Massachusetts Water Resources Authority

Valve and Piping Replacements

Deer Island Treatment Plant

(MWRA Contract 7275)

September 10, 2014

Contract 7275 Summary

- **Contractor:** Carlin Construction Company
- **Contract Price:** $16,960,425
- **Contract Duration:** 1,095 days, Notice to Proceed June 23, 2014
- **Scope:** Replace Valves and Piping at the following Deer Island facilities:

1. **North Main Pump Station**: Butterfly Valves (20) and Flow Meters (10)
2. **Winthrop Terminal Facility**: Knife Gates(6), Plug Valves(9), Check Valves(6) & Flow Meters(6)
3. **South System Pump Station**: Dashpots on Slanting Disc Check Valves (8)
4. **Primary Clarifiers & Gravity Thickener Complex**: Sludge Piping (6,500 lf), Scum Piping (2,000 lf) and Valves (107)
5. **Secondary Clarifiers**: RSL Plug Valves (81), WSL Plug Valves(3)

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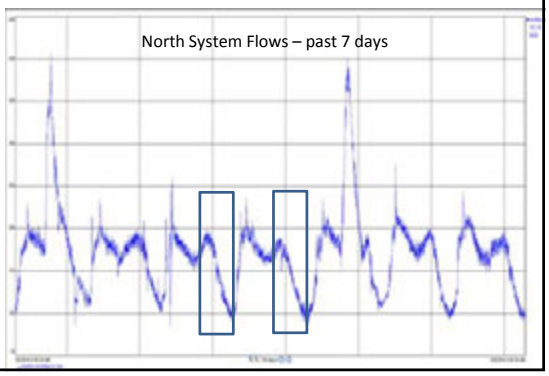
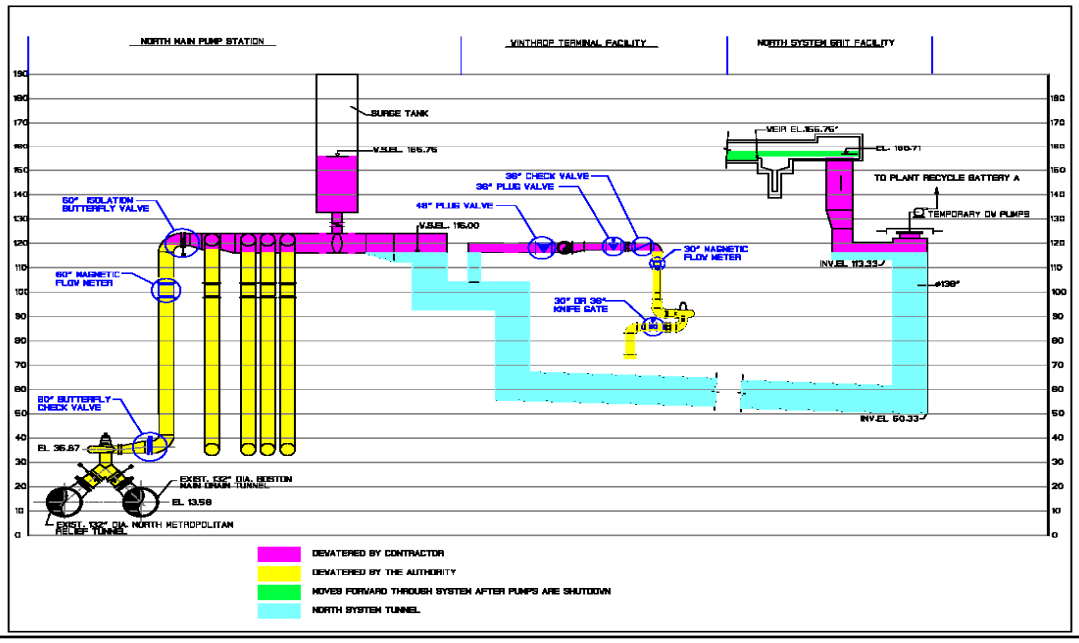
What is this contract trying to correct?

- **Problem**:
  - Many existing valves at NMPS & WTF do NOT provide complete isolation – equipment can't be properly maintained safely.
- **Resolution**:
  - Requires replacement of isolation valves. This will require shutdowns of the entire North Pumping System on DITP to complete work.
    - North Main Pump Station (30 shutdowns)
    - Winthrop Terminal Facility (18 shutdowns)
    - Installation and Removal of temporary dewatering system (2 shutdowns)
- **NS Shutdowns scheduled between 11PM-7AM**
  - When flow conditions allow
  - All work Weather dependent



Plant Shutdowns and Temporary Dewatering System



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Winthrop Terminal Facility

Receives North Sewer System Flow from North Metropolitan Trunk Sewer

Facility capacity is 125 MGD

Six (6) 600hp Raw Wastewater Pumps rated at 32 MGD each

RWW Pumps, Piping and Valves Installed during Boston Harbor Project in 1995

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Winthrop Terminal Facility: Force Mains

- Three (3) 48-inch Electrically Operated Plug Valves on WTF Force Mains
- Valve weight ~19,000 lbs
- Valves do not provide positive shutoff preventing safe isolation at facility
- The Contractor will be allowed up to 2 Plant Shutdowns per valve
- These will be the first valves replaced under this contract

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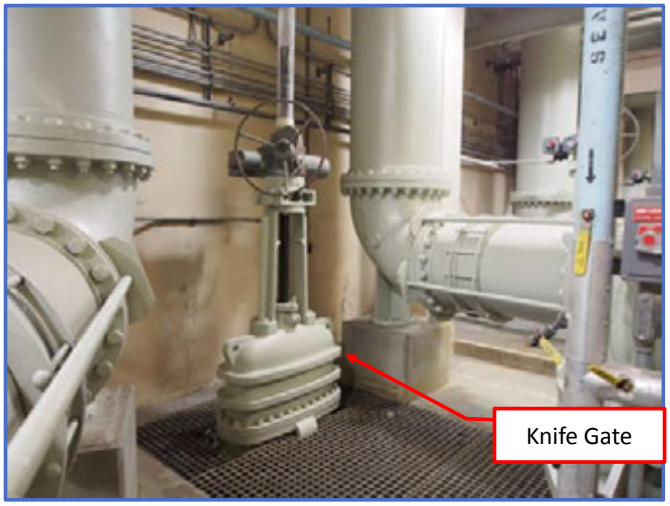
Winthrop Terminal Facility: Pump Suction



- Six (6) electrically operated Knife Gates and Piping on RWW Pump Suction
  - Two (2) 36-inch (#2&5)
  - Four (4) 30-inch (#1,3,4,6)
- The Contractor will be allowed up to 2 Shutdowns to replace each Knife Gate and piping.
  - These shutdowns will coincide with the 36-inch plug valve replacement on the pump discharge piping
- RWW Wet Well must be isolated and dewatered to perform this work.

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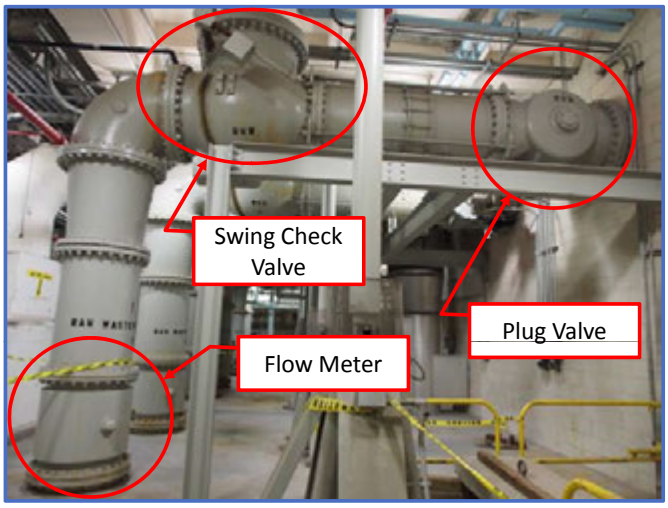
Winthrop Terminal Facility: Pump Discharge



- Each of the six (6) Pump Discharge Lines Include:
- 30-inch Magnetic Flow Meter (to be replaced for the same reason as the flow meters in NMPS)
- 36-inch Swing Check Valve (~10,000lbs)
- 36-inch Plug Valve (~7,000lbs) – Will require up to 2 Plant Shutdowns for each valve and will be done during Knife Gate replacement)

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North Main Pump Station

- Receives North Sewer System Flow from:
  - -Boston Main Drainage Tunnel
    - -**Ward Street Headworks**
    - -**Columbus Park Headworks**
  - -North Metropolitan Relief Tunnel
    - -**Chelsea Creek Headworks**
- Facility capacity is 788 MGD
- Ten (10) 3,500hp Pumps
- 110-150 MGD Capacity/Pump
- Most equipment installed during Boston Harbor Project in 1995

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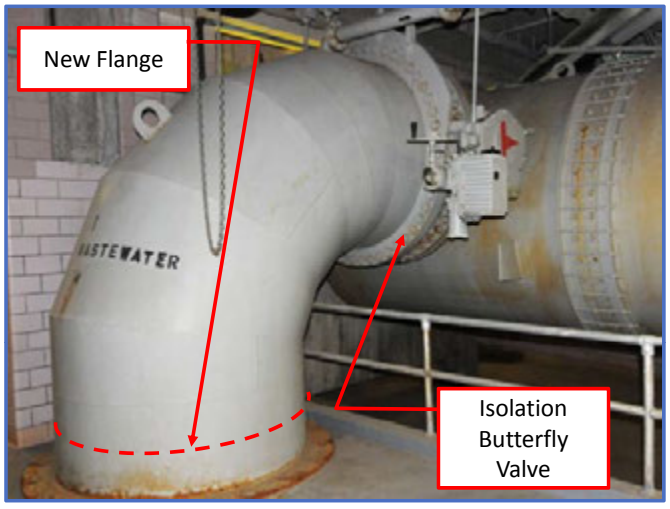
North Main Pump Station: Isolation Butterfly Valves



- **Ten (10) 60-inch Isolation Butterfly Valves and flanges**
  - Level B1
- Valves isolate pump risers from the 96-inch header
- Electrically Operated Valves
- Piping (elbow) is locked into the floor - must be cut to separate the piping for valve removal & replacement.
- New flanges will be installed on elbow to ensure a secure connection and proper fit up.
- Contractor will have up to 3 Shutdowns to replace each of these valves and install new flanges

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North Main Pump Station: Magnetic Flow Meters

- **Ten (10) 60-inch Magnetic Flow Meters**
  - Level B2
- High Accuracy +/- 0.5%
- Reliable and accurate flow measurement is critical for Process Control & NPDES Reporting
- Electronics now obsolete.
- Replaced while the 96-inch RWW header is isolated with a blind flange

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North Main Pump Station: Butterfly Check Valves

- **Ten (10) 60-inch Butterfly Check Valves**
  - Level B5
- Hydraulically Operated Valve
  - Pressure = 1,500psig
  - Bore = 200mm (7.87in)
  - Volume = 4.8 liters
- Replaced while the 96-inch RWW header is isolated with a blind flange
- Tunnels will be isolated with Knife Gates and Butterfly Valves on suction side of pump

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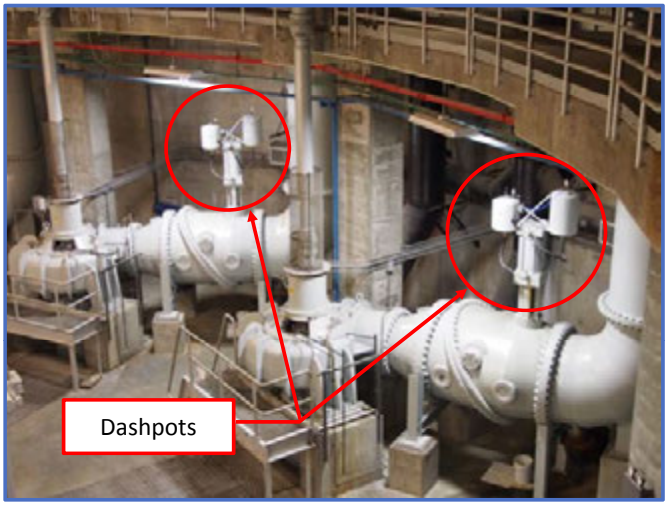
South System Pump Station: Dashpot Replacement



- Replace eight (8) hydraulic dashpots on Slanting Disc Check Valves on RWW Pump Discharge
- Dashpots are used to control the closing of the check valves to avoid water hammer
- Existing Dashpots are worn and require replacement
- No shutdowns required

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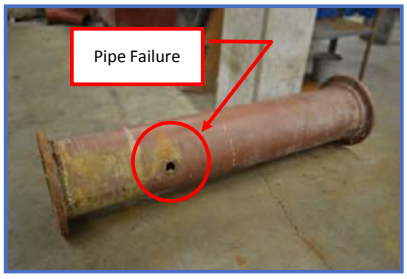
Primary Sludge and Scum Piping Replacement



- Existing Primary Sludge (PSL) and Primary Scum (PSC) lines are leaking due to failed glass lining and pipe corrosion
- Pipes were inspected by remote camera and revealed glass lining failures with significant crown corrosion and at pipe joints
- Glass lined pipe was field cut during installation 1994-96. Field cuts disturbed the glass lining creating failure points in the protective coating system
- Expect to get longer life from new piping system due to improvements in the glass lining process and field cutting pipe will not be allowed

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Primary Sludge and Scum Piping and Valve Replacement

- Replace ~6,500 linear feet of Primary Sludge Piping and 96 plug valves from Primary Clarifiers to Gravity Thickener Distribution Box (4" – 14")
- Each Primary Battery will be taken out of service for up to 21 Days to replace the PSL line in the pump galleries. Contractor will sequence pipe/valve replacement to allow a Battery to be returned to service by the end of each day, if plant flow requires
- Replace ~2,000 linear feet of Scum Piping and eleven (11) plug valves in Residuals Connecting Gallery (10"-12")
- No impact to plant capacity.

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Return Sludge Plug Valve Replacement

- Replace (81) 16-inch manual operated RSL Plug Valves and (3) 16-inch WSL Plug Valve on RSL header (28 valves per battery)
- Each valve isolates the common 72-inch RSL Header from each RSL pump and WSL line
- Each Secondary Battery must be taken out of service one at a time to complete this work. **Contractor is allowed up to 7 days per battery to complete this work. DITP will require 7 day recovery.**
- Contractor will install a new drain/vent on each RSL discharge line for future maintenance activities

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