



Presentation to

MWRA Board of Directors

*Deer Island Treatment Plant
Combined Heat and Power System*

July 24, 2024

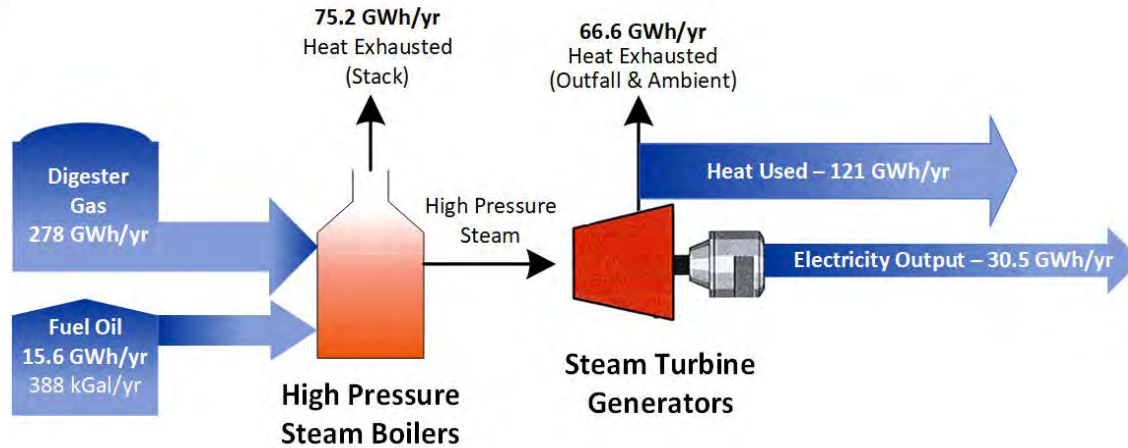


Contract 6730 Scope

- Develop a detailed design for a new combined heat and power (CHP) plant at Deer Island
- Includes:
 - Preliminary Design
 - Final Design
 - Bidding Phase Assistance
 - Engineering Services During Construction
- Total Contract Duration: 100 Months



Existing Combined Heat and Power System

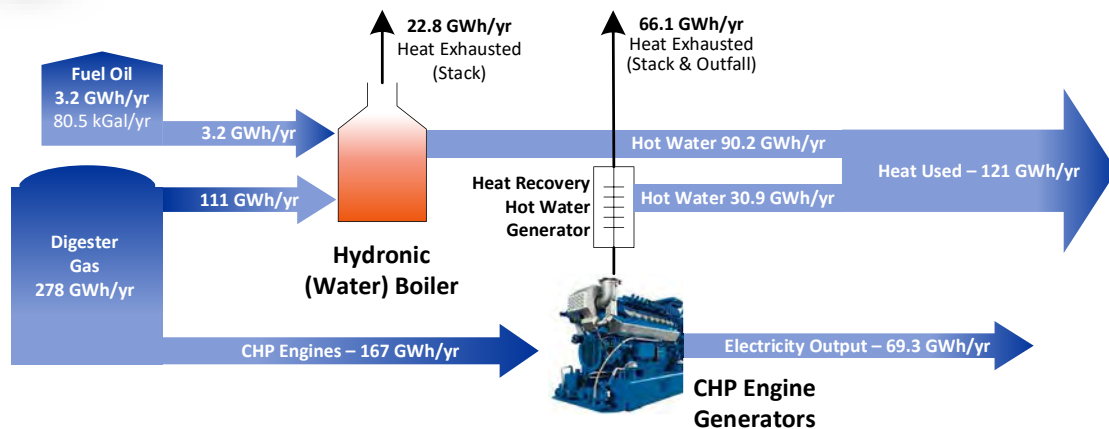


- Placed into operation in mid 1990's
- Steam boiler based system
- Heat generated first then electricity

	Percent electricity from CHP	CHP Efficiency	Percent energy from onsite sources
Key Metrics	21%	52%	~60%



New Combined Heat and Power System



**Predicted to save 12,800
metric tons CO₂/yr in
Greenhouse Gas Emissions or
32.5 million car miles**

- Array of five (5) reciprocating engines rated 15-17.5 MW
- Generates electricity and then extracts heat from exhaust
- Water boilers to meet heat demand

	Percent electricity from CHP	CHP Efficiency	Percent energy from onsite sources
Est. performance	48%	68%	~75%



Procurement Process, Project Cost and Recommendation

- One step RFQ/P

Proposer	Proposed Cost	Proposed Hours
Burns & McDonnell	\$18,610,776*	82,090
Engineer's Estimate	\$16,700,000	74,955

* Award amount was adjusted to \$18,377,091 based on Internal Audit review.

- Appropriate level of effort
- Strong team including CDM Smith, Green Environmental, JK Muir & Epsilon
- Extensive Combined Heat and Power design experience
- Staff recommend award to Burns & McDonnell**



Presentation to

MWRA Board of Directors

*Design, ESDC, and RE Services for
Cottage Farm CSO Facility PCB Abatement
Weston and Sampson Engineers, Inc.
Contract 7392*

July 24, 2024



Cottage Farm CSO Facility, 660 Memorial Drive, Cambridge





Cottage Farm CSO Facility





Project Scope





Procurement Process & Schedule

Summary of Proposals Received – Deadline June 12, 2024

Proposer	Proposed Contract Cost	Level of Effort (Hours)	Variance from Engineer's Estimate		Final Ranking
			Cost (%)	Level of Effort (%)	
Engineer's Estimate	\$3,123,842.08	18,350			
Weston & Sampson	\$3,757,000.41	18,161	20.3%	-1.0%	1
GEI Consultants	\$5,609,040.57*	25,854	79.6%	40.9%	2

*Adjusted value due to mathematical error

Schedule – 52 months from NTP

- Anticipate contract period from September 2024 through January 2029 (includes 12 month warranty period)



Presentation to

MWRA Board of Directors

***Oxygen Generation Facility Services
Contract S619***

July 24, 2024



DITP – Cryogenic Oxygen Generation Facility



- Provides oxygen to microorganisms in secondary treatment (97% Purity)
- Critical to core mission of NPDES permit compliance
- Specialized knowledge required for maintenance
- Hundreds of instruments requiring calibration for efficient operation



DITP – Cryogenic Oxygen Generation Facility



4 Large Air Compressors (2 @ 2,000hp, 2 @ 2500 hp)



2 Molecular Sieves



2 Cold Boxes



1,000 Ton Liquid Oxygen Storage



Instrumentation & Controls





Procurement Process

- Limited qualified contractors bid in past
- Advertised Chapter 149 Contract combining capital repairs and maintenance
 - One bid at 366% of Engineer's Estimate
- Rebid as Non-professional services maintenance contract
 - Capital work removed from scope (to be bid separately)
 - Received one bid: Solutionwerks at \$3,512,500
- Staff recommend award to Solutionwerks
 - Bid reasonable and complete
 - Successful past performance



Presentation to

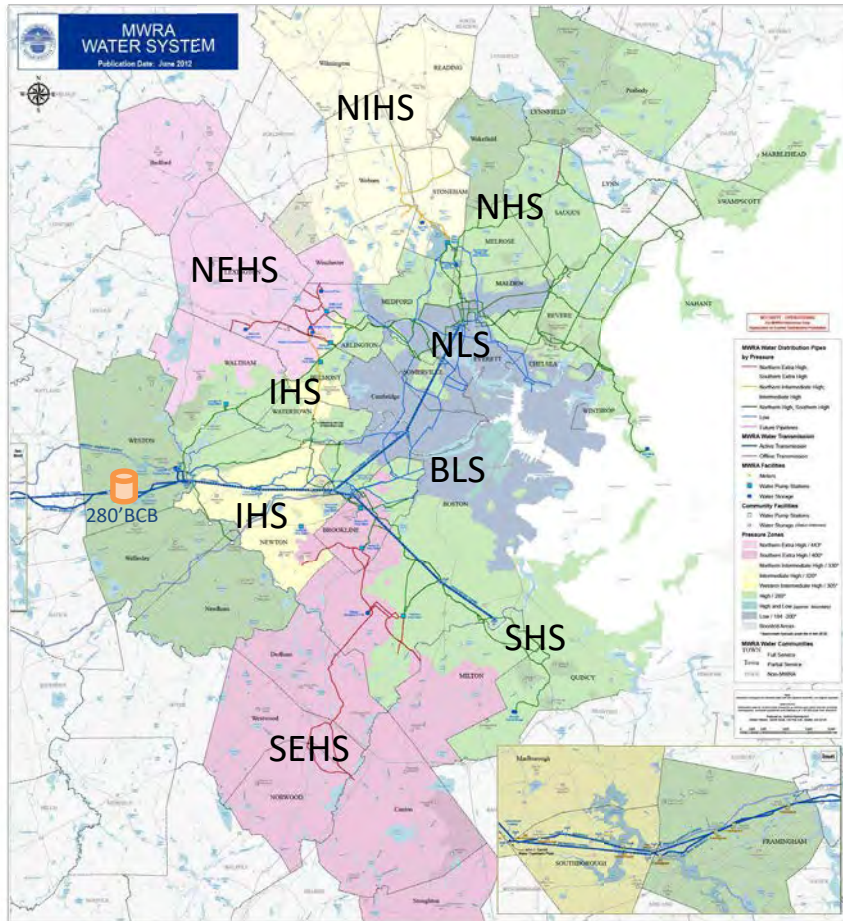
MWRA Board of Directors

***Overview of Water Pipeline Maintenance
Leak Repairs***

July 24, 2024



Metropolitan Water System Overview



- 41 Communities within Metropolitan Boston area
- 300+ Miles of Pipeline
- Over 5500 Valves
- Multiple Pressure Zones
- 11 Storage Facilities (Tanks & Covered)
- 11 Pump Stations



MWRA Leak Detection Program

- 334 miles of pipeline is surveyed on a regular maintenance schedule
- FY24, 143 miles were surveyed with a total of 7 leaks reported



	Massachusetts Water Resources Authority Leakage Control Report Inspection Branch	Leak No.: FY24-07 Date: 2/28/2024 Leak Indication Classification: I II III (Circle One) Service Area: Watertown Section
	Technician: Fishlin, Mosca Street Address: River Street Section #: WS Detail Record #: WS-3B	Town/City: Waltham Cross Street: Bright Street Record Plan #: Sheet 3 Date Installed: 12/2020

ESTIMATED LEAKAGE	
2 GPM	
INDICATION OF LEAK	
Sonic	
Surfaced Water	X

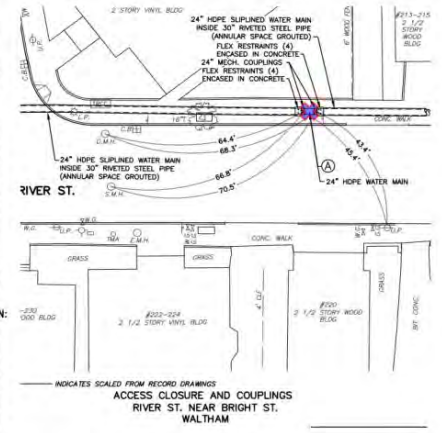
MATERIAL	
Cast Iron	
Steel	
Ductile Iron	
PCCP	
HDPE	X
Copper/Iron/Lead	

PIPE DIAMETER	
24 Inch	

LEAK APPEARS TO BE ON:	
Main	
Joint	X
Valve	
Blow Off	
Air Valve	
Service	

COVER	
Concrete	X
Asphalt	
Soil	

ESTIMATE DEPTH	
3 FT	



INDICATES SCALED FROM RECORD DRAWINGS
ACCESS CLOSURE AND COUPLINGS
RIVER ST. NEAR BRIGHT ST.
WALTHAM

Remarks: Leak appears to be on mechanical couplings on Watertown Section WS-3B as shown on the Detail Records. Minimal to no sound is heard through leak detection devices in this area but water did come back chlorinated. The public Waltham water main service to this building is off Bright St.



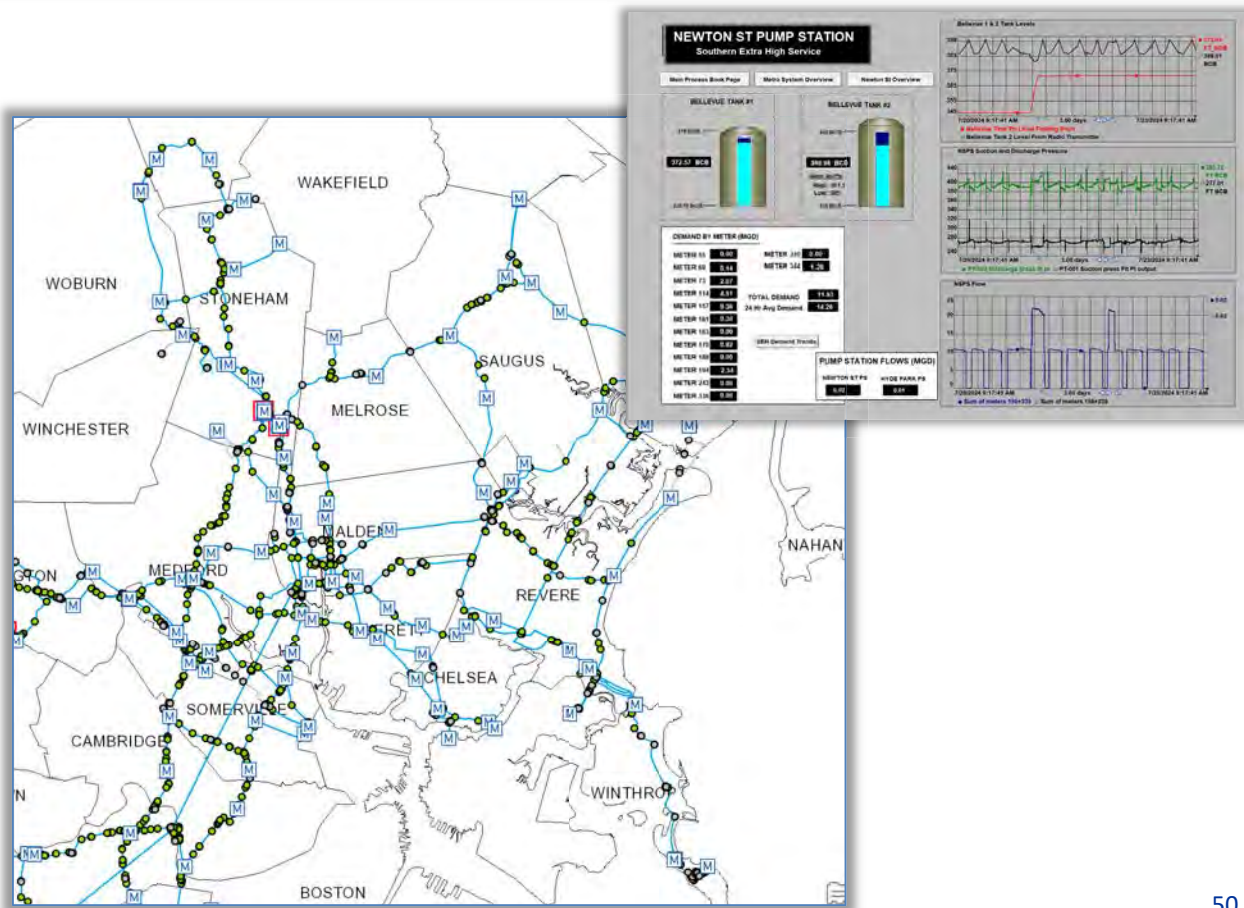
Leaks that Surface





Response Actions

- Dispatch crews
- Review record drawings
- Review operational data/impacts
- Community outreach





Operation Plans

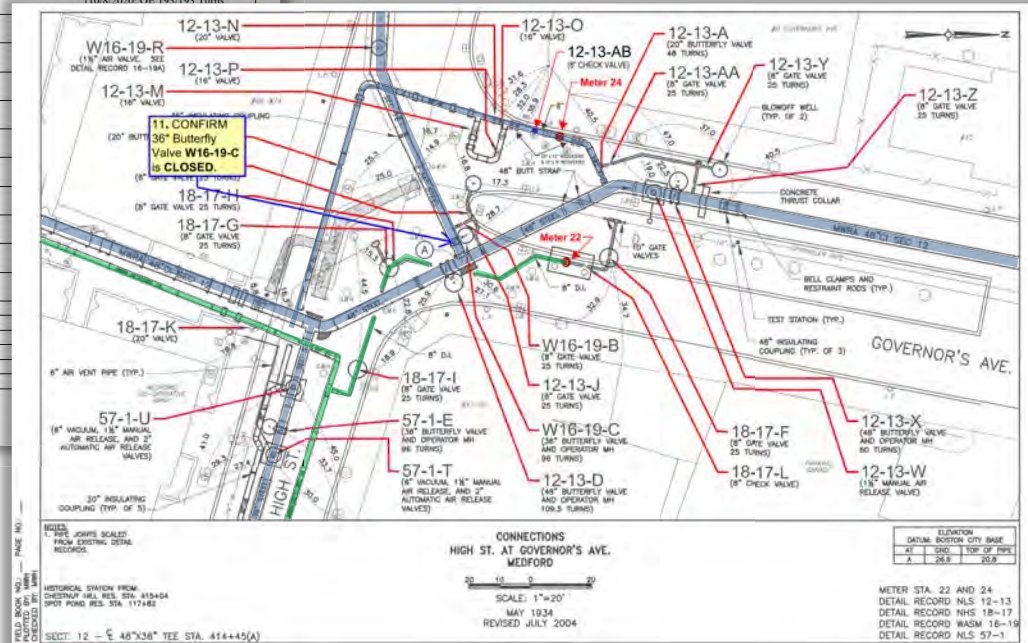
PROJECT : Section 53 Leak Repair

DATE: March 23, 2022

DESCRIPTION: Section 53 will be isolated for pipeline maintenance near Main & Madison Street, Malden. Extended shutdown included due to known BFV operability issues in 2018/2019

Prepared By: D. Kempe

ITEM	DESCRIPTION	ELEV. (FT)	LOCATION	COMMENT
PREREQUISITES				
ISOLATION				
1	Before proceeding with shutdown, slowly OPEN 36" Butterfly Valve 70-60-D in Saugus to supply NHS meters from Fells.		Lynn Fells Parkway at Main Street, Saugus	10/8/2020: OE 193/193 Turns
2	Slowly CLOSE 20" Gate Valve 49A-4-C .		Madison Street at Bow Street, Malden	
3	Confirm 12" Gate Valve 49A-1-C to Malden Meter 140 is CLOSED .		Madison Street at Main Street, Malden	
4	Slowly CLOSE 30" Butterfly Valve 14-7A-A .		Eastern Avenue at Main Street, Malden	
5	Slowly CLOSE 30" Butterfly Valve 14-6-A .		Pleasant Street at Main Street, Malden	
6	Slowly CLOSE 24" Gate Valve 49-14-A .		Main Street at Wigglesworth Street, Malden	
7	Slowly CLOSE 30" Gate Valve & Bypass 14-10A-A .		#16 Cross Street, Malden	
8	Slowly CLOSE 48" Butterfly Valve 53-3-A .		Eastern Avenue at Hillside Avenue, Malden	
9	Slowly CLOSE 48" Butterfly Valve 53-9-A .		Eastern Avenue at Warren Avenue, Malden	
10	Confirm 48" Butterfly Valve 53-9-C is CLOSED .		Eastern Avenue at Warren Avenue, Malden	
11	Slowly CLOSE 48" Butterfly Valve 53-9-B .		Eastern Avenue at Warren Avenue, Malden	
DEWATERING				
12	OPEN 12" Blow-off Valves 53-3-B and 53-3-C to dewater pipe.		Eastern Avenue at Hillside Avenue, Malden	
13	OPEN Air Valves as needed.			
13A	1.5" Air Valve 14-8-A	42.4'	Main Street near Ellis Avenue, Malden	
13B	6" Air/Vacuum Valve (14-7A-F)	19.2'	Eastern Avenue at Main Street, Malden	
13C	1-1/2" Air Valve (49A-2-A)	18.4'	Madison Street at Meridian Street, Malden	
13D	1" Ball Valves in chamber 53-1-A	15.0'	Main Street at Madison Street, Malden	
13E	1" Ball Valves in chamber 53-3-A	12.5'	Eastern Avenue at Hillside Avenue, Malden	
(remaining air valves in appendix expected to remain full unless additional blow-offs are used)				





Section 84 Leak

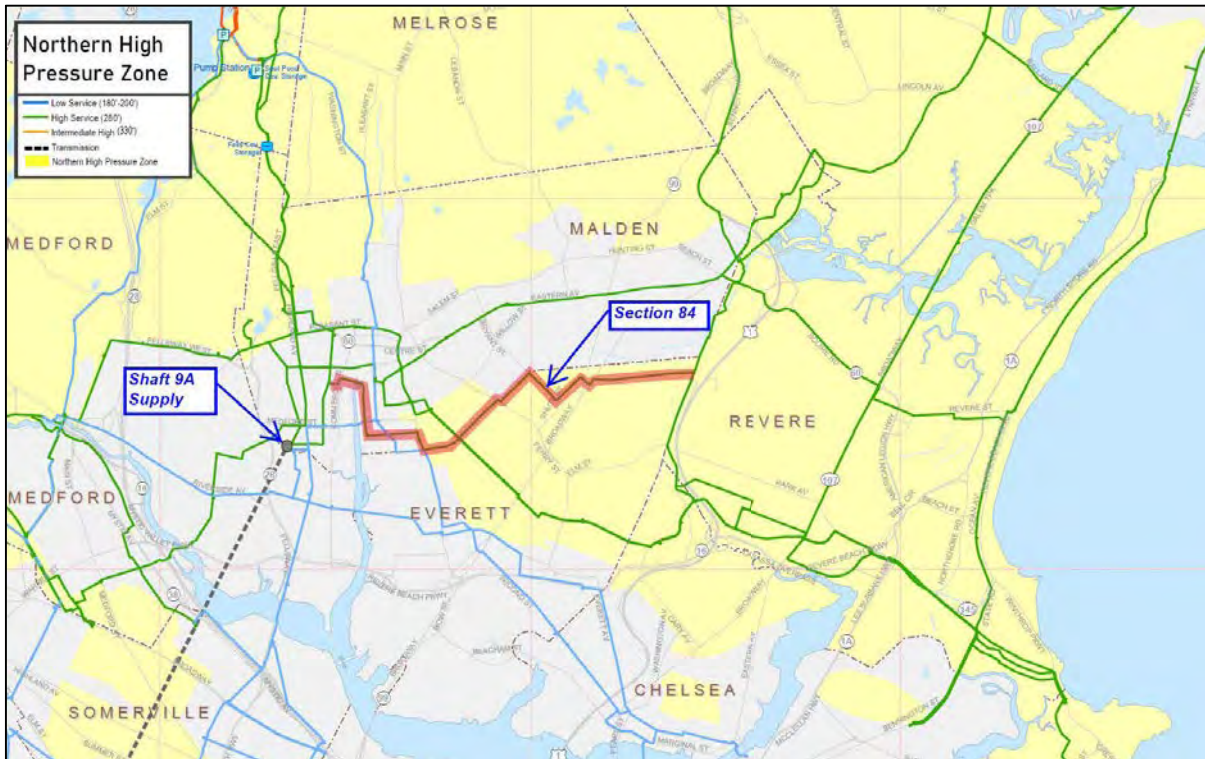


- Reported by City of Malden
- Confirmed by MWRA Leak Detection Crew
- Located on MWRA Section 84 pipeline





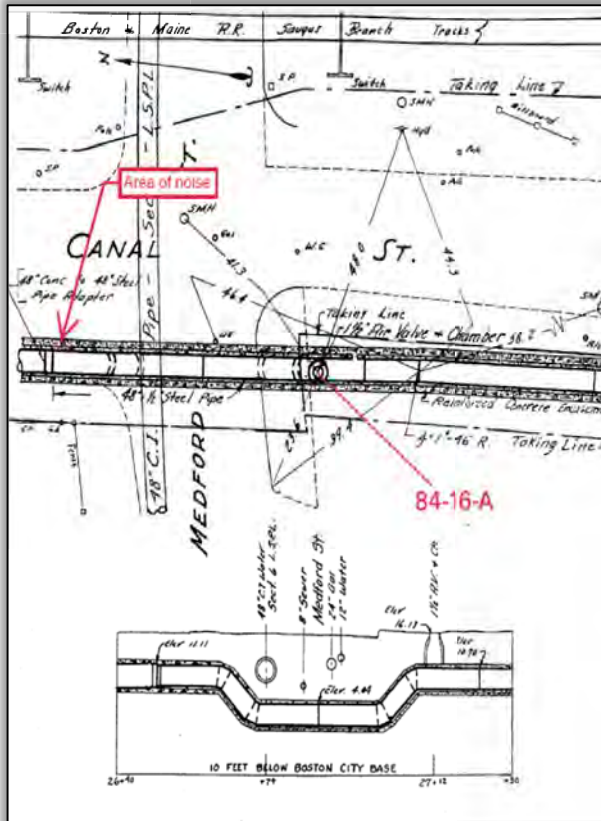
Section 84 Hydraulic Importance



- 48" Concrete Pipeline
- Major Supply to Northern High Service Area
- Seasonal constraints



54



- Pipe transitions to concrete encased steel at intersection
- Leak suspected in steel section
- Difficult excavation





Utility Conflicts



- City of Malden 12-inch water line conflict
- Main to be relocated
- Installed new valves and restraint



Concrete Encasement

- Concrete encasement concealed leak
- Staff had to remove encasement on one side of pipe
- Very labor intensive





Leak located



- Steel corroded on bottom of pipe
- Pipe severely pitted



Engineering Evaluation

- Thickness testing of steel pipe
- Recommended rolled steel welded repair
- Remove entire concrete encasement





Utility Pole Support Required





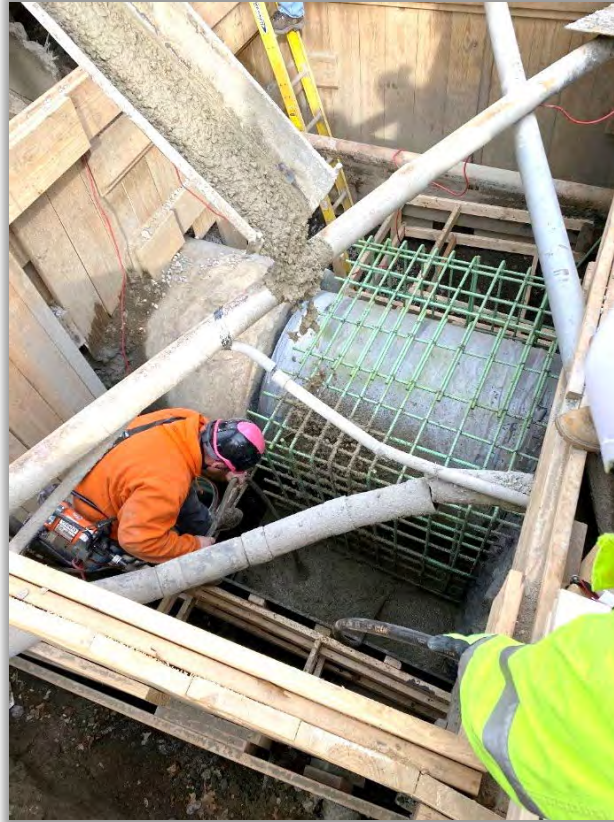
Concrete Encasement Removal / Rolled Steel Installation





Concrete Encasement Installation

- In-house design
- Two separate pours due to the dimensions





Pipeline Disinfection and Activation

- Disinfected and back in service before warm weather/high demand
- Final pavement completed and road reopened





Questions





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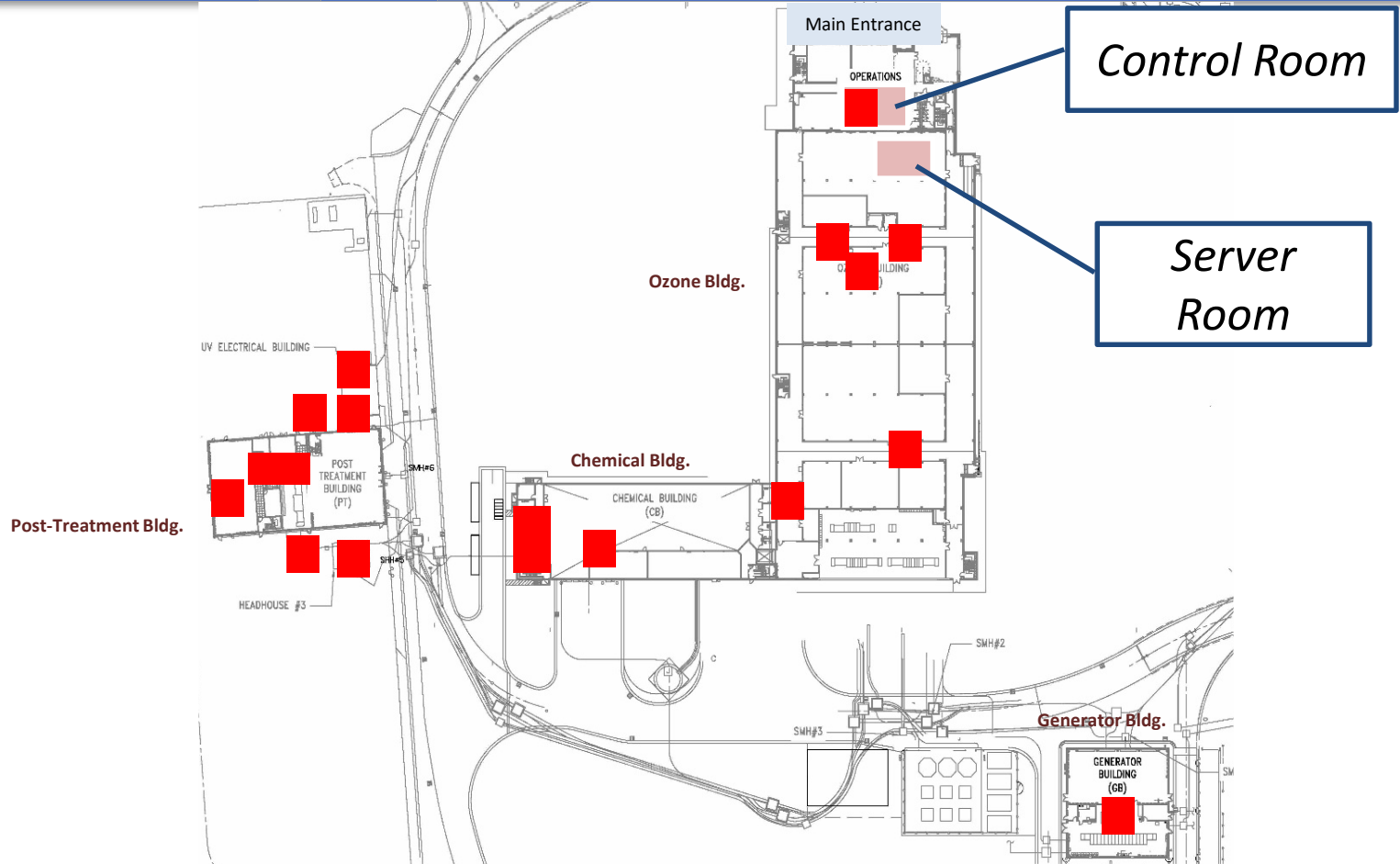
*Carroll Water Treatment Plant
SCADA System Improvements
Contract 7582, Change Order 14*

July 24, 2024



Contract 7582: Carroll Water Treatment Plant SCADA System

SCADA Control Panels (Qty: 17)





Contract 7582: Carroll Water Treatment Plant SCADA System

Typical SCADA Control Panel: Supply Chain Delays





Contract 7582: Carroll Water Treatment Plant SCADA System

Change Order #9: Cyber Security Improvements





Contract 7582: Carroll Water Treatment Plant SCADA System

Change Orders #10 & 13: Backplane Sub Panels & Additional Testing





Contract 7582: Carroll Water Treatment Plant SCADA System Control Room Upgrade

