



CHARLOTTE COUNTY
FLORIDA

CAAP FRAMEWORK DEVELOPMENT AND PILOT FLOW MONITORING PROGRAM

PRESENTATION TO CHARLOTTE COUNTY BOCC



**VEITH ENGINEERING
& BUSINESS SOLUTIONS**

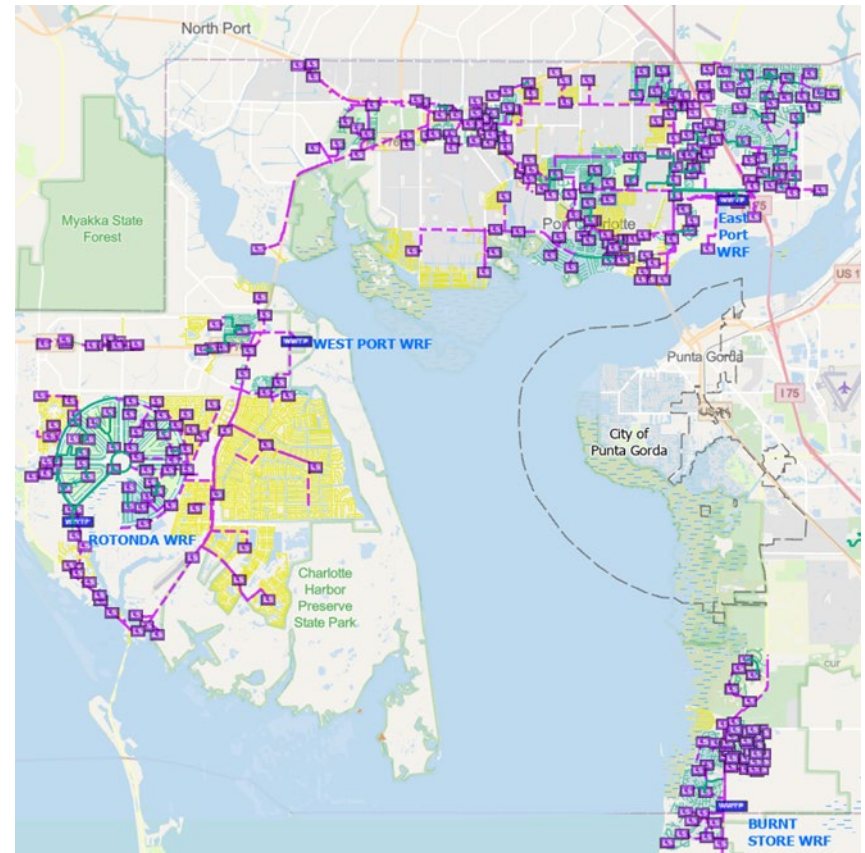
Bryan T. Veith, PE., F.ASCE, Assoc. DBIA

April 16, 2024

AGENDA

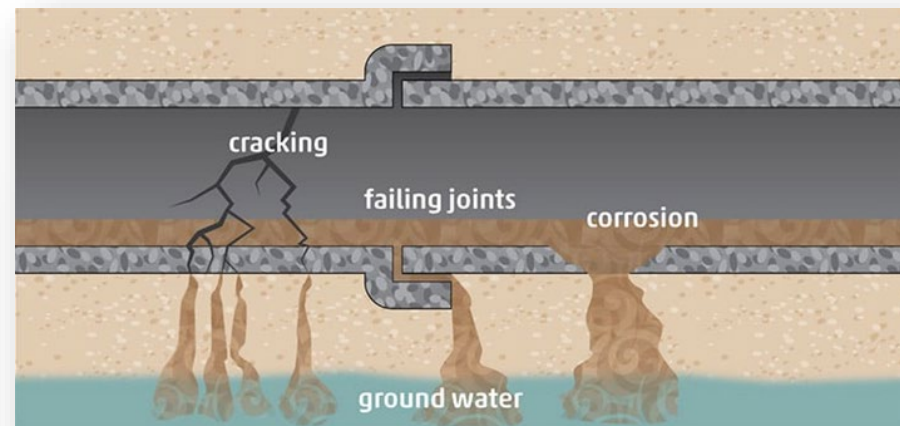
- 🔹 Overview
- 🔹 Scope and Goals
- 🔹 Program and SOP Development
- 🔹 Rotonda Area Pilot Project
- 🔹 County-wide Implementation
- 🔹 Pilot and Program Benefits
- 🔹 Questions and Answer

CCU WCS Network



OVERVIEW

- ◆ Part of CCU's Capacity, Management, Operation, and Maintenance (CMOM) Plan for Compliance with FDEP Consent Order (CO)
- ◆ Focus is on Wastewater Collection System (WCS)
 - ~380 miles of gravity sanitary sewer
 - ~7,600 sanitary manholes
 - ~380 miles of low-pressure sewer
- ◆ Develop New Capacity Assessment and Assurance Program (CAAP)
- ◆ Develop a Flow Monitoring Program Incorporating Lessons Learned from the Rotonda Pilot Project
- ◆ Reduce Infiltration & Inflow (I&I)



SCOPE AND GOALS

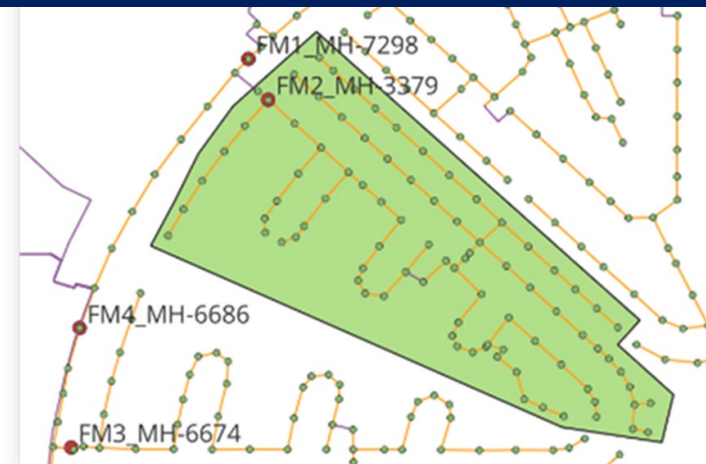
Scope of the Project

- Assess, Develop, and Implement
 - CAAP
 - Pilot Flow Monitoring Project
- Prepare a Series of 12 Technical Memorandums
- Prepare Executive Summary Program Report with Standard Operating Protocols (SOP) and Training
- Align with Industry Best Practices

County Goals

- Achieve Regulatory (FDEP) Compliance
- Reduce Sanitary Sewer Overflows (SSOs) and their related fines and environmental impacts

Rotonda Area WCS and FM Locations



PROGRAM AND SOP DEVELOPMENT



FLOW AND RAINFALL MONITORING STANDARD OPERATING PROCEDURE

SOP NO 2023-7

NOVEMBER 28, 2023

PREPARED BY:



AUTHORED BY: _____ DATE: _____
Author Name and Title

REVIEWED BY: _____ DATE: _____
Reviewer Name and Title

APPROVED BY: _____ DATE: _____
Approver Name and Title

Revision Number	Approved By	Revision Date

I&I EVALUATION AND MITIGATION OPTIONS GUIDANCE MANUAL

TECHNICAL MEMORANDUM NO. 9

NOVEMBER 17, 2023

PREPARED FOR



CHARLOTTE COUNTY UTILITIES



PREPARED BY



VEITH ENGINEERING & BUSINESS SOLUTIONS
 2201 CANTU COURT, SUITE 118
 SARASOTA, FL 34232 (941) 374-3422



ROTONDA PILOT AREA FLOW, RAINFALL, AND GW LEVEL MONITORING STANDARD OPERATING PROCEDURE

SOP NO. CAAP #1

JUNE 7, 2023

PREPARED BY:



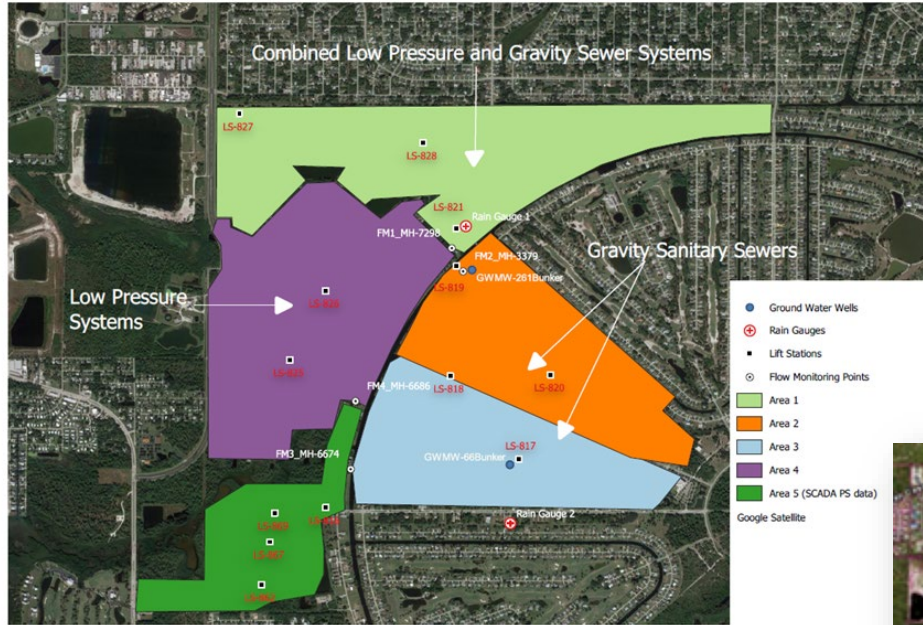
AUTHORED BY: _____ DATE: _____
Dave Cash (VEBS) and Anthony Carlisle (Hazem)

REVIEWED BY: _____ DATE: _____
Bryan Veith (VEBS), Principal

APPROVED BY: _____ DATE: _____
Approver Name and Title



ROTONDA AREA PILOT PROJECT



Metersheds 1, 2, 3 and 4



ROTONDA AREA PILOT PROJECT, CONT'D

Project Components

- Wastewater Gravity Pipe Flow Monitors
- Rain Gauges
- Groundwater Monitor Well Level Monitors

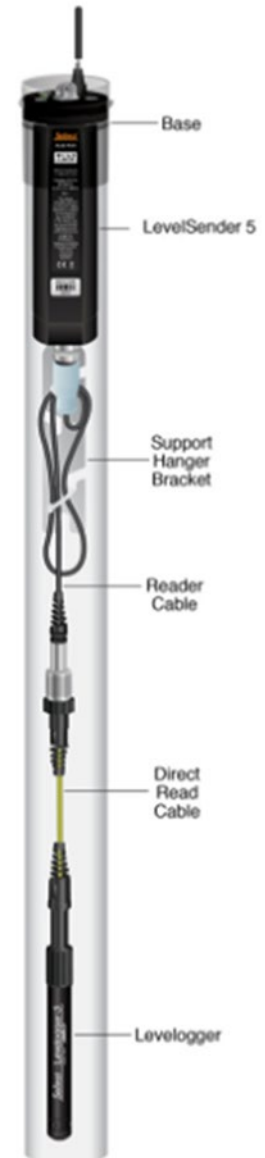
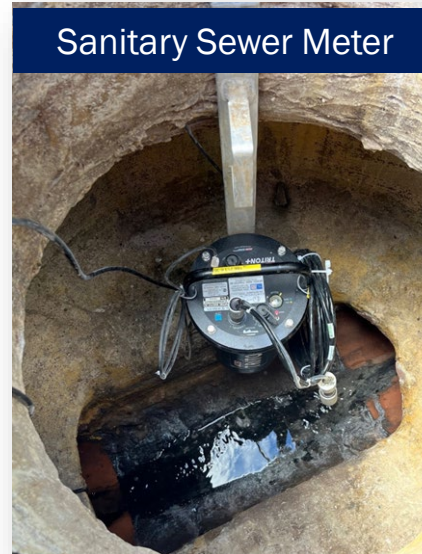
Specialty Vendor ADS

Monitoring During Summer/Fall 2023

Rain Gauge #2 w/Bird Protection Wire



Sanitary Sewer Meter



ROTONDA AREA PILOT PROJECT, CONT'D

Lessons Learned

- 💧 Monitoring proactively identified issues in WCS before other standard County O&M labor and monitoring activities would have caught them.
- 💧 Location and protecting rain gauge from wildlife (bird nesting) critical for data collection and accuracy
- 💧 Mobile (data) signal in the Rotonda area is not strong or reliable enough at times to receive remote groundwater level monitoring data

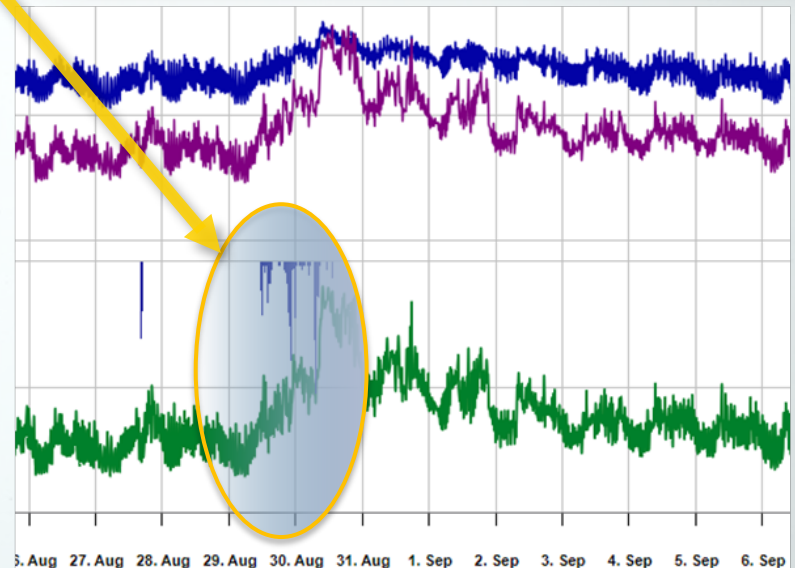
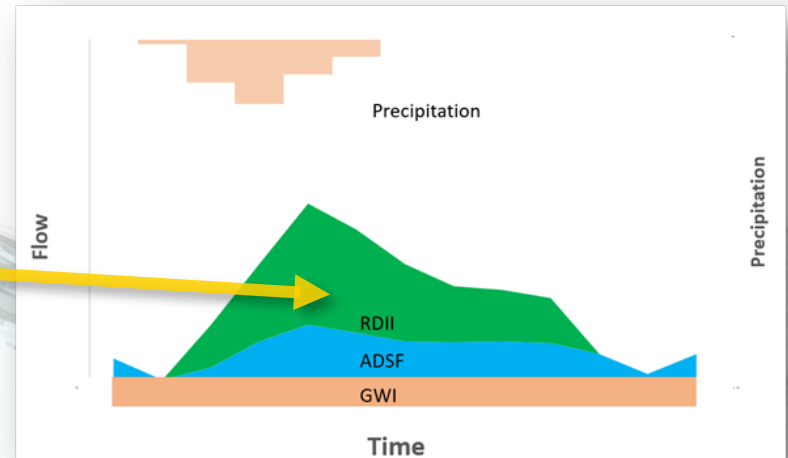
Results

- 💧 Even during the dryer-than-normal summer of 2023, some portions of the Rotonda Area were experiencing:
 - Groundwater Infiltration
 - Rainfall Dependent Infiltration
 - Rainfall Dependent Inflow
- 💧 Data shows higher I&I in FM2 and FM3 areas
- 💧 Data and SOPs are guiding County I&I field investigation efforts



ROTONDA AREA PILOT PROJECT, CONT'D

- FM2's immediate and high-intensity response to rain indicates WCS has Rainfall Dependent Inflow and Infiltration (RDII).
- Using new SOPs (2, 9, and 12), County staff are conducting field investigations to better pinpoint the sources and determine the best I&I mitigation remedies



Field Study I&I Rankings

1. FM2 Area Peaking Factor ~5.0+
2. FM3 Area Peaking Factor ~< 5
3. FM1 Area Peaking Factor ~3
4. FM4 Area – Minimal I&I

COUNTY-WIDE IMPLEMENTATION

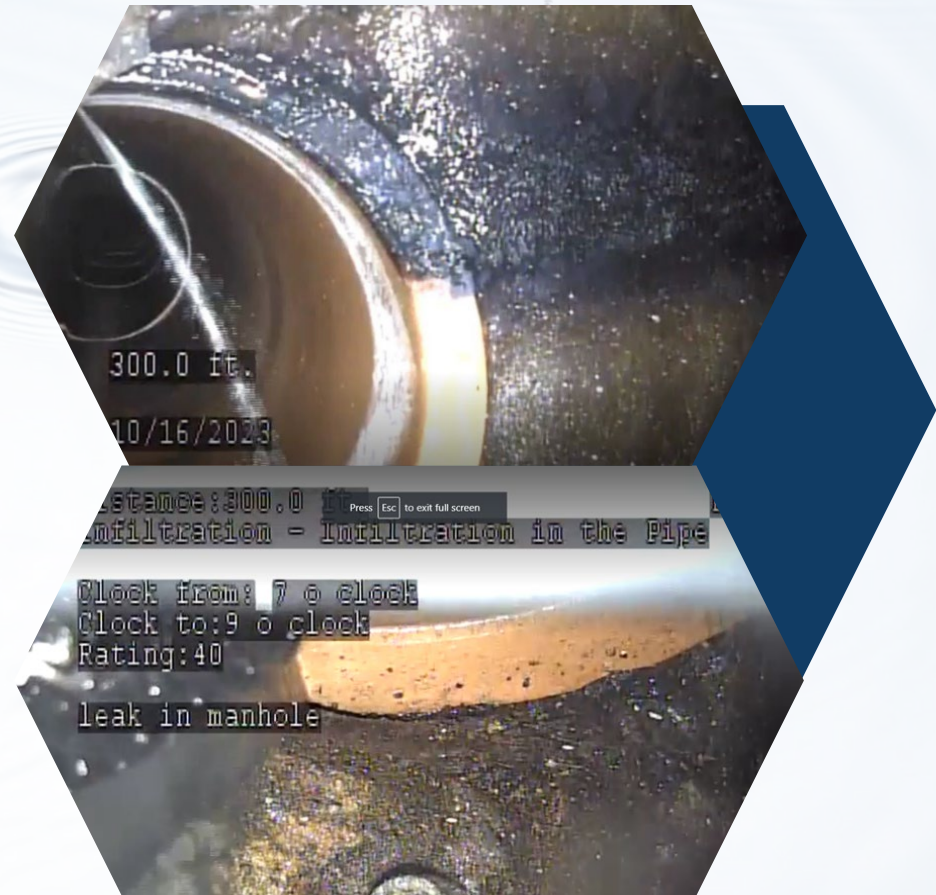
- ◆ Apply lessons learned from the Rotonda Area Pilot and the developed SOPs for County-wide flow monitoring program implementation
- ◆ Recommended Areas for Enhancement/Improvement
 - Mapping and Data/Information Management
 - SSO Reporting and Characterization
 - Approach to Modeling & Capacity Assessments
 - Flow and Rainfall Monitoring
 - I&I Mitigation
 - Capacity Assurance Process
 - New Decision Support Tools
 - Performance Dashboards
 - Training



PILOT AND PROGRAM BENEFITS



- ◆ WCS monitoring is a proven tool for proactively identifying WCS issues before they occur or become a real problem
- ◆ Lessons learned from Pilot Project being used to update SOPs and for County staff training
- ◆ Enhances timing and accuracy of WCS field data for use in County WCS modeling, capacity assessments, and capacity assurance reviews.
- ◆ Real-time and more accurate field data for County’s informed decision making (proactive vs. reactive)

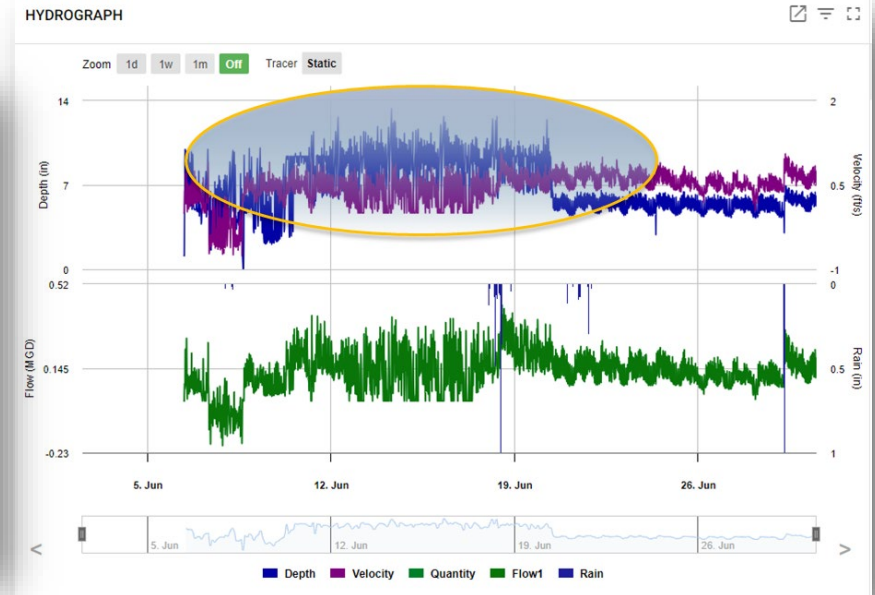


CCTV of CCU Sanitary Sewer in vicinity of FM 3 and FM4 showing infiltration

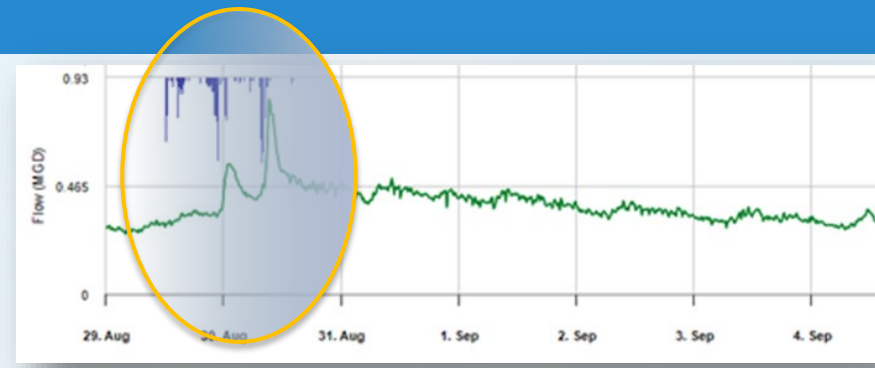
PILOT AND PROGRAM BENEFITS, CONT'D

- Provides comprehensive guidelines and procedures for CCU and external consultants and specialty vendors for conducting effective and efficient WWCS flow monitoring studies
- Provides a roadmap for future flow monitoring studies necessary to assess WCS performance
- Provides valuable tools to identify opportunities to reduce and mitigate SSOs

Charlotte County Utilities CAAP Framework and Pilot Flow Monitoring Program					Effectiveness	Cost	
I&I Mitigation Options Decision Matrix					Low	High	\$\$\$
Type of I & I	Problem Location	Problem Cause	Solution		Medium	Medium	\$\$
			Near Term / Urgent	Long-Term	High	Low	\$
Infiltration (from RDII)	Leaking LS Structure	Root Intrusion	Joint repair with Hydraulic Cement Mortar	Install Liner			
		Cracks	Internal Seal Cracks	Inject Sealant			
		Numerous Joint Leaks	Grout^	Coating (Structural Intact)			
		Structural Failure	Bypass Pumping	Replace Structure			
	Sanitary Sewers	Settlement	Bypass Pumping	Replace Structure			
		Root Intrusion	Clear roots*	CIPP			
		Cracks & Fractures	Grout Joints^	None			
		Sagging/Settlement	None	Excavation Point Repair			
				Replace Pipe			
		Corrosion	None	Replace Pipe			
CIPP							



QUESTIONS AND ANSWERS



Charlotte County Utilities CAAP Framework and Pilot Flow Monitoring Program
I&I Mitigation Options Decision Matrix

Type of I & I	Problem Location	Problem Cause	Solution	
			Near Term / Urgent	Long-Term
Leaking LS Structure	Root Intrusion	Hydraulic Cement Mortar	Joint repair with Hydraulic Cement Mortar	Install Liner
			Inject Sealant	
	Cracks	Internal Seal Cracks	Inject Sealant	
	Numerous Joint Leaks	Grout ^A	Coating (Structural Intact)	
			Install Liner	
Structural Failure	Bypass Pumping	Replace Structure		
Sanitary Sewers	Root Intrusion	Clear roots*	CIPP	
			Grout Joints ^A	None
	Cracks & Fractures	Grout Cracks ^A	CIPP	
	Sagging/Settlement	None	Excavation Point Repair	
Sanitary Manholes	Root Intrusion	Clear roots*	None	
			Internal Seal Joints ^A	Inject Sealant
	Barrel/Base Leak	Repair Mortar	Apply Cementitious or Polyurethane Material	
Sanitary Laterals	Root Intrusion	Clear Roots*	Line Pipe	
			None	Replace Pipe
	Cracks & Fractures	None	Replace Pipe	
			Line Pipe or Soot	

Effectiveness	Cost
Low	High \$\$\$
Medium	Medium \$\$
High	Low \$

