Wastewater Advisory Committee

Wastewater Pipeline Inspection and Maintenance

Stephen Cullen
Kenneth Bates

March 3, 2017

Today's Agenda

- Overview of MWRA Sewer System
- Pipeline Inspection
- Pipeline Maintenance
- Pipeline Renewal

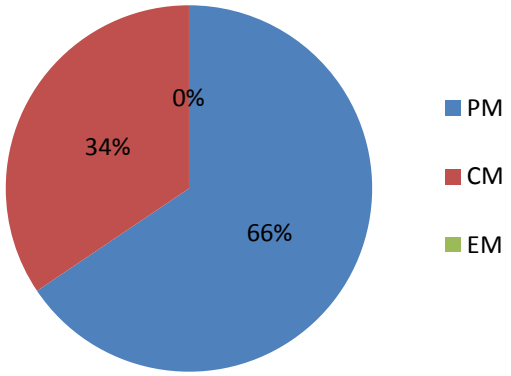

MWRA
SEWER SYSTEM
Publication Date: June 2016
Headworks Tributary Areas
MWRA Sewerage Facilities
MWRA
Interceptors and Outfalls

Sewers by Type

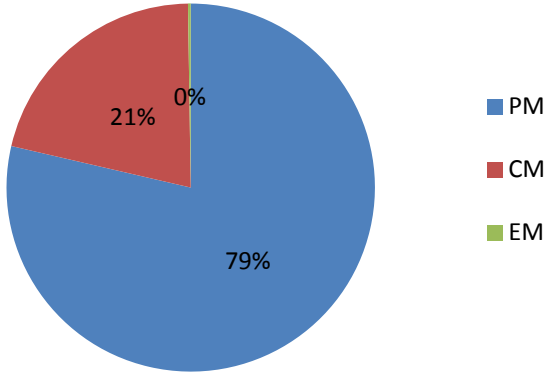
Sewer Type	Miles	Percent
Gravity Sewers	227	82%
Cross-Harbor Tunnels	18.1	6.5%
Force Mains	20	7.2%
Siphons	7	2.5%
CSO Outfalls	3.4	1.2%
Storage Tunnels	2.2	0.6%
Total	275.5	100%

Wastewater Pipeline Work Order History

TV INSPECTION
Work orders by Type



MAINTENANCE
Work order by type



PM – Preventative Maintenance
CM – Corrective Maintenance
EM – Emergency Maintenance

Wastewater Pipeline TV Inspection

<u>Function/Responsibilities</u>

TV Inspection

- Closed Circuit Television Inspection(CCTV) of MWRA Interceptors
- Structure Inspections – Manhole, Tide gate, Diversion, Junction & Head House – Pole Camera System
- Siphon Inspection – Sonar Camera System
- Wet Weather System Monitoring

Community Assistance

- CCTV of Member Community Sewer Systems as Requested

Inspection Goals
Gravity Pipeline, Siphon Barrels, Structures

- CCTV Inspect 32 Miles/13% of the system annually.
  The entire gravity system(227 miles) is inspected once every 7 years.

- Inspect 20 Siphons(48 individual barrels)/44% of the system annually.
  The entire siphon system(61 siphons, 109 individual barrels) is inspected once every 3 years.

- Inspect 650 structures/16% of the system annually.
  The entire structure system(4,000 structures) is inspected once every 6 years.

Wastewater Pipeline
TV Inspection/Maintenance

Wastewater Pipeline Performance Measure

TV Inspections	FY17	YTD
Sewer Line CCTV Inspections (Miles)	32	24.12
Siphon Inspections (Number of Barrels)	48 (2.3 miles)	28
Structure Inspections (Includes Manholes, Head Houses, Diversion, Tide Gate and Junction Structures)	650	555
Wastewater Pipeline		
Interceptor Cleaning (Miles)	36	24.28
Siphon Cleaning (Number of Barrels)	36 (1.7 miles)	44
Manhole Frame and Cover Replacement	108	99

Massachusetts Water Resources Authority
Manhole Inspection Work Order
FOD

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WO#: FO-3508 **MWRA ID:** SPIPES:626.0/0054+06-0053+85

Description: VACTOR SIPHON SECTION 626, SMELT BROOK WEYMOUTH

Asset: 87756	PIPE SEGMENT WRA-6260-0054+06 - WRA-6260-0053+2385	**Status:** INPRG
Location: SEWERPIPE	SEWERAGE PIPELINE HIERARCHY	**Work Type:** CM
Job Plan: VACTOR1	UTILIZE VACTOR TRUCK FOR MAINTENANCE ON SEWER	**Sub Type:** VJ
Supervisor: SALAMONE_A	**Report Date:** 02/01/2017 01:03:10 PM	**PM #:**
Planner: ANAYA_M	**Target Start:** 01/25/2017 01:03:00 PM	**Route:**
Requester: ANAYA_M	**Target Finish:**	**Master WO:**
Crew ID:	**Priority:** 3	**Contract:**

Tasks

Task ID	description
5	ENSURE THAT ALL EMPLOYEES FOLLOW ALL MWRA SAFETY PROCEDURES AND PROTOCALS Follow appropriate safety measures and procedures including but not limited to: hardhats with faceshields, safety glasses, hearing protection, appropriate respiratory protection, gloves, protective coveralls, reflective vests, safety boots etc. Follow all traffic safety measures: sign boards, cones, caution tape, barriers, lights, police detail as required etc. Follow all Confined Space Entry requirements: gas monitor, tripod, harness, fall retrieval, lights, radio as required etc.
10	MEET WITH SUPERVISOR TO DISCUSS JOB PLAN AND WORK SEQUENCING.
20	OBTAIN RELEVANT PLANS, DETAIL RECORDS, MAPS, AND PAST inspection reports for sewer segment / structure selected for maintenance.
30	ARRANGE FOR SUPPORT CREWS AND CALL FOR POLICE DETAILS if needed.
40	PREPARE AND MOBILIZE VEHICLES AND EQUIPMENT NEEDED to perform job tasks. Insure all equipment is in good working condition and fueled up before leaving to planned job site. Fill vactor truck with water as needed,
50	UPON ARRIVAL AT WORK SITE FOLLOW ALL SAFETY PROCEDURES and set up barriers to prevent unauthorized persons from entering job sites.
60	AS REQUIRED COMMUNICATE WORK LOCATION TO THE OCC and follow all CSE procedures before opening or entering any sewer segment / structure.
70	SAFELY POSITION VACTOR TRUCK AT SEWER SEGMENT / STRUCTURE to begin vactor / jetting operation. Reposition equipment as needed in order to complete planned job tasks. Stop cleaning at full tank alarm
80	REPORT AND RECORD ANY MAJOR DEFICIENCIES OR OBSTRUCTIONS to your supervisors.
90	AFTER COMPLETION OF JOB TASKS BREAK DOWN WORK SITE. Restore site to its original condition.
100	EMPTY VACTOR AT THE SOMERVILLE MARGINAL CSO. Record total amount of debris removed from sewer segment / structure. Clean equipment.
110	AFTER RETURNING TO CHELSEA MAINTENANCE FACILITY service equipment as needed and properly store to assigned area.
120	TURN IN ALL INSPECTION DOCUMENTS AND COMPLETE THE WORK ORDER ACTUALS and submit them to your supervisor for review.
130	VACTOR SIPHON

Planned Labor

laborcode	displayname	craft	Quantity	Est hrs	Rate	Line Total
		HEO	1	16:00	$31.00	$496.00
		SKLLDLBR	1	16:00	$25.00	$400.00
		PIPEFRM	1	16:00	$37.75	$604.00

Closed Circuit Television Inspection(CCTV)

Closed Circuit Television Inspection(CCTV)

Closed Circuit Television Inspection(CCTV)
Operator's Room

Closed Circuit Television Inspection(CCTV)
Pipe Transporters – Small/Large Pipe

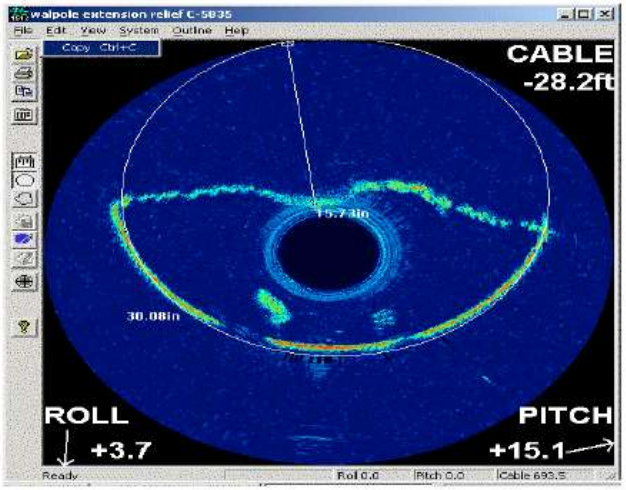
Sonar System – Siphon Inspections

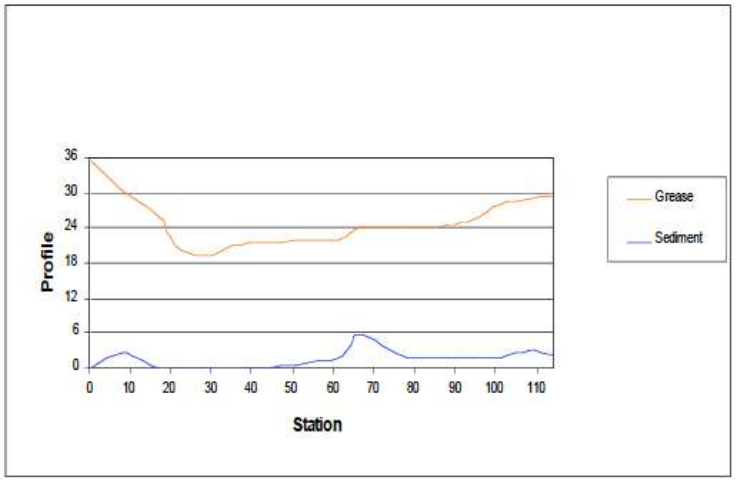
Siphon Inspection Equipment

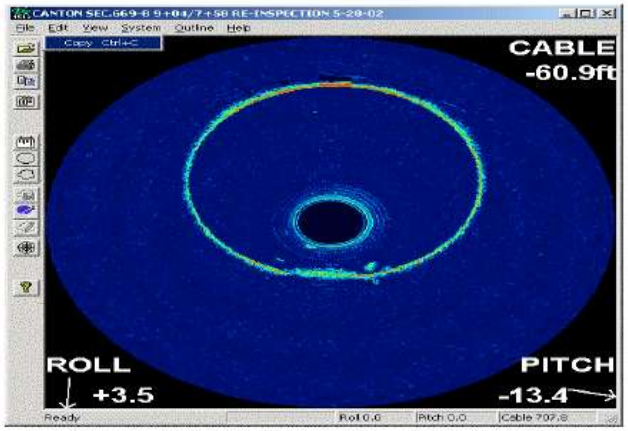
Walpole Extension Sewer, Norwood

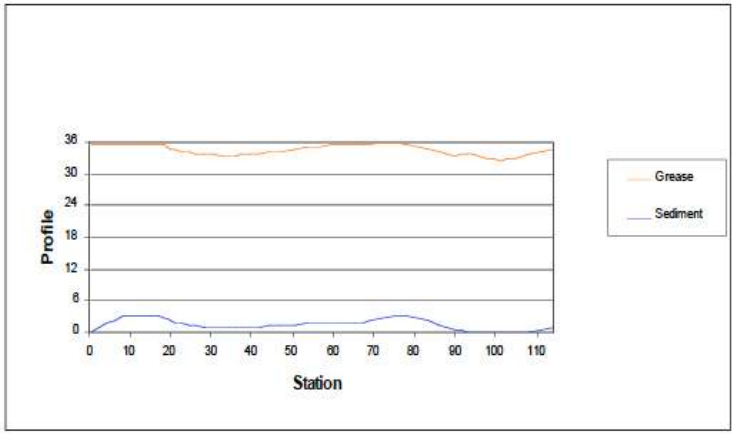
1 - 36” Barrel Siphon

Before and After Cleaning









Wastewater Pipeline Maintenance

Maintenance

- Hydraulic Cleaning of MWRA Interceptors/Siphons –Vactor Jet
- Mechanical Cleaning of MWRA Interceptors/Siphons –Bucket Machines
- Manhole Frame and Cover Replacement
- NPDES Monthly Inspections
- Facility Wet Well Cleaning
- Spot Repair- Manhole/Head House Structures and Sewer Pipelines
- Wet Weather Monitoring

Maintenance Goals
Gravity Pipeline, Siphon Barrels, Structures

- Maintain 36 Miles/16% of the system annually.

  The entire gravity system(227 miles) is inspected once every 7 years.

- Replace 108 Structure Frames and Covers/2.7% of the system annually.

  The entire structure system(4,000 structures) is inspected once every 6 years.

- Maintain 20 Siphons(36 individual barrels)/33% of the system annually.

  The entire siphon system(61 siphons, 109 individual barrels) is cleaned once every 3 years.

Maintenance Equipment

VACTOR JET PIPE MAINTENANCE

VACTOR JET PIPE MAINTENANCE

MAINTENANCE EQUIPMENT
BUCKET MACHINE

SIPHON BARRELL CLEANING EQUIPMENT

SIPHON CLEANING

GREASE/DEBRIS REMOVAL

GREASE /DEBRIS REMOVAL

GREASE/DEBRIS REMOVAL

GREASE/DEBRIS REMOVAL

Maintenance/TV Inspection Training

- Right of Way - MBTA
- Railroad Safety – Keolis
- Confined Space Entry
- CPR/AED/First Aide
- Right to Know
- Work Zone Safety/Flagger
- Crane & Derrick Rigging/Signal
- ARC Map 9
- OSHA 40 Hour Hazardous Waste
- OSHA 8 Hour Annual Review
- OSHA 10 Hour Construction

Pipeline Renewal Overall Goals

- Prioritize Condition of all Pipelines
- Proactive Replacement/Rehabilitation of Pipelines

Interceptor Renewal Decision Support Model

Factors Related to Assessment of Risk of Failure

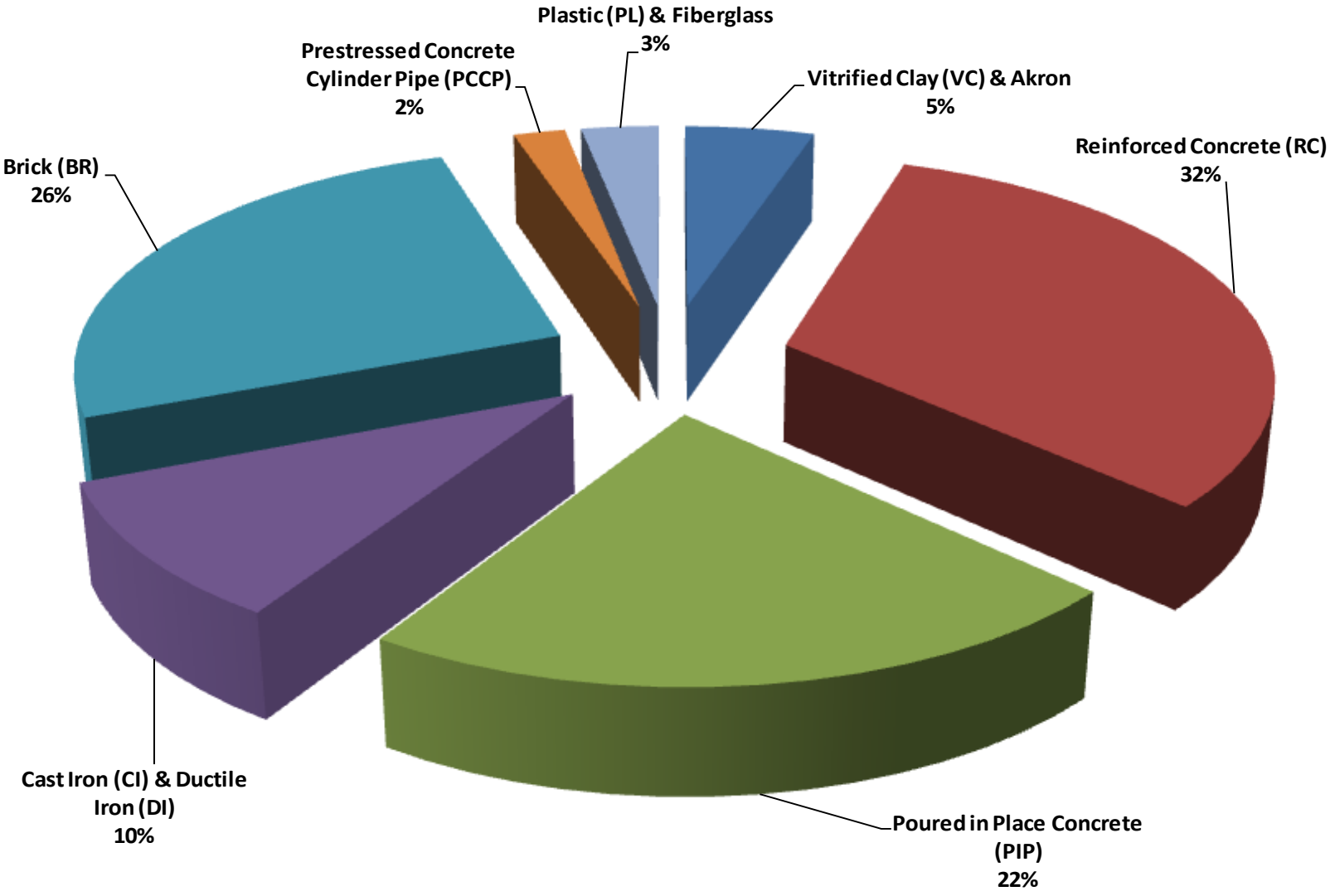
Primary Factors

	Description	Code	Weight	Points
TV Inspection Rating	No Rating	0	0	200
	A Rating	1	0	
	B Rating	2	0.5	
	C Rating	3	1	
Age	1-25 yrs	1	0.2	40
	26-50 yrs	2	0.4	
	51-75 yrs	3	0.6	
	76-100 yrs	4	0.8	
	101-125 yrs	5	1	
Material	Akron (VTC)	8	1	40
	Brick (BR)	2	0.8	
	Cast Iron (CI)	5	0.4	
	Ductile Iron (DI)	6	0.4	
	Plastic (PL)	12	0.1	
	Poured in Place Concrete (PIP)	3	0.75	
	Reinforced Concrete (RC)	1	0.75	
	Steel (STL)	7	0.1	
	Vitrified Clay (VC)	4	1	

Secondary Factors

		Age					Factor Points
		1	2	3	4	5	
Material Code	1	0	0.87	0.12	0.005	0.005	20
	2	0	0	0	0	0	
	3	0.01	0	0.77	0.15	0.07	
	4	0	0	0	0	0	
	5	0	0	0	0	0	
	6	0	0	0	0	0	
	7	0	0	0	0	0	
	8	0	0	0	0	0	
	12	0	0	0	0	0	

MWRA Sewer System Pipelines
(by material)



SEWER SIPHON CHAMBER/MANHOLE REHABILITATION

MANHOLE FRAME AND COVER REPLACEMENT

Manhole Frame and Cover Replacement

In House Manhole Frame and Cover Replacement
Section 651-High Level Sewer, Station 20+26, Milton

In House Manhole Structure Rehabilitation
Section 43 – Metropolitan Sewer, Station 74+30, Cambridge

In House Manhole Structure Rehabilitation
Section 43 – Metropolitan Sewer, Station 74+30, Cambridge

MANHOLE STRUCTURE REPLACEMENT

MANHOLE STRUCTURE REPLACEMENT

SEWER REHABILITATION – SPOT REPAIR

Completed Rehabilitation of Sections 83 (Arlington) and 160 (Winchester/Medford) using Cured-in-Place Technology

Rehabilitation of Section 156 (MDC 17.5)

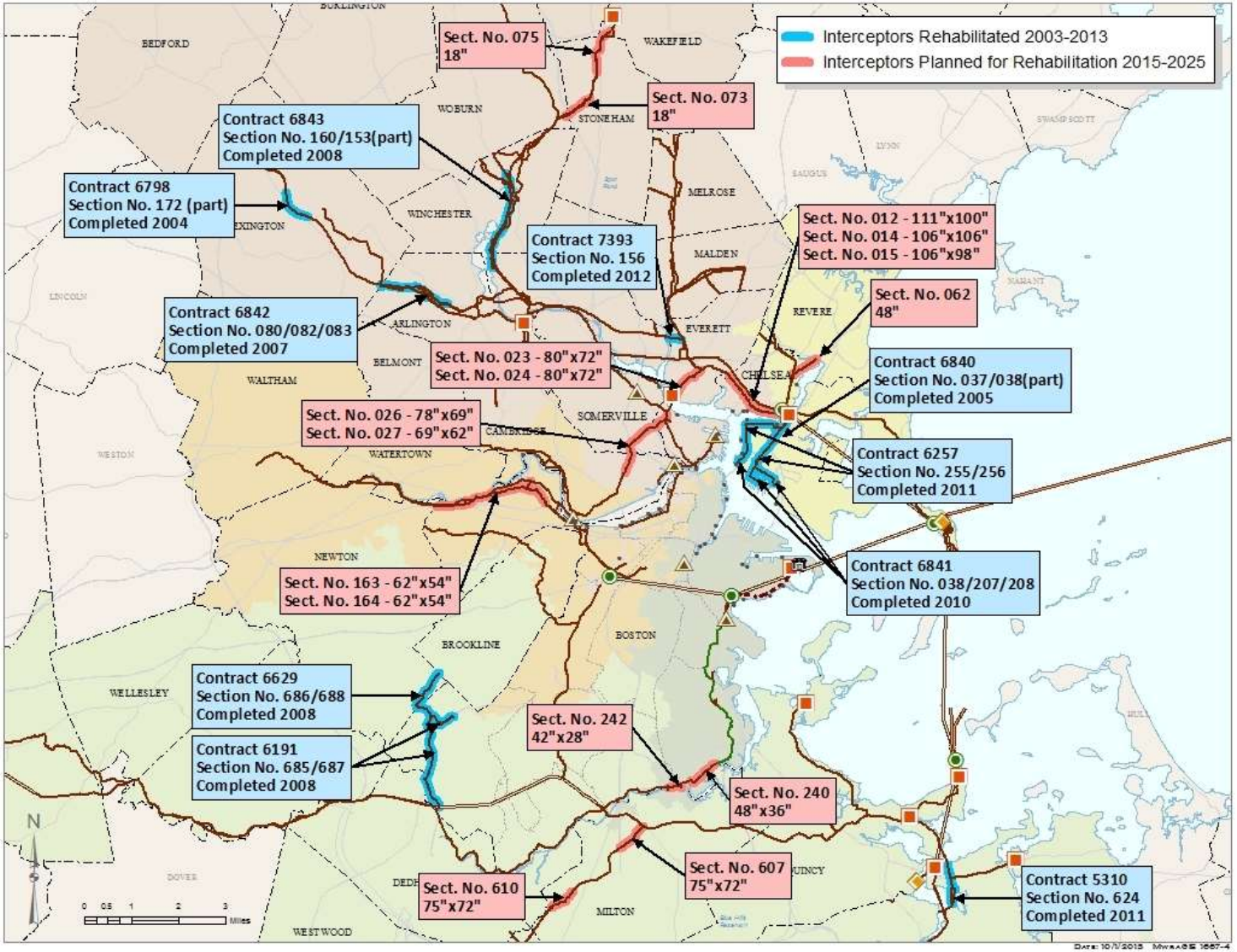
Everett, MA

CIPP air/steam process

COMPLETED PIPELINE PROJECTS (2004-2016)

Contract	Section No. MWRA	Section No. MDC	2006 Rank	Location	Size (in)	Length (ft)	Cost ($million)	Method	Substantial Completion	Comment
6798	172	93A	N/A	Lexington	36	4,000	$ 1.5	CIPP	2004	Advanced deterioration moved project Up (project awarded before ranking list)
6840	37	37	3	East Boston	41x36	6,000	$ 5.1	CIPP	2005	Scheduled Construction/Condition and Hydraulic Relief
6842	80/82/83	80/82/83	15/25/140	Arlington	20	4,500	$ 1.2	CIPP	2007	Deformed section moved project Up
6843	160/153part	MVS	123/49	Winchester/Medford	28x26	9,500	$ 1.6	CIPP	2008	Deformed section moved project up
6629	529/530 (new686/688)	29/30	115/120	Newton/West Roxbury	15 to 45x48	11,100	$ 8.3	Cut and cover	2008	Scheduled Construction/Condition and Hydraulic Relief (new 685/687)
6191	526/527/528 (new 685/687)	26/27/28	13/22/27	West Roxbury	42	18,500	$ 37.9	Jacking / cut and cover	2008	Scheduled Construction/Condition and Hydraulic Relief (new 685/687)
6841	38/208/207	38/38BR/37BR	34/2/35	East Boston	15	5,300	$ 7.0	Pipe Burst	2010	Scheduled Construction/Condition and Hydraulic Relief
6257	39 (new255/256)	39	1	East Boston	36/48/66	13,000	$ 59.0	MicroTunnel	2011	Scheduled Construction/Condition and Hydraulic Relief (new 255/256)
5310	624	124	283	Weymouth	60x57	2,100	$ 2.5	CIPP	2011	Scheduled Construction/ B-W Hydraulic Relief and poor condition
7393	156	17.5	14	Everett	61x56	1,700	$ 2.5	CIPP	2012	Deteriorating Pipe moved project Up
				Total		75,700	$ 126.6			

MWRA INTERCEPTOR PROGRAM



Questions?