

The Adventures of Large Diameter Force Main Pigging

Long Wharf Force Main Cleaning
By the **City of Newport, RI**
in partnership with Kleinfelder

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Presentation Outline

Newport Department of
Utilities Background



North End Sewer
System Evaluation



Long Wharf Force Main
Cleaning Design



Long Wharf Force Main
Pigging Operations



Findings &
Recommendations



Project Summary &
Photos

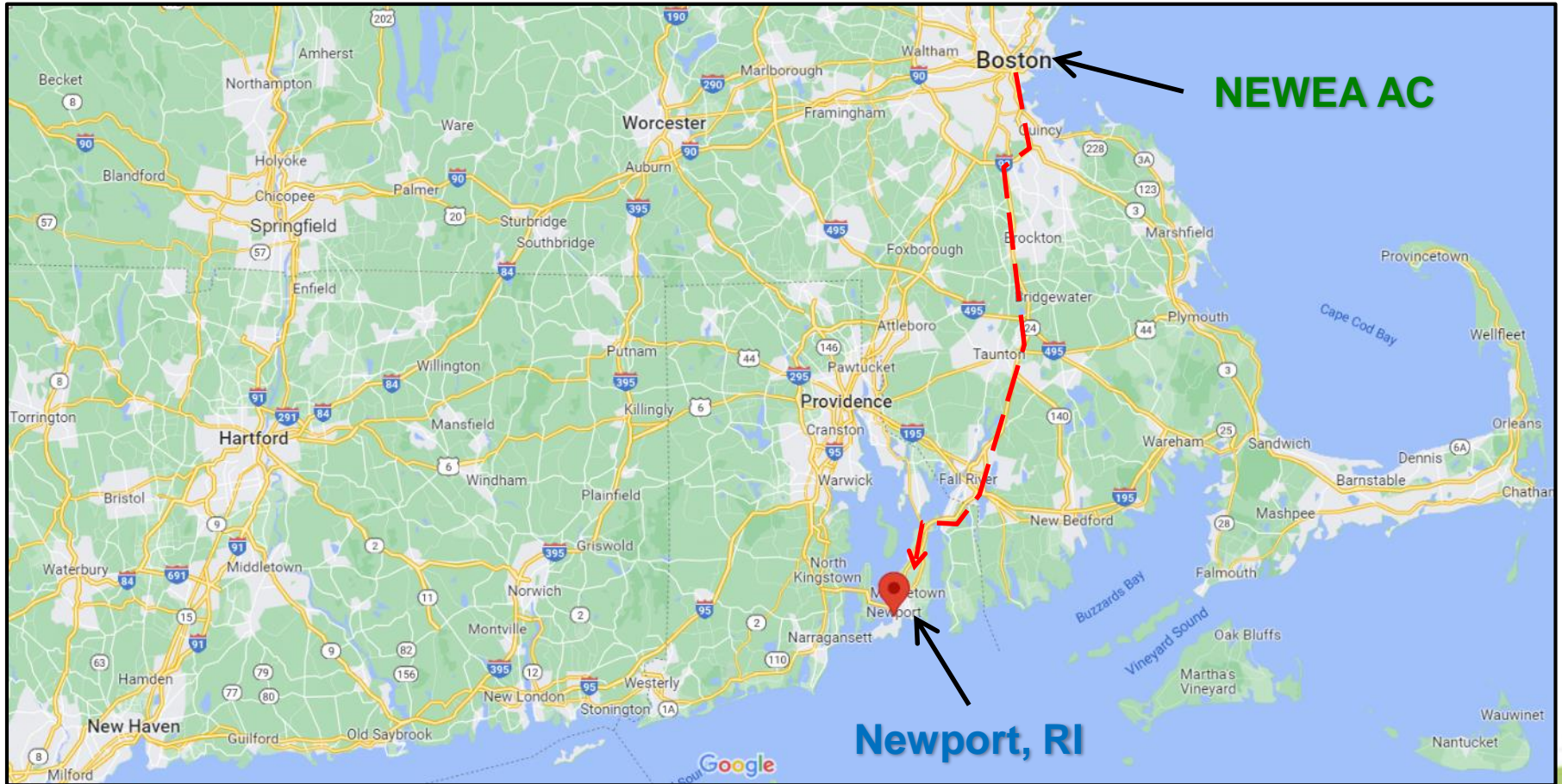


Newport, RI



Photo Credit: Discover Newport. [LINK](#)

Location of Newport, RI



Newport Department of Utilities



The Newport Department of Utilities is committed to protecting our natural resources and believe that maintaining our infrastructure is a vital component of maintaining and improving our quality of life.

Water Pollution Control Division

- 97 miles of sewers / force mains
- 50 miles of storm drainage pipe
- 15 pump stations
- 2 CSO treatment facilities
- UV disinfection facility (SW)
- Water Pollution Control Plant

Goal: reliable sewer service, reduce CSOs to Newport Harbor.

Water Division

- 170 miles of distribution mains
- 9 source water reservoirs
- 8 pump stations
- 4 storage tanks
- Station 1 Treatment Plant
- Lawton Valley Treatment Plant

Goal: deliver clean and affordable drinking water to our customers.

Past Projects	Ongoing/Future Projects
<i>Water Treatment Plant Upgrades</i>	<i>Water Distribution Improvements</i>
<i>Sewer Treatment Plant Upgrades</i>	<i>Pump Station Improvements</i>
<i>Stormwater Drainage Improvements</i>	<i>Flooding Mitigation and Resiliency</i>

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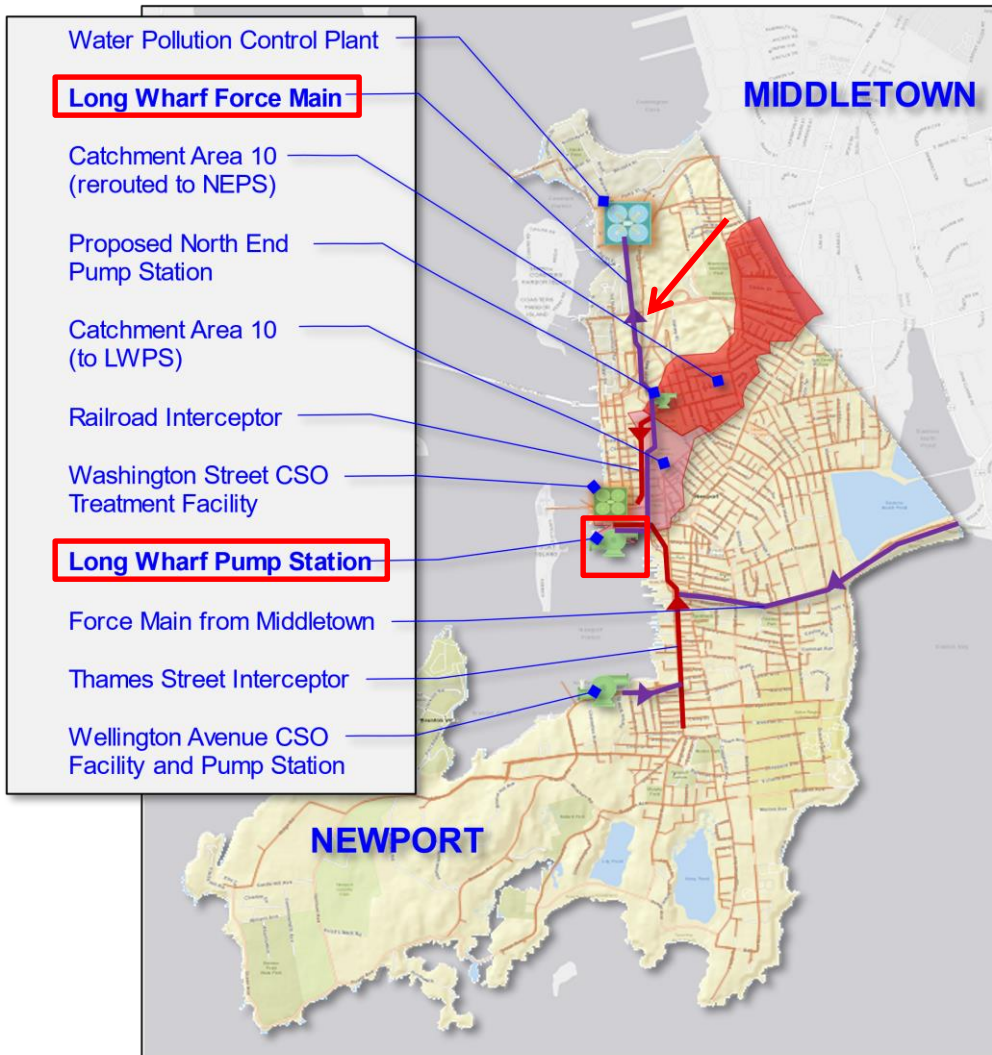
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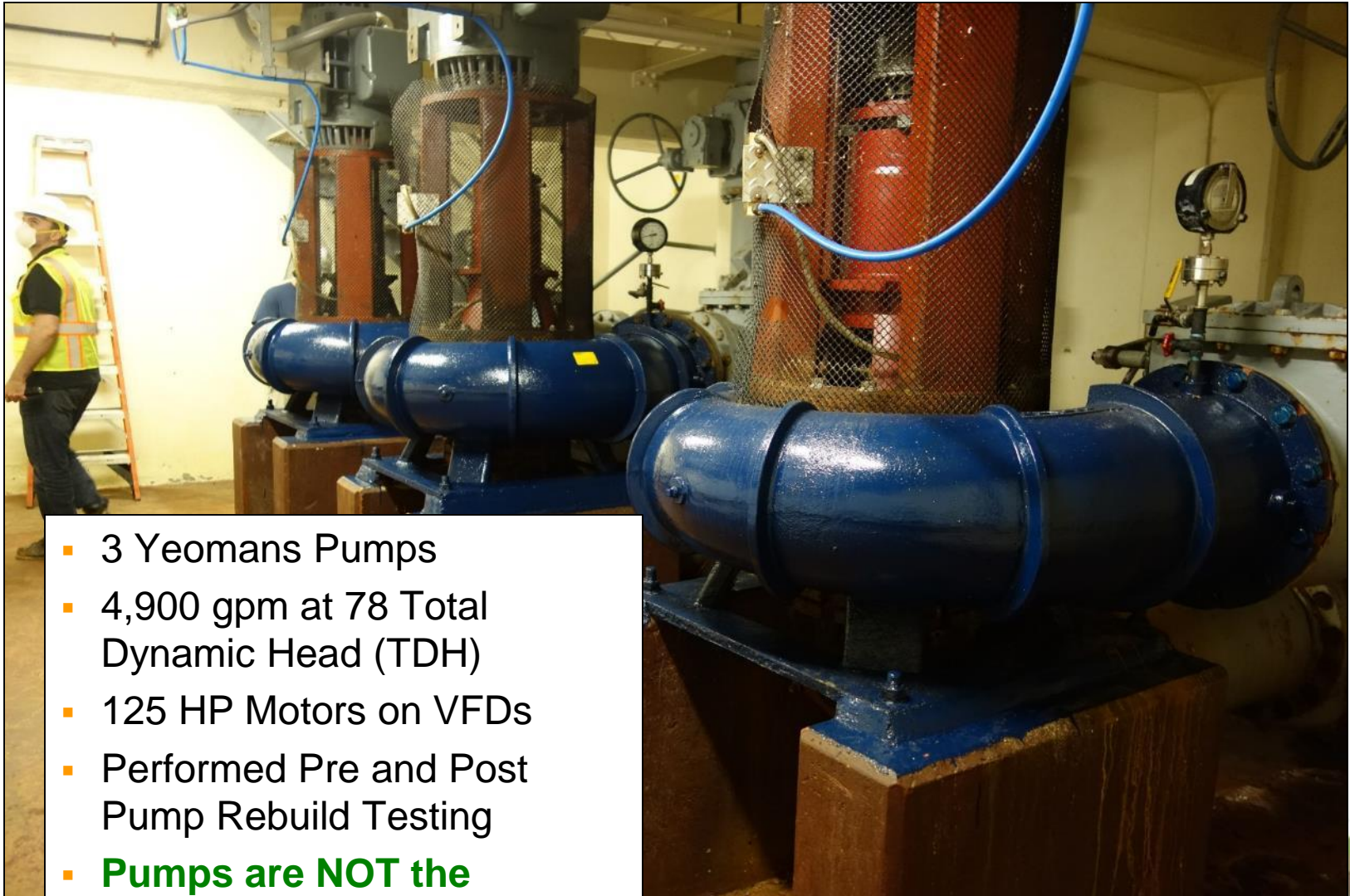
Project Background



North End Sewer System Evaluation

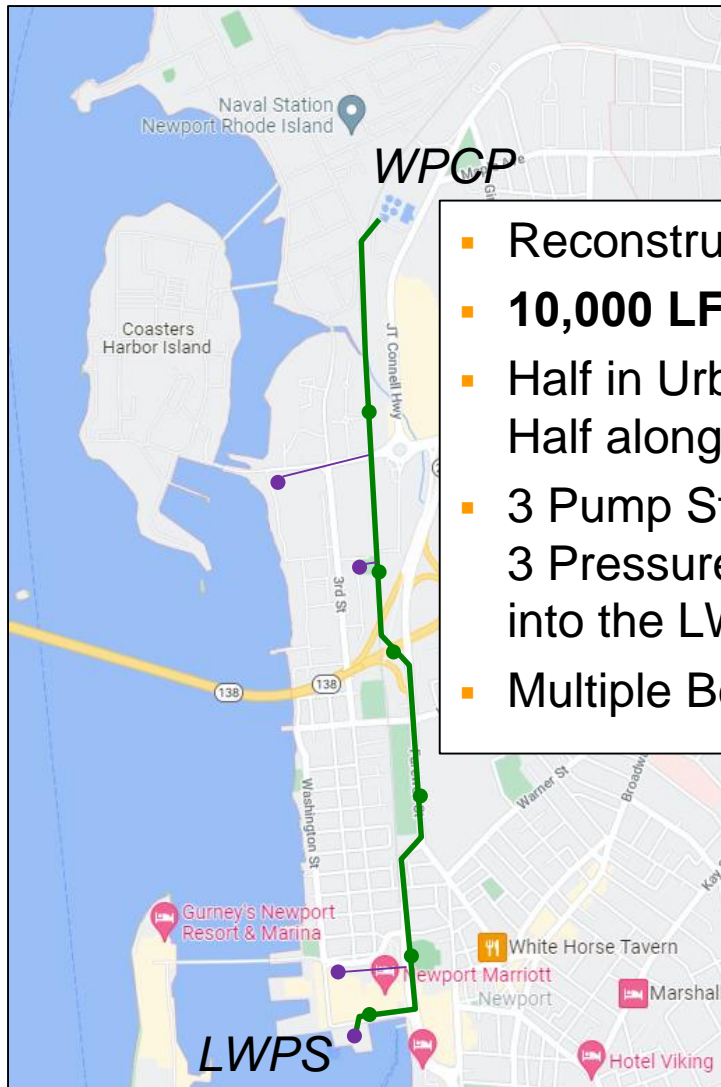
- 2012-2014 Sewer Master Plan (SMP)
- Reduce Combined Sewer Overflows (CSOs) to Newport Harbor
- KLF Identified an Issue with Planned Reroute Catchment Area 10 to a New Pump Station
- Need to Evaluate Pumping System (LWPS and LWFM)**

Long Wharf Pump Station Investigation



- 3 Yeomans Pumps
- 4,900 gpm at 78 Total Dynamic Head (TDH)
- 125 HP Motors on VFDs
- Performed Pre and Post Pump Rebuild Testing
- **Pumps are NOT the Problem (Operationally)**

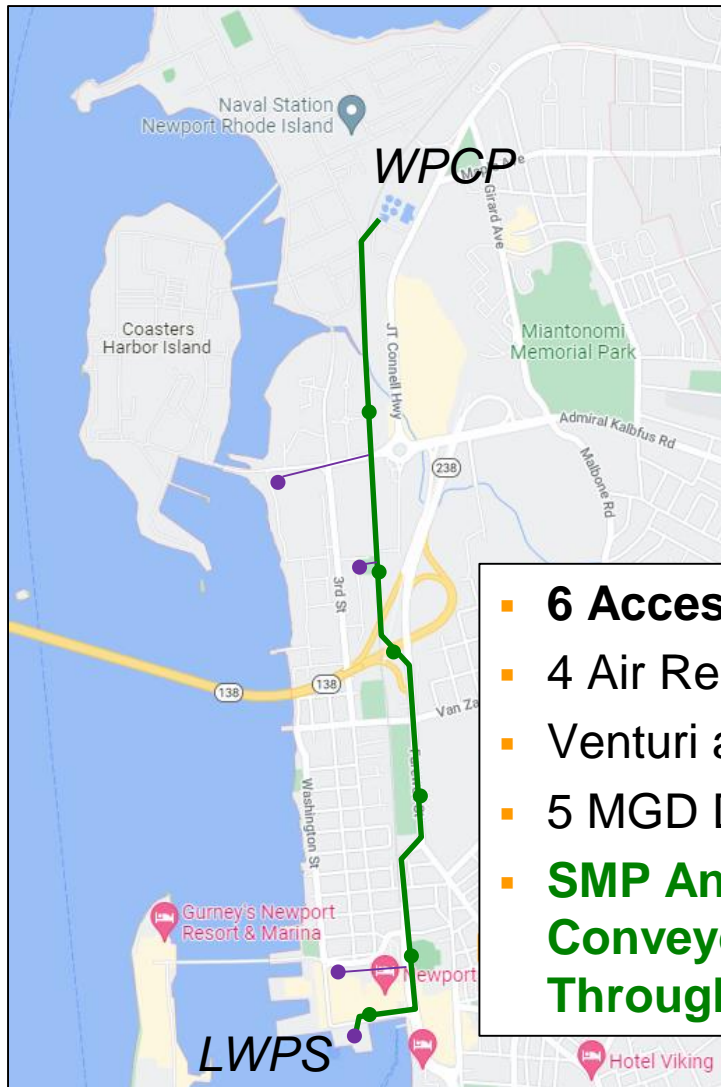
Long Wharf Force Main Investigation



- Reconstructed in 2009
- **10,000 LF of 30"/36" PVC**
- Half in Urban Roadway, Half along Railroad Corridor
- 3 Pump Stations and 3 Pressure Sewers Tie into the LWFM
- Multiple Bends and Fittings



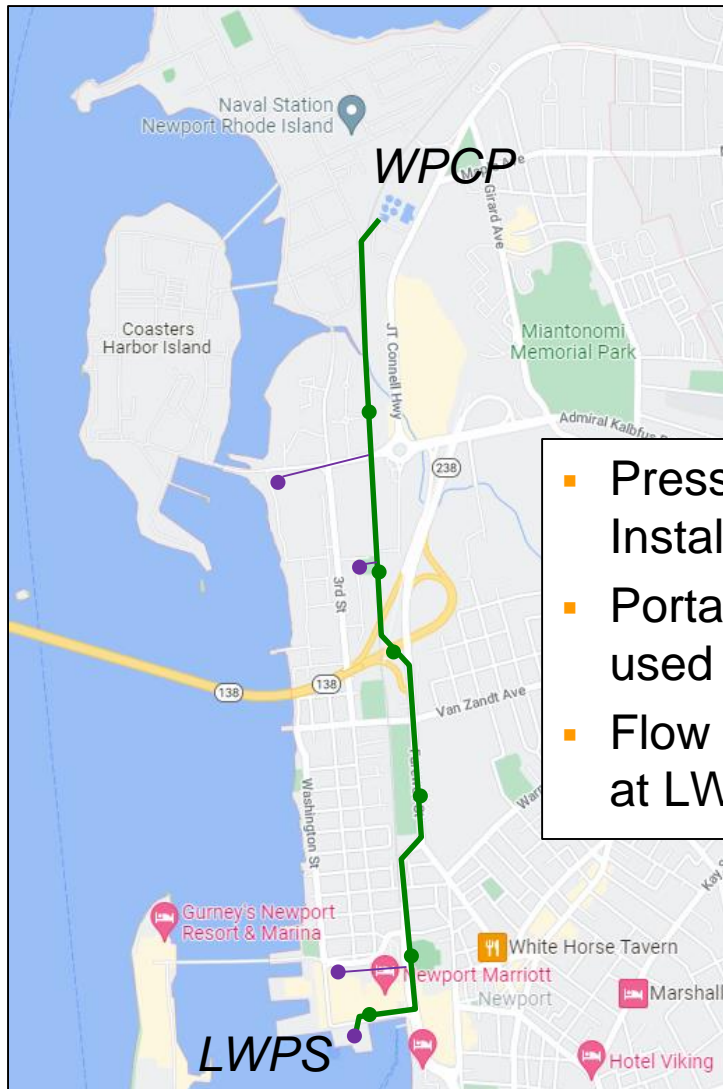
Long Wharf Force Main Investigation



- **6 Access MHs w/ Gate Valves**
- **4 Air Release Structures**
- **Venturi and Mag Meters**
- **5 MGD DWF / 20 MGD WWF**
- **SMP Anticipates 27 MGD Conveyed to the WPCP Through LWFM**



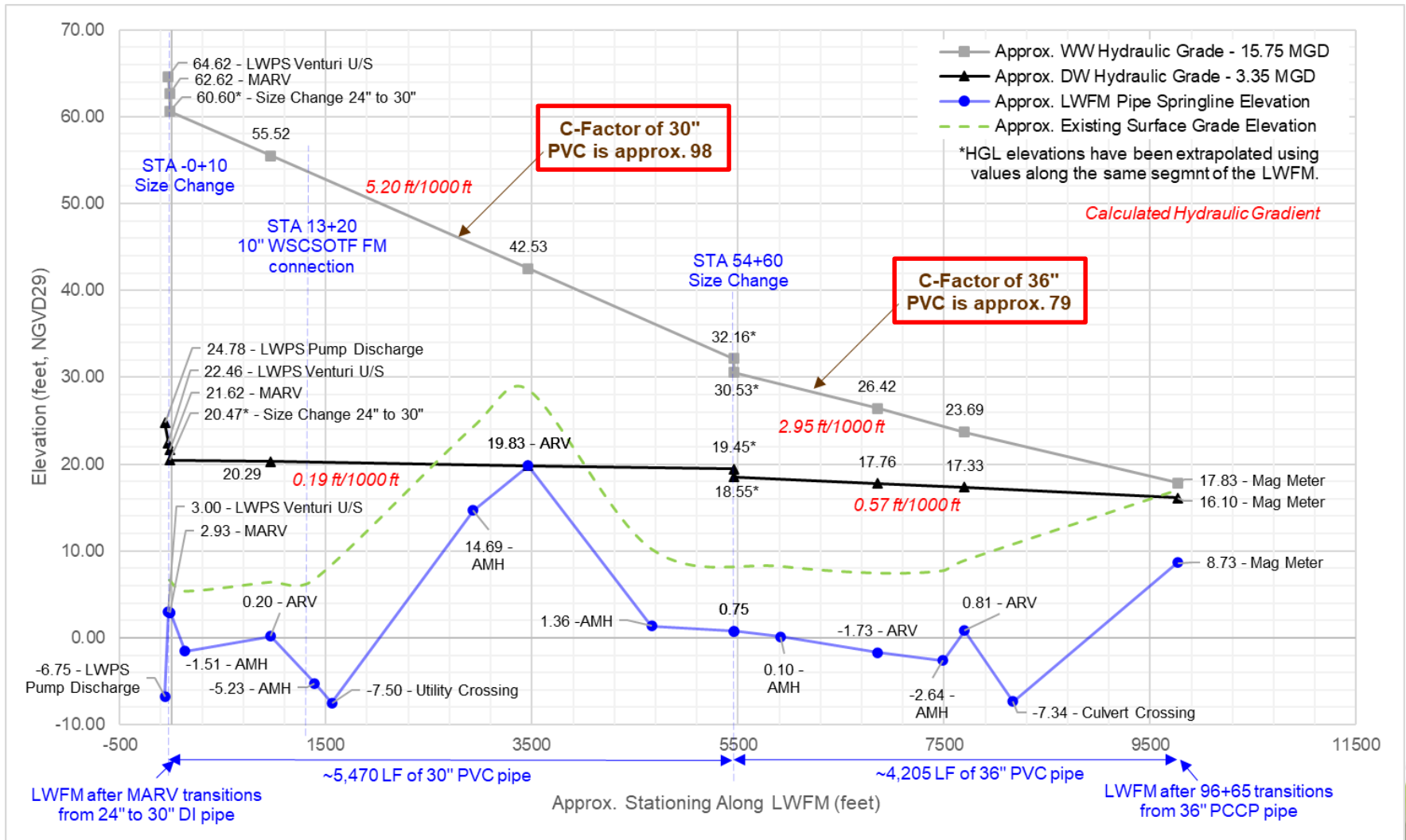
Long Wharf Force Main Investigation



- Pressure Loggers Installed at ARVs
- Portable Flow Meter used along LWFM
- Flow Data Collected at LWPS and WPCP



Long Wharf Force Main Hydraulics



■ **Approx. C-Factor of 90.... Should be 130-140**



Long Wharf Force Main Condition

What is Causing these Hydraulic Deficiencies?

- Accumulated Sediment/ Debris in the Pipeline?
- Air Pockets within Pipeline High Points?
- Crews Identified Grease Buildup at a Vacuum/Air Release Valve



**Pipeline Cleaning
May Be Required**

Presentation Outline

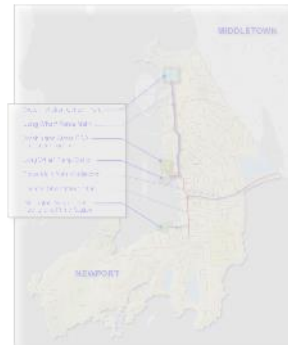
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Force Main Cleaning Development

Cleaning Approaches Evaluated (Reason Ruled Out)

- Mechanical Cleaning/Jetting
(Required Pumped Bypassing)
- Chemical Pipe Cleaning
(Applicability/Effectiveness for
PVC Host Pipe)
- Ice Pigging (Effectiveness at
Larger Diameters)
- **Conventional Pipe Pigging
Identified as Best Approach**

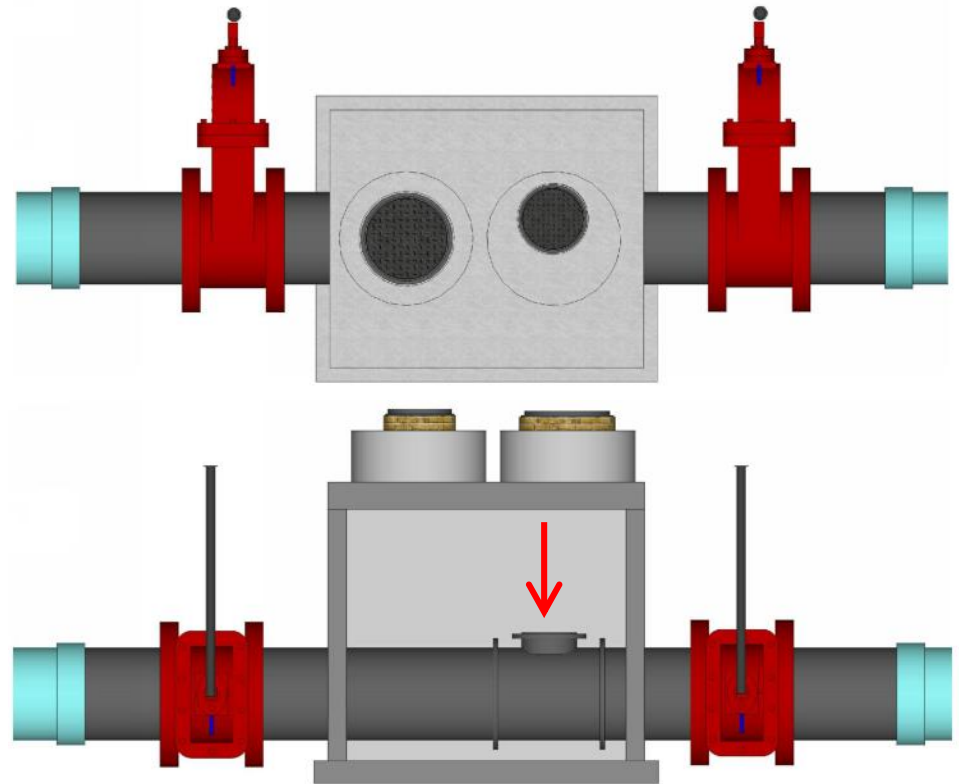


Photo Credit: C.B. Utility Co. [LINK](#)

Bypass Pumping Would be Expensive, >\$1M

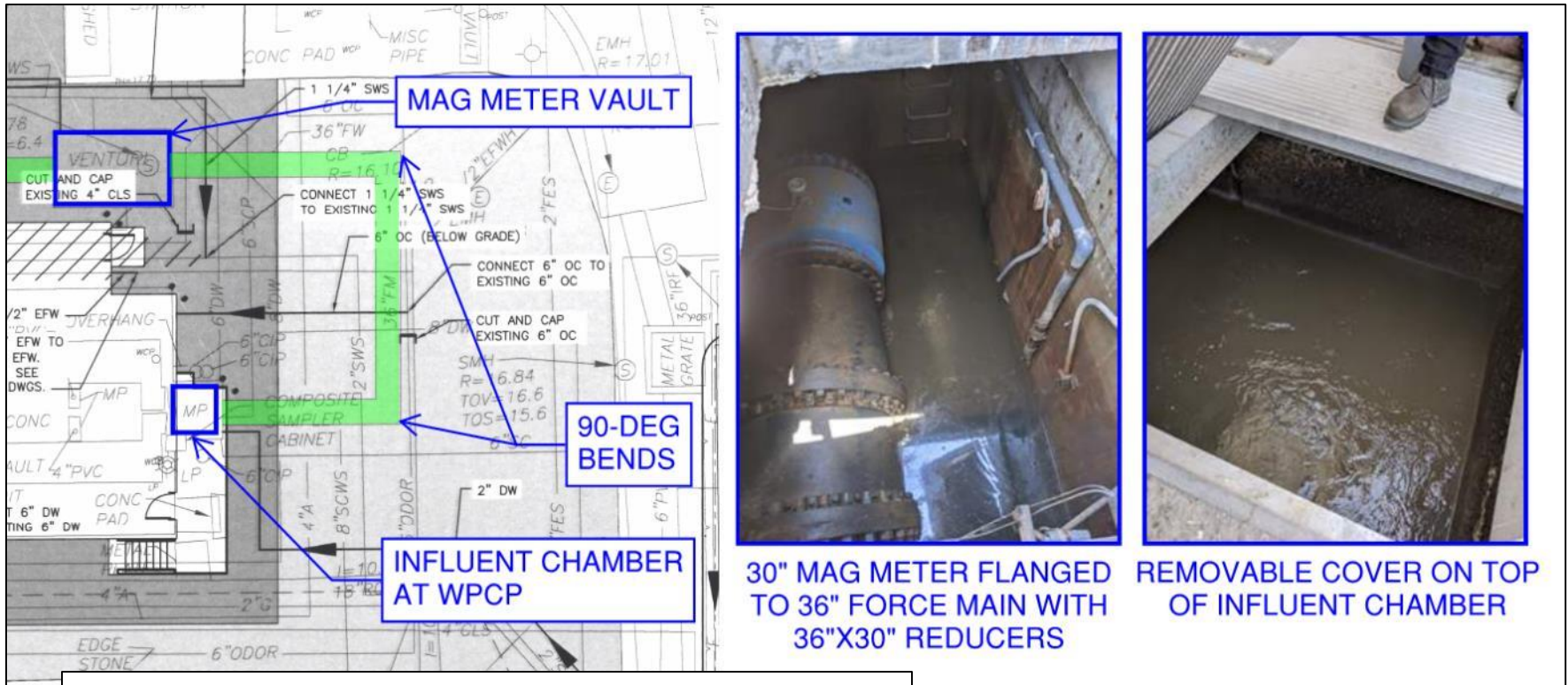
Force Main Cleaning Design

- **Limits of Work:** Full Pipeline
Approx. 10,000 Feet
- **Identify Access:** No Launching or Receiving Pits, but can use Existing Tees at Access MHs
- **Viable to use Pump Station as the Mechanism to Push Pigs**
- **Validation:** Target a C-Factor of 120, Require Pressure and Flow Data to be Collected
- **Supplemental Work:** Limited Jet Cleaning, CCTV, Sonar, and Caliper Inspections



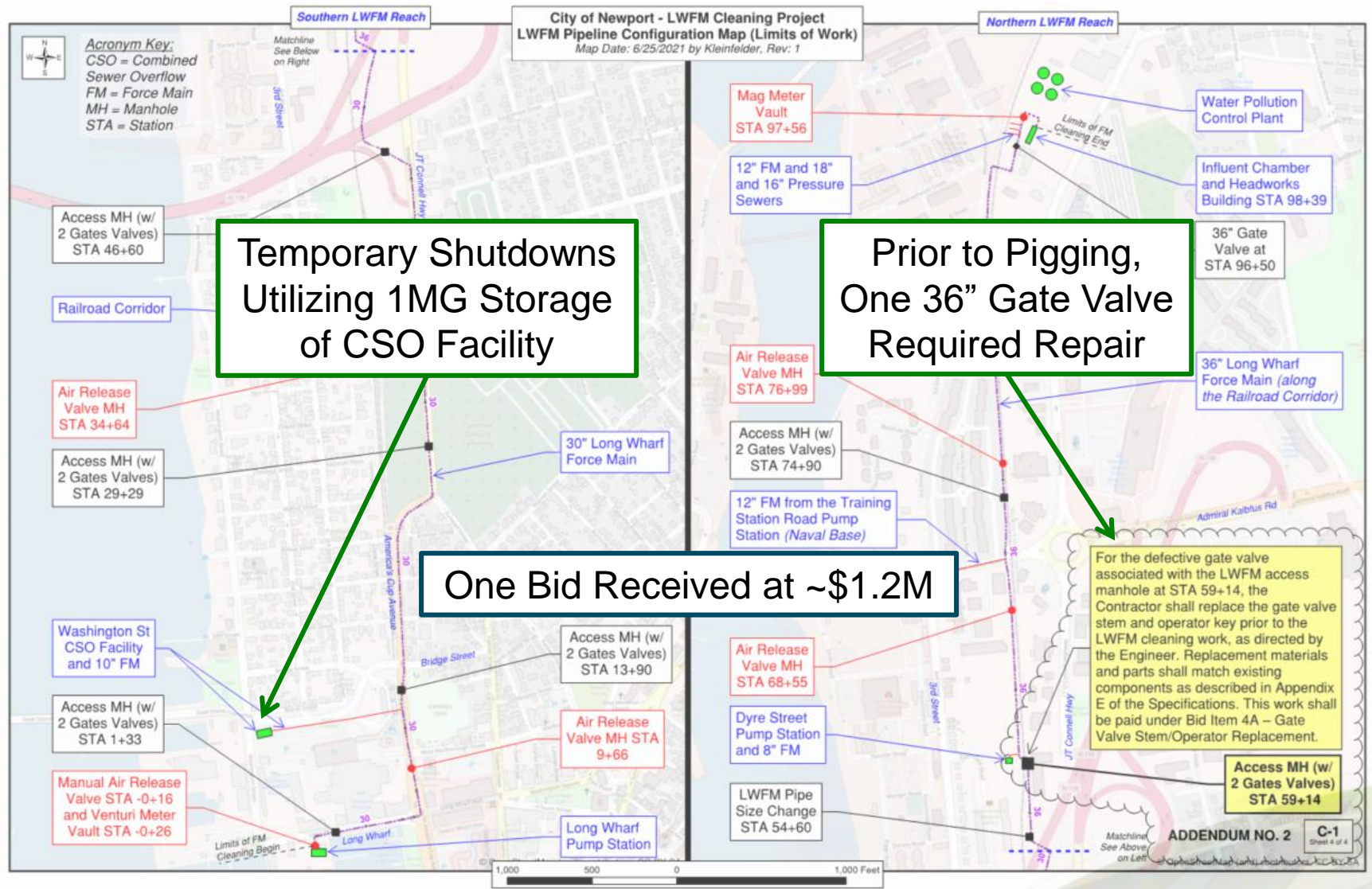
Access MHs Tees Used for Pig Launching

Force Main Cleaning Design



- Poly Pigs of Increasing Size and Density Launched Through LWFM to WPCP
- **WPCP Capable of Handling Additional Grit/Debris Removal**

Bidding the Force Main Cleaning



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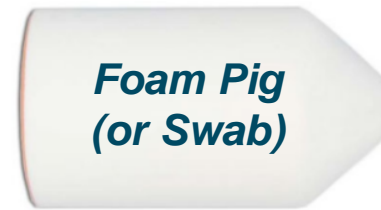


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Force Main Cleaning Preparations

- **Submittal Reviews:** Poly Pigs, Polyurethane Foam Swabs in Varying Sizes and Densities to Navigate Bends and Fittings
- **Develop a Work Plan:** Progressive Cleaning Starting Near the WPCP and Working Back Upstream to LWPS
- **Coordination:** Water Pollution Control Plant on Alert, LWPS Operations, Naval Base Facility Operations, Gate Valve Ops
- **Emergency Protocols:** Dig-up Contractor on Standby, Consider Bypass from Access MH to MH



*Transmitters
and Sensors
to Track Pig*



Gate Valve Repair and Operations



- 30" and 36" Gate Valves are Horizontally Buried
- Defective Gate Valve Bevel Gear Required Replacement

- Automated gate wrenches used to operate 30" (578 Turns) and 36" GVs (488 Turns).... **It Takes Time**
- Used Flow from LWPS to Scour Resilient Seat of Gate Valve

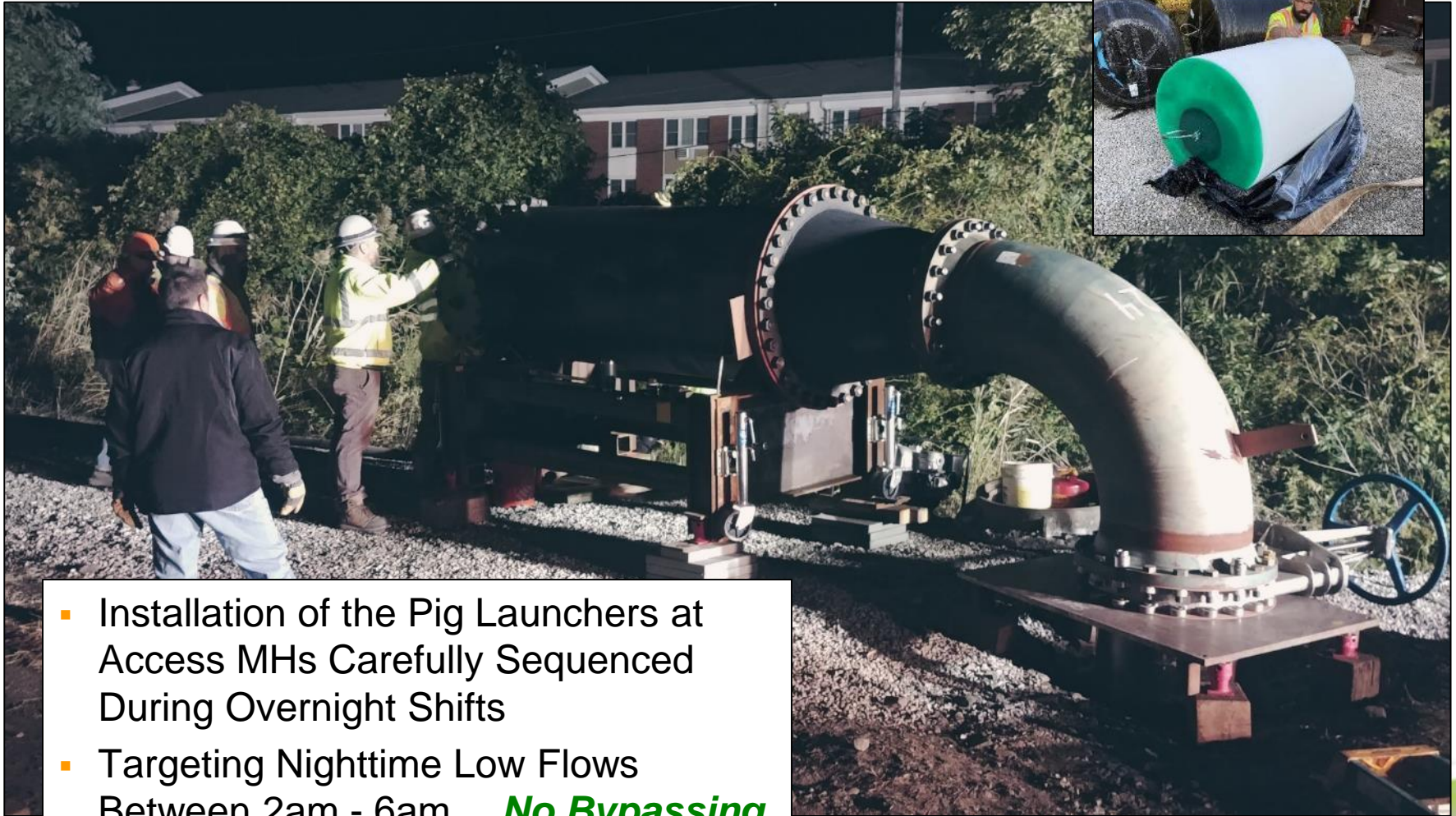


Long Wharf Force Main Cleaning

- Equipment Included Crane, Compressors, Pig Launcher, Dewatering Pump/ Vac Trucks, and a 10-12 Person Crew

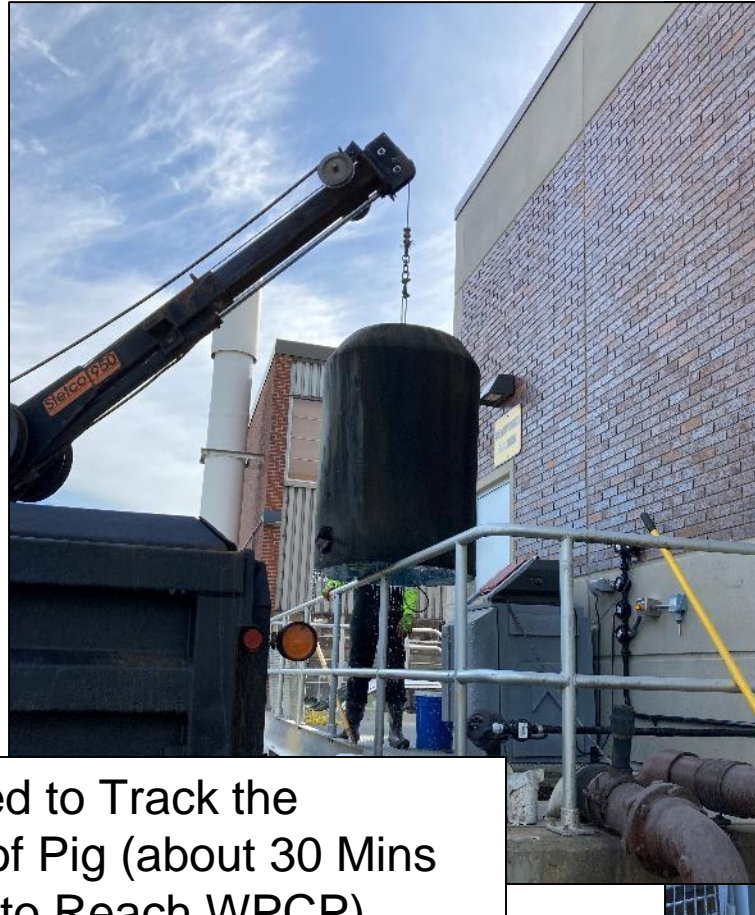


Long Wharf Force Main Cleaning



- Installation of the Pig Launchers at Access MHS Carefully Sequenced During Overnight Shifts
- Targeting Nighttime Low Flows Between 2am - 6am... **No Bypassing**

Long Wharf Force Main Cleaning



- Tools Used to Track the Location of Pig (about 30 Mins to 1 Hour to Reach WPCP)
- Poly Pigs (**Still Intact**) Retrieved from WPCP Influent Structure

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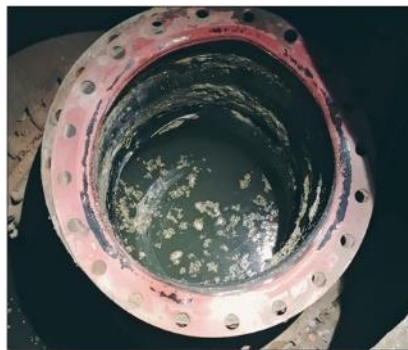
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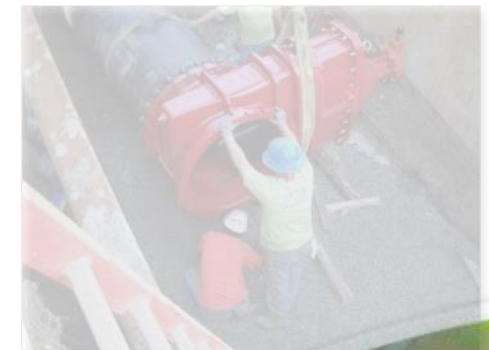
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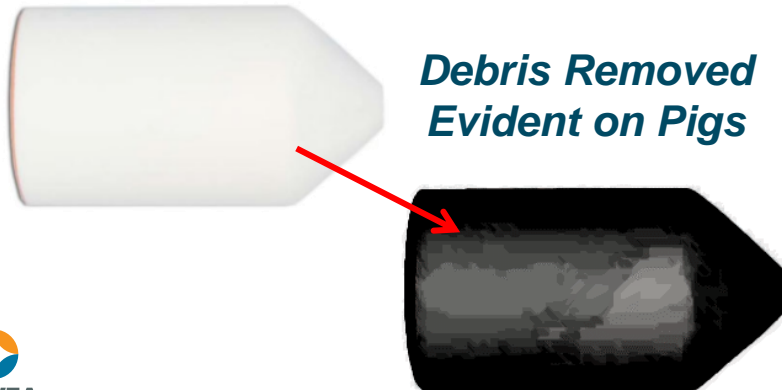
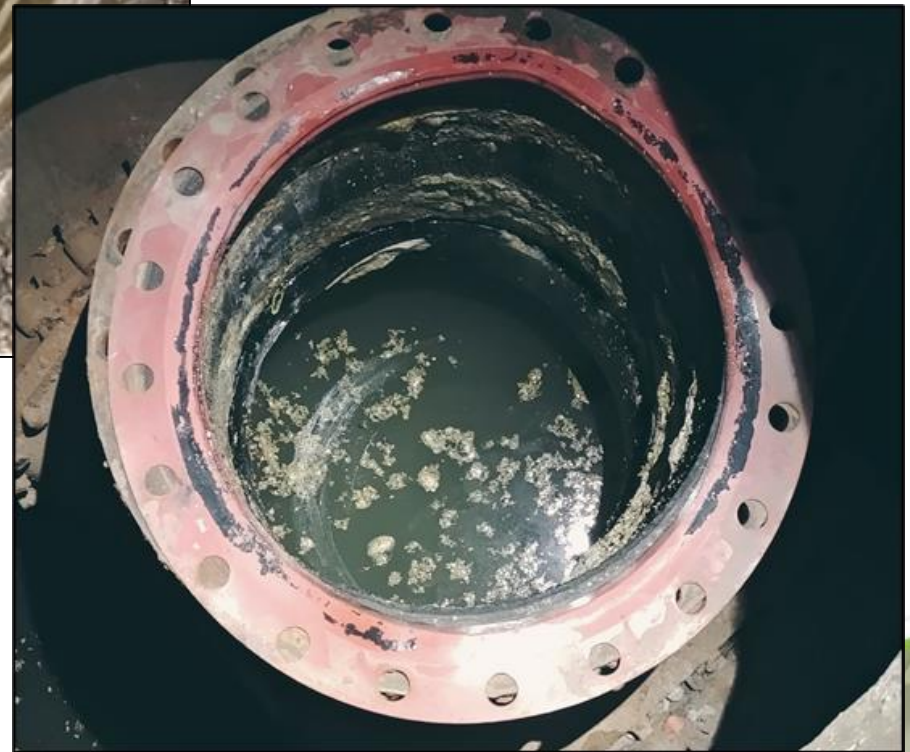
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Long Wharf Force Main Cleaning Results

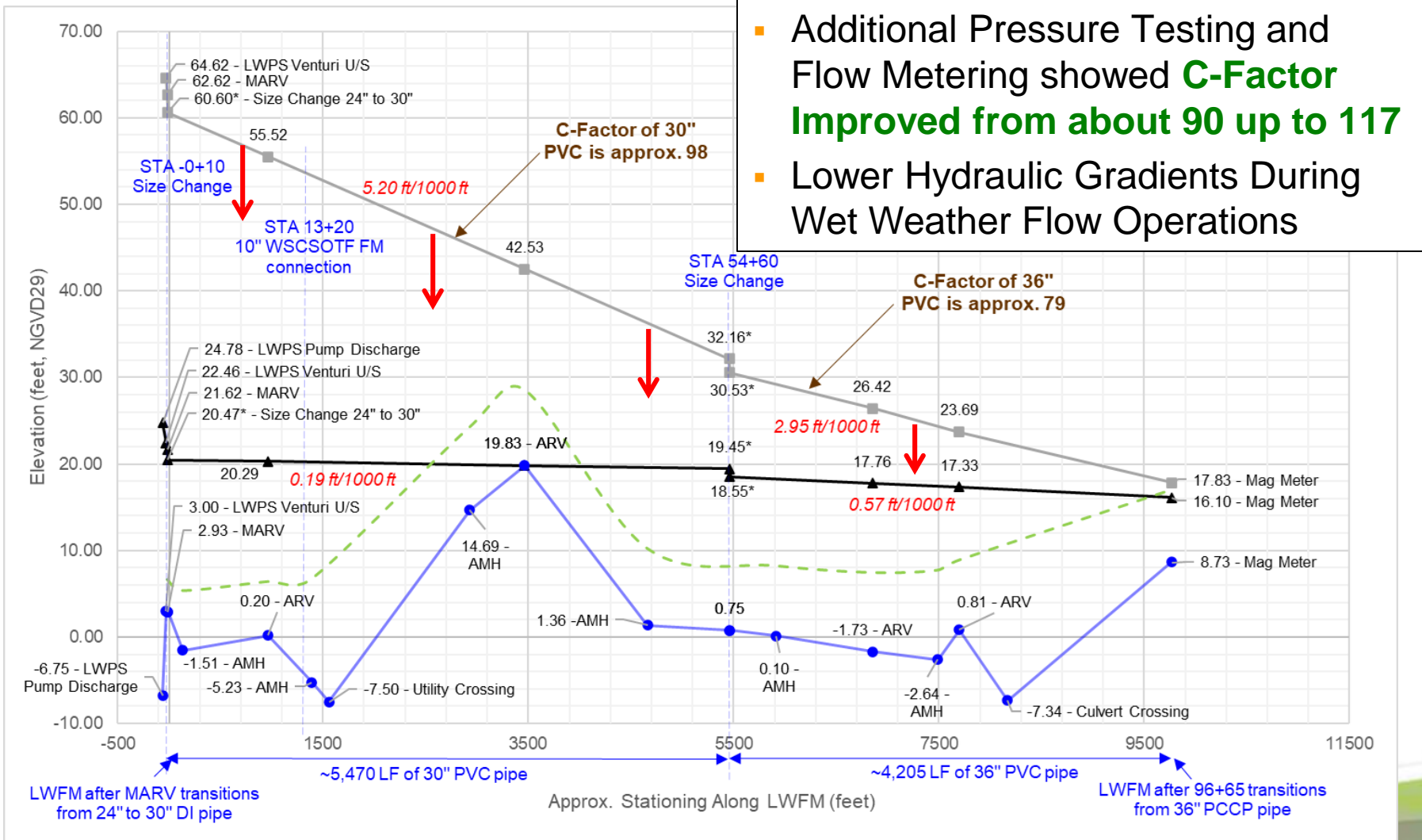


- Pig Launcher Installation Required Heavy Cleaning at Access MH Tees (**Hardened Grease**)



Long Wharf Force Main Cleaning Results

- Additional Pressure Testing and Flow Metering showed **C-Factor Improved from about 90 up to 117**
- Lower Hydraulic Gradients During Wet Weather Flow Operations



Findings and Recommendations

Project Findings

- Pigging Removed Significant Grease, Sediment, and Grit Material from LWFM
- Limited Change to Typical Dry Weather Flow Operations
- Temporary Shutdowns and Manual Operations Does Stress System Components
- **Increased Flow Conveyance will be Recognized with LWPS Improvements Project**

Recommendations for All

- Use System Configuration to Avoid Bypass Pumping or Costly Launch/Receiving Pits
- Continue with System Maintenance, Use Periodic System Pigging as Needed (at least Every 5 Years)
- **Consult/Coordinate with Experienced Industry Experts**

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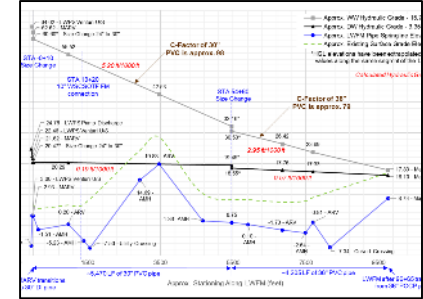


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Project Summary

- System Evaluation Identified Hydraulic Issues with LWFM
- Performed 10,000 LF of Pipe Cleaning via Pigging 30"/36" PVC
- Use Temporary Shutdowns to Avoid Bypass Pumping and LWPS to Push Poly Pigs
- **Increased in LWFM C-Factor from About 90 to 117**



Additional Photos



Additional Photos



Thank You!

Acknowledgements

- **City of Newport:**

Rob Schultz

- **Project Contractor / Operator Support:**

JK Muir, SUEZ (Veolia),
National Water Main Cleaning Company,
American Pipeline Solutions

- **Kleinfelder:**

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Jill Rossini, Umang Chauhan, Keerthi Palanisamy



QUESTIONS???

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