





***Update on Containment Spill Response Program  
at Reservoirs***

December 19, 2018



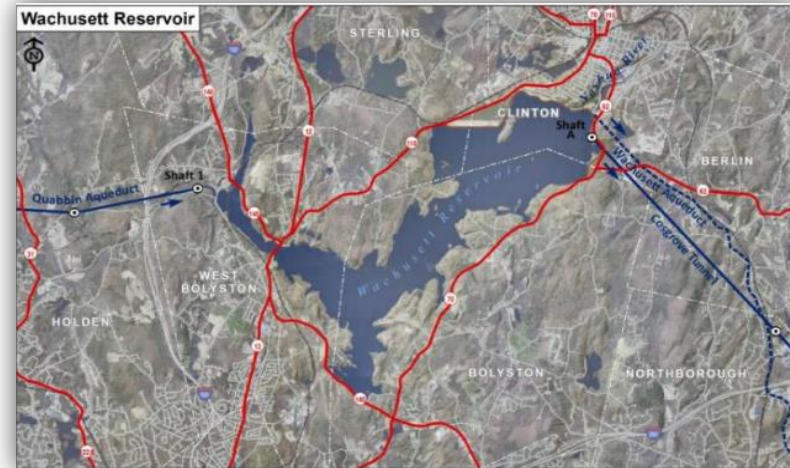
# Threats In The Watersheds

## Roadway Threats:

- Over 100 miles of roadway combined in watersheds
- Fuel oil /heating oil trucks
- Saddle tanks on large trucks

## Railroad (Wachusett only):

- Staff reviews RR cargo manifests
- Response operations depend on the type of spill





# Equipment: 8 Response Trailers Staged at Quabbin and Wachusett



Boom deployment support equipment



Terrestrial Spill Response equipment





# Equipment: Several MWRA, DCR and FD Boats Available



MWRA



Watershed Fire Depts.

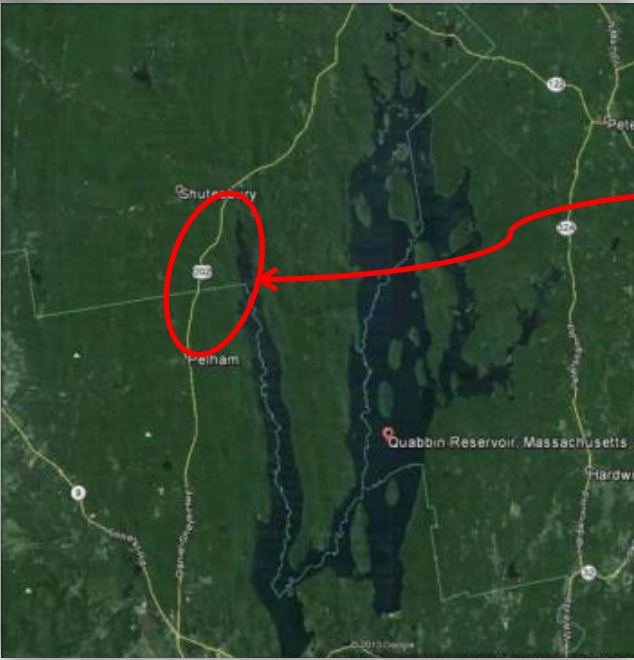


DCR-DWSP





# Equipment: Remote Rt. 202 Quabbin West Branch Boom Shed



Rt 202 threat at this location





# Equipment: Cosgrove Intake Boom Staged For Rapid Boat Response

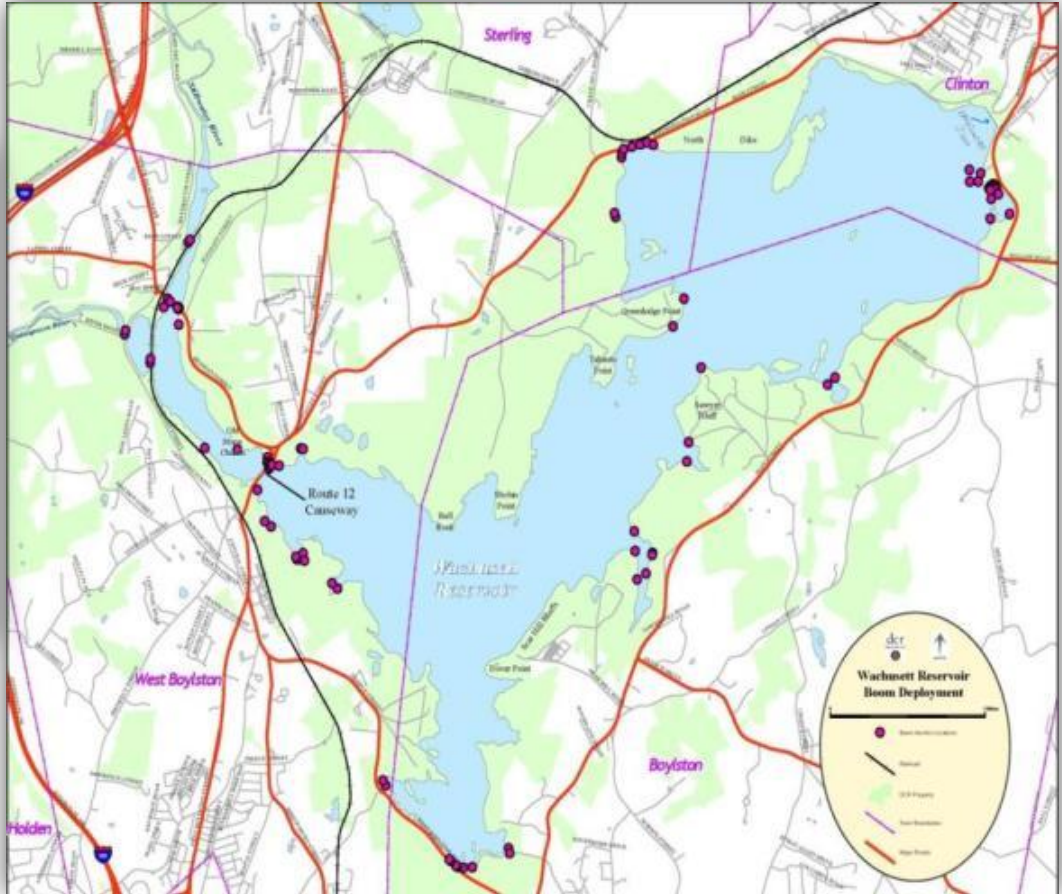


Boom definition cans anchored off the intake for quick connection





# Prepositioned Boom Anchor Points For Strategic Collection







# Training: Experienced, Engaging Trainer Key For Skills Reinforcement





# Training: Night Operations Take More Detailed Planning Due To Safety Concerns





# Training: Local Watershed Fire Departments Important Partner





# Booming Techniques: Vary To The Spill And Conditions





# Booming: Open Water Floatable Contaminant Collection





# Booming: MWRA ESU Metro Training At Spot Pond





# Booming: Watershed Tributary Spill Response





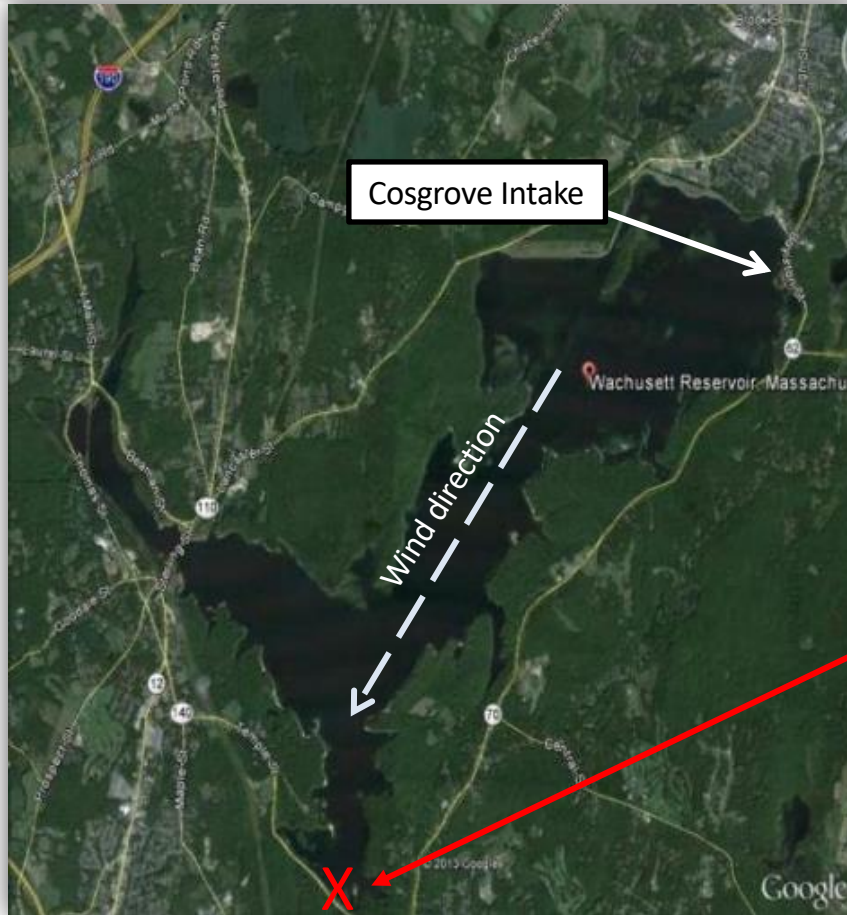
## Response: Actual release incidents that put training into action

- 2008 - Rt 140 diesel release at Wachusett Reservoir
- 2010 - Discarded 55-gal. drum discovered at Quabbin watershed
- 2016 - Car in water at Spot Pond
- 2018 – Vehicle accident at Ware River Shaft 8 Intake





# Response To Diesel Spill On January 2, 2008





# Response: Watershed Staff Played A Crucial First Responder Role On January 2, 2008 Diesel Spill





# Response: Discarded Drum In Quabbin Watershed In 2010





# Response: Vehicle Accidents At MWRA Facilities



Spot Pond 2016



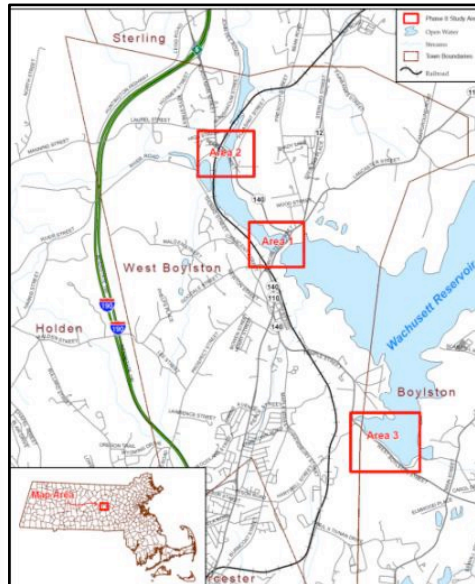
Ware River Shaft 8 Intake 2018



# Removal of Direct Discharges from Roadways at Wachusett



Phase II areas: Completed 2017



Phase I, Cosgrove Intake area: Completed



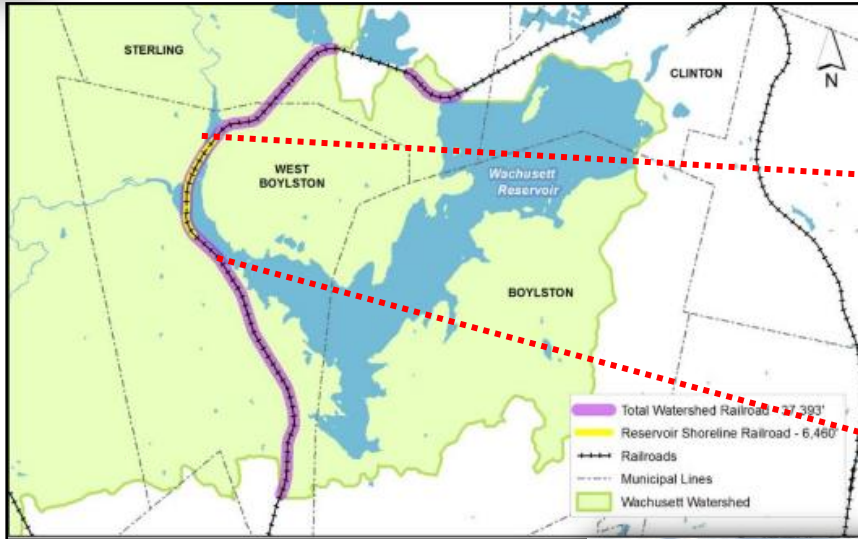


# Direct Discharge Basins, Dry And Post-storm Detention





# Remaining Challenges - Railroad Crossing Watershed







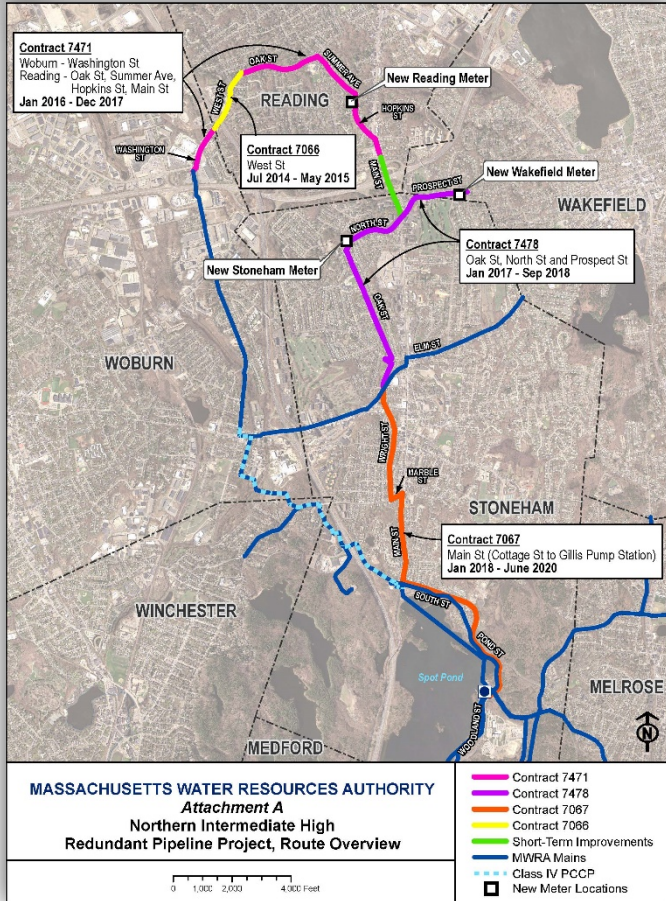


***Northern Intermediate High Service  
Redundant Pipeline  
Contract 6906, Amendment 3***

December 19, 2018



# NIH Contract 6906 Stantec Consulting Services



- **Contract 7066: (\$2,230,715)**
  - 2,400 linear feet of 36-inch pipeline
  - Completed May 2015.
- **Contract 7471: (\$12,230,715)**
  - 8,800 linear feet of 36-inch pipeline
  - Completed December 2017
- **Contract 7478: (\$18,512,415)**
  - 7,800 linear feet of 48-inch pipeline
  - 2,600 linear feet of 16 and 12-inch pipeline
  - Completed September 2018
- **Contract 7067: (\$22,737,300)**
  - 14,000 linear feet of 48-inch pipeline
  - NTP June 2017/Completion June 2020
  - 7,500 linear feet installed to date

**Total Construction Cost \$55,700,000**



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## Amendment 3 Summary

Out of Scope Changes	\$285,500 *
Additional Local Record Drawings	\$137,500
Re-Stationing of Section 110	\$45,000
<b>TOTAL</b>	<b>\$468,000</b>

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\* Offset by settlement agreement of \$80,000 for design error on Oak Street drain line rework

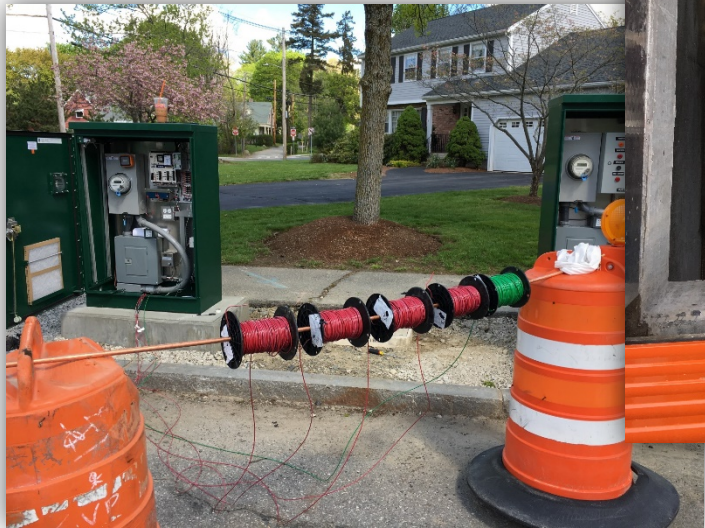


# NIH Stoneham Meter 122 Installation



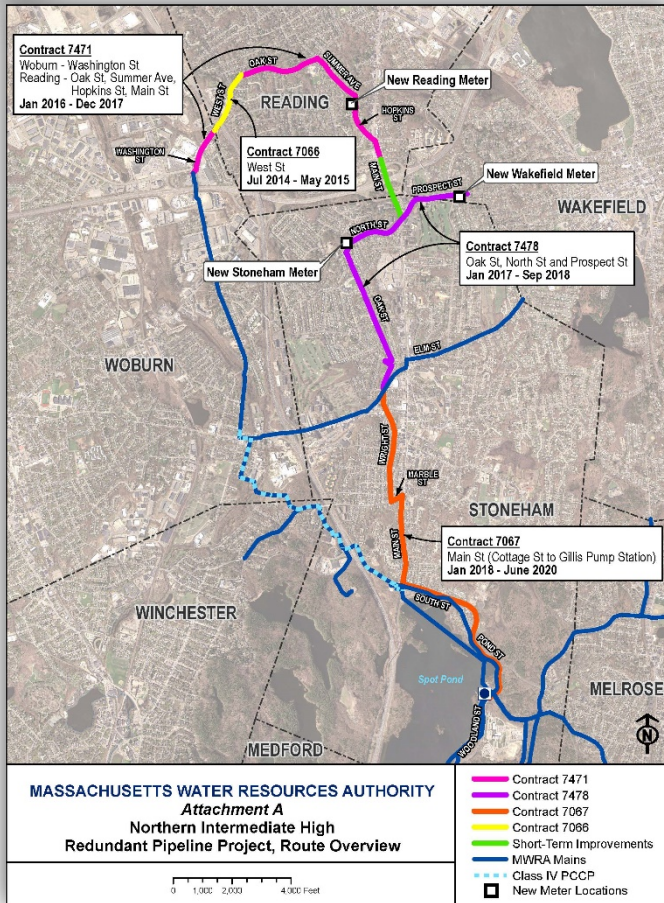


# NIH Reading Meter Cabinet and Line Valve Bypass





# NIH Additional Drawing Updates



## Re-Stationing of MWRA Section 110 Drawings

- 13,100 linear feet of 36-inch pipeline
- 21,800 linear feet of 48-inch pipeline
- 2,600 linear feet of 12/16 -inch pipeline
- Five separate construction contracts
- Three separate design consultants

## Local Water, Drain, and Sewer Drawings

- 18,750 linear feet of 4 to 30 inch diameter





***Delegated Authority Report***

December 19, 2018





# Recent Vehicle Purchases - Pricing

## MSRP vs. Bid Price

Vehicle	MSRP	Liberty Chevrolet	Colonial Ford
2019 GM K3500 Double Cab	\$77,915.00	\$65,464.00	<b>\$64,389.50</b>
Equinox SUV	\$33,001.25	<b>\$29,164.00</b>	\$31,284.00
GM Bolt	\$47,720.62	<b>\$40,656.00</b>	\$41,848.75
GM 2500 155" WB Series Van	\$49,281.25	\$40,560.00	<b>\$39,768.50</b>

*Prices include Fees, Options, and Outfitting*

## Competition Across Bid Items

Vehicle	Quantity	Liberty Chevrolet	Colonial Ford
K3500 Double Cab	1	\$65,464.00	<b>\$64,389.50</b>
K1500 Double Cab	1	\$35,121.50	<b>\$32,086.10</b>
K2500 Double Cab, no plow	1	\$37,660.00	<b>\$36,735.35</b>
K1500 Double Cab <i>(slightly different lighting package than line #2)</i>	2	\$69,813.00	<b>\$63,947.20</b>
Colorado Crew Cab	2	<b>\$78,726.00</b>	\$82,575.50
K2500 Crew Cab	3	<b>\$193,972.80</b>	\$205,231.50



# Electric Vehicles

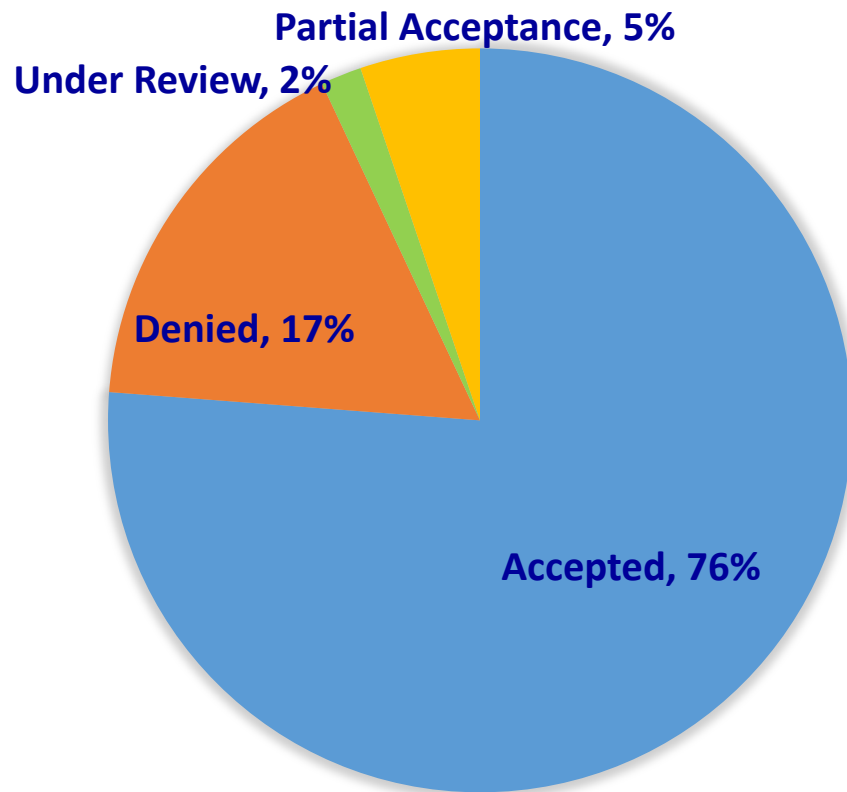






***Change Order Requests on  
Active Construction Projects***

December 19, 2018







(Not presented)

## ***FY2020 Proposed Capital Improvement Program***

December 19, 2018



***FY20 Proposed  
Capital Improvement Program***

December 19, 2018



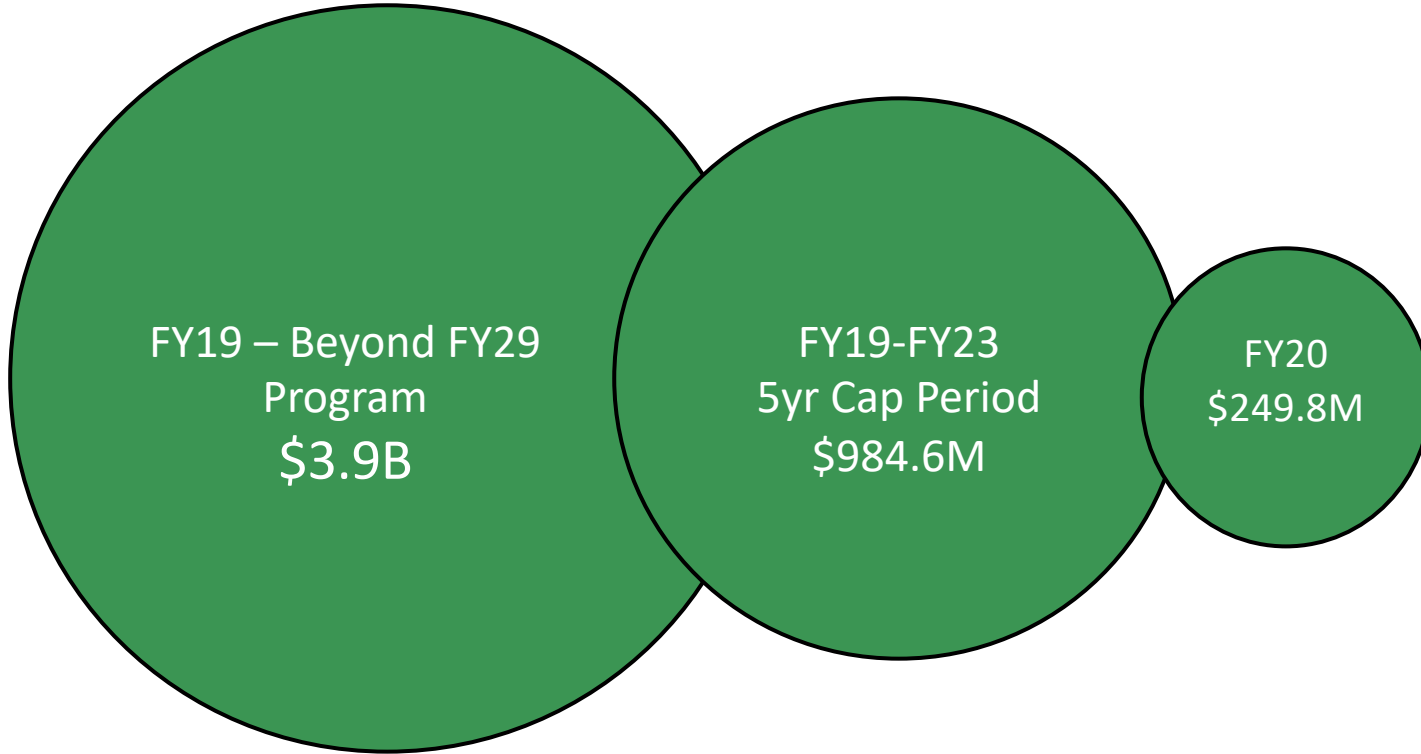


## FY20 Proposed CIP

- FY20 Proposed CIP complies with the Cap requirements
- Focus on Asset Protection and Long-Term Redundancy
- Metropolitan Tunnel Redundancy



# FY20 Proposed CIP





# FY20 Proposed CIP - FY19-23 Base-Line Cap

FY20 Proposed		FY19	FY20	FY21	FY22	FY23	Total FY19-23
		Projected Expenditures	\$174.3	\$249.8	\$258.7	\$218.8	\$182.3
	I/I Program	(29.0)	(25.7)	(25.0)	(28.2)	(26.9)	(134.8)
	Water Loan Program	(22.4)	(9.7)	(5.2)	(4.4)	4.2	(37.5)
	<b>MWRA Spending</b>	<b>122.9</b>	<b>214.4</b>	<b>228.5</b>	<b>186.1</b>	<b>159.6</b>	<b>\$911.6</b>
	Contingency	0.0	13.6	14.8	12.5	10.7	51.6
	Inflation on Unawarded Construction	0.0	2.1	5.5	6.2	7.6	21.4
	Chicopee Valley Aqueduct Projects	(0.0)	0.0	0.0	0.0	0.0	(0.0)
	<b>FY19 Proposed FY19-23 Spending</b>	<b>\$122.9</b>	<b>\$230.1</b>	<b>\$248.8</b>	<b>\$204.7</b>	<b>\$178.0</b>	<b>\$984.6</b>

FY19 Final		FY19	FY20	FY21	FY22	FY23	Total FY19-23
		Projected Expenditures	\$179.2	\$276.1	\$251.3	\$194.9	\$150.4
	I/I Program	(19.2)	(25.7)	(24.3)	(27.9)	(26.1)	(123.2)
	Water Loan Program	(8.3)	(8.4)	(7.2)	(5.6)	(2.8)	(32.4)
	<b>MWRA Spending</b>	<b>151.7</b>	<b>241.9</b>	<b>219.7</b>	<b>161.4</b>	<b>121.4</b>	<b>\$896.2</b>
	Contingency	9.9	15.9	14.5	11.0	8.2	59.4
	Inflation on Unawarded Construction	0.7	5.0	7.8	7.2	8.5	29.3
	Chicopee Valley Aqueduct Projects	(0.0)	0.0	0.0	0.0	0.0	(0.0)
	<b>FY19 Proposed FY19-23 Spending</b>	<b>\$162.3</b>	<b>\$262.8</b>	<b>\$242.0</b>	<b>\$179.6</b>	<b>\$138.1</b>	<b>\$984.8</b>



# FY20 Proposed CIP – Top Construction Projects (\$ in 000s)

Project	Contract	FY20 Proposed Spending
DI Treatment Plant Asset Protection	Clarifier Rehab Phase 2 - Construction	\$23.1
Facility Asset Protection	Chelsea Creek Upgrades - Construction	\$19.3
Facility Asset Protection	Prison Point Rehabilitation Construction	\$18.6
Corrosion & Odor Control	Nut Island Odor Control HVAC Improvement Construction Ph 2	\$10.0
DI Treatment Plant Asset Protection	HVAC Equipment Replacement Construction	\$8.0
SEH Redundancy & Storage	Redundancy Pipeline Sect 111 - Construction 3	\$7.0
Residuals Asset Protection	Residuals Electrical/Mechanical/Drum Dryer Replacement	\$6.4
DI Treatment Plant Asset Protection	Gravity Thickener Rehabilitation	\$6.3
New Connecting Mains -Shaft 7 to WASM 3	CP3 Sections 23, 24, 47 Rehabilitation	\$6.0
<b>Total</b>		<b>\$104.7</b>
<b>% of Total FY20 Proposed MWRA Spending</b>		<b>41.9%</b>



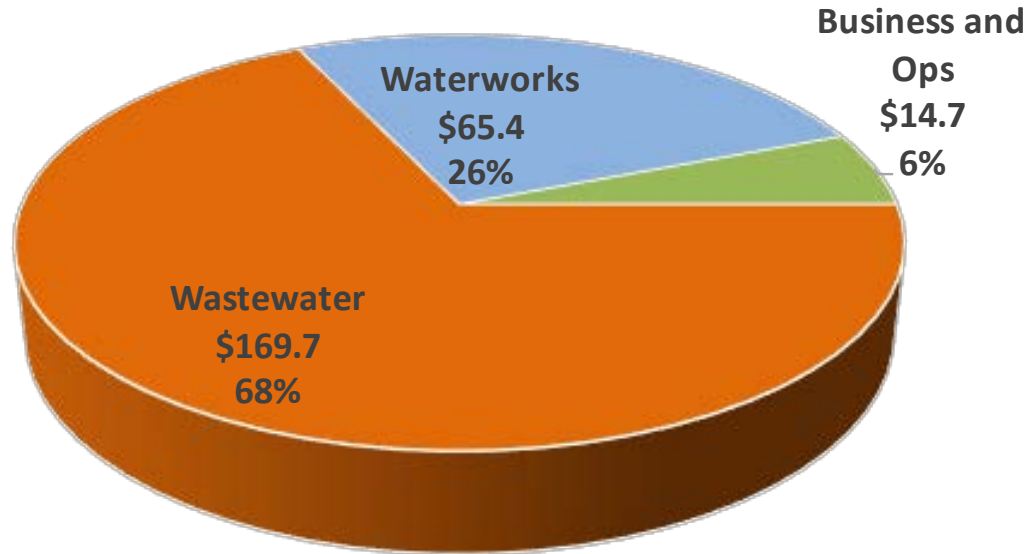
## Spending Composition

Ongoing Awarded Contracts	\$67.3M
Proposed Contract Awards	<u>\$182.5M</u>
Total Proposed Expenditures	\$249.8M



# FY20 Proposed CIP – Proposed FY20 Expenditures

Total Proposed FY20 Expenditures: \$249.8 million



*\$s in millions*



## FY20 Proposed CIP – New Projects

Total New Projects Added in FY20: \$54.5 million

- Wastewater: \$48.8 million
- Waterworks: \$0.8 million
- Business & Operations Support: \$5.0 million



## FY20 Proposed CIP – New Projects

- Pump Stations & CSO Facility Rehabilitation: \$45.0 million
- As-Needed Design Contracts 18 and 19: \$5.0 million
- Deer Island Resident Engineering Inspection: \$3.0 million
- Carroll Water Treatment Plant Emergency Generator No. 1 Replacement (Electric Portion) - \$0.8 million
- Sections 191 & 192 Charles River Valley Sewer - \$0.5 million
- Clinton Wastewater Treatment Plant Equipment & Supplies Storage Building - \$0.3 million





# FY20 Proposed CIP – Top New Project

- Pump Stations & CSO Facility Rehabilitation: \$45.0 million





# FY20 Proposed CIP – Asset Protection and Water Redundancy

Project Category	FY14-18	FY19-23	FY24-28
Asset Protection	\$284.6	\$773.4	\$1,095.4
Water Redundancy	174.6	213.2	\$373.5
CSO	64.7	7.7	\$0.0
Other	61.7	89.6	\$109.5
<b>Total</b>	<b>\$585.6</b>	<b>\$1,083.9</b>	<b>\$1,578.4</b>
<b>Asset Protection</b>	<b>48.6%</b>	<b>71.4%</b>	<b>69.4%</b>
<b>Water Redundancy</b>	<b>29.8%</b>	<b>19.7%</b>	<b>23.7%</b>
CSO	11.0%	0.7%	0.0%
Other	10.5%	8.3%	6.9%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

- Asset Protection and Redundancy are the principal drivers of future capital expenditures



- Preserve the condition of assets
  - Asset Protection in CIP
  - Day to Day Maintenance in CEB



## Clarifier Rehabilitation Phase 2 Construction

FY 20 Budget : \$23.1M

Total Contract: \$135.0M

NTP: February 2019

SC: November 2022





# FY20 Proposed CIP – FY20 Top Spenders – Asset Protection

## Chelsea Creek Headworks Upgrade Construction

FY20 Budget: \$19.3M

Total Contract: \$81.8M

NTP: November 2016

SC: November 2020





# FY20 Proposed CIP – FY20 Top Spenders – Asset Protection

## Prison Point Rehabilitation Construction



FY 20 Budget: \$18.6M  
Total Contract: \$36.3M  
NTP: July 2019  
SC: July 2021



# FY20 CIP – FY20 Top Spenders - Asset Protection

## Nut Island Odor Control & HVAC Improvements Construction

FY 20 Budget : \$10.0M

Total Contract: \$39.9M

NTP: May 2019

SC: September 2022





# FY20 CIP – FY20 Top Spenders - Asset Protection

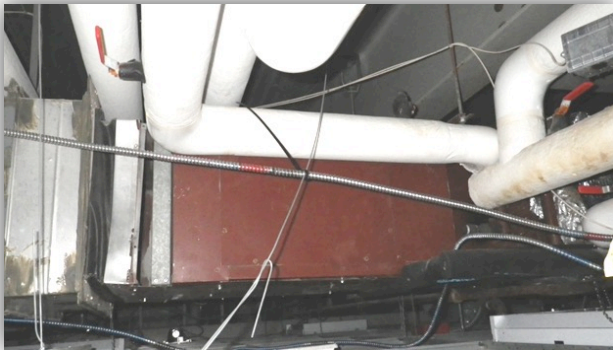
## Deer Island HVAC Equipment Replacement Construction

FY 20 Budget : \$8.0M

Total Contract: \$40.2M

NTP: March 2019

SC: September 2022







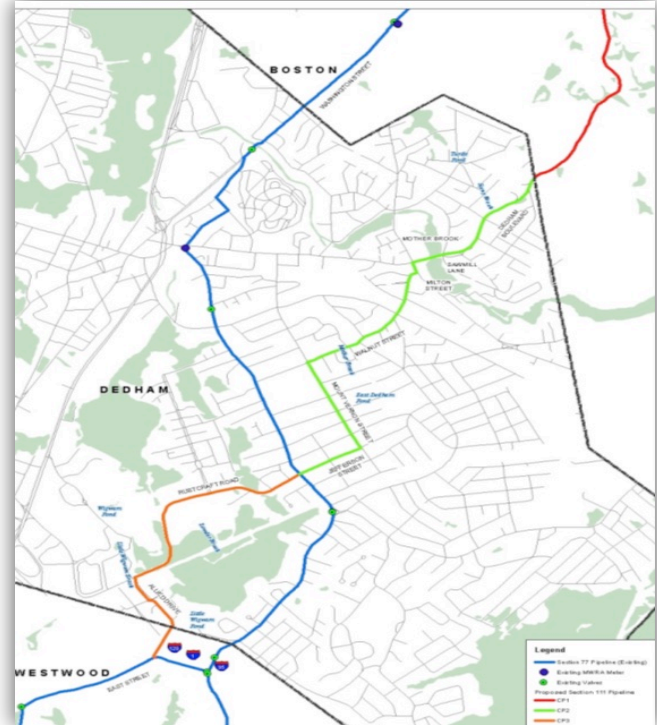
# FY20 CIP – FY20 Top Spenders - Redundancy

- Southern Extra High Redundancy Section 111 Construction 3

FY 20 Budget: \$7.0M

NTP: June 2018

SC: September 2020





## Residuals Electrical/Mechanical/Drum Replacement

FY 20 Budget: \$6.4M

NTP: June 2019

SC: December 2020





## Gravity Thickener Rehabilitation

FY 20 Budget: \$6.3M

NTP: May 2018

SC: February 2021





## New Connecting Mains CP3 Sections 23, 24,27 Rehabilitation

FY 20 Budget: \$6.0M

NTP: April 2019

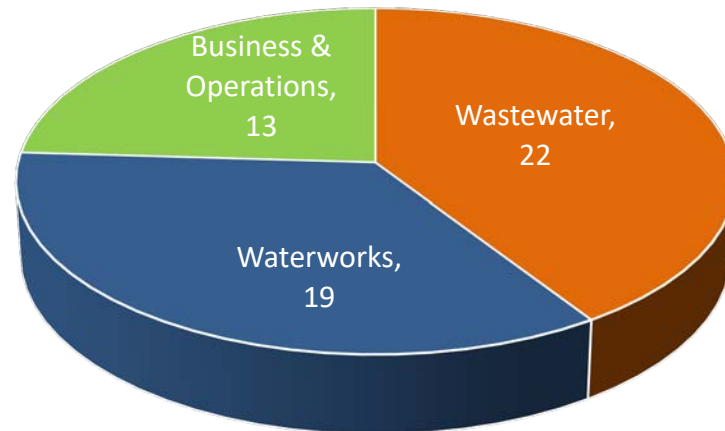
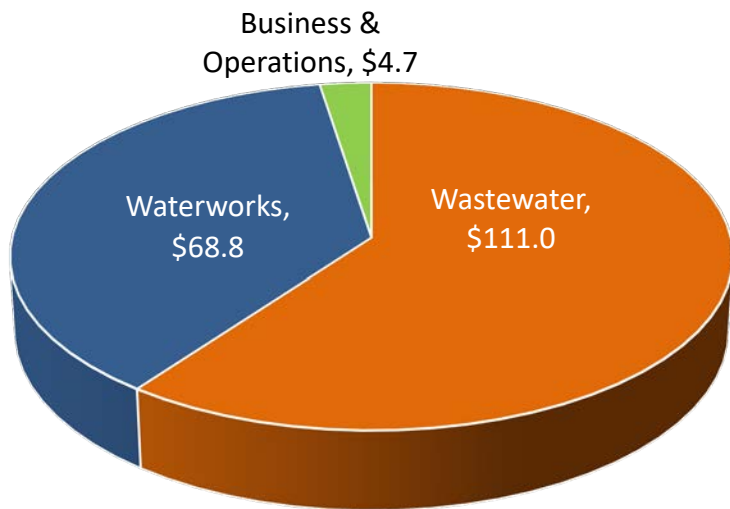
SC: March 2022





# FY20 Proposed CIP – Proposed FY20 Contract Awards

- 54 FY20 Contract Awards
- Total Contract Value: \$182.5 million



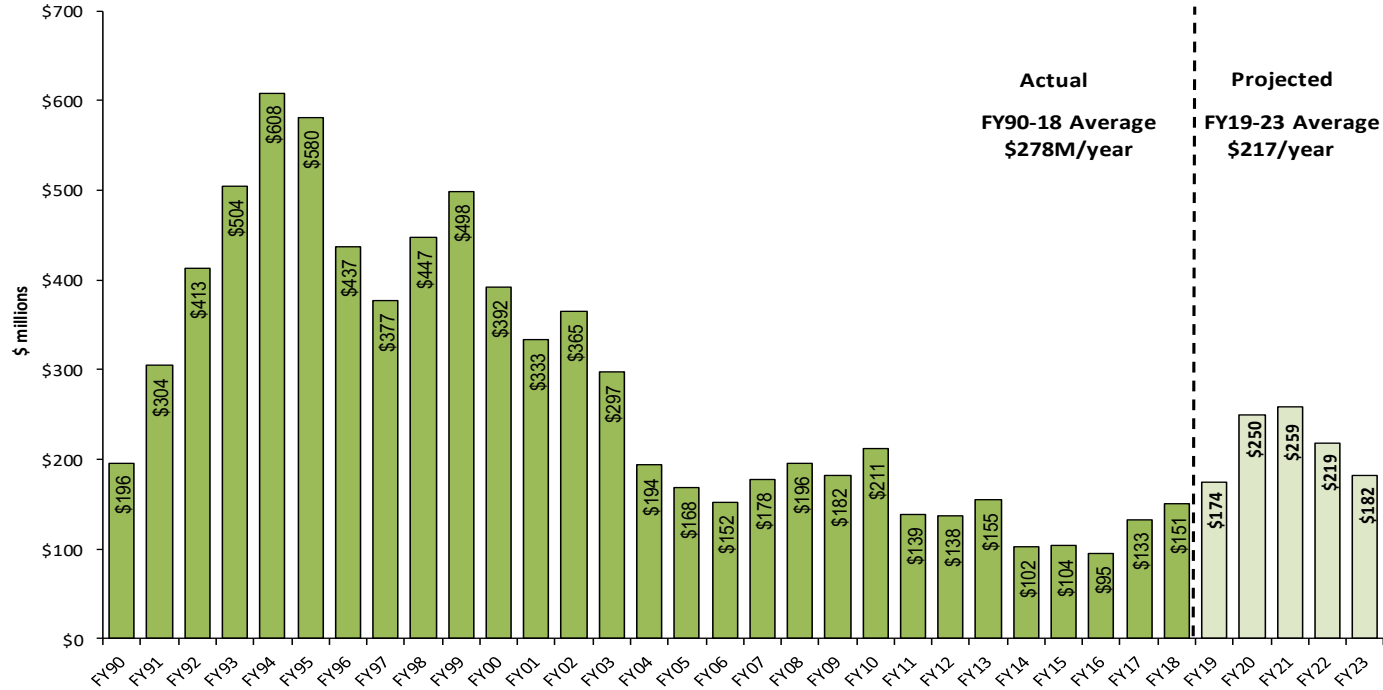


# FY20 Proposed CIP - Projected Contract Awards (\$s in millions)

Project	Subphase	Notice to Proceed	Total Contract Amount
Facility Asset Protection	Prison Point Rehabilitation - Construction	Jul-19	\$36.3
DI Treatment Plant Asset Protection	Fire Alarm System Replacement - Construction	Aug-19	\$22.0
Metropolitan Redundancy Interim Improvements	WASM 3 CP-1	Jan-20	\$20.4
NIH Redundancy & Storage	Sections 89 & 29 Replacement - Construction	May-20	\$16.0
Facility Asset Protection	Ward St & Columbus Park Headworks Design/CA	Feb-20	\$11.4
Metropolitan Tunnel Redundancy	Preliminary Design & MEPA Review	Apr-20	\$9.3
DI Treatment Plant Asset Protection	Digester & Storage Tank Rehabilitation Design/ESDC	Jan-20	\$4.1
DI Treatment Plant Asset Protection	DI Dystor Membrane Replacements	Jul-19	\$4.0
Wastewater Meter System-Equipment	WW Metering Asset Protect/Equip. Purchase	Aug-19	\$4.0
Watershed Division Capital Improvements	Maintenance Garage/Wash Bay/Storage Building Construction	Apr-20	\$3.9
<b>Top 10 Contract Awards</b>			<b>\$131.3</b>
<b>54 Contract Awards Planned for FY20</b>			<b>\$182.5</b>

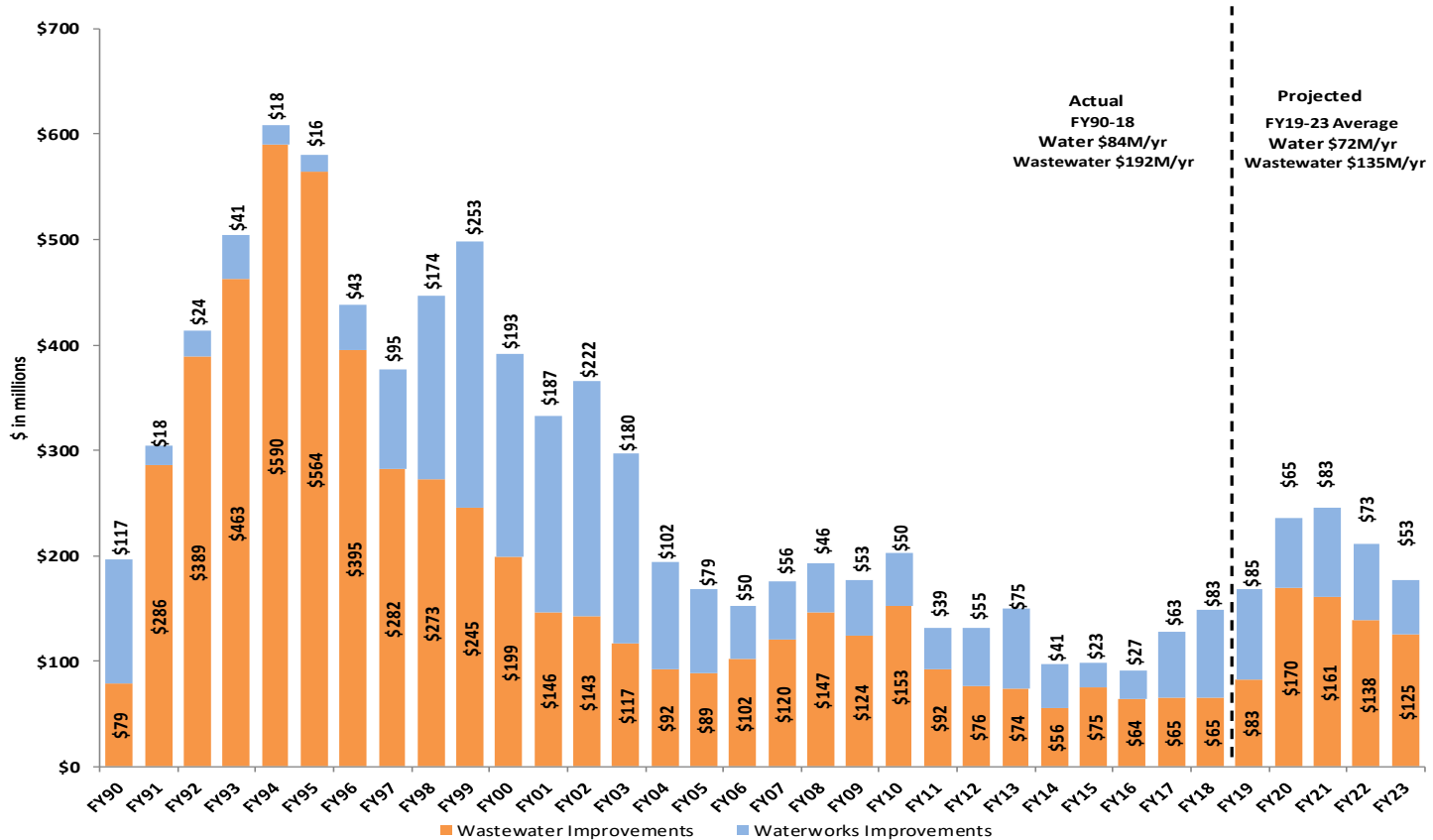


# Historic and Projected Capital Improvement Spending





# Historic and Projected Capital Improvement Spending by Utility

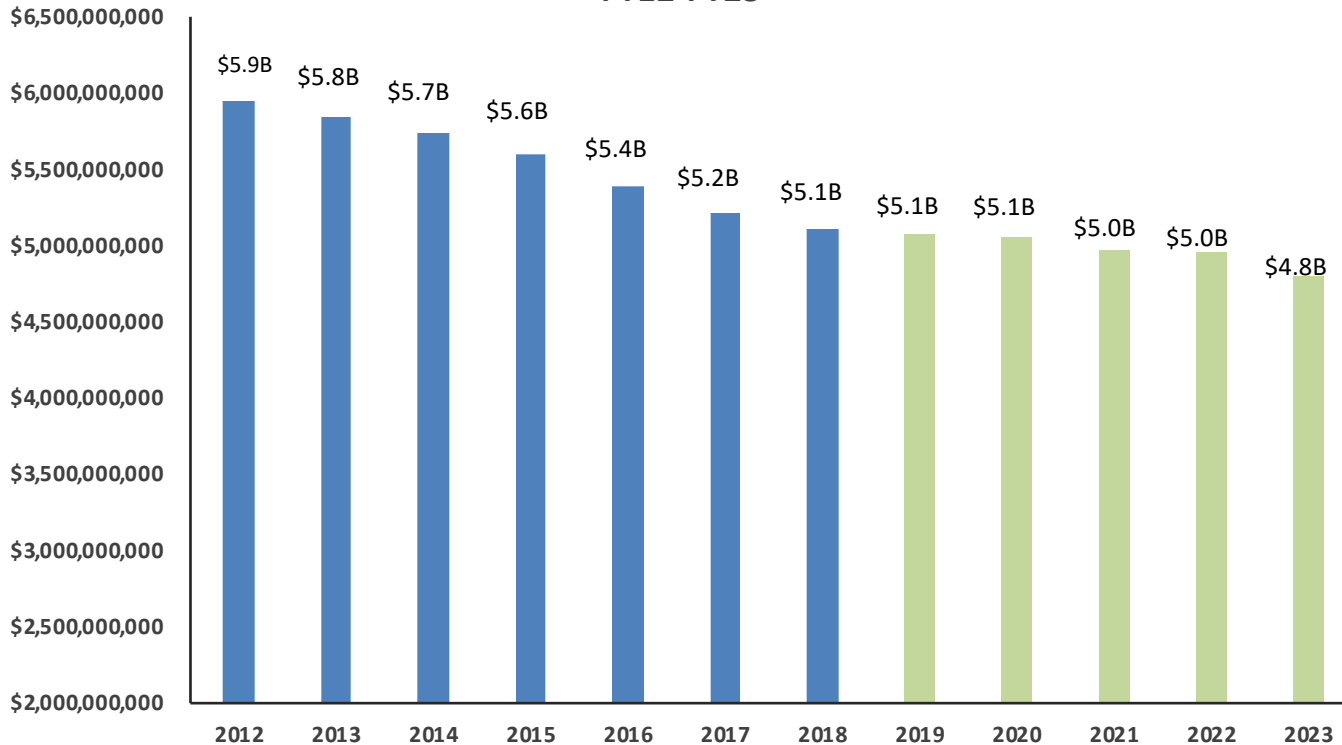






# Level of MWRA Indebtedness

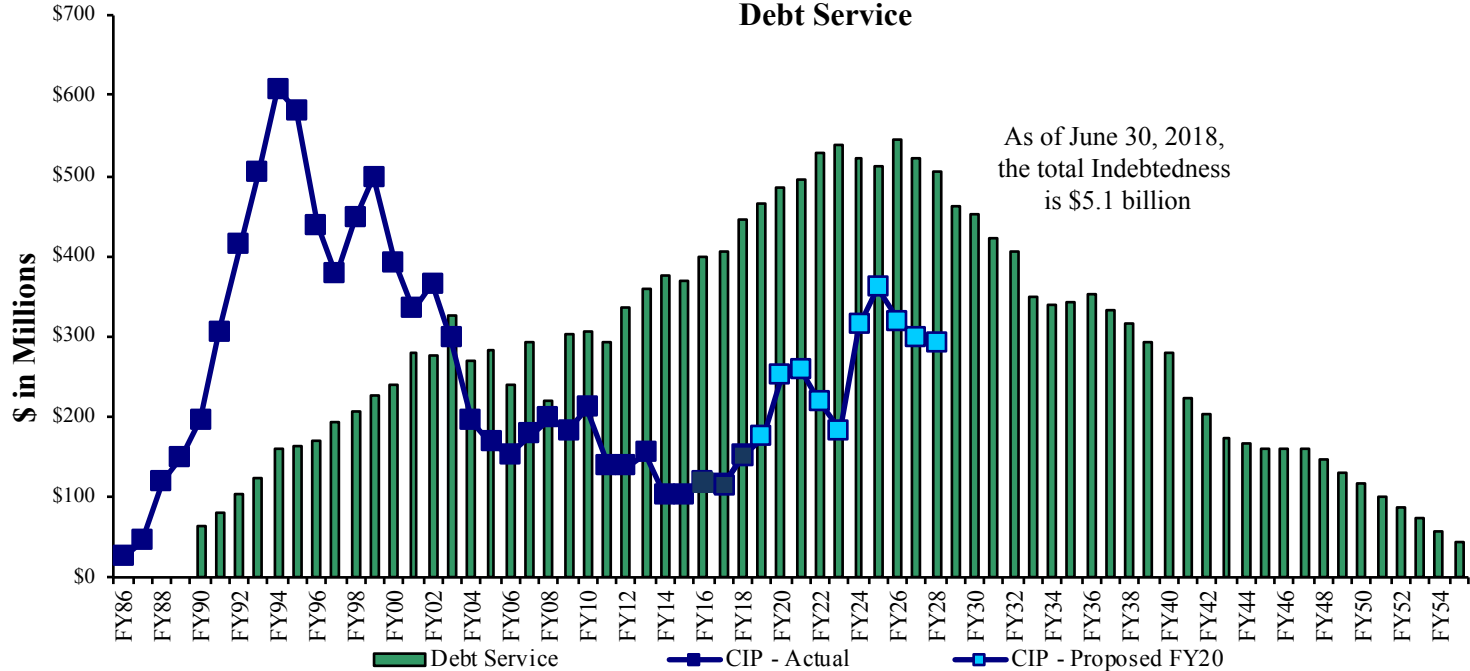
Outstanding Debt on June 30 by Fiscal Year  
FY12-FY23





# Capital Spending and Debt Service

## MWRA Capital Spending & Debt Service





## Looking Ahead

- Metropolitan Tunnel Redundancy
- Lessons learned from Chelsea Headworks Upgrades
- Continue Asset Protection

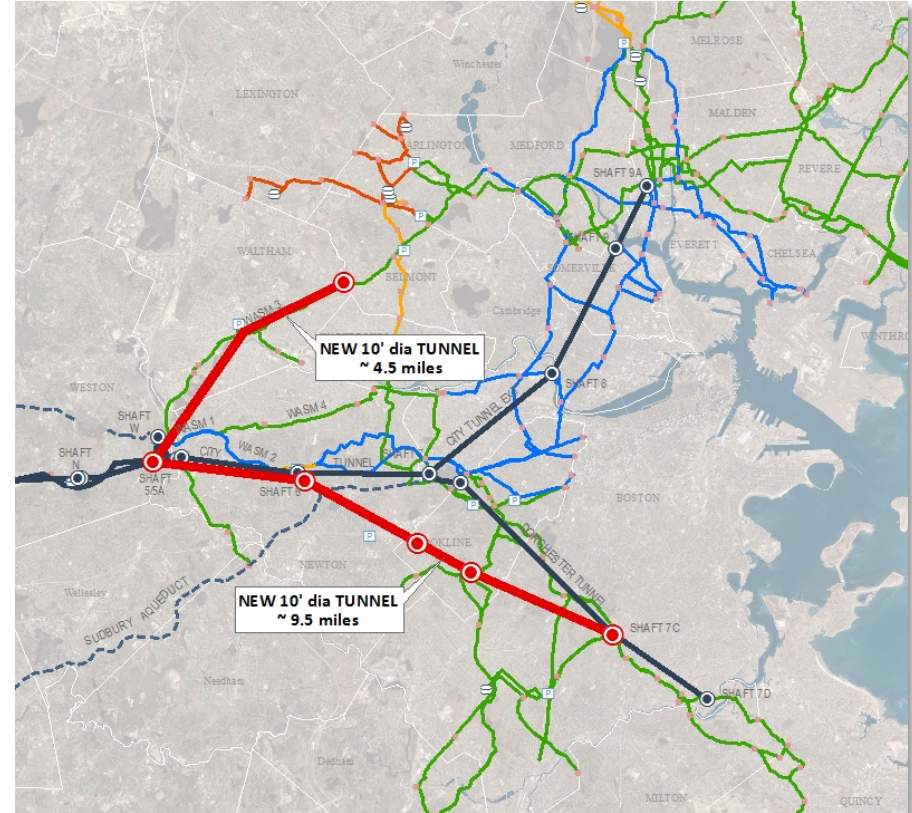


# Metropolitan Tunnel Redundancy Program

## FY19-23 Projected Expenditures

Contract Name	Start/Duration (years)	Contract Budget (millions)	FY19-23 Spending (millions)
Program Support Services	FY19/9	\$13.6*	\$6.0
Preliminary Design/MEP A Review	FY20/3	\$9.3	\$9.0

\*FY20 dollars. Escalation not included.





## Next Steps

- Work with the Advisory Board
- Finalize FY20 CIP
- Submit FY20 Final CIP to Board of Directors for approval in June 2019



**THANK YOU**







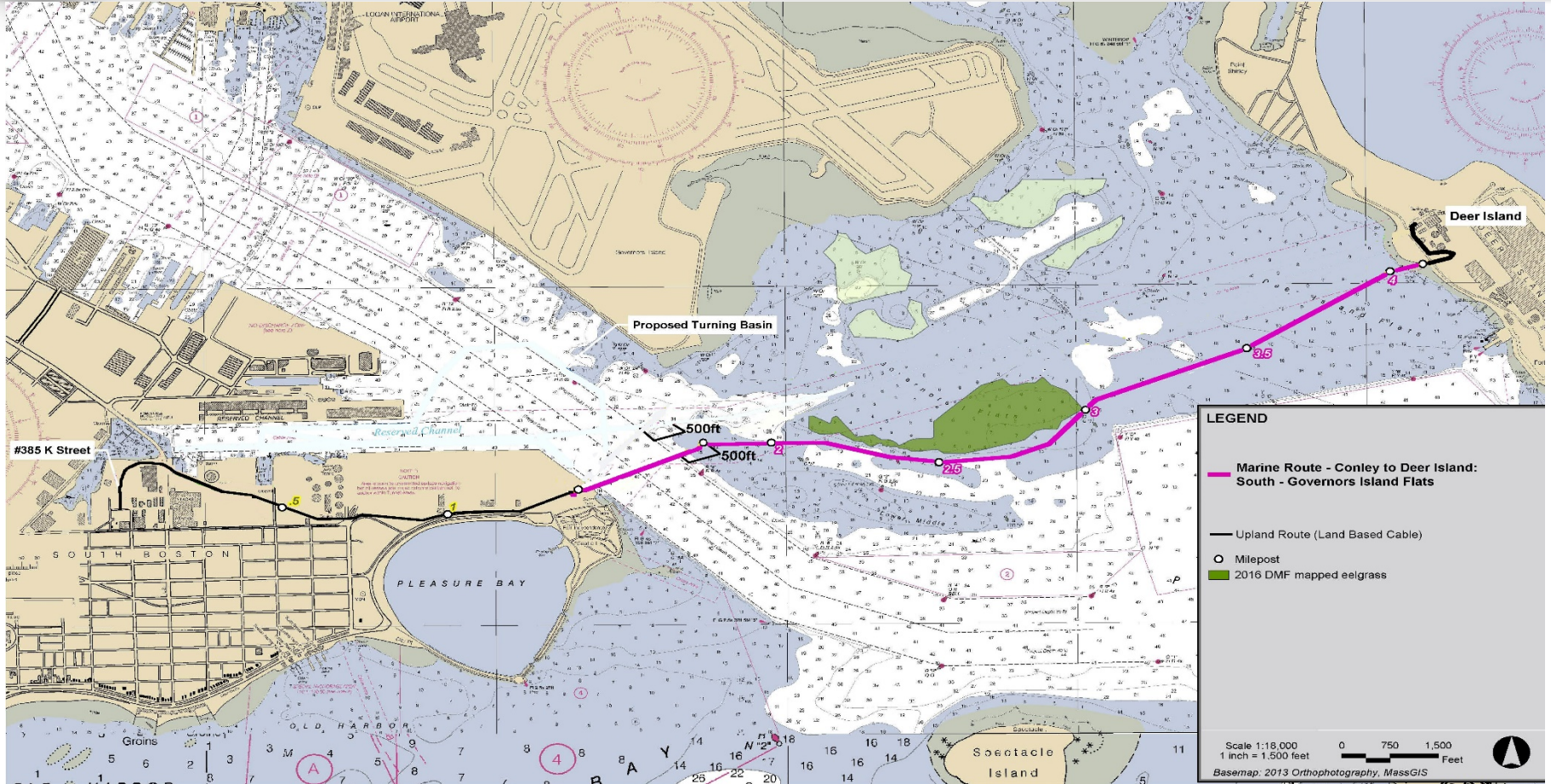
***Update on Construction of  
Cross-Harbor Cable***

December 19, 2018





# Eversource Cable Route





# Construction Methods (Horizontal Directional Drilling)



Drill Rig



Drill Casing



Drill Bits



# Construction (HDD-Conley Terminal)



- Approx. 3300' HDD on Conley Terminal side
- Approx. 1100' HDD on Deer Island side
- Four total passes (9-7/8", 24", 30" and 36")



# Construction Methods (Hydroplow)





# Construction Methods (Hydroflow)





# Construction Methods (Open Excavation-Conley Terminal)





# Construction Methods (Open Excavation-Deer Island)





# Construction Methods (Open Excavation-Deer Island)





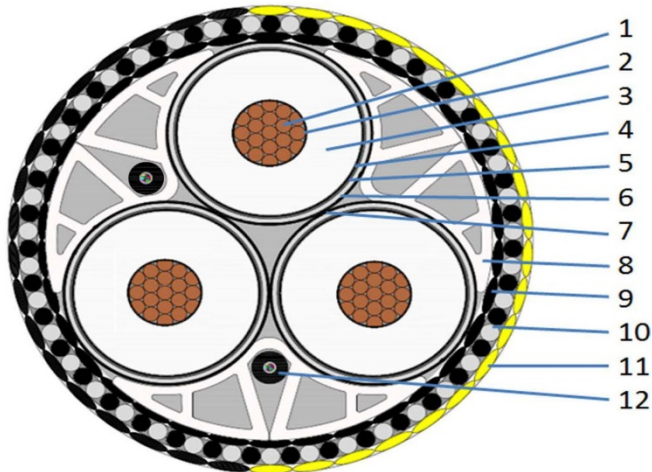


# Marine Cable Information

<b>Prysmian Group</b>	<b>Data Sheet</b>	<b>PRYSMIAN</b> <b>Draka</b>
<b>Cust Ref:</b> PROJECT SPECIFICATION FOR UNDERGROUND AND SUBMARINE CABLE <b>Project:</b> Deer Island		<b>Pry Ref:</b> PPL-17-114-SE-DTS-001 Page 5 of 14

## 3 115 kV Submarine Cable Supply

### 3.1 Cable Diagram



(For information only – not to scale)

#### Description

1. Copper wires	7. Core Jacket
2. Conductor screen	8. Fillers
3. XLPE Insulation	9. PP string bedding
4. Insulation screen	10. Mixed (Galvanised Steel + PE) wire armour
5. Water Blocking tape	11. PP string serving
6. Metallic shield	12. Optical Unit

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- New 115KV Submarine cable manufactured by Prysmian Group
- Solid Dielectric vs oil filled cable
- Same capacity 90MVA

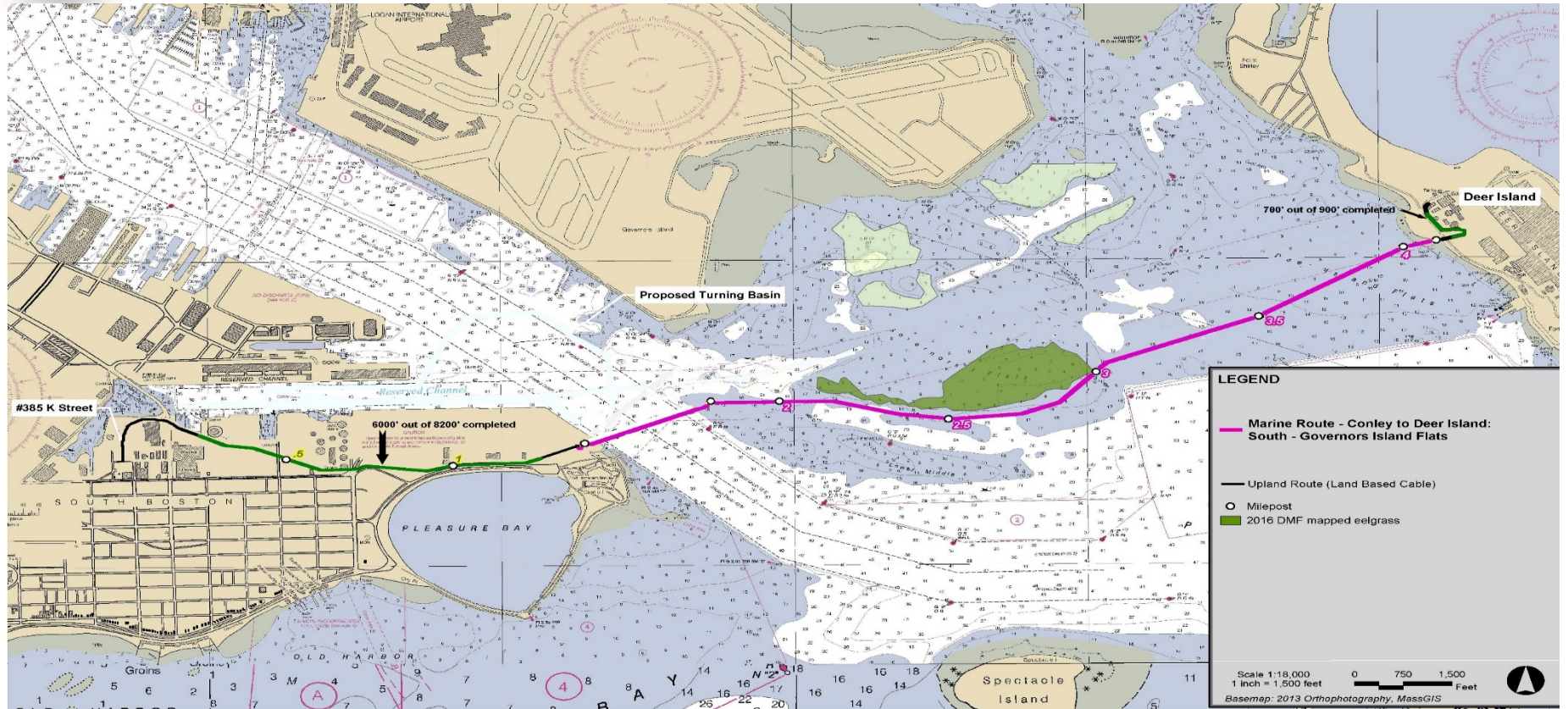


# Eversource HDPE Fusing Operation





# Construction Progress





# Construction Schedule

- HDD drilling January 2019
- Hydroplowing February 2019
- Marine cable installation April 2019
- New cable testing period August 2019
- Cable placed into service September 2019
- Existing cable removal December 2019





***Refurbishment of Secondary Reactor Aerator  
and Mixer Gearboxes at Deer Island  
Bid WRA-4594***

December 19, 2018



# Deer Island Secondary Treatment

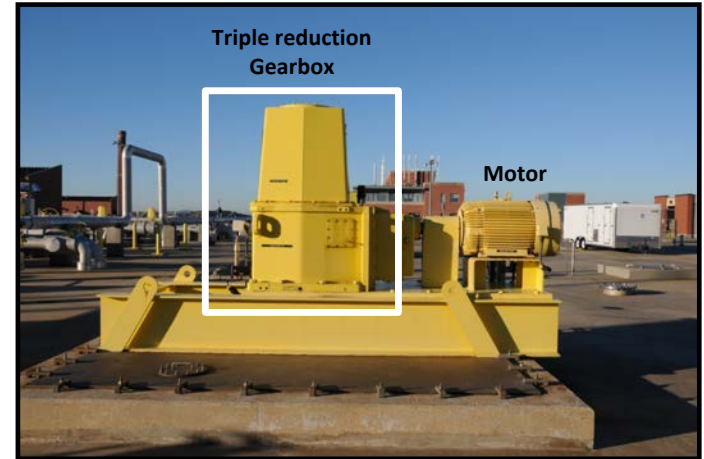
- Cryogenic Oxygen Generation
- **Secondary Reactors**
- Secondary Clarifiers





# Deer Island Secondary Reactor Gearboxes

- **A Critical Component of Oxygen Reactors**
  - Provides for oxygen transfer
  - Promotes biomass growth for treatment
  - Mixer/Aerator system:
    - Drives, Motors, **Gearboxes** & Mixers
      - 9 Trains x 8 Gearboxes = 72 units
      - 6 Trains operate 24/7
- Equipment Age: 17-21 years
- Expected Service Life for Gearboxes: 11 years







# Procurement: Refurbishment basis & Award Recommendation

## Annual refurbishment plan, as required:

6 - 50 hp units (18 during contract term)

1 - 150 hp unit (3 during contract term)

6 - 100 hp units (18 during contract term)

- Competitively Bid
- 2 Vendors submitted bids
- Lowest Bidder: SPX Corporation (incumbent and OEM)
- Not to exceed \$885,936
- 3-Year Term



Low Speed Gear