



Massachusetts Water Resources Authority

Update on MWRA Training Programs

November 18, 2015



Succession Planning

Maintaining Knowledge and Skills

Acquiring & Maintaining Professional Licenses/Certifications

Professional/Career Development

Facility Rehab & Start-up Vendor Training

Safety

Ensuring Accountability and Workplace Conduct





Maintaining Knowledge / Skills

- ASCE Managing the Design Process
- ASCE Design & Installation of Buried Pipes
- Specification Writing
- Environmental Compliance Strategies
- Wastewater Pumps & Hydraulics
- Fundamentals of Secondary Treatment
- Industrial Waste Treatment
- Chemical Delivery
- Hydraulics Institute Pump System Optimization
- Hands-on Microbiology
- Sampling for NPDES Permit & Process Control





- Water and Wastewater Operator
- O & M Collection Systems
- Wind Turbine Climbing & Rescue
- CDL
- Hoisting
- Professional Engineer (PE)
- Underground Storage Tanks (UST)
- Backflow Device Inspector/Tester
- Certified Control Systems Technician (CCST)





Professional/Career Development

- Vehicle Maintenance Technical Training
- Supervisory Development
- Blueprint Reading
- Business Writing
- MIS Classes









Safety

- OSHA 40, 24, 10, 8
- Hot Works Welding Safety
- Safety Awareness
- Confined Space
- Lockout/Tagout
- Electrical Safety for Non-Electricians
- MBTA & Keolis Right of Way & Track Safety

Right to Know



Hot Works Welding Safety

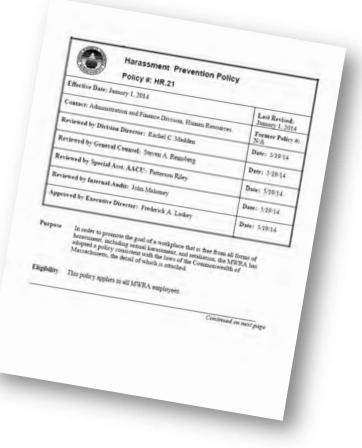
MBTA & Keolis Right of Way & Track Safety



Ensuring Accountability and Workplace Conduct

- Ethics
- Diversity
- Harassment Prevention
- Drug and Alcohol Abuse
- Active Shooter











North System Flow Shutdown – Event Overview

# of Valves / Flow meters		Total # of
Shutdowns		
Force Main Dewatering System*	NA	2*
Winthrop Terminal Facility*	21 / 6	18* (9 x 2)
North Main Pump Station	20 / 10	30 (10 x 3)
Total*	41 / 16	50*

^{*7} completed to date.

WTF: There is potential to eliminate 12 full North Systems shutdowns, may be able to limit shutdowns to WT flows only.



Summary of Shutdowns Through 11/17/15

Total of 11 shutdowns to date

4 trial shutdowns

5/20 – Chelsea Creek & Winthrop Flows only

6/10 – Ward & Columbus Park Headworks only

6/24 – All North System Flows for 4 hours

7/22 - All North System Flows for 8 hours

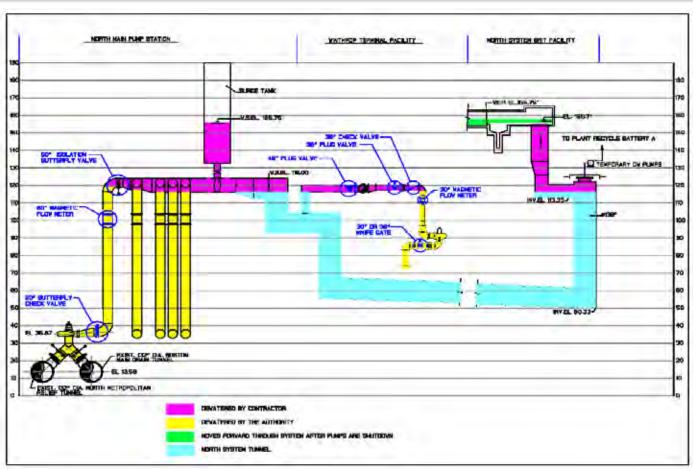
7 contractor shutdowns

9/1	5 hour:	Install FM dewatering system
10/20	8 hour:	Remove 1 st WT 48" FM Isolation valve
10/26	approx 6 hour:	Install 1st WT 48" FM Isolation valve
11/2	5 hour:	Remove 2 nd WT 48" FM Isolation valve
11/5	approx 7 hour:	Install 2 nd WT 48" FM Isolation valve
11/9	5 hour:	Remove 3 rd WT 48" FM Isolation valve
11/16	5.5 hours:	Install 3rd WT 48" FM Isolation valve



North System Shutdowns and Temporary Dewatering System

DITP force main (between NMPS & WT and the Grit Facility) water level must be lowered by 40 ft, (approx. 500,000 gal) to safely remove valves at NMPS & WT





Temporary Dewatering Suction Manifold



- Temporary dewatering connection
- Dewater 500,000 gallons to Primary
- Approx. 60 minutes to dewater
- Accomplished with 3 10,000 gpm pumps
- Automatically controlled by level





Dewatering System Install / Shutdown on 9-1-2015





Winthrop Terminal Facility Valve Replacement



Completed to date:

- Three 48-inch Plug Valves on WTF Force Mains Replaced
 - Each valve 19,000 lbs
 - 10 ft off flow / near ceiling
 - Restricted by fire service lines & conduits
 - 35 bolts (1.25" dia.) per side
 - 6 restraining rods
 - Dresser coupling with 30 bolts
- Allowed two Shutdowns (11pm to 7am) per valve



Winthrop Terminal 48" Valve Removal – Sequence of Work

Day(s) in Advance:

- Exercise/replace 70 bolts on valve
- Exercise/replace 6 restraining bolts
- Exercise/replace Dresser coupling 30 bolts
- Arrange scaffolding
- Move service pipes/electrical conduits in way

Morning of Work:

- Set up crane Rig Valve
- Verify dewatering system operation
- Remove 1/3 of bolts on valve
- Set rigging for blank flanges
- Inventory supplies, extra components available on site



Crane to Place Valves into Position



Crane used to aid work

Crane boom penetrates roof & 1st floor through 3 foot square opening to support valve in lower level

- 19,000 lb valve
- Pre-Rigged for drop/lift
- Must be level only 0.5" to 1.5" space between piping



Winthrop Terminal 48" Valve Removal – Sequence of Work

Day of Work:

- 1 hr to dewater force main confirm liquid level
- Maximum of 7 hrs to complete work
 - Remove remaining bolts (valve supported by crane)
 - Remove restraint rods
 - Remove dresser coupling verify ample spacing
 - Drop valve
 - Install blank flange & mega-lug blank
 - Re-install restraining bolts
 - Install strong backs on blanks
 - Install jacks for lateral support between pipe sections
 - Restore pumping operation





Removal of 48" Force Main Isolation Valves







Remove Existing Valves







Remove Existing Valve by Wall







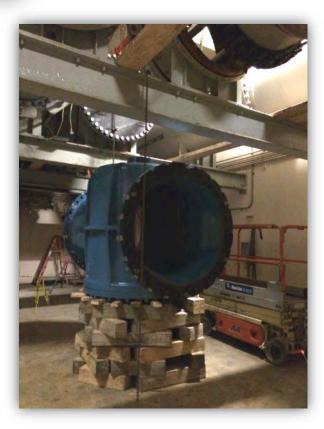
Rig New Valve into Building







Install New 48" Plug Valve







Rig New Valve into Position / Make Final Connections





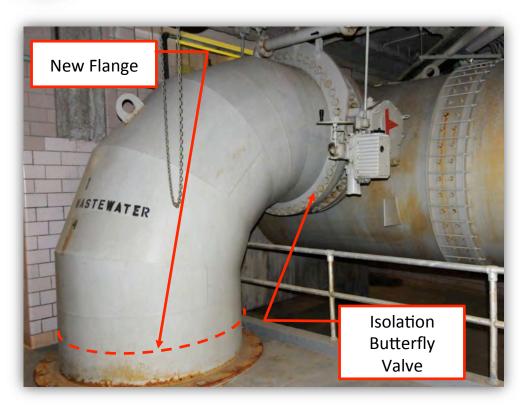


Install New Coupling Assembly





Future Valve Replacement Challenges – North Main Pump Station



- Larger valves 60"
- Tight confining spaces
- Rigging from ceiling (no crane openings)
- No flange on elbow pipe must be cut
- Still working in 7 hr construction window
- Once cutting begins point of no return
- NS Flows can not be restored until blank is installed on force main.



MWRA Collection System – Only North Flows Impacted



North System Tributary Areas

Winthrop Terminal Facility System

- BWSC (E. Boston)
- Revere
- Winthrop

Chelsea Creek Headworks System

- Arlington
- Bedford
- Belmont (portion)
- BWSC (Charlestown)
- Burlington
- Cambridge (portion)Chelsea
- Everett
- Lexington
- Malden
- Medford
- Melrose
- Reading
- Somerville
- Stoneham
- Wakefield
- Wilmington
- Winchester
- Woburn

Columbus Park Headworks System

- BWSC (Downtown, S. Boston, Dorchester)
- Milton

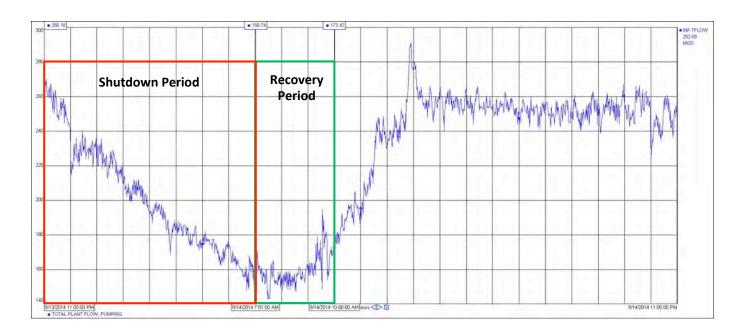
Ward Street Headworks System

- Belmont (portion)
- Brookline
- Cambridge (portion)
- Newton
- Waltham
- Watertown



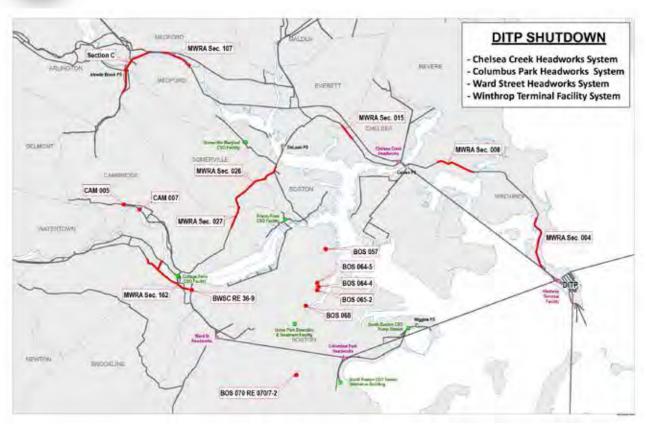
When are the Shutdowns Occurring?

- NS Shutdowns scheduled between 11PM-7AM
 - When flow conditions allow
 - All work Weather dependent





Collection System Monitoring Locations



Critical locations will be monitored

Staff will be recording elevations every 15 minutes

Immediately notify the EOC when the elevation reaches a pre-determined elevation at each station



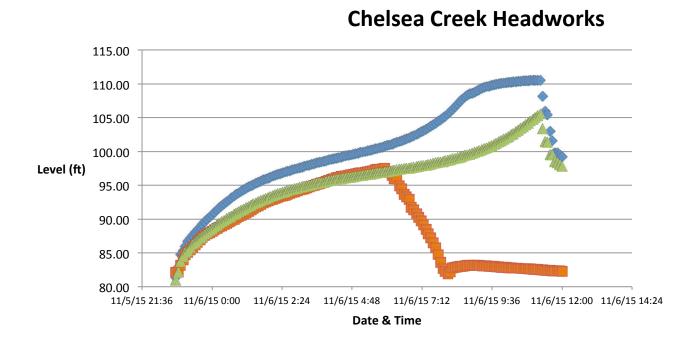
Elevation Readings at the Monitoring Locations

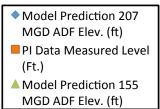


Staff record elevations every 15 minutes throughout shutdown.



Elevation Readings at the Monitoring Locations



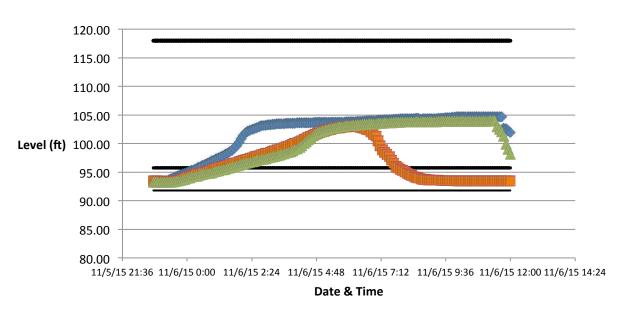


Staff in the EOC monitor facility elevations to compare against model simulated system response.



Elevation Readings at the Monitoring Locations





- Model Prediction 207 MGD ADF Elev. (ft)
- PI Data Measured Level (ft)
- Model Prediction 155 MGD ADF Elev. (ft)

Location: Arlington Ave, Charlestown (SECWRA: 035

Sta. 0009+72)

Interceptor: Metropolitan Sewer, Somerville-Medford

Branch Sewer

Staff in the EOC monitor in system meters to compare against model simulated system response.





Massachusetts Water Resources Authority

Emergency Response Drill Wachusett Reservoir

November 18, 2015



Concern Over Train Travel by the Wachusett Reservoir

- Pan Am Railway line along the Wachusett Reservoir
- Typically two freight trains per day
- Carrying a variety of chemicals including crude oil
- Train derailments fairly common in the United States and Canada





The Participants

- MWRA
- Department of Conservation and Recreation
- Department of Environmental Protection
- Pan Am Railways
- South Wachusett Regional Emergency Planning Committee
- Federal Railroad Administration
- Transport Security Agency
- Environmental Protection Agency
- Mass State Police
- Mass Emergency Management Agency
- Mass Department of Transportation

- Mass Department of Fire Services
- Mass Fusion Center
- University of Massachusetts Amherst
- West Boylston Fire Department
- Boylston Fire Department
- Holden Fire Department
- Sterling Fire Department
- Clinton Fire Department
- West Boylston Water District
- Clinton DPW / Water District
- Boylston Water District
- Anna Marie College



Precautions Taken

- Monitor rail car contents
- Work with Pan Am Railways on track condition and train speed
- Work with the DCR on deploying booms
- Reservoir modeling by University of Massachusetts, Amherst
- Spill Emergency Response Plan
- Research into water treatment effects on chemicals





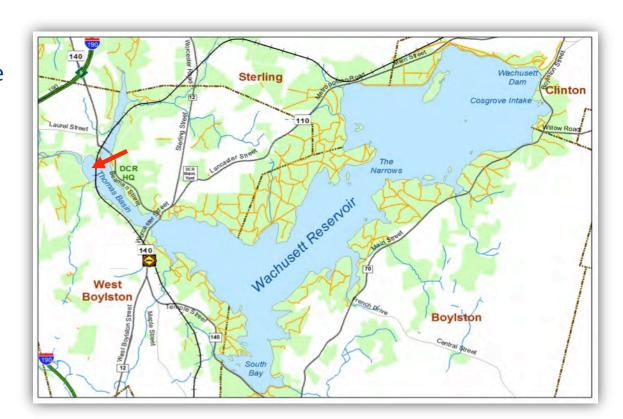
Exercises Simulating a Train Derailment

- Desktop drill on December 16, 2014
- Field drill on October 15, 2015
 - 1 train
 - 20 bags of peat moss
 - 230 participants





- Train derails on the Quinapoxet Causeway in the Thomas Basin
- One rail car ruptures and spills 30,000 gallons
- Two rails cars develop slow leaks
- Red placards read "1267"

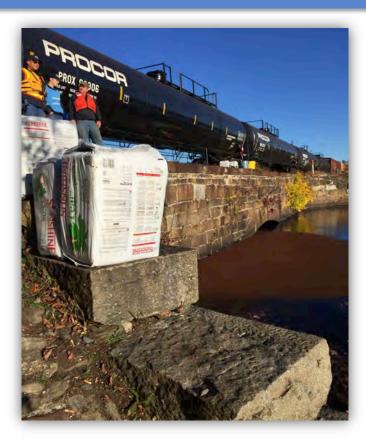




Peat Moss

 Peat moss was used to simulate floating crude oil





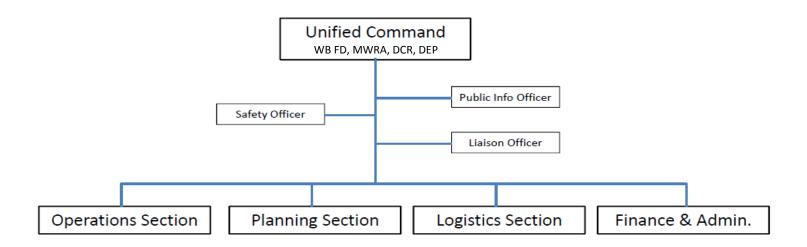


The Drill Begins





Incident Command System and Unified Command





Status Briefing





Remote Sites – Cosgrove and Carroll WTP

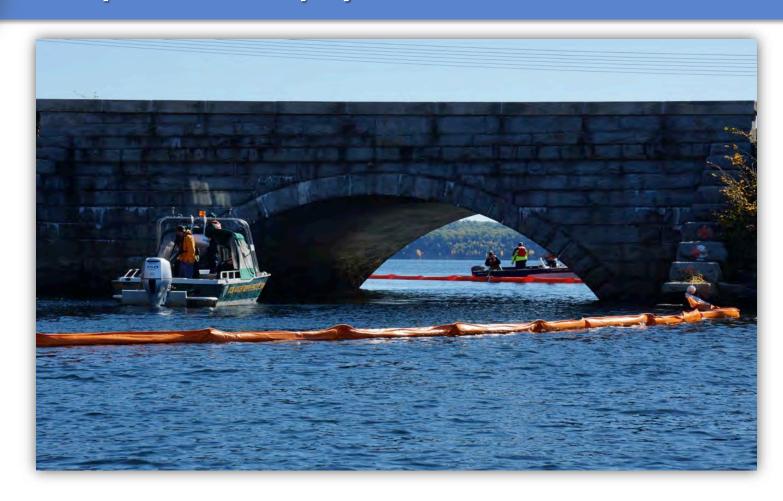


First Boom





Subsequent Boom Deployments – Route 12



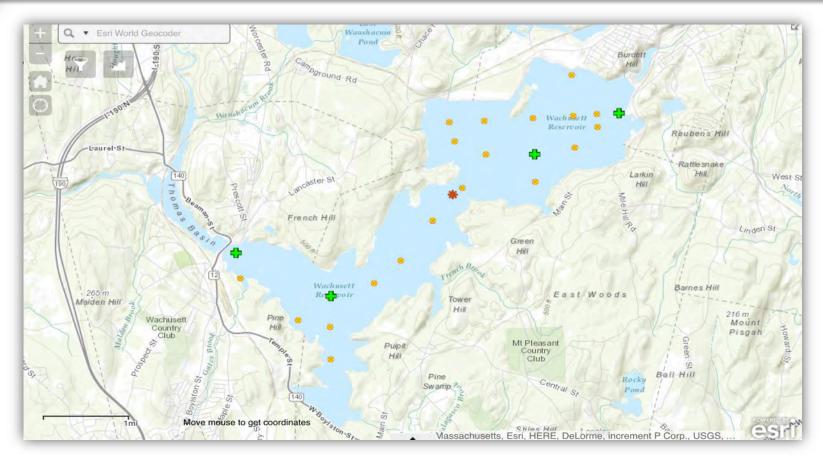


Boom in Front of Cosgrove Intake



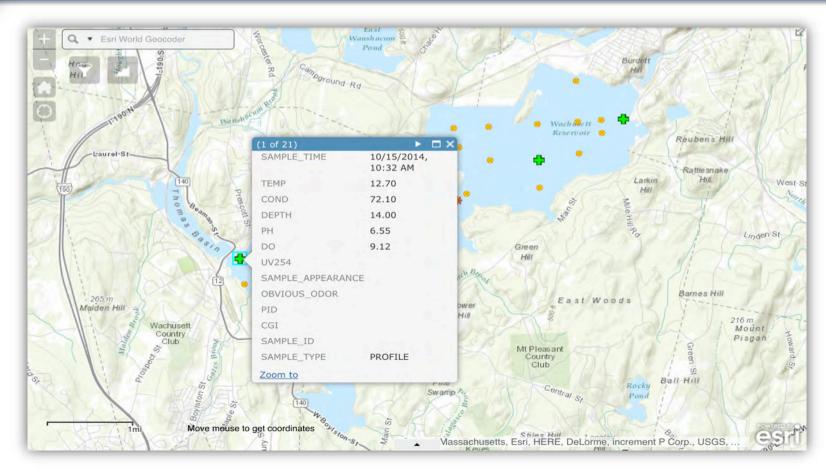


Water Quality Sampling





Sampling Data Base





Lessons Learned

- More frequent status updates
- Second common radio channel
- Possible Wiki use for event log
- Better ICS resource tracking
- CWTP EOC reconfiguration
- Better Cosgrove boom moorings
- Surface transport model needed
- More robust Mobile Lab GC/MS











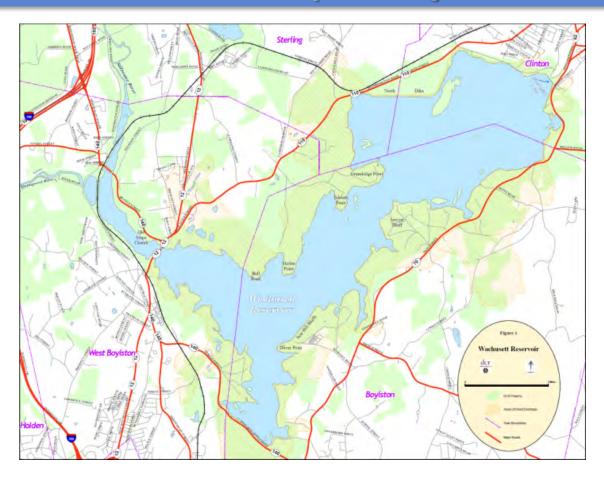
Massachusetts Water Resources Authority

Remediation of Direct Discharges at Wachusett Reservoir

November 18, 2015

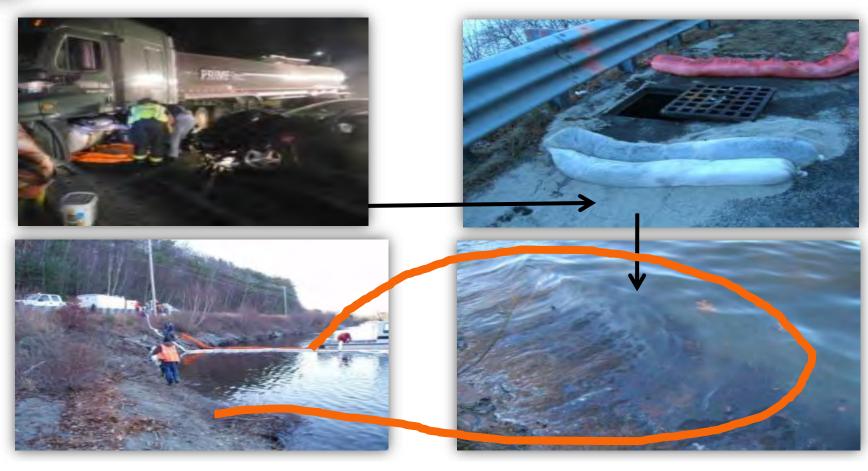


Wachusett Reservoir is Surrounded by Major Roads Stormwater Runoff and Risk of Spills = WQ threats





Water Quality Threat – Hazardous Spills





Direct Discharge: Location Where Runoff Is Directed To The Reservoir, Through A Pipe Or Other Structure







Initial Road Drainage Assessment

- Conducted in 2008
- Identified priority areas for treatment or removal
- Made initial recommendations:
 - Phase I
 - Phase II





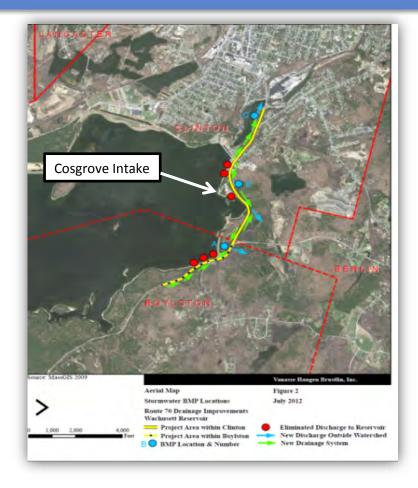
Prior Work: Cosgrove Intake Stormwater Improvements 1998





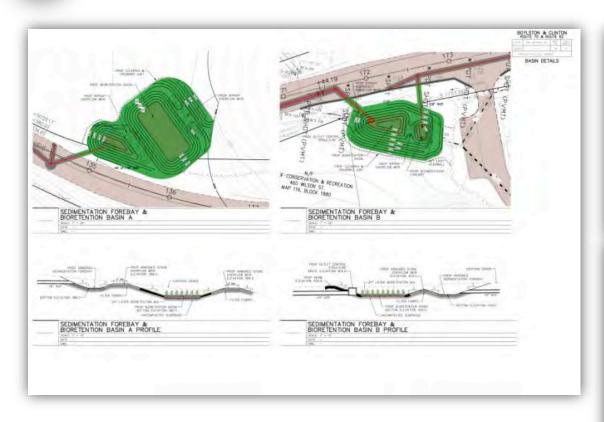
Phase I Project - Completed

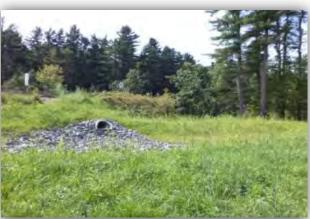
- Design awarded 2009
- MassDOT funded construction, completed in 2012
- Eliminated 6 direct discharges; two local BMPs
- Total cost \$1.9 Million





Phase I BMP — Infiltration Basin at Rt 70

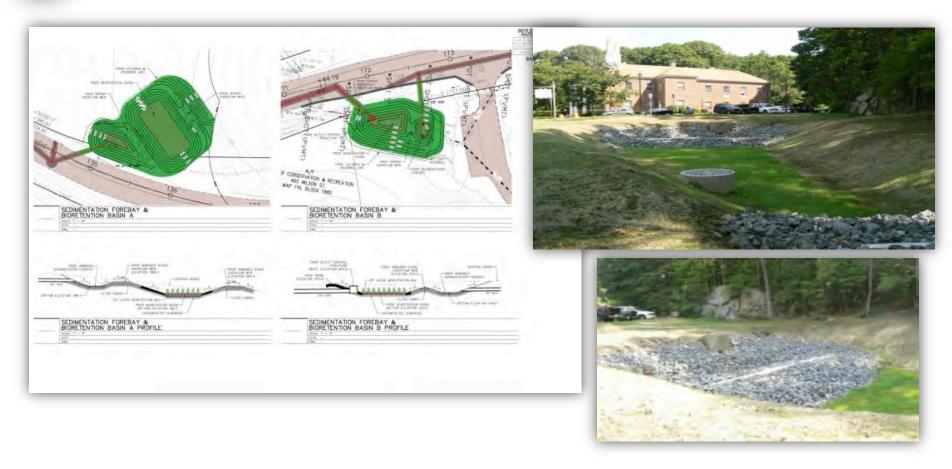






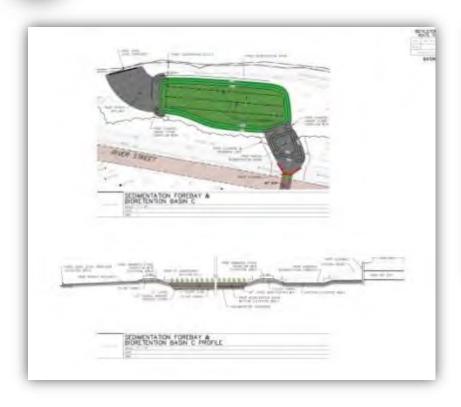


Phase I BMP - Bioretention Basin at Clinton Courthouse





Phase I BMP – Bioretention Basin at River Road

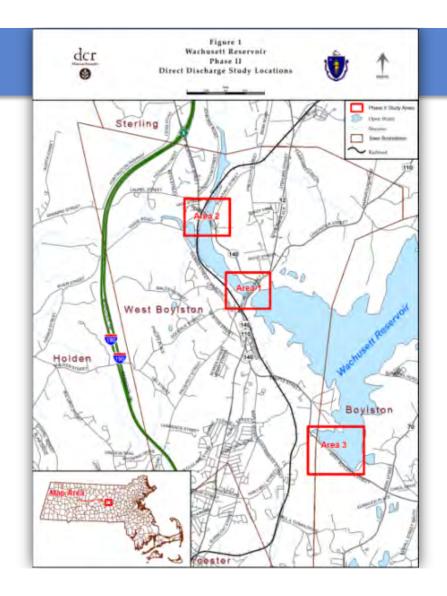




- All BMPs inspected by DCR 2x/year; and after any storm > 3 inches.
- DCR agreement w/ MA DOT for each project stating DCR will maintain BMPs.



Phase II Project - 3 Areas





Area 1 - Route 12/140 Causeway — Existing Conditions



Road runoff down hill and directly to reservoir from road



Area 1 - Route 12/140 Causeway — Proposed Design





Area 2 - Beaman Street Bridge — Existing Conditions

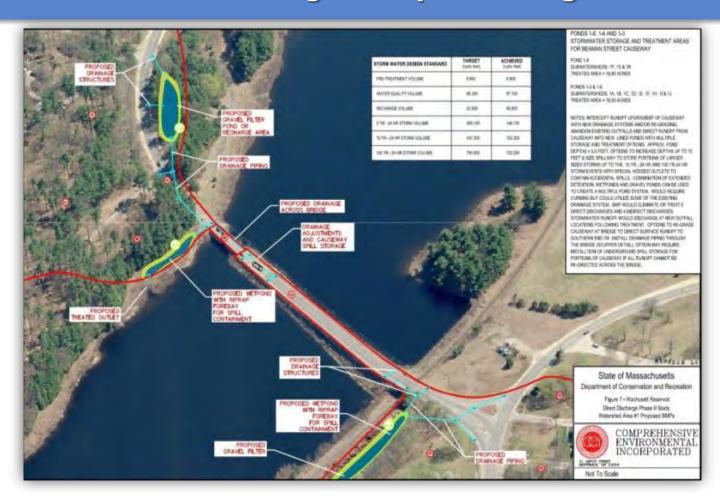


Road runoff down hill to reservoir





Area 2 - Beaman St. Bridge - Proposed Design





Area 3 - South Bay — Existing Conditions





Road runoff to reservoir via direct discharges



Area 3 - South Bay — Proposed Design





Area 3 - South Bay — Proposed Design





Phase II Project Status

Area 1 - Route 12 Causeway

Design awarded.

MassDOT bid Sept. 2015

Construction 2016

\$ 3.0 M (excluding water main - at Town cost)

Area 2 - Beaman St. Bridge

75% Design completed

Public Hearing Fall 2015

Anticipated accelerated Bid in 2016/Construction 2017

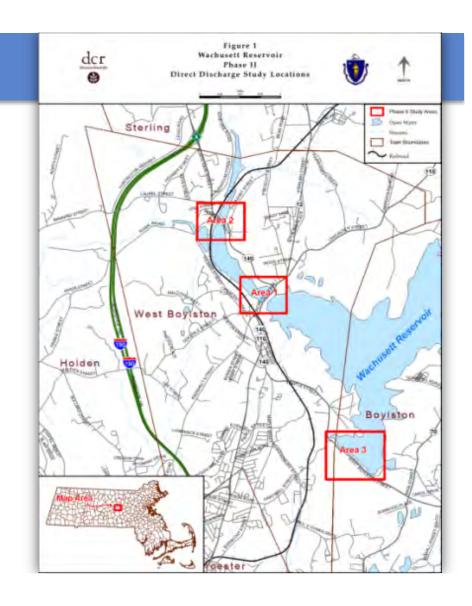
\$1.0 M (excluding water main - at Town cost)

Area 3 - South Bay

75% Design completed

Public Hearing Fall 2015

\$ 1.4 M





Wachusett Reservoir Direct Discharge Summary

- Program Underway to Eliminate/Mitigate Roadway Spills/Stormwater Discharges
- Prioritized Based Upon Location/Potential Water Quality Impacts.
- DCR Watershed/MWRA/MassDOT and Town of West Boylston Coordinating
- MWRA Funding Design: \$698,000
- MA DOT Funding Construction: \$8,091,400



Project	DCR Fiscal Year Budgets*	Total Design Cost included in DCR Budget	Construction Year	MassDOT Funding	Potential additional DCR costs	
Phase I						
Phase I – Cosgrove Intake roadway area improvements	FY9 – 12	\$173,000	2012	\$1,900,000	-	
Phase II						
Conceptual Study	FY12	\$ 45,000	-	-	-	
Area 1 - Rt 12 Causeway Improvements	FY12-16	\$191,000	2016	\$3,000,000***	-	
Area 2 - Beaman St. Bridge Improvements	FY13-16	\$116,000	2020**	\$1,001,800***	\$60,000	
Area 3 - South Bay Improvements	FY15-16	\$173,000	2020	\$2,189,600	\$60,000	
Total		\$698,000		\$8,091,400	\$120,000	

^{*}Water Supply Protection Trust- approved

^{**} Anticipated acceleration to 2016/17

^{***} Excluding town-funded water main





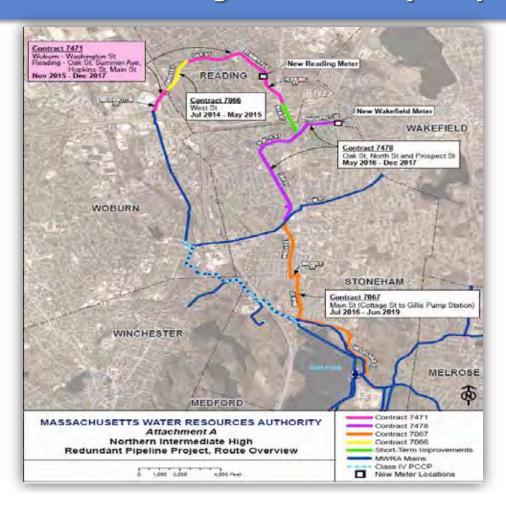
Massachusetts Water Resources Authority

Northern Intermediate High Section 110 Reading and Woburn Construction Contract Award

November 18, 2015

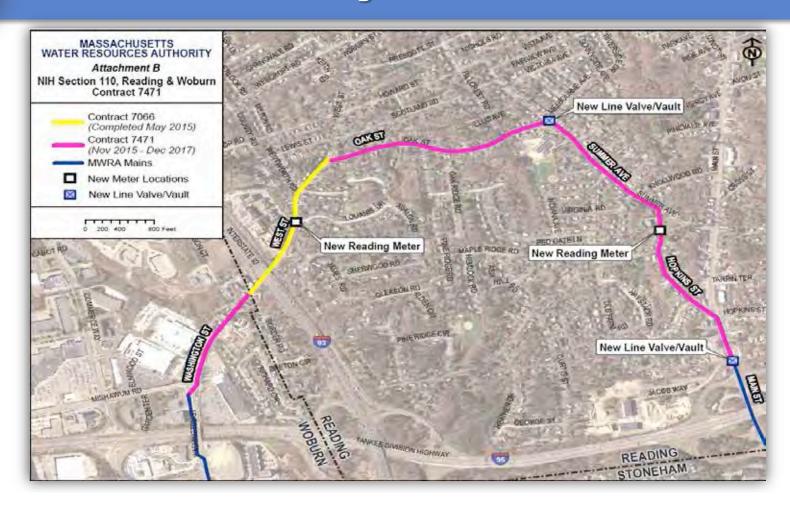


Northern Intermediate High Redundancy Loop





Northern Intermediate High Contract 7471





Bid Results for Contract 7471

General bids were opened on October 22, 2015 as follows:

Albanese D&S \$9,	888,000
P. Gioioso and Sons \$9,	945,400
Fed Corp \$10	0,054,809
Baltazar Contractors Inc. \$10	0,417,000
Albanese Brothers Inc. \$10	0,897,000
Revoli Construction \$13	1,032,450
RJV Construction \$13	1,888,000
P. Caliacco Corp. \$12	2,178,000
The Dow Company \$12	2,713,000
McCourt Construction Company \$15	5,811,000
Engineers Estimate \$10	0,100,000



- Low bidder is Albanese D&S
- Prior MWRA projects:
 - Northern High Service Pipeline Improvements-Section 53
 - Northern Intermediate High Stoneham-Reading Connection
 - Cummingsville Branch Replacement Sewer

Recommendation

- Staff have determined that Albanese D&S is qualified to construct contract Northern Intermediate High Section 110 – Reading and Woburn and is the lowest responsible and eligible bidder
- Staff recommends the award of Contract 7471 to Albanese D&S in the amount of \$9,888,000 for a contract duration of 808 calendar days



Construction Notice to Proceed
 November 2015

Construction Substantial Completion December 2017





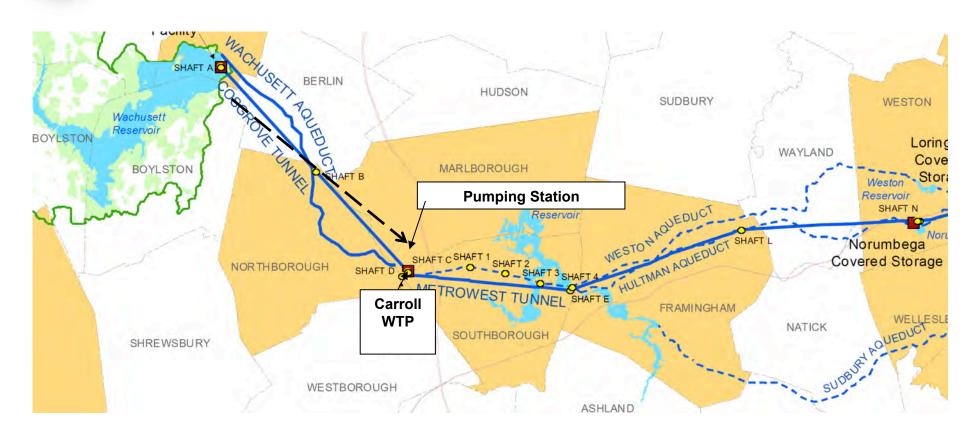
Massachusetts Water Resources Authority

Wachusett Aqueduct Pumping Station Construction Contract Award

November 18, 2015

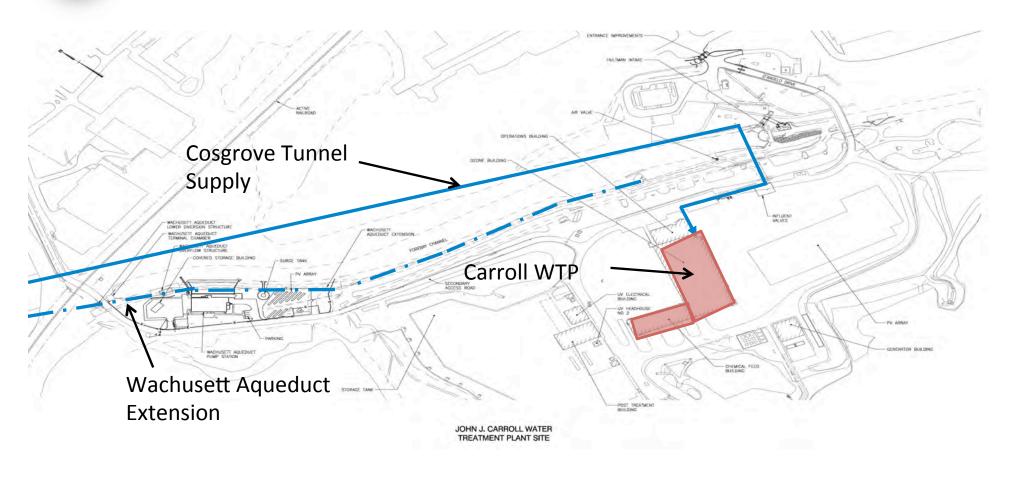


MWRA Transmission System



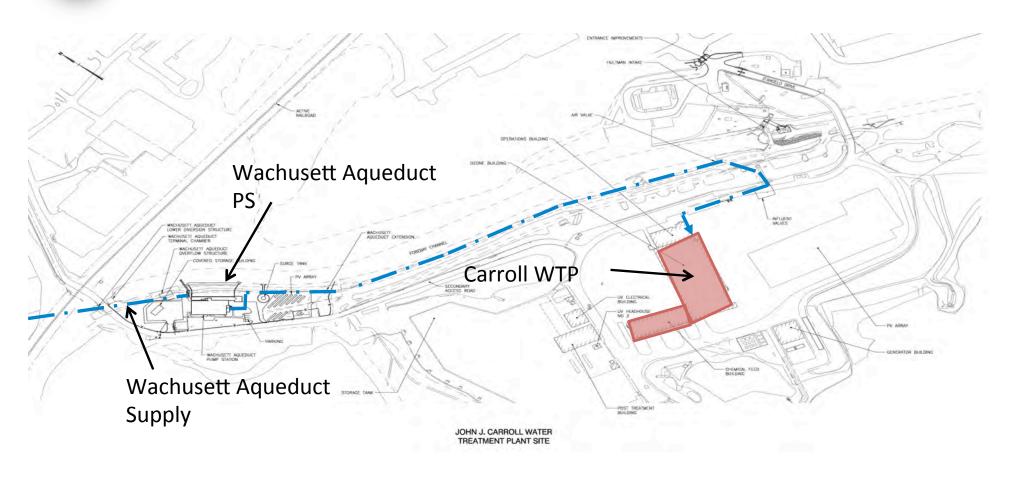


Carroll WTP Supply – Cosgrove Tunnel





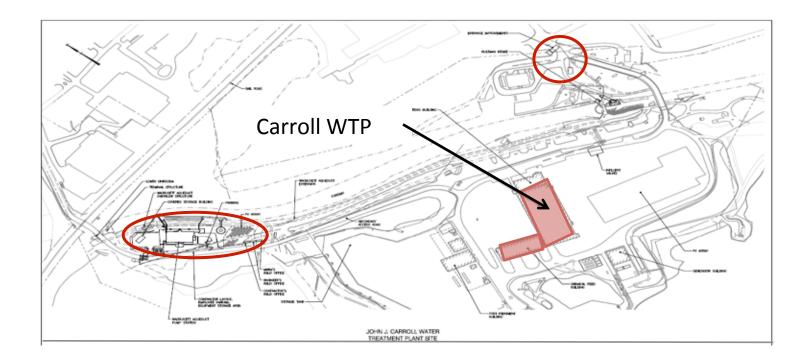
Carroll WTP Supply – Wachusett Aqueduct for Redundancy





Major Design Elements

- 240 mgd pumping station located near the end of the Wachusett Aqueduct
- Security Gate Improvements





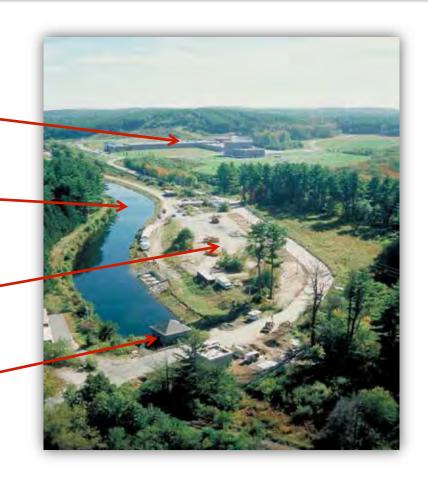
WAPS and Carroll WTP Site



Forebay Channel

Wachusett Aqueduct Pumping Station Site

Wachusett Aqueduct Terminal Chamber





Wachusett Aqueduct Pump Station Rendering

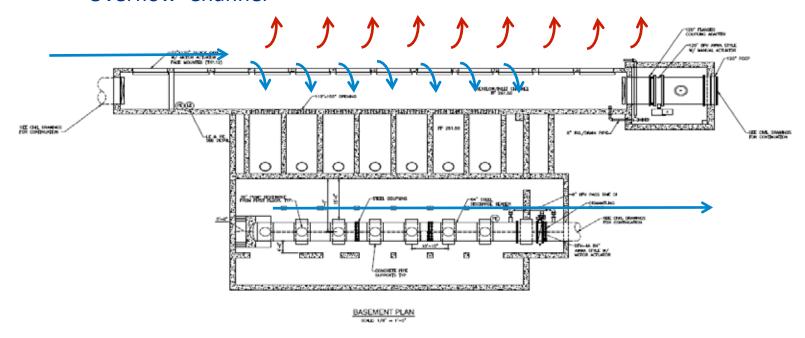
- 122' x 68' and 51' high masonry building
- Surge tank
- Storage yard





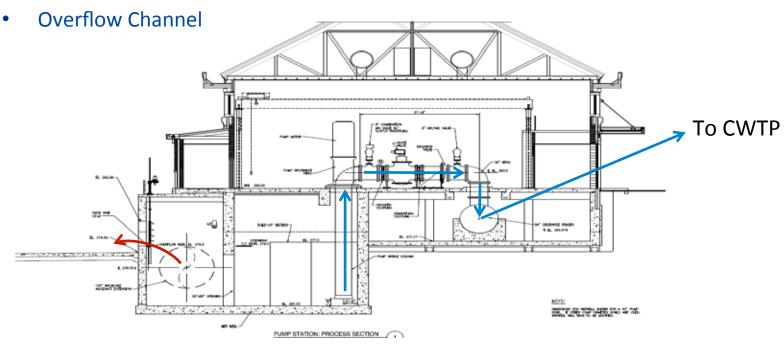
Basement Plan

- Seven 40 mgd pumps with 700 hp motors (six for 240 mgd and one stand-by)
- Control valves on pump discharge to prevent surges
- Overflow Channel



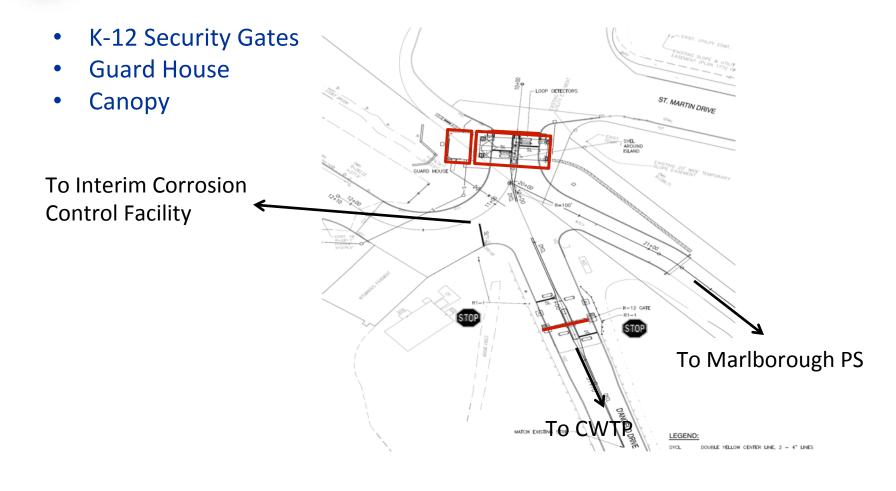


- Constant speed vertical turbine pumps
- Intake Channel





Entrance Improvements





Entrance Improvements





Bid Results for Contract 7157

General bids were opened on October 15, 2015 as follows:

•	BHD/BEC JV 2015, A Joint Venture	\$47,011,000
•	Walsh Construction Company	\$47,789,433
•	PC/R.H. White, Joint Venture	\$47,855,000
•	Carlin Contracting Co., Inc.	\$49,586,840
•	Daniel O'Connell's Sons	\$49,967,433
•	J.F. White Contracting Co.	\$50,467,433
•	Engineer's Estimate	\$60,500,000

Contractor

Low bidder is BHD/BEC JV 2015, A Joint Venture:

- Barletta Heavy Division
- Barletta Engineering Corporation
- Numerous Prior MWRA projects including John J. Carroll Ozone Treatment Plant

Recommendation

- Staff have determined that BHD/BEC JV 2015 is qualified to construct the Wachusett Aqueduct PS and is the lowest responsible and eligible bidder
- Staff recommends the award of Contract 7157 to BHD/BEC JV 2015, A Joint Venture in the amount of \$47,011,000 for a contract duration of 1,260 calendar days



Construction Notice to Proceed
 December 2015

Construction Substantial Completion June 2019

