



# Massachusetts Water Resources Authority

*Presentation to the*



## ***FY2018 PRIORITIES AND CHALLENGES***

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Executive Director

September 21, 2017

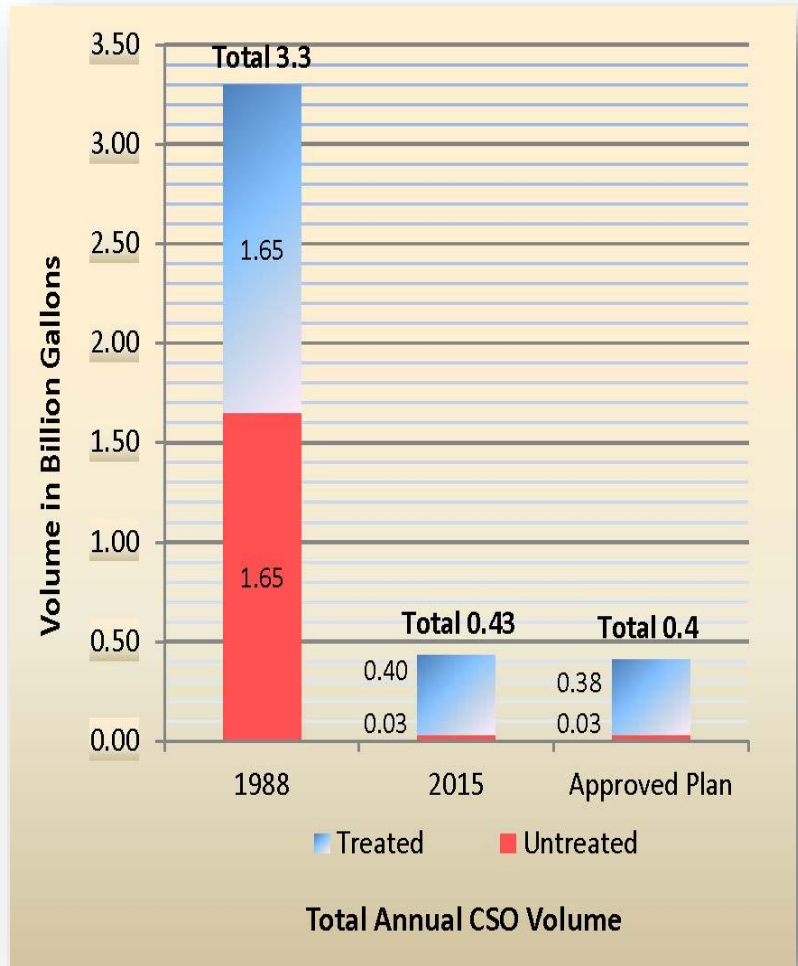


# **CSO Post-Construction Monitoring and Assessment**



# CSO Control Efforts and Accomplishments

- 35 CSO projects designed and constructed in 20 years
- \$910.6 million total
- Reduces system-wide CSO discharge volume in a typical year by 88%, with 93% of remaining volume treated at MWRA's CSO facilities





## Remaining Federal Court Milestones

Of the 184 CSO related milestones in Schedule Seven, there are two milestones are left:

- January 2018: Commence 3-year performance assessment, including post-construction monitoring
- December 2020: Submit results of 3-year performance assessment to EPA and DEP to demonstrate attainment of long-term levels of CSO control, including as to frequency and volume of discharge



# Post-Construction Monitoring and Assessment: Scope

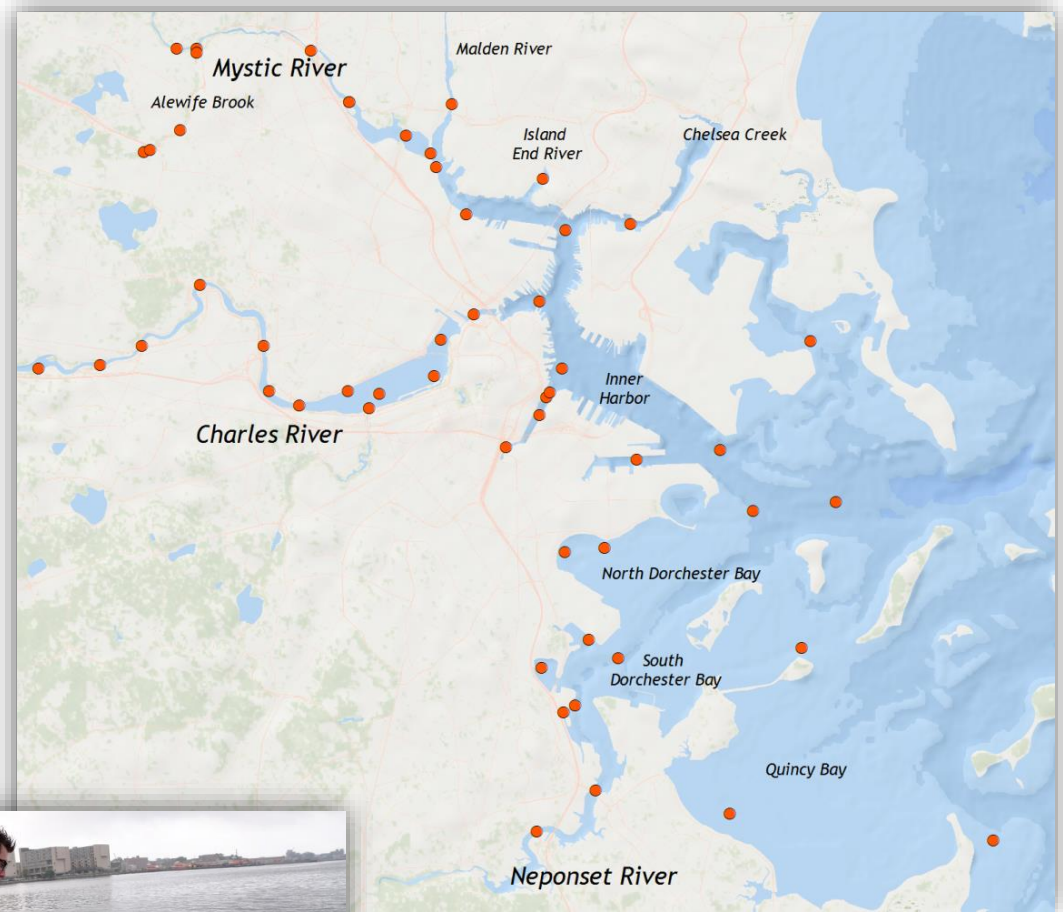
- Extensive metering of system conditions and CSO discharges
- Hydraulic modeling
- CSO performance assessments: Are CSO discharges meeting court mandated levels of control?
- Receiving water quality monitoring for bacteria and other pollutants
- Water quality assessments: Do remaining CSO water quality impacts meet water quality standards?



# CSO Receiving Water Monitoring

Locations in the Harbor's tributary rivers and near shore in the harbor; current focus on the Charles and Mystic Rivers

Sampling for bacteria (*Enterococcus* and *E. coli*/fecal coliform; physical data (temp, pH, DO, conductivity) collected by YSI sonde; Secchi depth





# CSO Post Construction Existing and Proposed Meter Locations





# Post-Construction Monitoring and Assessment Schedule

Consultant contract award	October 2017
Overflow metering	April 2018 through June 2020
Semiannual assessment reports	September 2018 through September 2020
Annual water quality reports	July 2018 through July 2020
Final system assessment report	December 2020
Final water quality report	December 2020

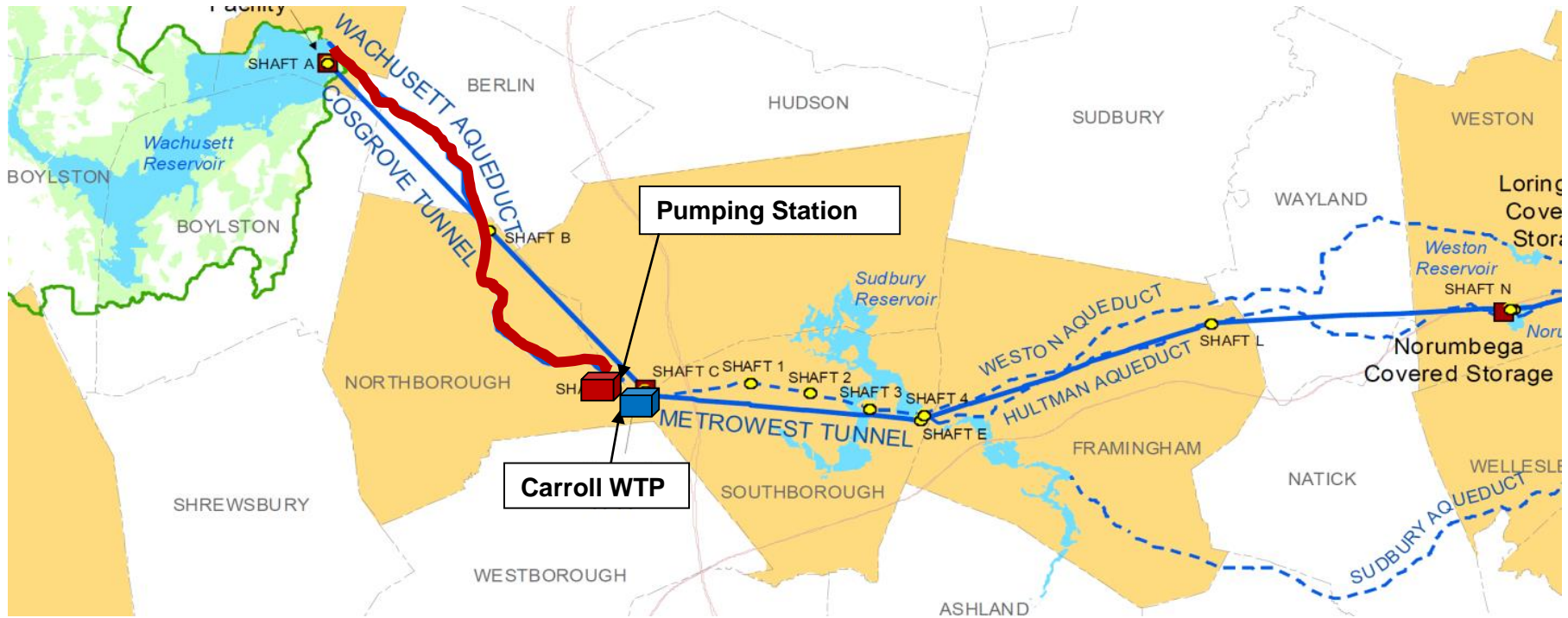




# **Water System Redundancy**



# Wachusett Aqueduct Pumping Station





# Progress on Wachusett Aqueduct Pump Station Construction



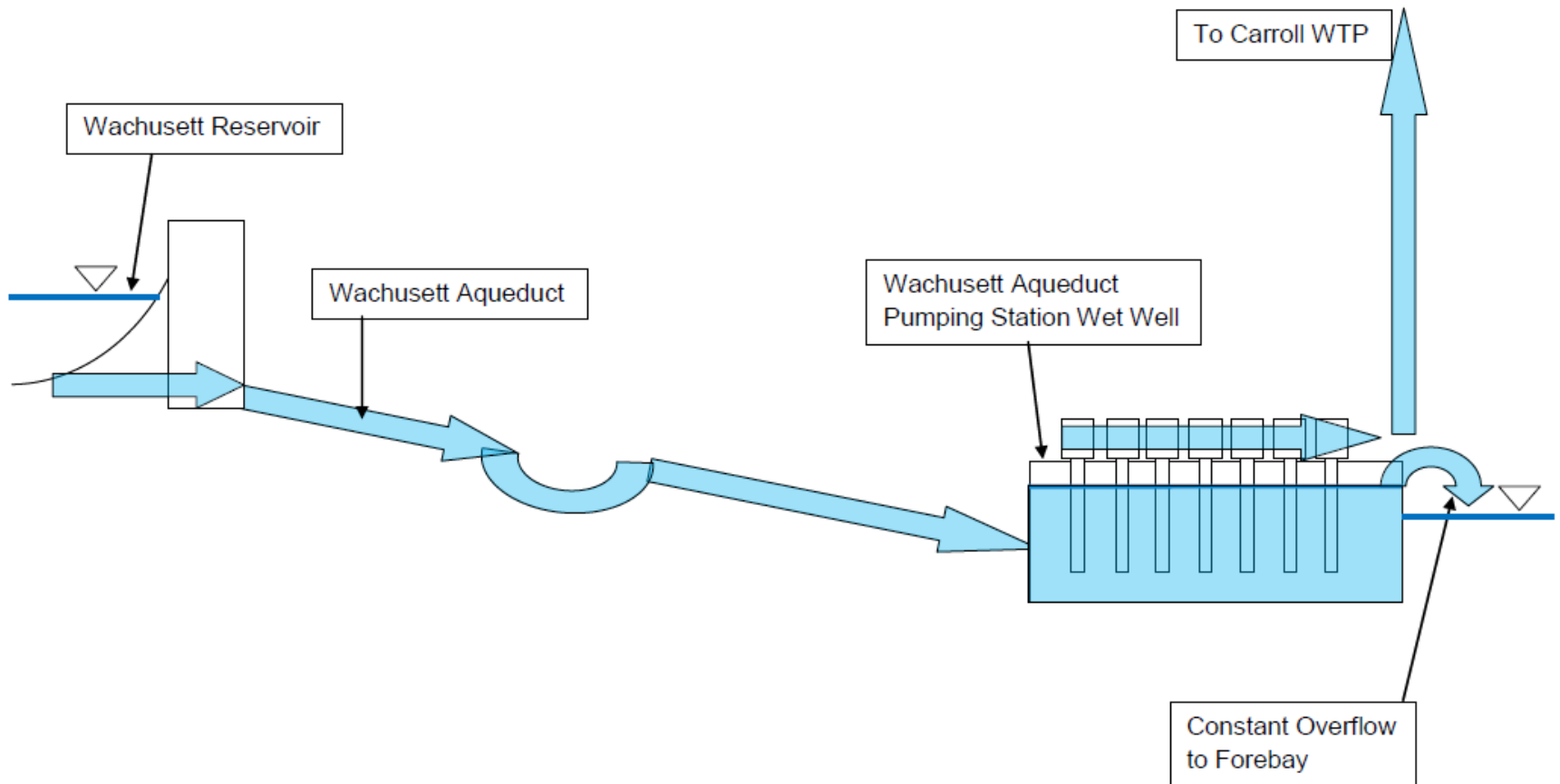
Project is currently 62% complete





# Profile from Wachusett Aqueduct to the Pump Station

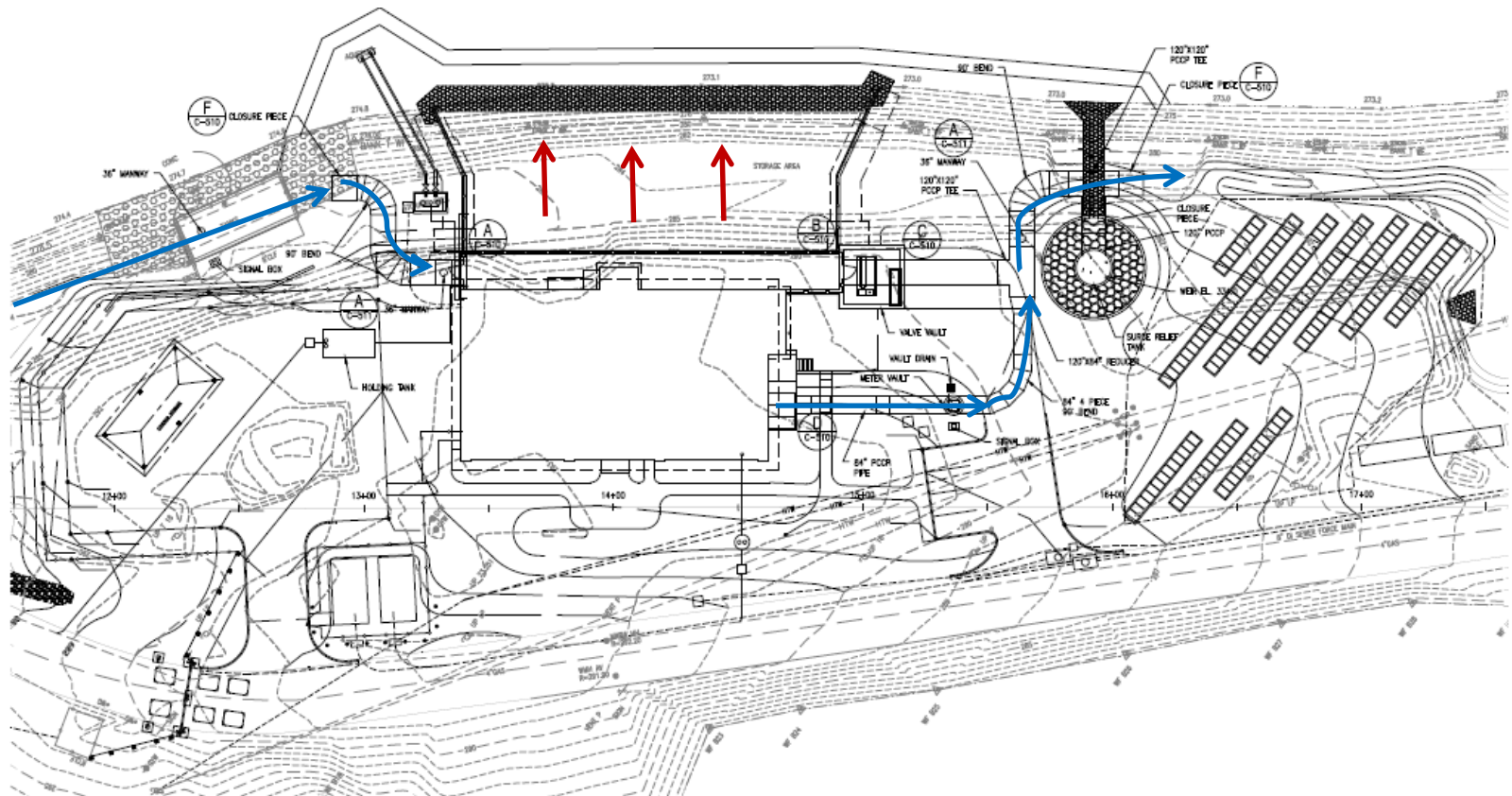
Flow into Wachusett Aqueduct Pumping Station





# Flow Into and Out of the Pump Station

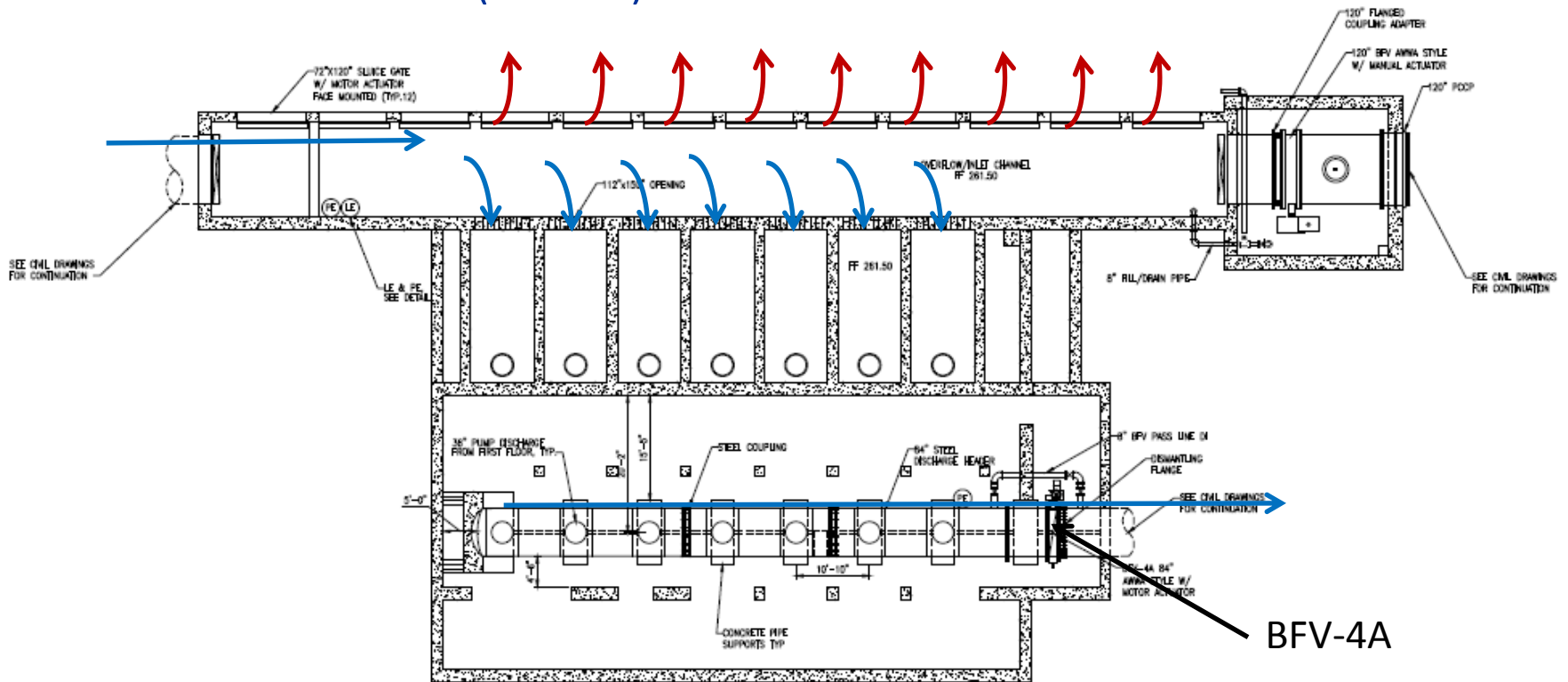
- Flow from Wachusett Aqueduct with overflow to Forebay
- Pumps start to Carroll





# Basement Plan

- Flow from Wachusett Aqueduct with Overflow to Forebay
- Pumps start at a flow less than in Aqueduct
- Discharge to header
- 84" control valve (BFV-4A) controls flow to Carroll

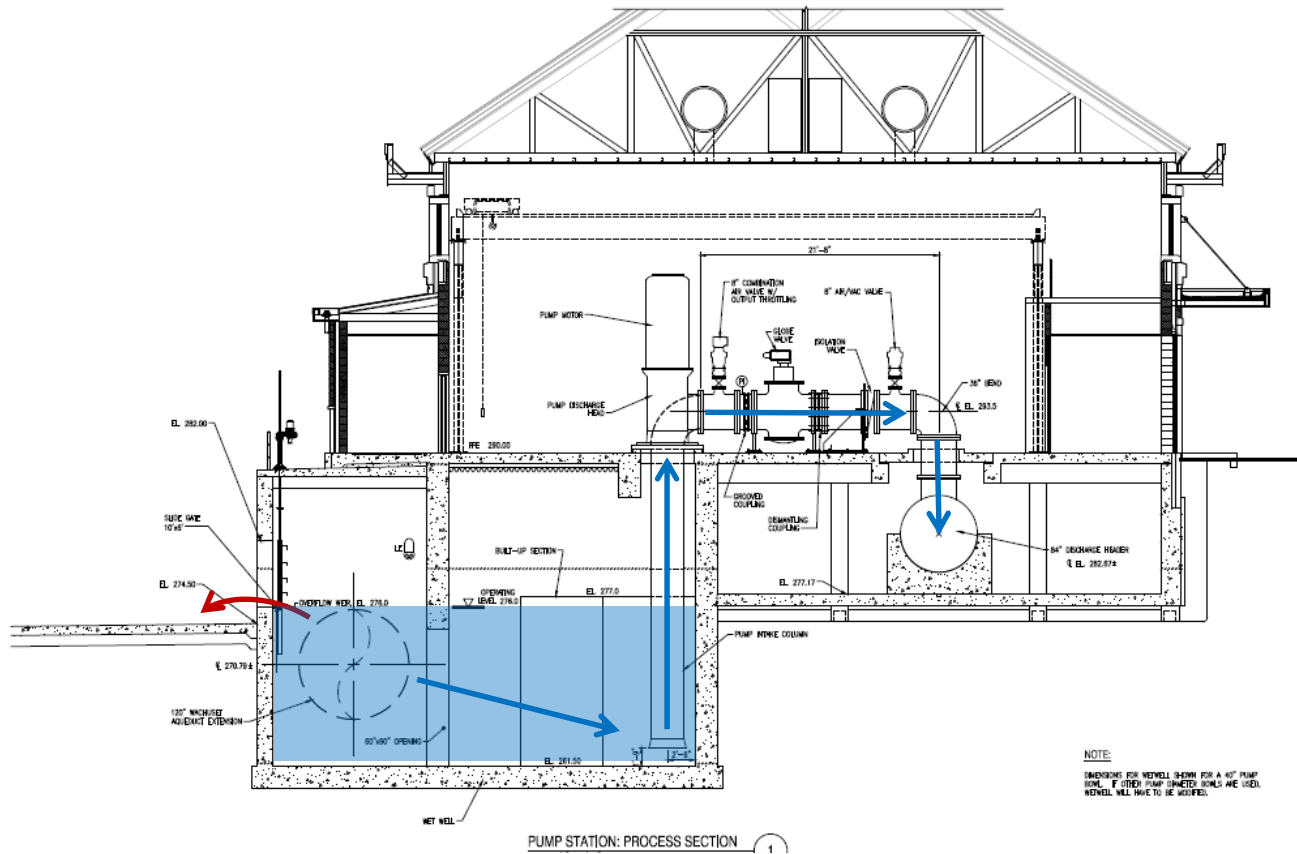


BASEMENT PLAN  
SCALE 1/8" = 1'-0"



# Section

- Vertical turbine pumps
- Overflow Channel
- Intake Channel and wet wells





# Wachusett Aqueduct Pump Station Pumps

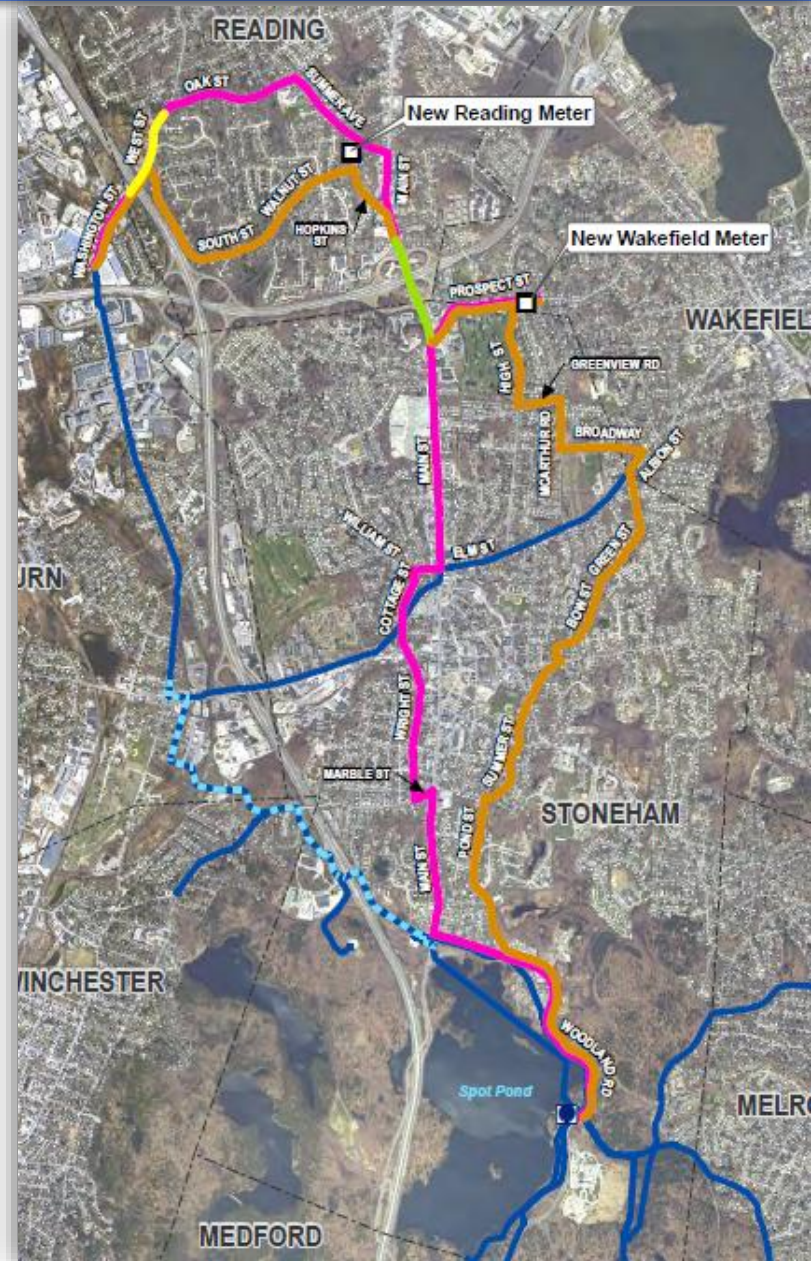






# Northern Intermediate High Redundancy Project

- The project consists of four contracts:
  - 7066 in Reading was completed in May 2015
  - 7471 in Reading is 98.5% complete
  - 7478 in Stoneham is 43% complete
  - 7067 in Stoneham is just starting





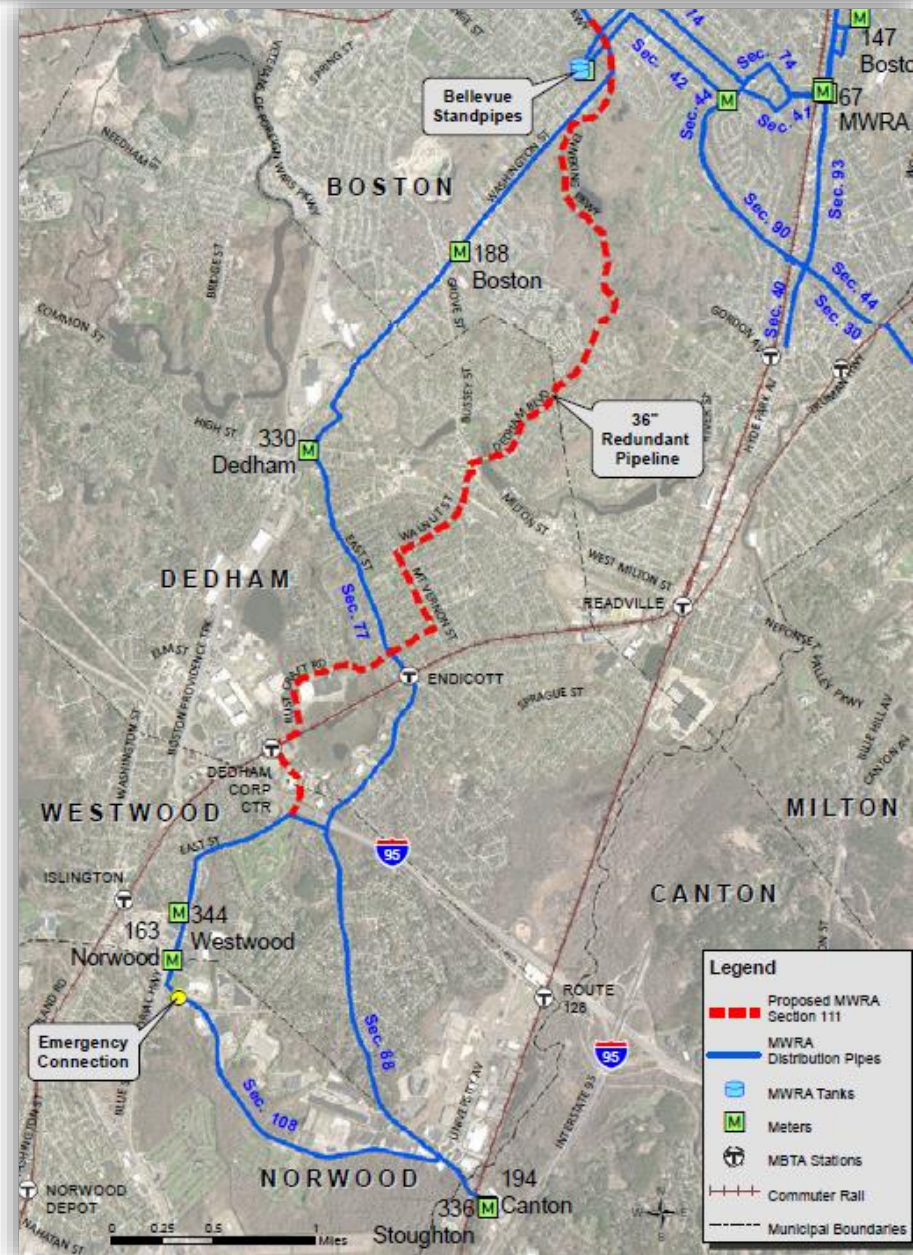
# Northern Intermediate High Redundancy Project





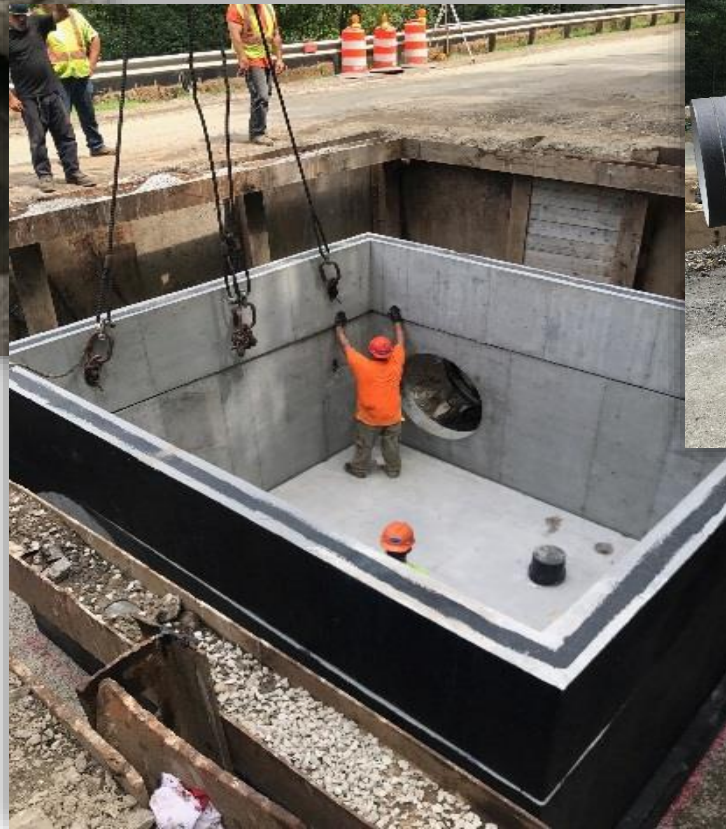
# Southern Extra High Redundancy Project

- The project consists of three contracts:
  - 6454 in Boston is 64% complete
  - 7504 in Dedham (north) was awarded and is about to begin
  - 7505 in Dedham (south) advertisement expected late fall





# Southern Extra High Redundancy Project





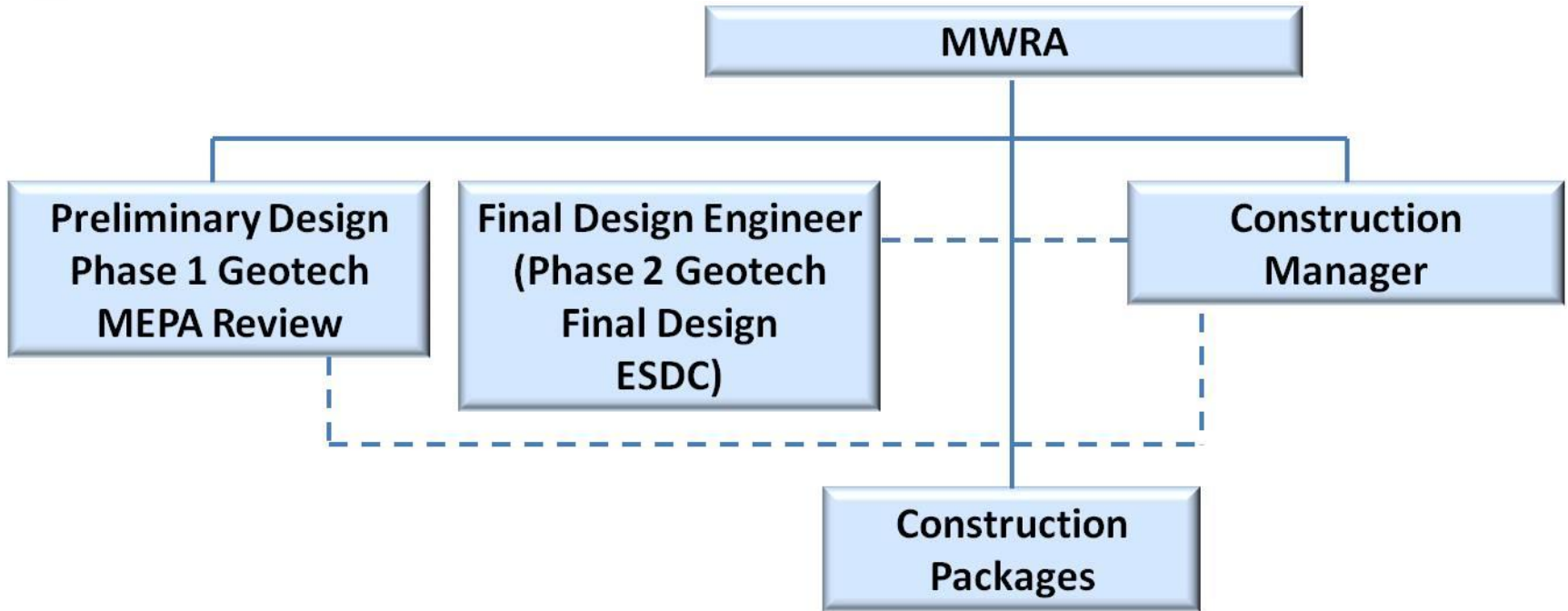
# Long-Term Redundancy for Metropolitan Tunnel System: Status

- Staff are currently developing the first contract for Preliminary Design/ Geotech/MEPA Review
- Staffing will follow a program management-type model





# Program Management-Type Model



ID	Task Name	Start	Finish	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035								
1	<b>Metropolitan Tunnel Redundancy</b>	<b>Fri 3/9/18</b>	<b>Thu 11/22/35</b>		[Gantt bar spanning from 2018 to 2035]																									
2	Preliminary Design/Geotech/MEPA Review	Fri 3/9/18	Tue 3/17/20		[Gantt bar]																									
3	Final Design/ESDC	Wed 3/18/20	Tue 11/6/35				[Gantt bar starts]	[Gantt bar continues]																						
4	Construction Management	Fri 3/9/18	Thu 11/22/35		[Gantt bar spanning from 2018 to 2035]																									
5	Construction - North	Fri 3/31/23	Fri 10/26/29								[Gantt bar]																			
6	Construction - South	Thu 4/4/24	Thu 11/22/35									[Gantt bar]																		



# **Corrosion Control**



# Pipeline Corrosion



## Waltham Bridge Pipeline

- Original pipe was 77 years old
- New Pipe was Installed in 2004 with coating and insulation





# Causes of Corrosion

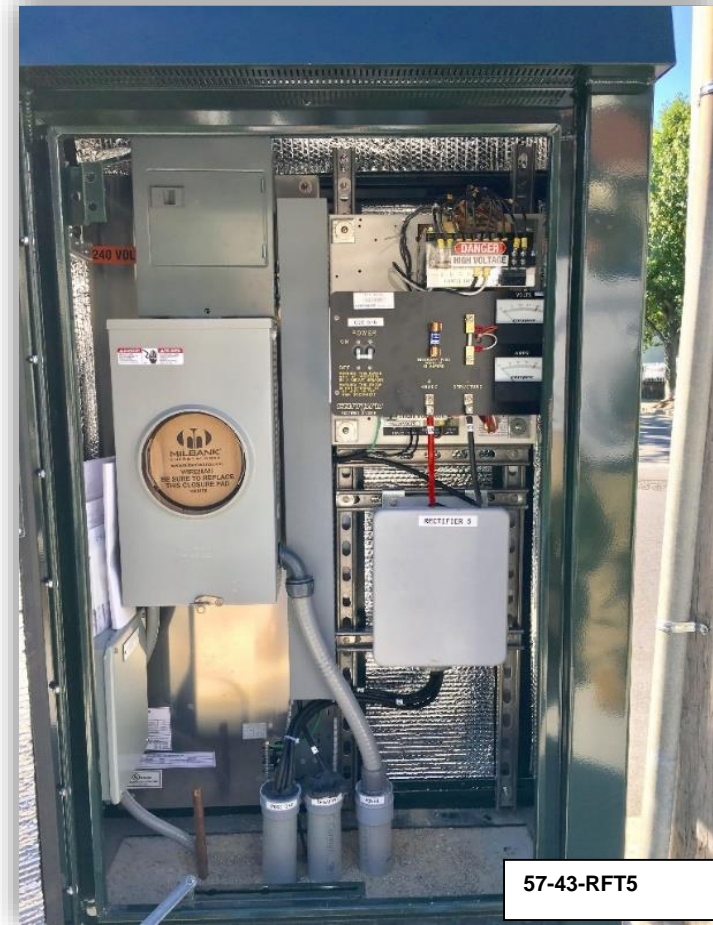
- Soil properties
- Electrochemical reactions with other nearby dissimilar metals
- High levels of hydrogen sulfide
- In storage tanks, reaction at the interface between the water and the interior surface of the tank wall
- Effects of stray currents from other structures in the vicinity



# Typical Test Stations and Rectifier Units



57-42-CTS1



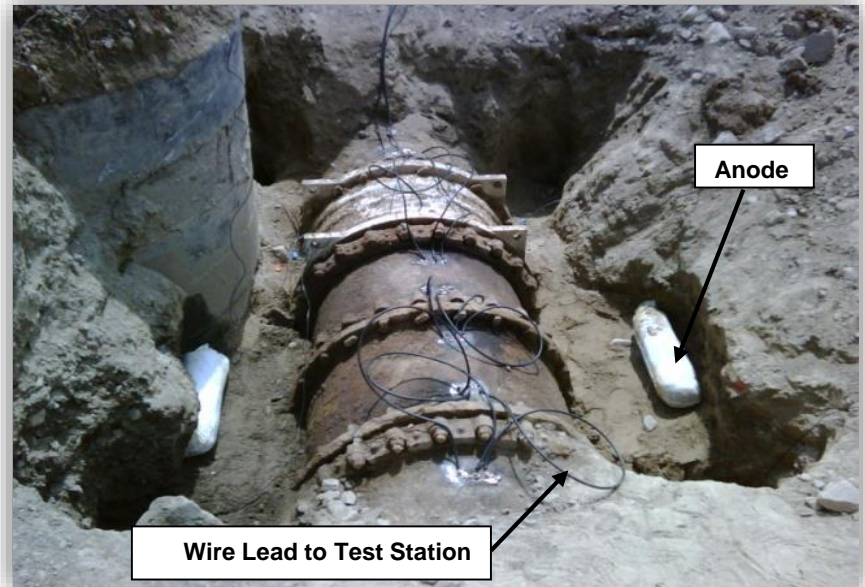
57-43-RFT5



# Corrosion Mitigation



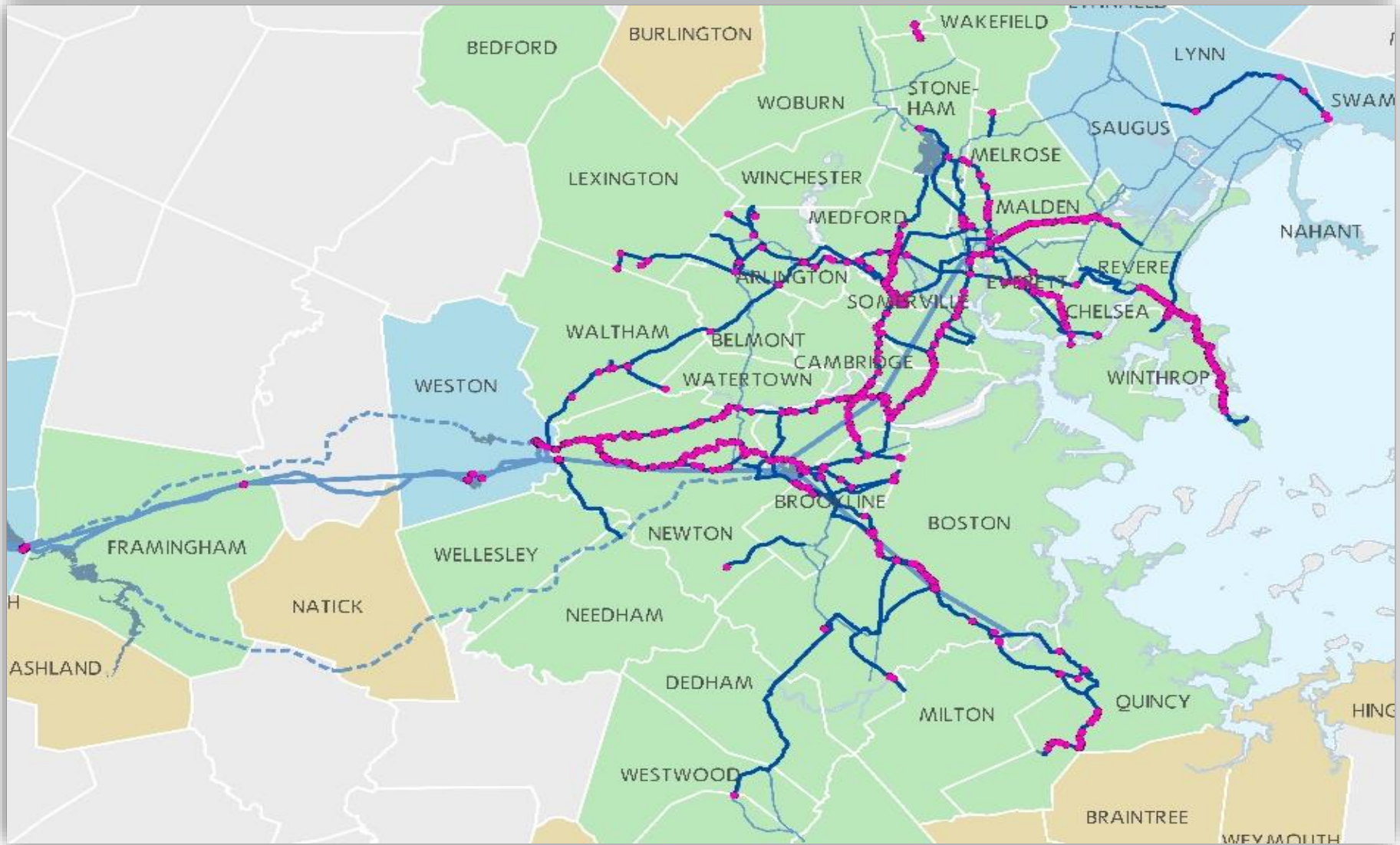
**Tape wrapped steel pipe reducer  
WASM 3 Connection, Arlington**



**Passive Sacrificial Anode System Installation  
Section 80 in Weston**



# MWRA Water System Cathodic Protection Test Stations





# MWRA Sewer System Cathodic Protection Test Stations





# Deer Island Treatment Plant Cathodic Protection Test Stations





# In-house Cathodic Protection Replacement



Welding Leads to Pipeline



Testing Cathodic Protection Station



# In-house Cathodic Protection Replacement



Coke Backfill Material Ready for Placement



5 Foot Anode Prior to Installation





# Cyber Security



# Computers Run Everything

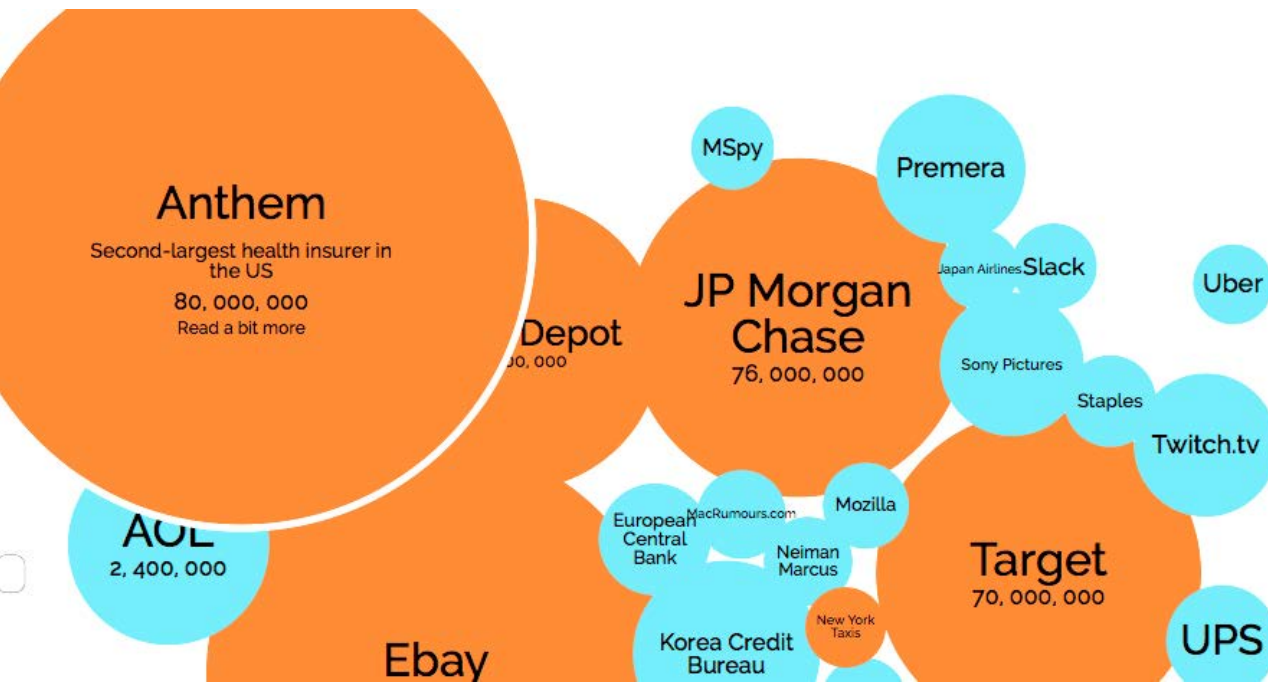
- MWRA has been very aggressive in implementing computer technology to modernize operations across the agency
- Virtually every function - big and small - is now dependent on IT
- But it comes with the risk of cyber attacks that could cripple parts, if not all, of the operation





# Data Breaches are Reported More and More Often

- Equifax
- Target
- Sony Pictures
- Children's Hospital
- And more...





# Our Networks and Email are Constantly Bombarded

## Total Events per month:

- 553 million total
  - 47 suspicious events
    - 27 actionable events

## Email Filtering per month:

- 1,700,000 messages received
  - 72% blocked, < 1% Quarantined



# Financial Issues



# Retirement System Funding

## MWRA Employee Retirement System

### Asset Allocation Considerations

	Current Target	Mix A	Mix B	7.75% Mix
Large Cap Equities	15%	15%	16%	10%
Small/Mid Cap Equities	6%	6%	6%	4%
Int'l Equities (Unhedged)	10%	10%	10%	16%
Int'l Sm Cap Equities (Unhedged)	5%	5%	5%	11%
Emerging Int'l Equities	4%	4%	4%	7%
<b>Total Equity</b>	<b>40%</b>	<b>40%</b>	<b>41%</b>	<b>48%</b>
Core Bonds	9%	8%	8%	10%
TIPS	4%	6%	8%	0%
Diversified Fixed Income	8%	8%	8%	0%
<b>Total Fixed Income</b>	<b>21%</b>	<b>22%</b>	<b>24%</b>	<b>10%</b>
<b>Total Global Asset Allocation</b>	<b>14%</b>	<b>15%</b>	<b>15%</b>	<b>0%</b>
Real Estate	7%	8%	10%	16%
Hedge Funds	9%	5%	0%	0%
Private Equity	9%	10%	10%	26%
<b>Total Alternatives</b>	<b>25%</b>	<b>23%</b>	<b>20%</b>	<b>42%</b>
<i>Expected Return 5-7 yrs</i>	6.6%	6.6%	6.6%	7.75%
<i>Standard Dev</i>	12.4%	12.5%	12.5%	16.8%
<i>Sharpe Ratio (5-7 years)</i>	0.39	0.39	0.39	0.36
<i>Expected Return 30 yrs</i>	7.6%	7.6%	7.6%	8.6%

**The MWRA Board has always been active in ensuring the portfolio asset allocation meets the Plans goals and objectives**

- As a result, the asset allocation has been reviewed and adjusted as needed to position the portfolio to best take advantage of current opportunities

**Based on recent discussions, we have provided two potential mixes which look to reorganize the hedge fund allocation**

- Both sample mixes look to either reduce or eliminate the hedge fund allocation in favor of more direct exposure throughout the portfolio
- Mix A reduces the hedge fund target to 5% from the current target of 9%
- Mix B eliminates hedge funds entirely

**By reallocating the funds across different asset classes, both mixes are able to achieve a similar risk adjusted returns**

**For reference, we have also profiled a portfolio targeting a 7.75% return. This results in a portfolio that has a vastly different structure and risk profile than the current approach**



# Retirement System Funding

## CHART 16

Funding Schedule – Fully Funded by June 30, 2024 with amortization payments calculated to increase 4.5% per year

(1) Fiscal Year Ended June 30	(2) Employer Normal Cost	(3) Amortization Payment	(4) Total Plan Cost: (2) + (3)	(5) Unfunded Actuarial Accrued Liability at Beginning of Fiscal Year	(6) Percent Increase in Total Cost
2018	\$2,804,146	\$473,223	\$3,277,369	\$18,666,103	--
2019	2,906,001	5,056,790	7,962,791	28,301,078	142.96%
2020	3,011,471	8,317,463	11,328,934	39,330,039	42.27%
2021	3,120,682	11,428,289	14,548,971	43,834,937	28.42%
2022	3,233,765	13,067,947	16,301,712	38,119,957	12.05%
2023	3,350,853	13,656,004	17,006,857	26,930,911	4.33%
2024	3,472,089	14,270,525	17,742,614	14,270,525	4.33%

Notes: Assumes contribution of budgeted amount for fiscal year 2018.

Recommended contributions are assumed to be paid on July 1.

Item (2) reflects 3.0% growth in payroll as well as a 0.15% adjustment to total normal cost to reflect the effects of mortality improvement due to the generational mortality assumption.

Projected normal cost does not reflect the future impact of pension reform for new hires.

Amortization payments are calculated to increase at 4.50% per year.

Unfunded actuarial accrued liability reflects deferred investment losses. Recognizing deferred investment losses means the System is anticipating investment losses on an actuarial basis.



# Time to Start Planning the FY2019-2024 CIP Spending Cap

