.00/ft
Lateral Launch	$1,125/each	$1,700/each

Traditional Lateral Lining Design Approach

- Develop Design Drawings & Specifications
  - Review CCTV Inspection Videos
    - Identify Locations & Extents of Spot Repairs
    - Determine Service Sizes, Material, Depth, Number of Service Connections (open/capped) Define Surface Conditions

Traditional Lateral Lining Design Approach

- Design Drawings & Specifications
  - Extents of Lateral Lining & Spot Repairs
  - Detail How Spot Repairs and Trenchless Rehabilitation Are Performed
    - Approved Materials & Installation Methods

Traditional Lateral Lining Design Approach

- Design Drawings & Specifications
  - Contain Permit Obligations
    - Wetlands
    - State Highway Access
    - Adjacent Buried Infrastructure
  - Permit Requirements
    - Special Materials/Procedures (Control Density Fill)
    - Pavement Thickness
    - Traffic Management

Find & Fix Method

- Design/Build for Trenchless Rehabilitation
- Can Save Money and Reduce Project Duration
  - Eliminate the Need to Perform Inspections Prior to Design
- Success Directly Related to Completeness of Design Specifications
  - Carry Items to Cover all Types of Scenarios That May Be Encountered During Construction

Determination of Potential Scenarios

- Spot Replacement of Service Laterals
  - Federal or State Owned Roadways
    - Special Paving Requirements
  - Ground Surface Features
    - Private Property
    - Easements
    - Curbing Types
  - Subsurface Conditions
    - Cobbles, Rail Ties, Contaminated/Unsuitable Soils, Etc.

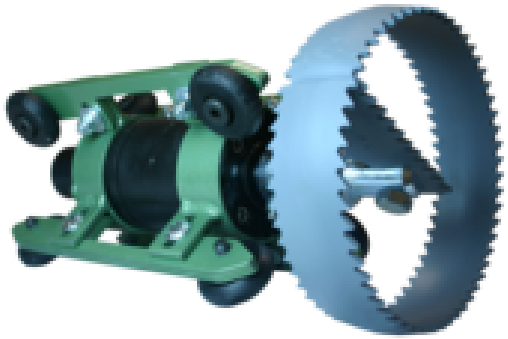

Taft St
Plaza Paisa
Revere Beach Pkwy
Revere Beach Pkwy
Revere Beach Pkwy
Revere Beach Pkwy
Wilson St
Wilson St
Wilson St
16

Determination of Potential Scenarios

- Previously Lined Pipe
  - Services Not Properly Reinstated
  - Capped Services Reinstated
  - Protruding Taps Not Ground Down

Determination of Potential Scenarios

- Multiple Protruding Taps
  - Prevents Access from Both Sides
  - Typical Rotary Cutter Cannot Be Used
  - Lateral Reinstatement Device Is Needed
    - Equipment Not Usually Owned by CCTV Contractor



Determination of Potential Scenarios

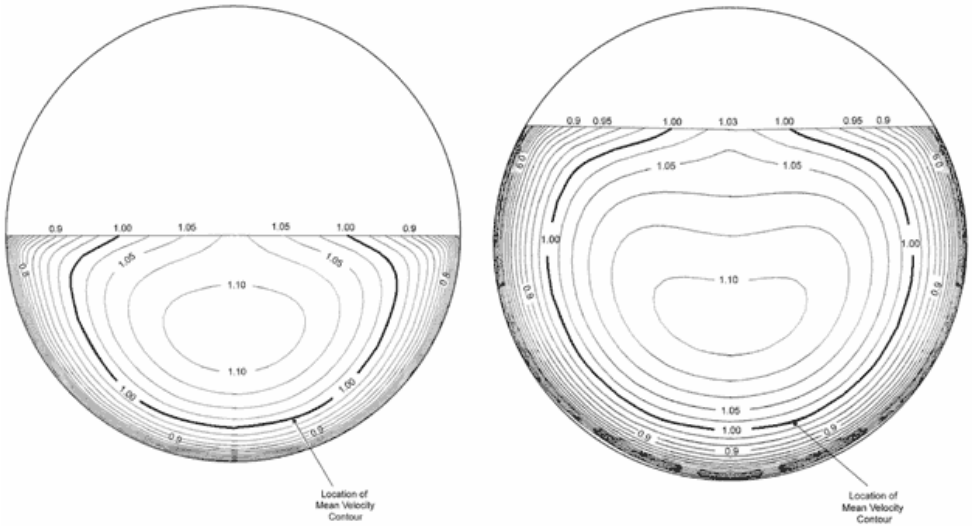
- Large Changes in Quantities
  - PVC Pipe
    - Less Lining Than Originally Thought
  - GIS Database Could Have Inaccurate Building Counts
    - Bid Items Could be Larger or Smaller
    - Perform Site Walk

Determination of Potential Scenarios

- Unknown Service Lateral Connections
  - Status: Active or Capped is Unknown
    - Dye Testing May Be Required to Confirm
  - Incorrect Reinstatement Could result in Backups or Need for Short Liner

Determination of Potential Scenarios

- Surcharged Sewers
  - Initial CCTV Inspection Cannot be Performed
  - Bypass Pumping May Be Required to Perform Inspection/Rehabilitation



Determination of Potential Scenarios

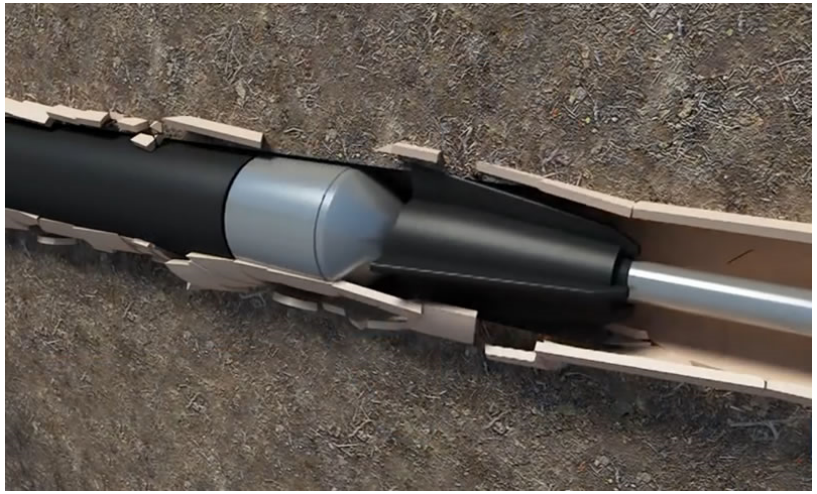
- Project Delays/Contract Duration
  - Many Unknowns That Could Cause Delays
    - Extra Spot Repairs
    - Changes in Liner Quantities Effect Ordering
  - Projects Could Extend Into Winter Months
    - Can Slow Down Production

Determination of Potential Scenarios

- Unknown Infrastructure
  - Connectivity Issues
  - Missing or Extra Sewer Pipes

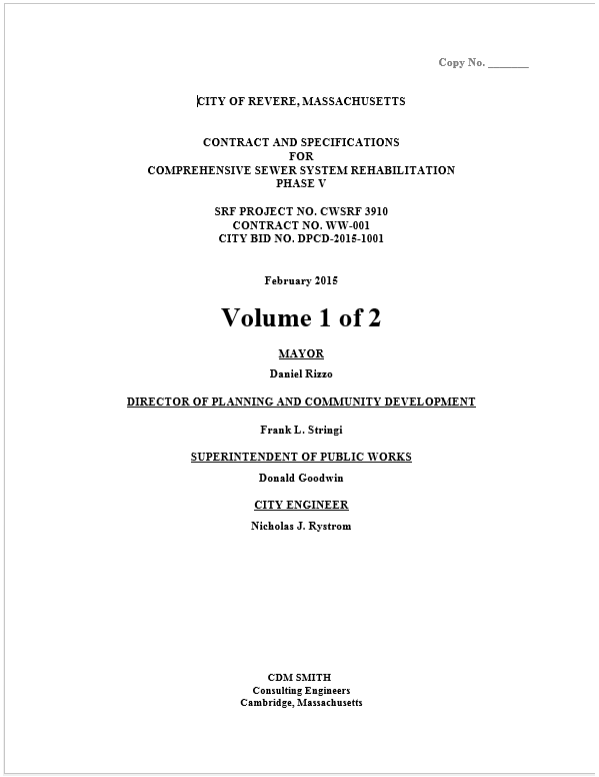
Determination of Potential Scenarios

- Additional Trenchless Options
  - Conventional Dig and Replace Spot Repair Not Possible
    - Utility Conflicts
    - Depth of Repair
  - Other Rehabilitation Techniques May Be Needed
    - Pipe Bursting



Determination of Specifications

- Development of Robust and Detailed Technical Specifications is Critical to Success
- Unique Bid Items Required
- Enhanced Language in Measurement & Payment Needed



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CITY OF REVERE, MASSACHUSETTS

CONTRACT AND SPECIFICATIONS
FOR
COMPREHENSIVE SEWER SYSTEM REHABILITATION
PHASE V

SRF PROJECT NO. CWSRF 3910
CONTRACT NO. WW-001
CITY BID NO. DPCD-2015-1001

February 2015

Volume 1 of 2

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Development of Specifications

- Spot Replacement of Service Laterals
  - Include Bid Items to Account for Various Possibilities
    - Depth
    - Length of Repair
    - Surface and Subsurface Conditions
  - Estimate Quantities Based on Review of System

Spot Replacement Bid Items

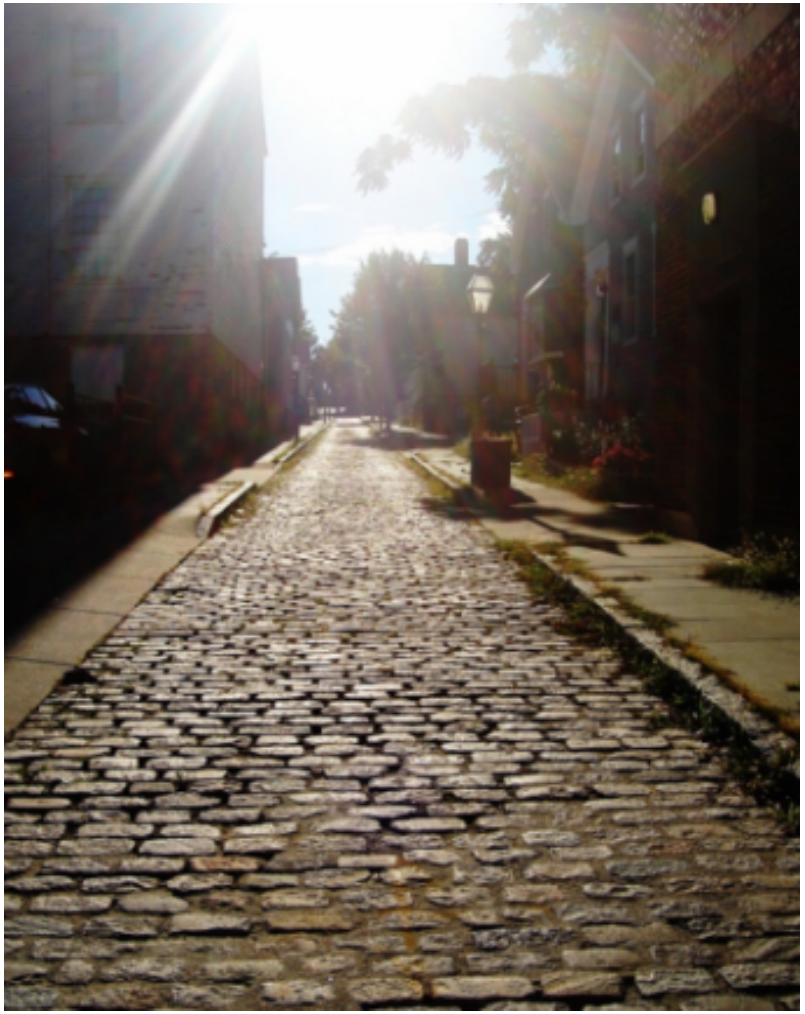
Item Number	Description	Estimated Quantity	Unit	Unit Price	Total
14a	Remove and Replace (4-in thru 6-in) existing VC service lateral connection (0'-8' deep)	11	Each	$7,743.25	$85,175.75
14b	Remove and Replace (4-in thru 6-in) existing VC service lateral connection (9'-12' deep)	8	Each	$7,924.38	$63,395.04
14c	Remove and Replace (4-in thru 6-in) existing VC service lateral connection (13'-16' deep)	4	Each	$10,867.50	$43,470.00
14d	Remove and Replace (4-in thru 6-in) existing VC service lateral connection (17-20' deep)	1	Each	$12,075.00	$12,075.00
15a	Remove and Replace (4-in thru 6-in) existing VC service lateral (0'-8' deep) beyond the connection specified in Item 14a	20	Linear Foot	$370.75	$7,415.00
15b	Remove and Replace (4-in thru 6-in) VC service lateral (9'-12' deep) beyond the connection specified in Item 14b	16	Linear Foot	$370.75	$5,932.00
15c	Remove and Replace (4-in thru 6-in) existing VC service lateral (13'-16' deep) beyond the connection specified in Item 14c	8	Linear Foot	$302.40	$2,419.20
15d	Remove and Replace (4-in thru 6-in) VC service lateral (17'-20' deep) beyond the connection specified in Item 14d	4	Linear Foot	$302.40	$1,209.60

Development of Specifications

- Spot Replacement of Service Laterals
  - Include Detailed Language in Measurement and Payment
    - Restoring Private Property
    - Removing Trolley Tracks
    - Restoring Sidewalks and Curbing
    - Disposing of Unsuitable/Contaminated Soils

Restoring Private Property

Cobbled Streets



Trolley/Streetcar Tracks

Sidewalks and Curbing

Contaminated Soils

Development of Specifications

- Spot Replacement of Service Laterals
  - Digging in State Owned Roadways or Easements
    - Permit Requirements
    - Reduced Working Hours
    - Difficult Access

Lateral Spot Replacement Bid Items

Item Number	Description	Estimated Quantity	Unit	Unit Price	Total
21	Remove and Replace (4-in thru 6-in) existing VC service lateral connection (0'-8' deep), in State Highway	2	Each	$8,223.25	$16,446.50
22	Remove and Replace (4-in thru 6-in) existing VC service lateral (0'-8' deep), in State Highway, beyond the connection specified in Item 21	10	Linear Foot	$400.75	$4,007.50
23	Remove and Replace (4-in thru 6-in) existing VC service lateral connection (9'-12' deep), in cross-country areas	1	Each	$8,500.00	$8,500.00
24	Remove and Replace (4-in thru 6-in) VC service lateral (9'-12' deep), in cross-country areas, beyond the connection specified in Item 23	5	Linear Foot	$375.50	$1,877.50

Development of Specifications

- Previously CIPP Lined Sewers
  - Include Bid Items For:
    - Additional Service Lateral Reinstatement/Brushing
    - Installation of Short Liners
    - Grinding Down Protruding Taps

Development of Specifications

- Multiple Protruding Taps
  - Cannot Be Cut With Rotary Cutter
    - Changed Condition
  - Include Bid Item For Grinding Down Protruding Tap with Lateral Reinstatement Equipment

Item Number	Description	Estimated Quantity	Unit	Unit Price	Total
8	Grind-down Multiple Protruding Taps Using Lateral Reinstatement Equipment	12	each	$442.50	$5,310.00

Development of Specifications

- Dye Testing
  - Status of All Service Connections Will Not Be Known
    - Risk in Reinstating or Not Reinstating Services
  - Include Bid Item For Dye Testing of Services

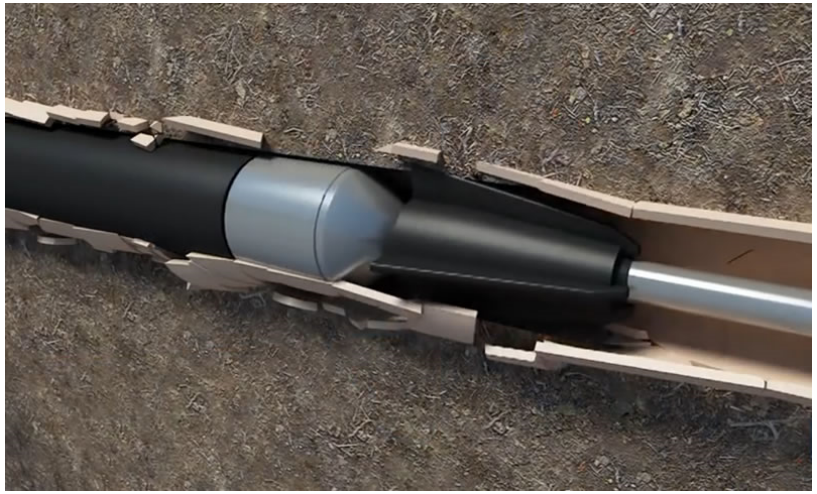
Development of Specifications

- Dewatering/Bypass Pumping
  - Sewers Could Be Surcharged
    - Must be Cleaned and Inspected
  - Include Bid Item For Dewatering/Bypass Pumping/Heavy Cleaning

Item Number	Description	Estimated Quantity	Unit	Unit Price	Total
48	Dewater/Bypass Pump and Perform Television Inspection of Sewer Pipe and Service Laterals - 8" -24"	5,271	Linear Foot	$3.00	$15,813.00

Development of Specifications

- Additional Trenchless Alternatives
  - Spot Replacement of Service Laterals Not Always Possible
    - Utility Conflicts
    - Depth of Repair
  - Include Bid Item For Pipe Bursting
    - Detailed Language with Assumptions on Pipe Size



Conclusions

- Find & Fix Method is Design/Build for Trenchless Rehabilitation
- Can Save Money and Time
- Allow Municipalities to Rehabilitate Large Portions of their Sewer System
- Detailed Specifications are Crucial to Limit Change Orders

Thank you for Attending

- Questions?
- For more information please contact:

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