



Wastewater Advisory Committee

Wastewater Pipeline Asset Management & Protection

John Vetere
Stephen Cullen
Margery Johnson
Patrick Smith

October 4, 2013



Today's Agenda

- Overview of MWRA Sewer System
- Asset Protection
- Pipeline Inspection
- Pipeline Maintenance
- I/I Local Financial Assistance Program
- Pipeline Renewal
- Questions



Wastewater Flow Components

- Sanitary Sewage
- Groundwater Infiltration
- Stormwater Inflow



Groundwater INFILTRATION

Manhole INFLOW





Wastewater Flow Components

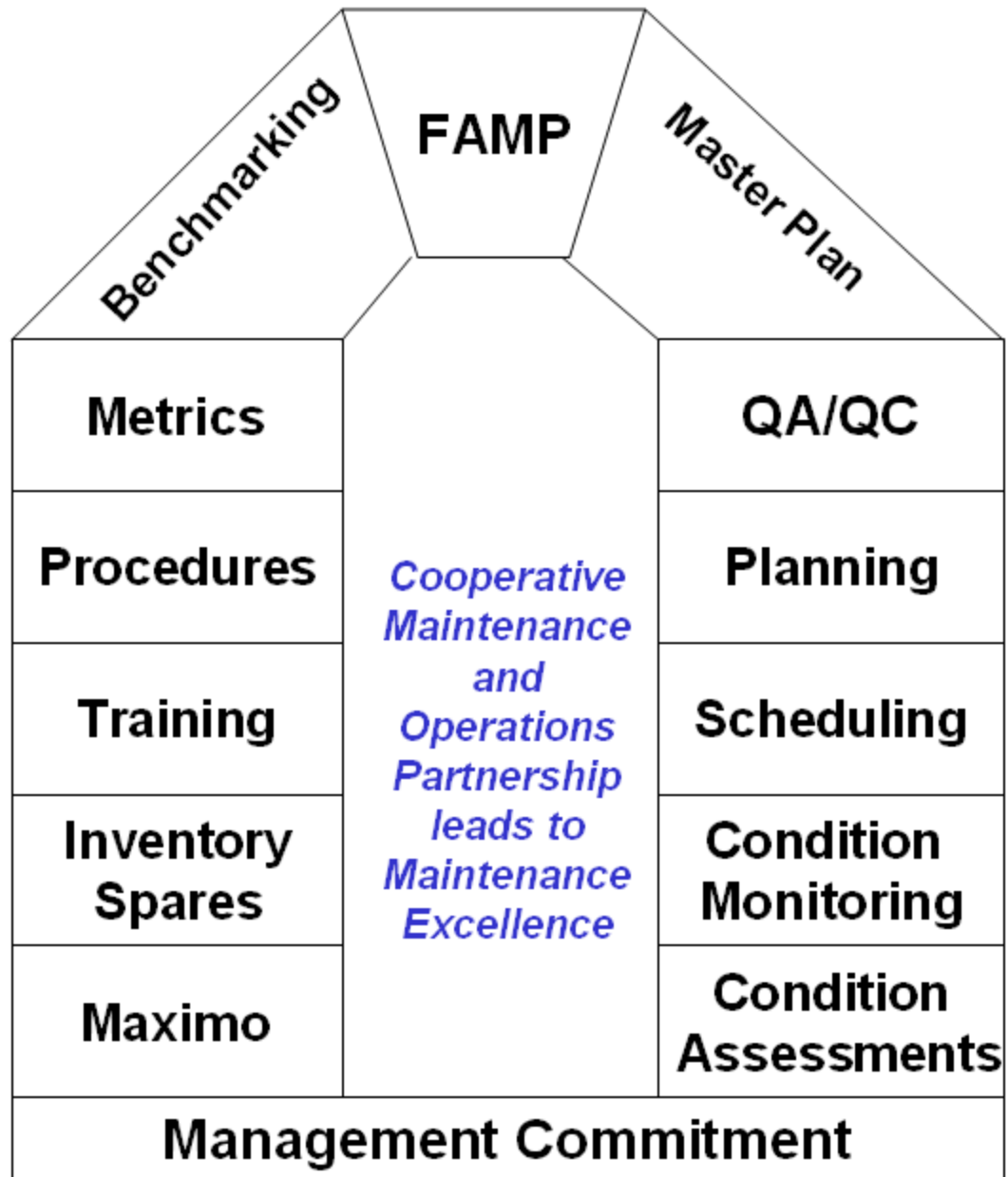


Sump Pump Inflow

- Stormwater inflow from private property
- Identify private inflow sources using smoke testing, dye tracing, and house-to-house inspections



Downspout Inflow





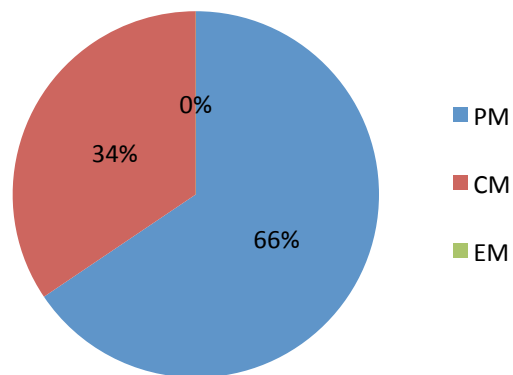
Sewers by Type

<u>Sewer Type</u>	<u>Miles</u>	<u>Percent</u>
Gravity Sewers	227	82.4%
Cross-Harbor Tunnels	18.1	6.6%
Force Mains	20	7.3%
Siphons	7	2.5%
CSO Outfalls	3.4	1.2%
Total	275.5	100%

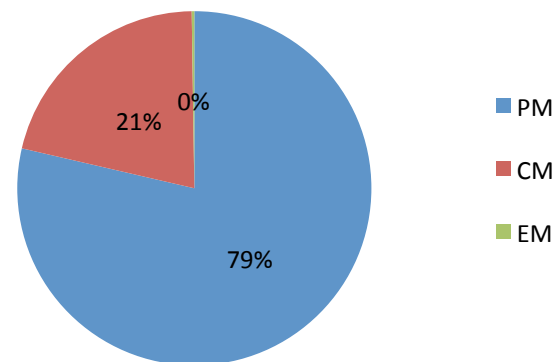


Wastewater Pipeline Work Order History

TV INSPECTION Work orders by Type



MAINTENANCE Work order by type



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



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.



Massachusetts Water Resources Authority WOPrint1

WO#: W4377062

MWRA ID: SPIPES:038.0/0012+94-0012

Description: VACTOR BREMEN ST SEWER SECTION 38 Sep 2013		
Equipment: 77052	- PIPE SEGMENT WRA-0380-0012+86 - WRA-0380-0012+80	Status: INPRG
Location: SEWERPIPE	- Sewerage Pipeline Hierarchy	Work Type: PDM
JP Number: VACTOR1	- VACTOR SEWER PIPELINE SEGMENT	Sub Type: VJ
Supervisor: SALAMONE,ANGELO	Report Date: 9/20/2013 3:18:32 PM	PM Number:
Planner: YOUNG, LEONARD	Target Start: 7/29/2013	Route Number:
Requester: YOUNG, LEONARD	Target Finish: 8/2/2013	Master WO:
Crew ID: S/PIPE12	Priority: 3	Contract:

Tasks							
<u>Task ID</u>	<u>Description</u>						
10	OBTAIN PLANS, SAMS REPORTS, LAST INSPECTION REPORT AND MH INSPECTION REPORTS.						
20	PLAN INSPECTION SEGMENTS, ARRANGE FOR DETAILS SUPPORT CREWS IF NEEDED.						
30	FOLLOW TIU SOP AND CSE PROCEDURES						
40	JET FROM MH TO MH						
45	VACTOR OUT DEBRIS						
50	REPORT MAJOR DEFICIENCIES AND / OR OBSTRUCTIONS						
60	RECORD ACTUALS ON WORK ORDER						
70	TURN IN ALL INSPECTION DOCUMENTS						
80	jet and vac both barrels						
90	vac out su,mp						
100	vactor out debris						
110	vactor both barrels						
120	vactor both barrels						
130	vactor siphon						
		Planned Labor					
<u>Labor Code</u>	<u>Description</u>	<u>Craft Qty</u>	<u>Est Hrs</u>	<u>Rate</u>	<u>Line Total</u>		
EQUIPOPH	HEAVY EQUIPMENT OPERATOR	1.00	8.00	\$27.08	\$216.64		
PIPELINEW	WASTEWATER PIPELINE	4.00	8.00	\$25.73	\$823.36		
		Planned Tools					
<u>Tool #</u>	<u>Tool Description</u>	<u>Quantity</u>	<u>Hours</u>	<u>Rate</u>	<u>Line Total</u>		
1002	Crew Cab Utility	1.00	40.00	\$18.75	\$750.00		
1036	2500 GAL VACTOR TRUCK	1.00	40.00	\$13.89	\$555.60		
		Actual Labor					
<u>Labor Code</u>	<u>Name</u>	<u>Start Date</u>	<u>Mileage</u>	<u>RegHrs</u>	<u>OTHrs</u>	<u>RegRate</u>	<u>Line Total</u>
101519	DENICOLIS,VINCENT	9/20/2013		8.00	0.00	\$30.04	\$240.32
101519	DENICOLIS,VINCENT	9/20/2013	500	0.00	0.00	\$30.04	\$0.00
102103	JOHNSON, ROBERT	9/20/2013		8.00	0.00	\$24.50	\$196.00
101991	LEONE, CHRISTOPHER C.	9/20/2013		6.50	0.00	\$25.73	\$167.25
					Total	\$603.57	



Wastewater Pipeline TV Inspection/Maintenance

Wastewater Pipeline Performance Measure

<u>TV Inspections</u>	<u>FY14</u>
Sewer Line CCTV Inspections (Miles)	32
Siphon Inspections (Number of Barrels)	48 (2.3 miles)
Structure Inspections (Includes Manholes, Head Houses, Diversion, Tide Gate and Junction Structures)	650
 <u>Wastewater Pipeline</u>	
Interceptor Cleaning (Miles)	36
Siphon Cleaning (Number of Barrels)	36 (1.7 miles)
Manhole Frame and Cover Replacement	108



Maintenance Goals

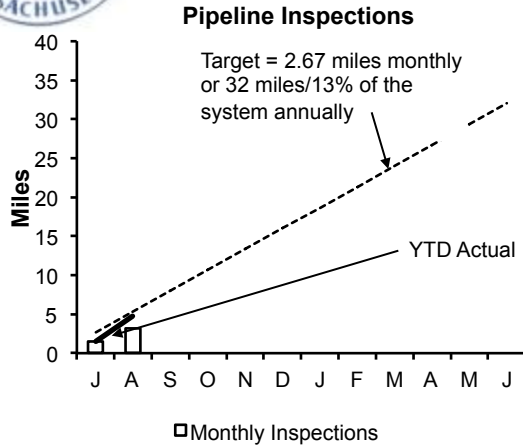
Gravity Pipeline, Siphon Barrels, Structures

- 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.

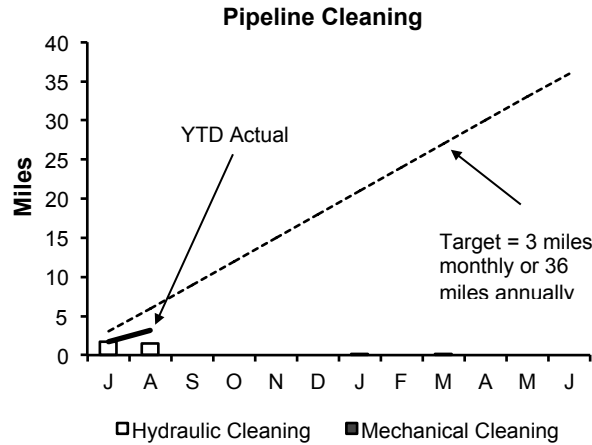


Wastewater Pipeline and Structure Inspections and Maintenance

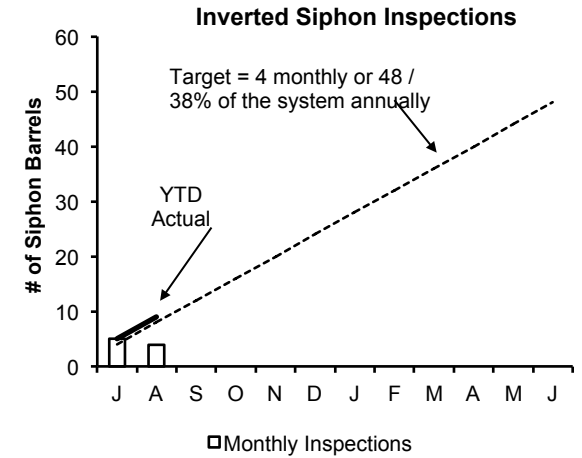
August 2013, FY 14



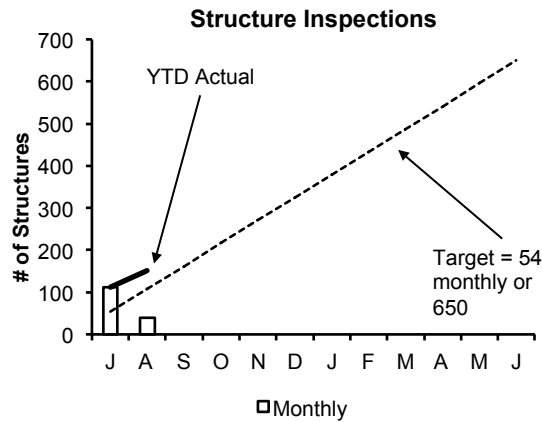
Staff internally inspected 3.20 miles of MWRA sewer pipeline during the month of August. The year to date total is 4.71 miles. No Community Assistance was provided this month.



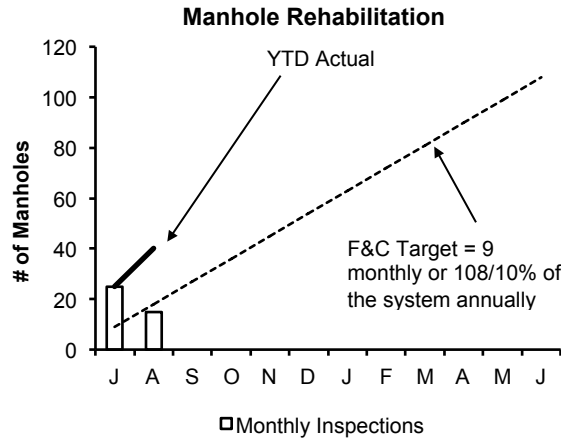
Staff cleaned 1.50 miles of MWRA's sewer system and removed 9 yards of grit and debris during the month of August. The year to date total is 3.18 miles. No Community Assistance was provided this month.



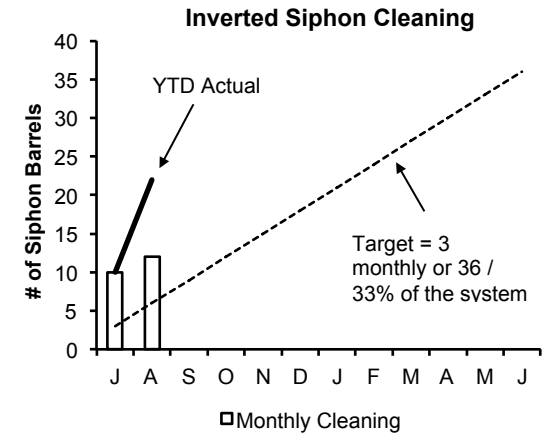
Staff inspected 4 siphon barrels during the month of August. Year to date total is 9 inspections.



Staff inspected the 12 CSO structures and performed 28 additional manhole/structure inspections during the month of August. The year to date total is 152 inspections.



Staff replaced 15 frames & covers during the month of August. The year to date total is 40.



Staff cleaned 12 siphon barrels during the month of August. The year to date total remains at 22 barrels.



Wastewater Pipeline TV Inspection

Function/Responsibilities

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



Closed Circuit Television Inspection(CCTV)





Sonar System – Siphon Inspections





Siphon Inspection Equipment

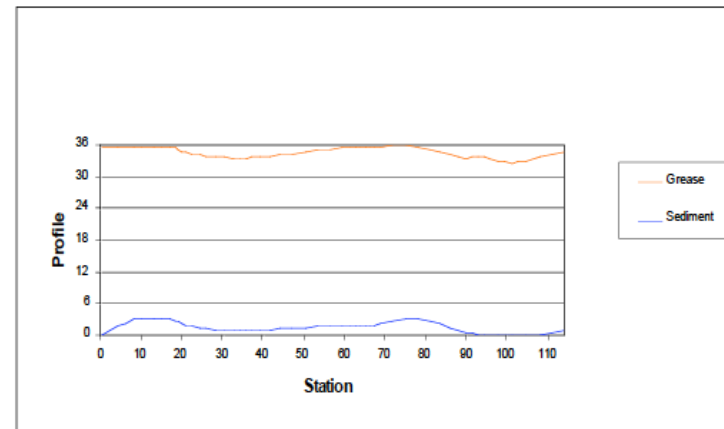
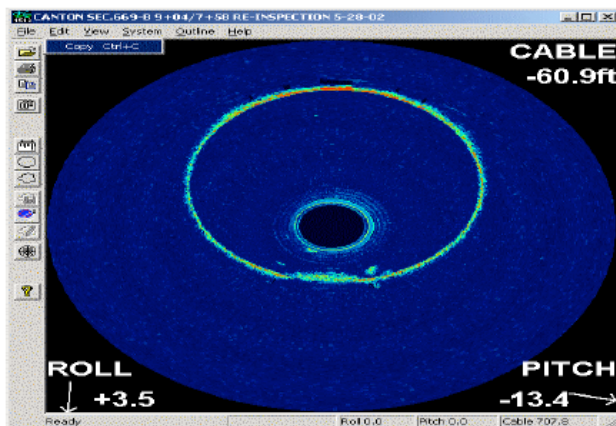
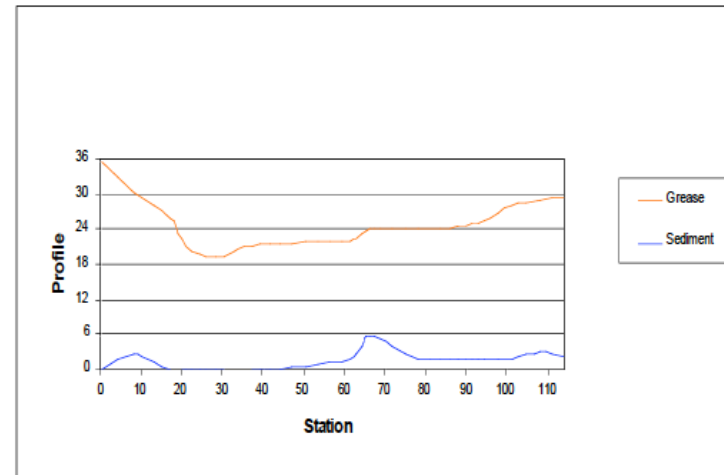
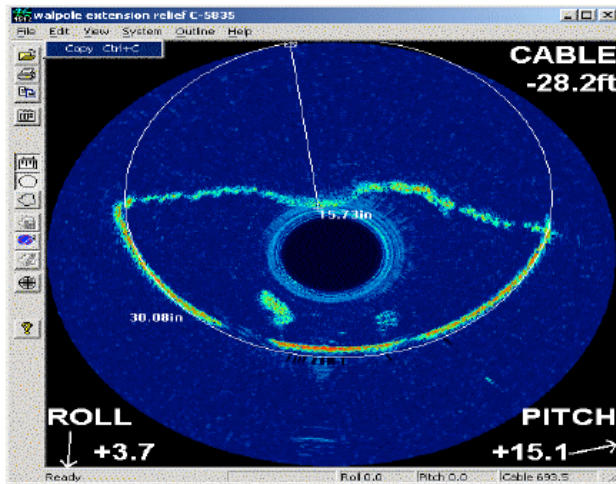




Walpole Extension Sewer, Norwood

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 Equipment





Grease/Debris Removal





Maintenance Equipment





Grease/Debris Removal





Grease/Debris Removal



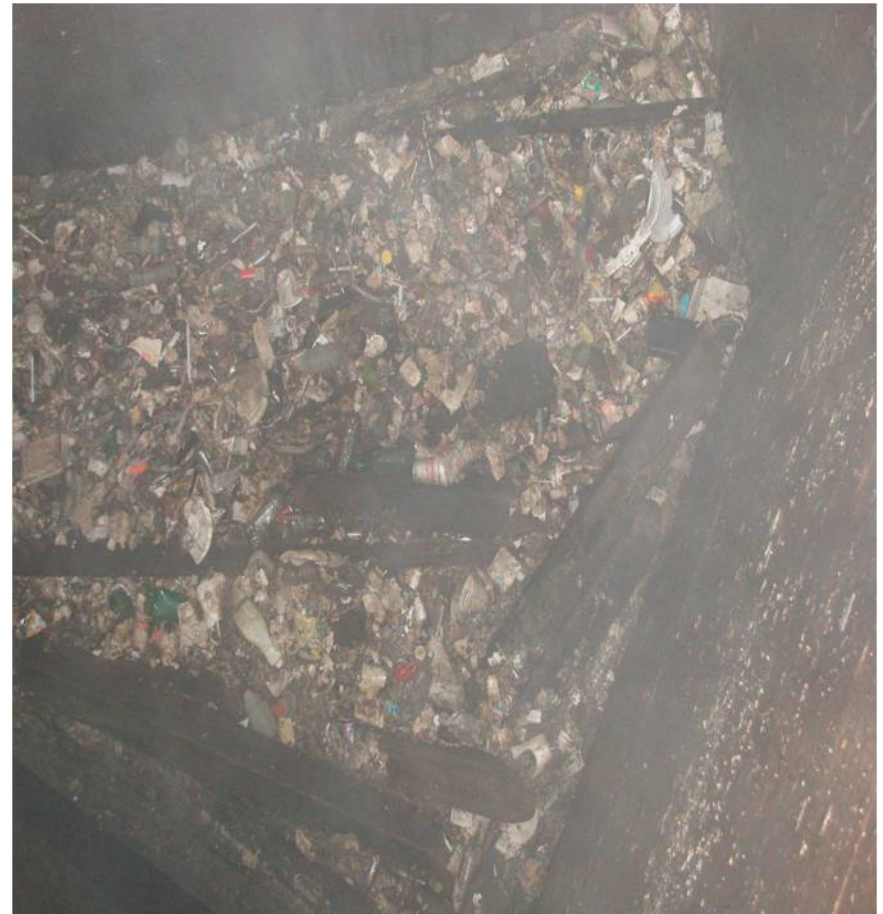


Maintenance Equipment





Grease/Debris Removal





Manhole Frame and Cover Replacement





Maintenance/TV Inspection Training

- Right of Way - MBTA
- Railroad Safety – MBCR
- 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



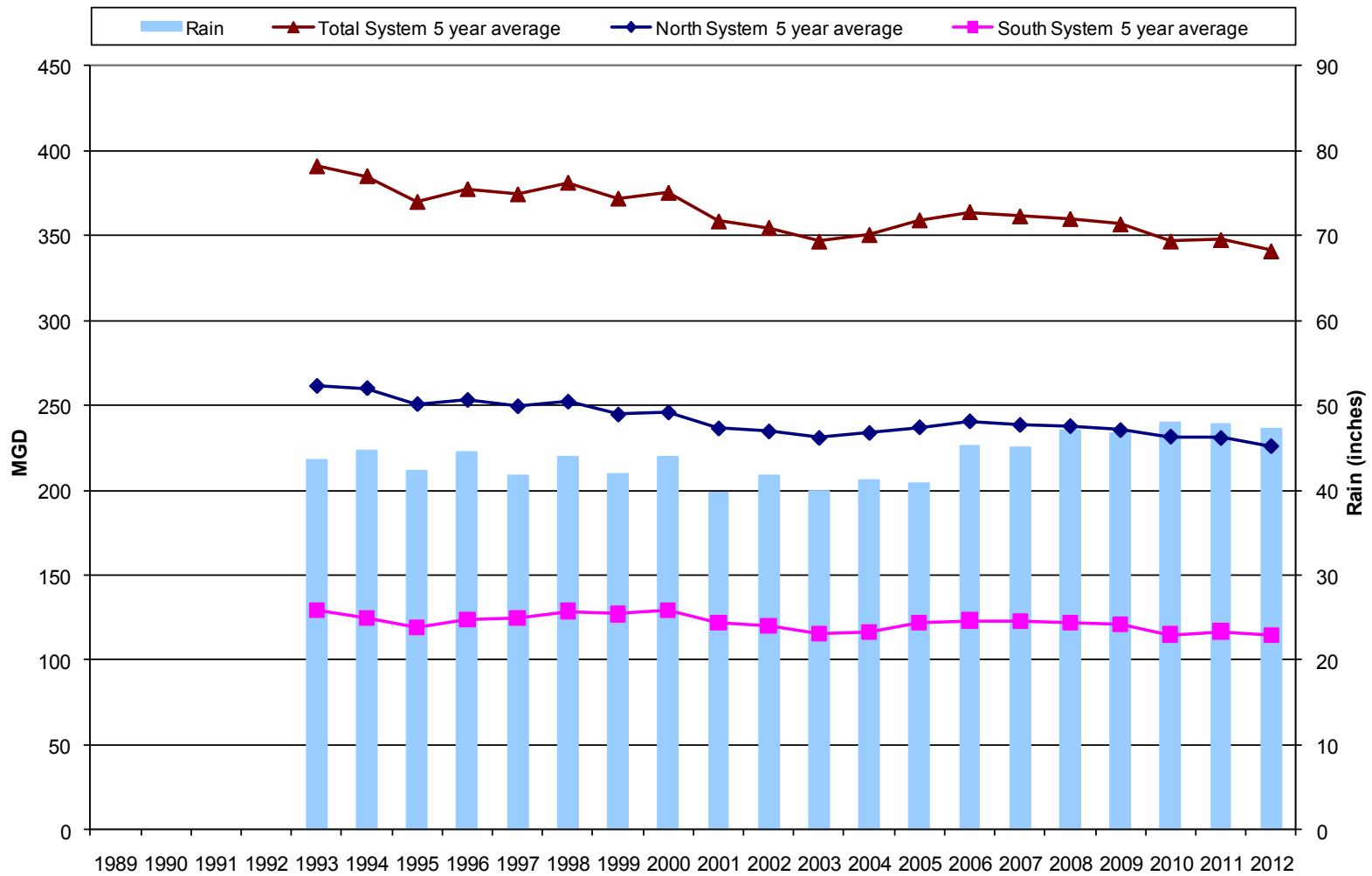
I/I Local Financial Assistance Program

- Community allocation based on percent sewer charge
- \$256M distributed through August 2013
- 45 percent grant / 55 percent interest-free loan
- Loan repayment over 5 years
- All 43 communities participating – over 450 projects funded
- 75% of funds to construction projects
- 25% of funds to planning and design projects



Long-Term Regional Flow Data

MWRA Long-Term Regional Flow Data
 5-year Running Averages
 5 year running average NOAA Rainfall at Logan Airport





Pipeline Renewal Overall Goals

- Prioritize Condition of all Pipelines
- Proactive Replacement/Rehabilitation of Pipelines
- Minimize Pipeline System Risk and Consequence of Failure



Interceptor Renewal Decision Support Model

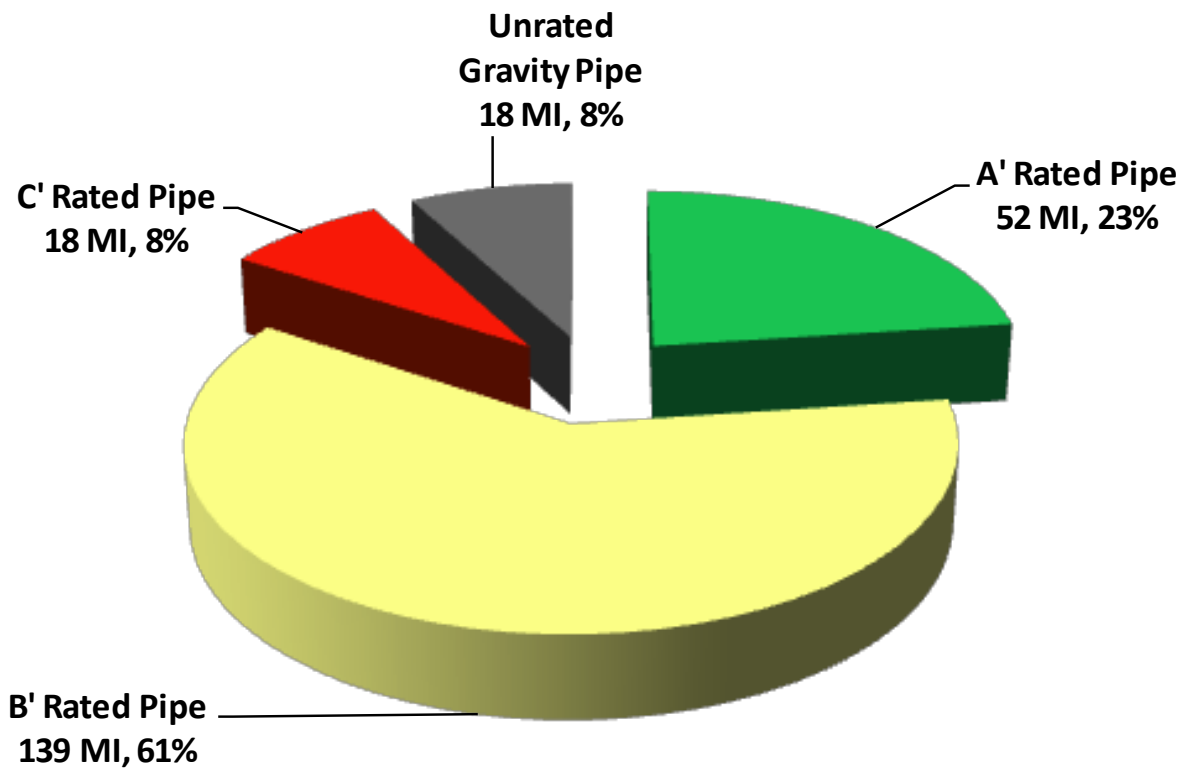
Factors Related to Assessment of Risk of Failure

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							
Material Code		Age					Factor Points
		1	2	3	4	5	
		1	0	0.87	0.12	0.005	
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		

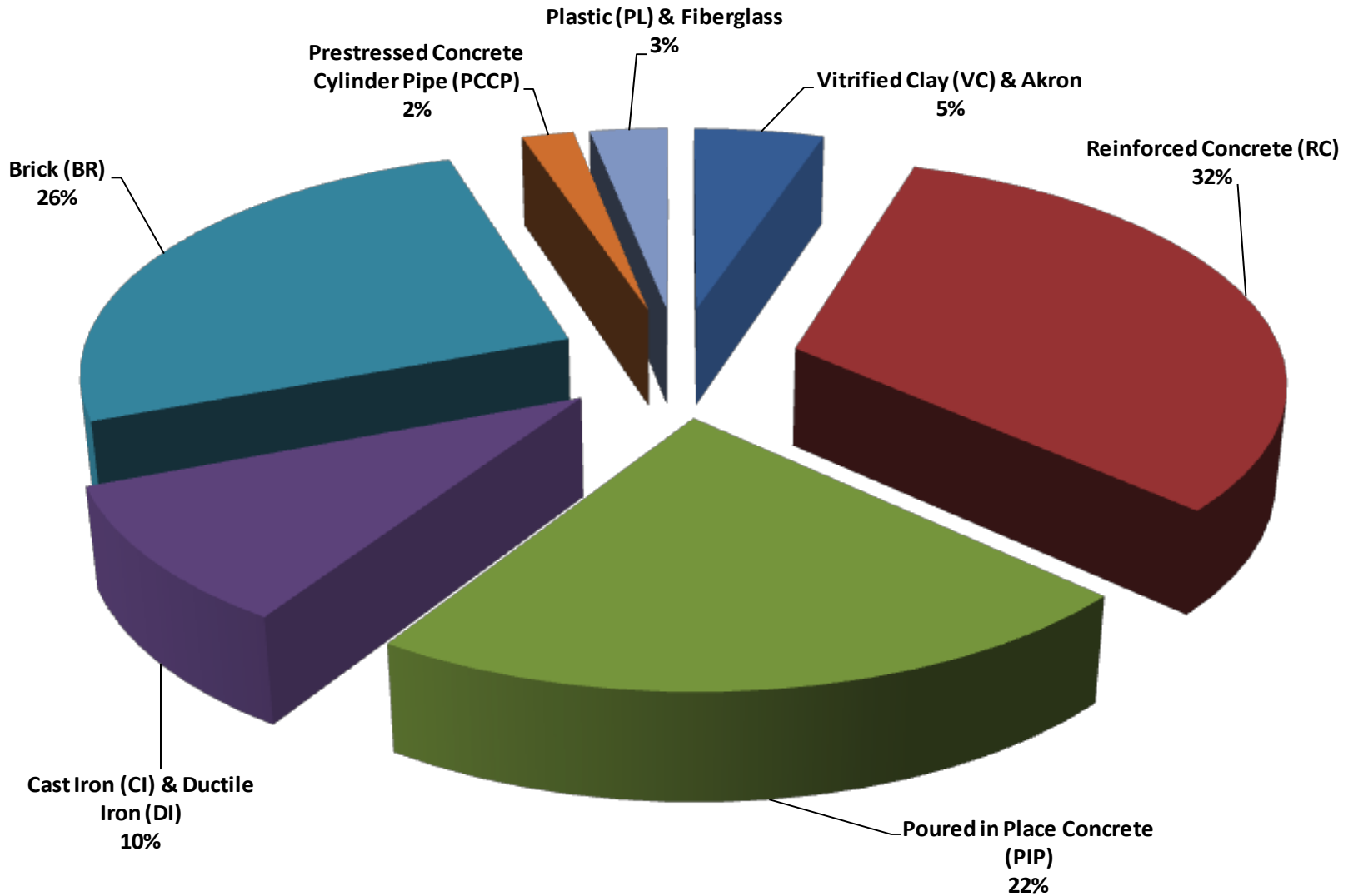


Pipeline Condition Ratings (Pipeline Miles %)



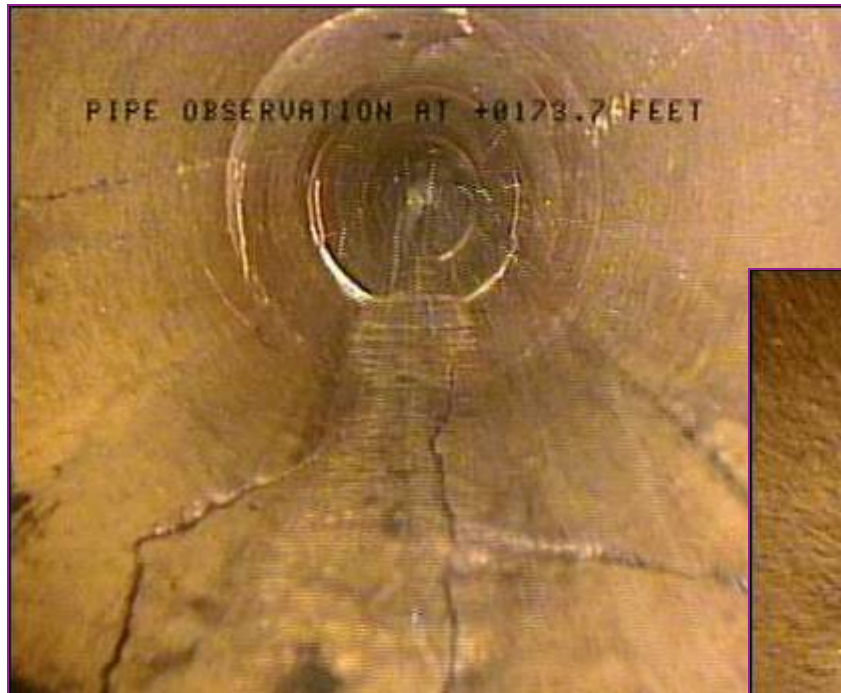


MWRA Sewer System Pipelines (by material)





"C" Rated Pipe





Rehabilitation of Section 156 (MDC 17.5) Everett, MA



CIPP air/steam process





Sewer Siphon/ Manhole Rehabilitation





Manhole Structure Replacement





Manhole Structure Replacement





Sewer Rehabilitation



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





Completed Projects (2004-2013)

Contract	Section No.		2006 Rank	Location	Size (in)	Length (ft)	Cost (\$million)	Method	Substantial Completion	Comment
	MWRA	MDC								
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			



FUTURE PROGRAMS FOR REHABILITATION

Section MWRA(MDC)	Total Pipe	Size	Built (yr)	Material	Community	Name	Project No.	Estimated Cost (\$M)	Construction NTP
27	4,793	69x62	1893	Brick	Somerville	Metro Cambridge Branch	1		Aug-16
26	4,233	78x69	1893	Brick	Somerville	Metro Cambridge Branch	1	10.5	Aug-16
240(9)	3,582	48x36	1895	Brick	Dorchester	Dorchester Intercepting Sewer	2		Sep-18
241(10)	1,557	48x36	1895	Brick	Dorchester	Dorchester Intercepting Sewer	2		Sep-18
242(11)	1,361	42x28	1896	Brick	Dorchester	Dorchester Intercepting Sewer	2		Sep-18
73	3,600	18	1919	VC/CI	Woburn	North Met Relief Sewer	2		Sep-18
74	3,164	18	1919	VC	Stoneham	North Met Relief Sewer	2		Sep-18
75	5,456	18	1919	VC	Stoneham	North Met Relief Sewer	2	8.0	Sep-18
62	2,788	48	1904	Brick	Chelsea	Metro Revere Extension Sewer	3		Sep-21
15	1,741	106x98	1892	Brick	Chelsea	Metropolitan Sewer	3		Sep-21
14	3,445	106x106	1893	Brick	Chelsea	Metropolitan Sewer	3		Sep-21
12	3,034	111x100	1983	Brick	Chelsea	Metropolitan Sewer	3	17.0	Sep-21
23	2,268	80x72	1893	Brick	Everett	Metro Cambridge Branch	4		Sep-24
24	2,162	80x72	1892	Brick	Everett	Metro Cambridge Branch	4		Sep-24
164	8,027	62x54	1892	Brick	Brighton	Charles River Valley Sewer	4		Sep-24
163	5,300	62x54	1892	Brick	Brighton	Charles River Valley Sewer	4	12.5	Sep-24
607(107)	3,568	75x72	1930	PIP	Milton	New Neponset Valley Sewer	5		Sep-27
608(108)	3,568	75x72	1930	PIP	Milton	New Neponset Valley Sewer	5		Sep-27
608(108)	4,450	75x72	1930	PIP	Milton	New Neponset Valley Sewer	5		Sep-27
610(110)	3,180	75x72	1932	PIP	Milton	New Neponset Valley Sewer	5	11.0	Sep-27
Total	71,277	=13.54 miles						\$ 59.0	



Questions?