Somerville Marginal CSO (MWR205) Status and Update

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Mystic Water Quality Science Forum
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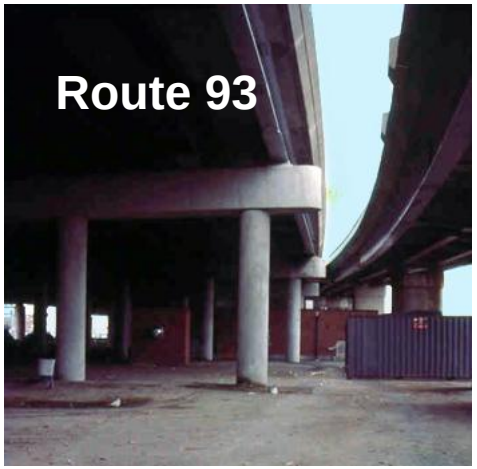
About the Somerville Marginal CSO Facility

One of four CSO facilities in the MWRA sewer system that discharges screened, chlorinated and de-chlorinated effluent into receiving waters in wet weather.

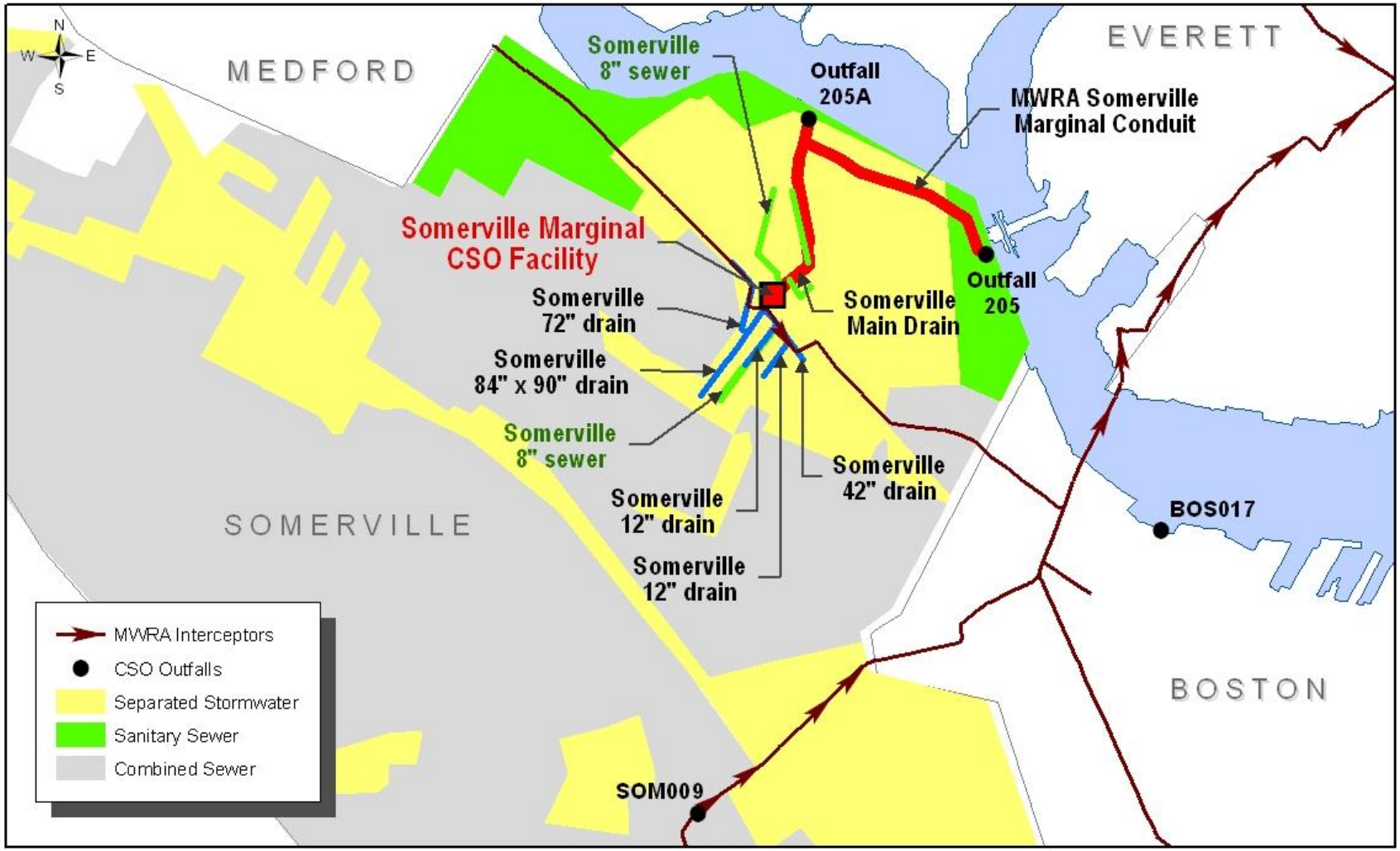
The facility is located under Route 93 between Assembly Square and East Somerville.

CSO flows originate from a 700-acre area in East Somerville, when sewer capacity is exceeded during heavy rainstorms. Peak capacity is 245 MGD.




Somerville Marginal Facility, Mystic Ave

About the Somerville Marginal CSO Facility



- City of Somerville Main Drain, Middlesex Ave. – 7'x 6" – 11'x 0" (2,147' Linear Feet & 25 connections)
- MWRA Somerville Marginal Conduit – 7'x6" – 11'x 0" (1,588' Linear Feet & 5 connections)
- MWRA Metropolitan Sewer, Section 35 – 39" x 47.5"
- City of Somerville drain and 8" sewer, McGrath Highway

About the Somerville Marginal CSO Facility

Following treatment, effluent is discharged into outfall conduit which also receives stormwater from downstream systems.

During a CSO activation, facility discharges treated flow to one of two outfalls (wet weather only):

1) the 205 outfall discharges downstream of Amelia Earhart dam into Mystic River mouth.

2) If tide is high, discharge also occurs upstream of Amelia Earhart Dam near Assembly Square via outfall 205A.

Initiation of 205 investigations, 2009 - 2010

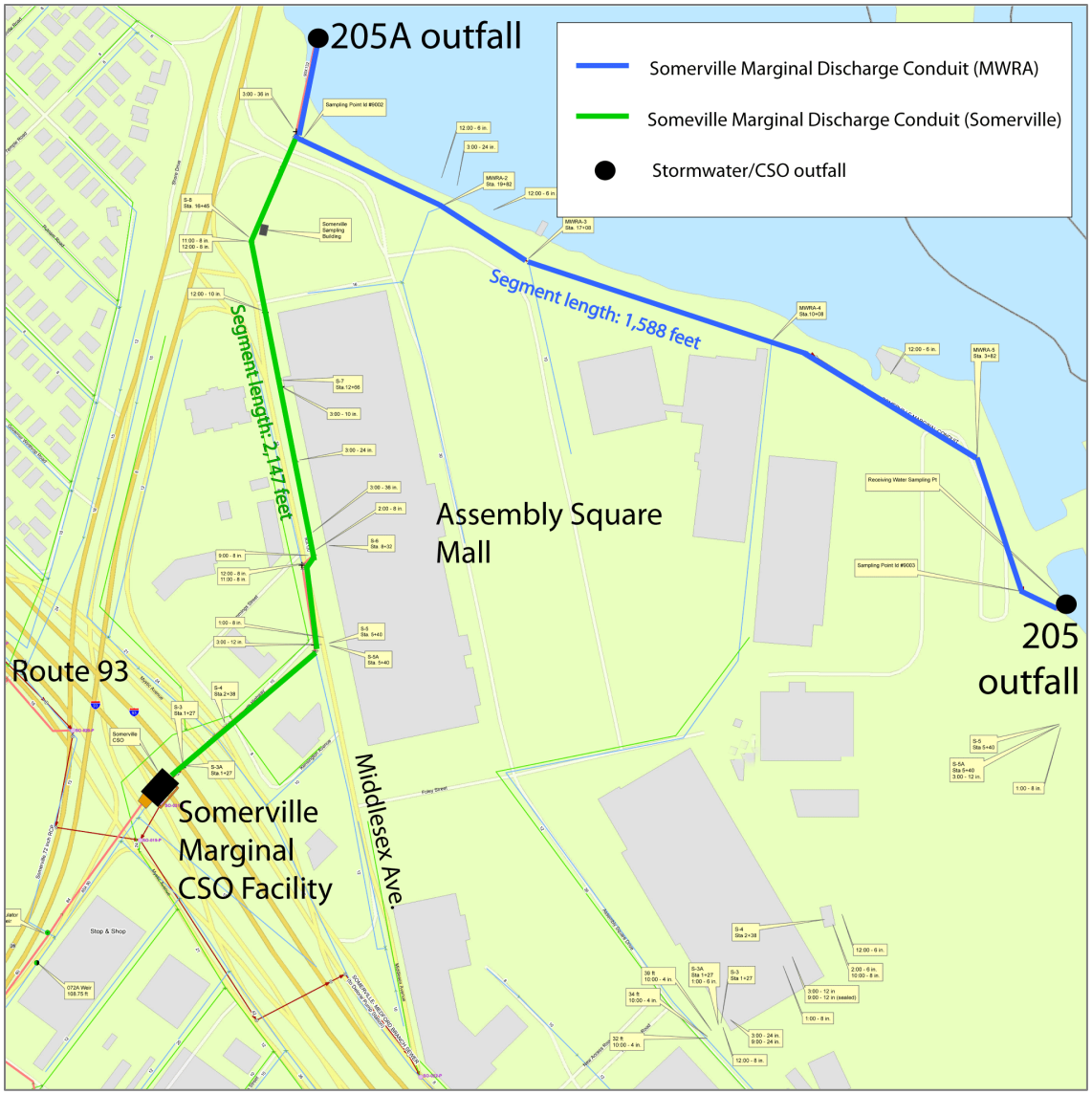
In 2009, DEP and EPA sampling identified elevated bacteria counts at the 205 outfall in dry weather.

Without enforcement action, MWRA and the City of Somerville subsequently initiated significant sampling, TV inspection, sewer line repair and facility improvement efforts.

February 2010 – sampling upstream of Somerville Marginal Facility

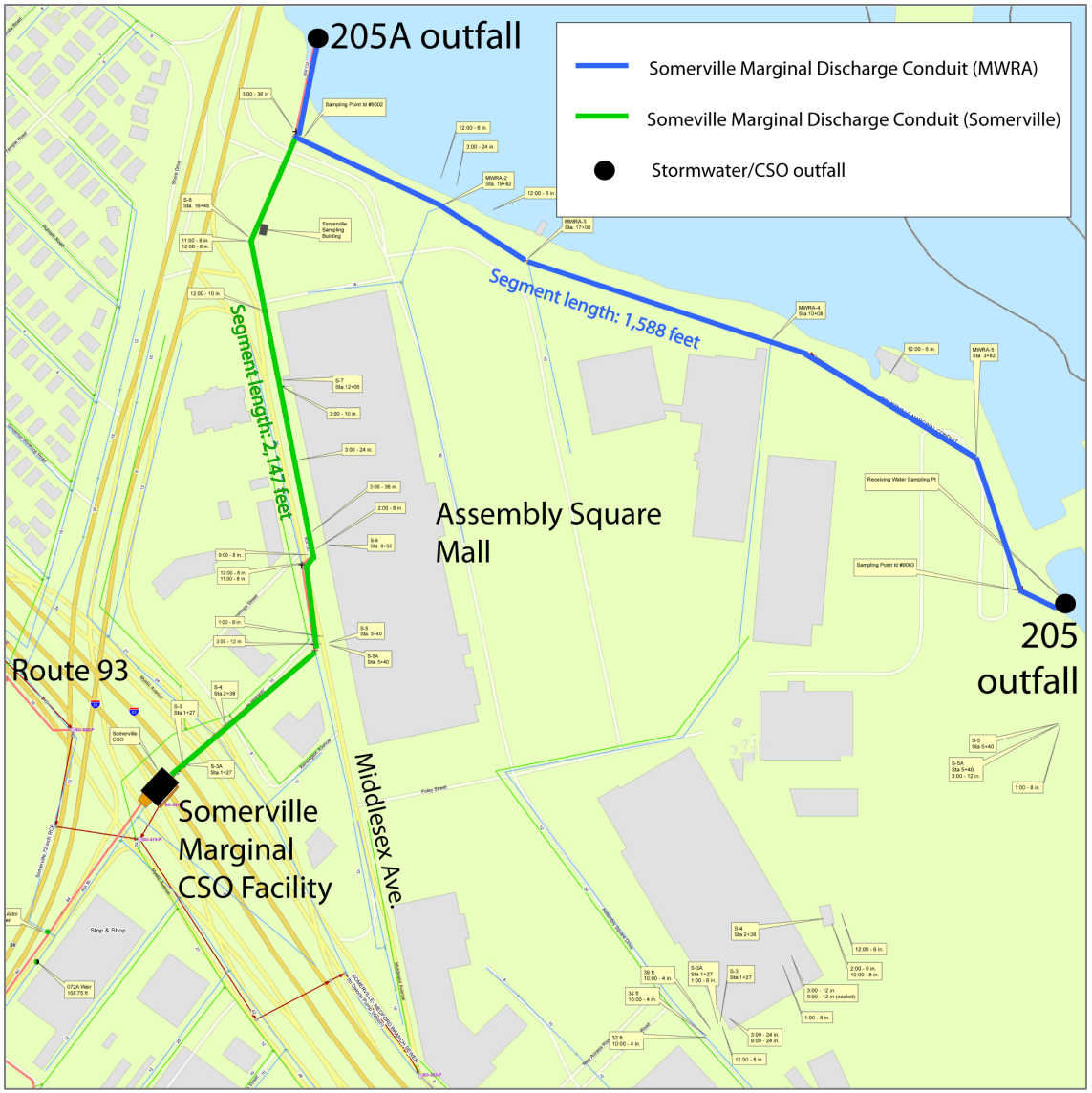
Timeline of 205 investigations 2009 - 2010

- **Spring 2009.** Assisted DEP with sampling. MWRA assists DEP in opening manholes and collecting samples in the conduit.
- **Late 2009/early 2010.** Performed closed-circuit TV inspections of local sewer lines, dye testing, additional in-line sampling.



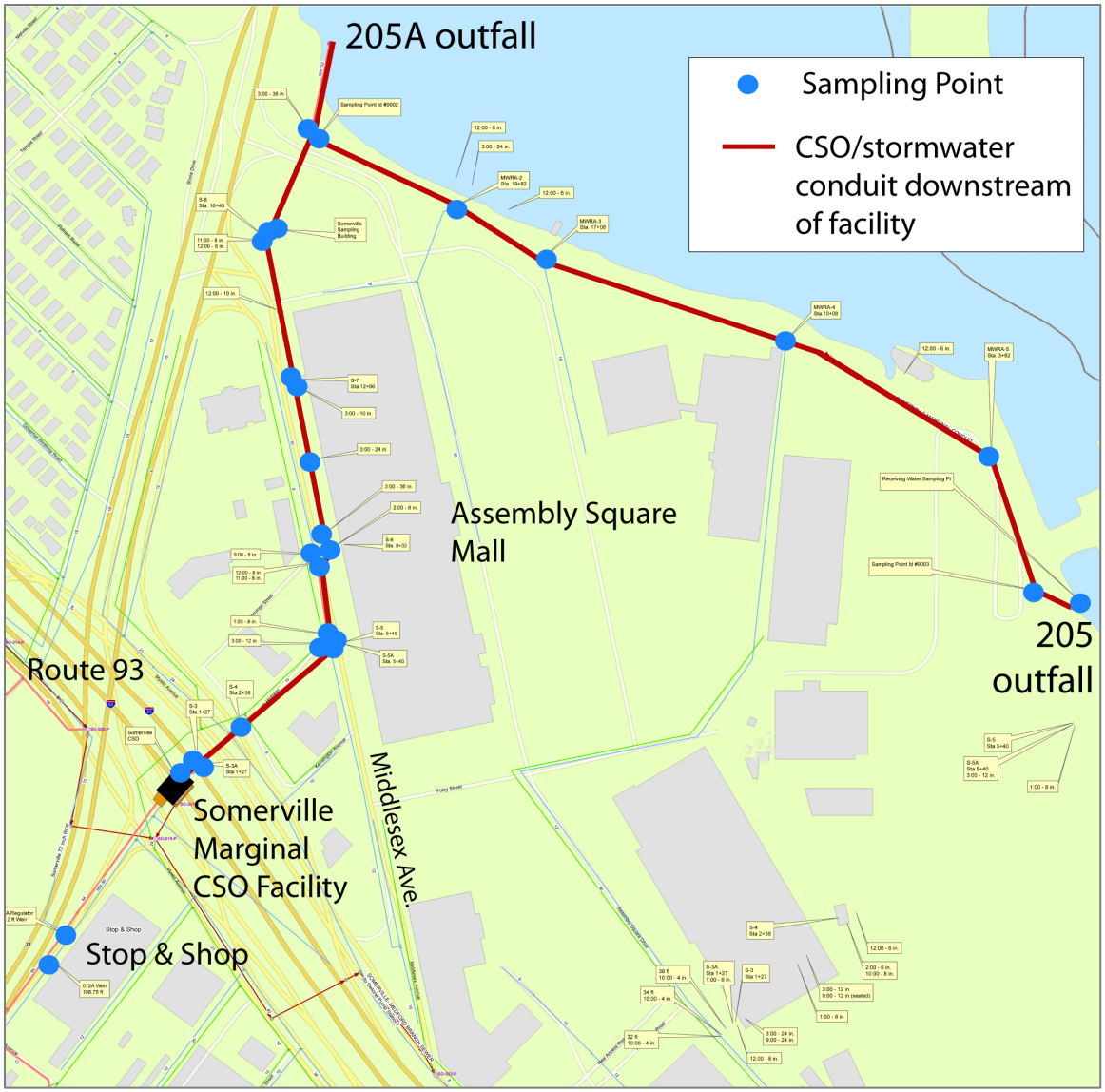
205 investigations: conduit inspections, 2009

- Using TV inspection, examined entire length of the 205 outfall for condition (cracks, silt, infiltration) and to identify all lateral connections. Total length of conduit from facility to 205 outfall: 3,735 feet.
- TV-inspected Somerville and Mass. DOT drainage lines
- Identified 29 stormwater connections along the length of conduit (downstream of facility).



205 investigations: sample collection 2009-10

- Collected samples at 25 locations upstream and downstream of Somerville Marginal Facility to identify areas of interest (included confined space entry)
- Samples analyzed for *Enterococcus*, fecal coliform, *E. coli*, pH, surfactants, ammonia, salinity, chlorine residual
- Samples are collected in six events in late 2009/ early 2010. Bacteria results suggest area of interest at upstream of Somerville Marginal facility.



205 investigations, upstream of facility, 2009-10

Staff inspecting Stop & Shop's fats-oils-grease separator

Example of sewer line blocked with grease

205 investigations, upstream of facility, 2009-10

MWRA and Somerville staff identify an 8” sewer line blocked with grease which caused a back-up into a City of Somerville 12” storm drain that flows to the 205 conduit.

- Collected samples in the area of blockage
- In November 2009, blockage cleared with Vactor Jet
- TV-inspected 8” sewer and 12” storm drain
- Inspected Stop & Shop and their FOG Separator
- Stop & Shop hired a contractor to cleaned out their FOG Separator

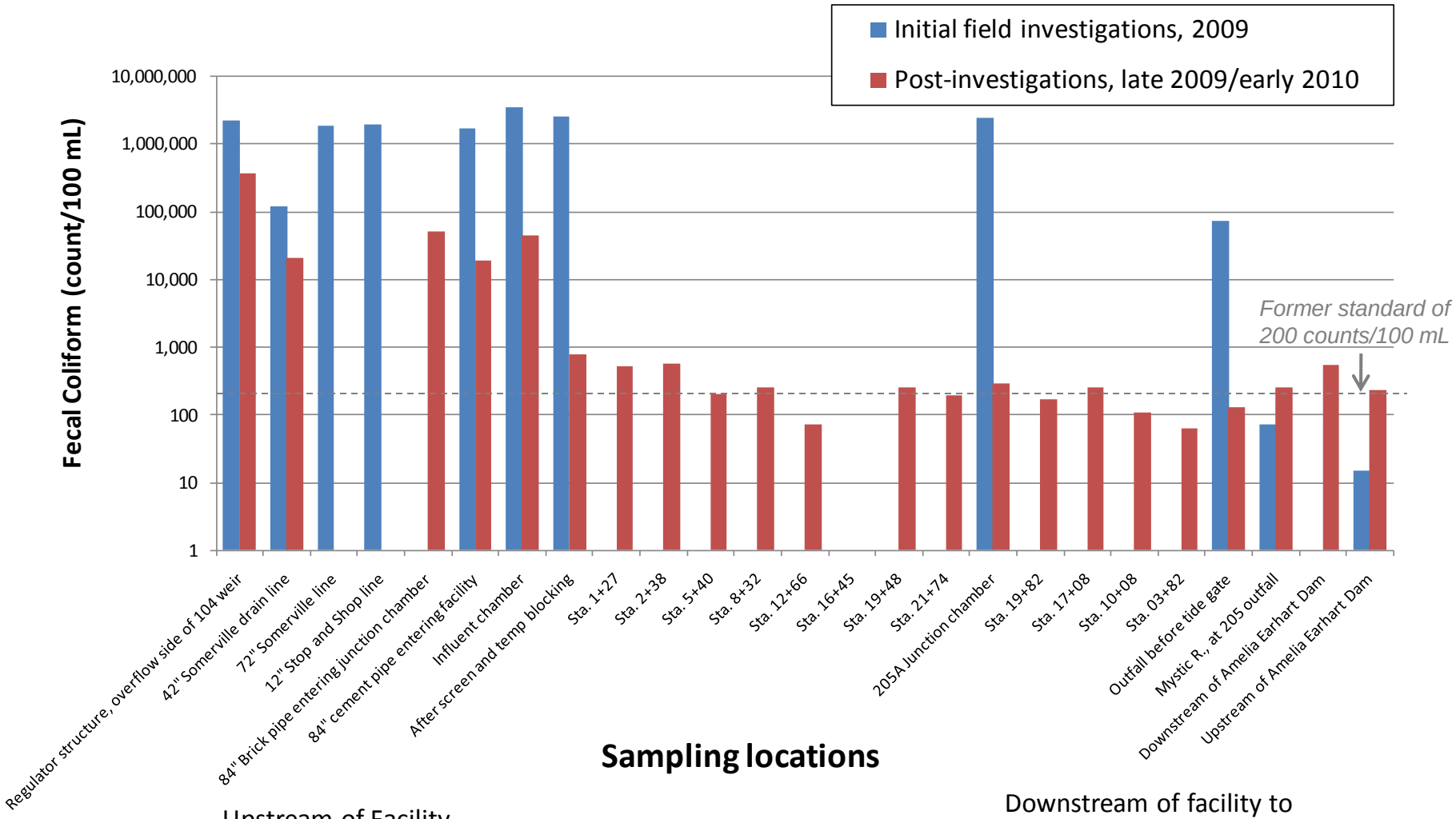
Dye testing in combined sewer (dye is sewer side), after cleaning. In event of a grease clog, sanitary flow would overtop the weir into a storm drain line to the Somerville Marginal conduit.

Interim improvements, Somerville Marginal Facility 2009-10

To address any potential leakage through influent gates:

- Float activated sump pumps were installed between the influent stop logs and the Influent gates
- Temporary bulkhead installed upstream of influent gates
- Initiated planning/design for new influent gates

205 conduit bacteria results before and after investigations 2009-10



Second round of 205 investigations, 2011-12

- **June 2011.** Additional sampling by EPA indicates dry weather contamination upstream of the 205 outfall. MWRA agrees to follow up with additional sampling and TV inspections.

- **July 2011.** MWRA conducts dry weather/low tide sampling between the Somerville Marginal CSO facility and Mystic River.

  - Sampling performed over three consecutive dry days, 14 sites each day.

  - Highest bacteria counts are found at the upstream end of the 205 line, downstream of facility.

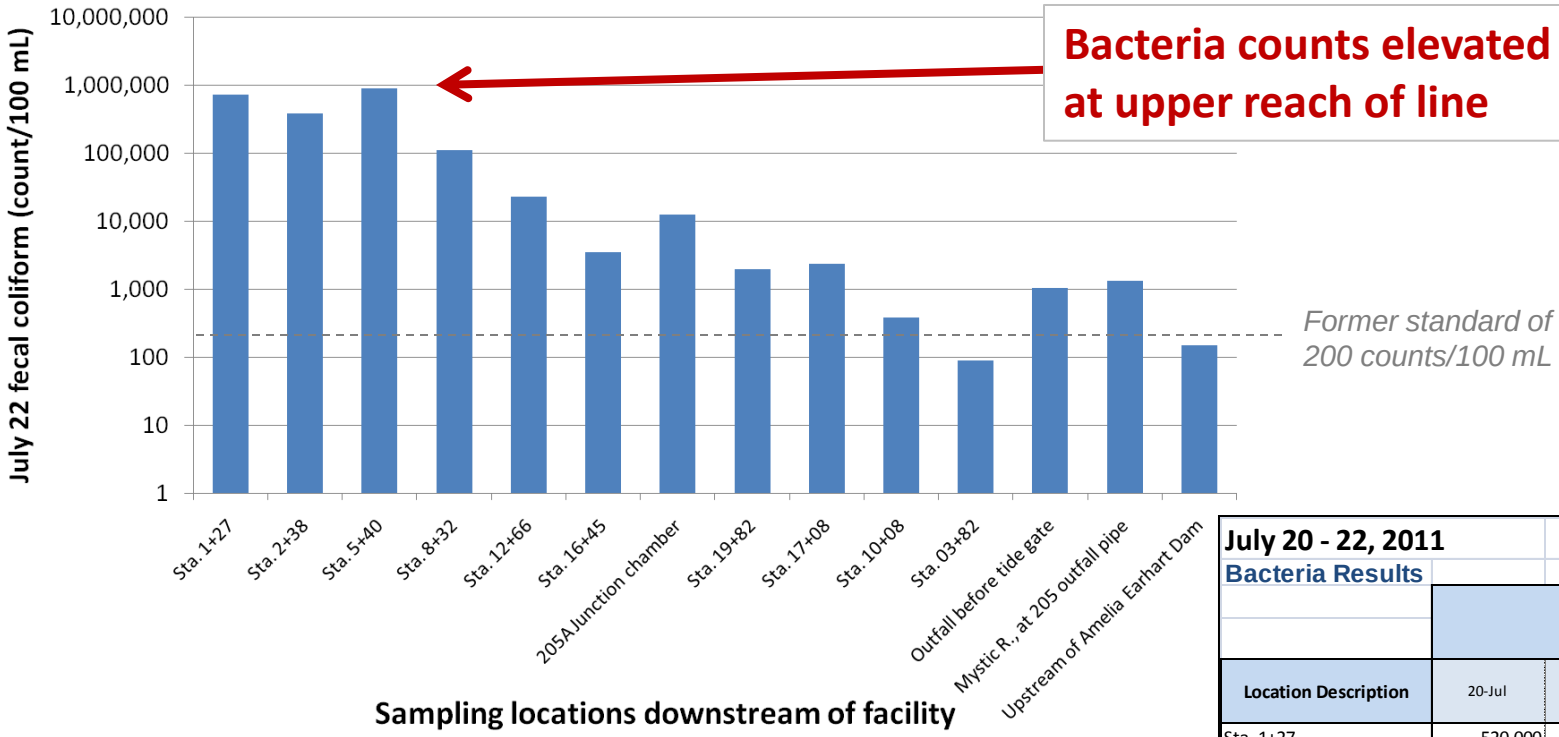
- **August 2011.** All physical connections downstream of the outfall were reviewed using 2009 internal TV inspection footage.

  - Dry-weather discharges from drain lines in 2009 were noted.

  - In 2009, ten drain discharges were noted as active, with four of these accessible in the upper reach. None of the 4 were discharging on August 4, 2011 and two were actively discharging on the August 8, 2011 sampling day.

  -New TV inspections performed of Somerville sewer line and Mass. DOT drain lines

205 Conduit bacteria results, July 2011



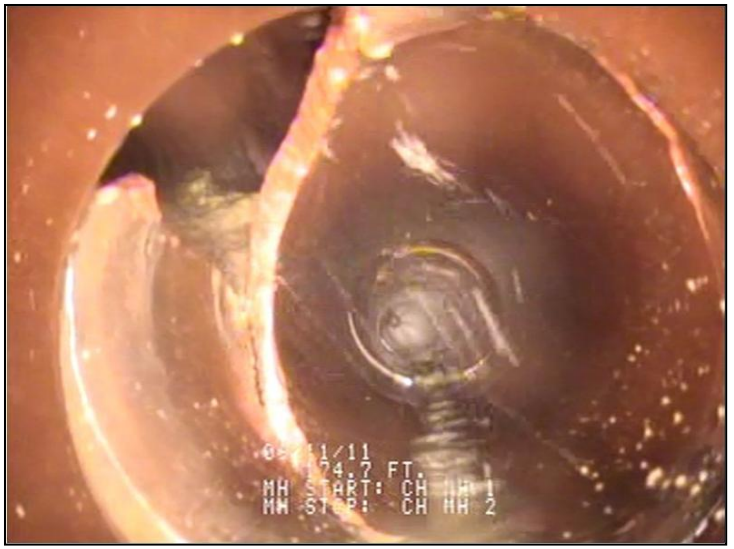
July 20 - 22, 2011

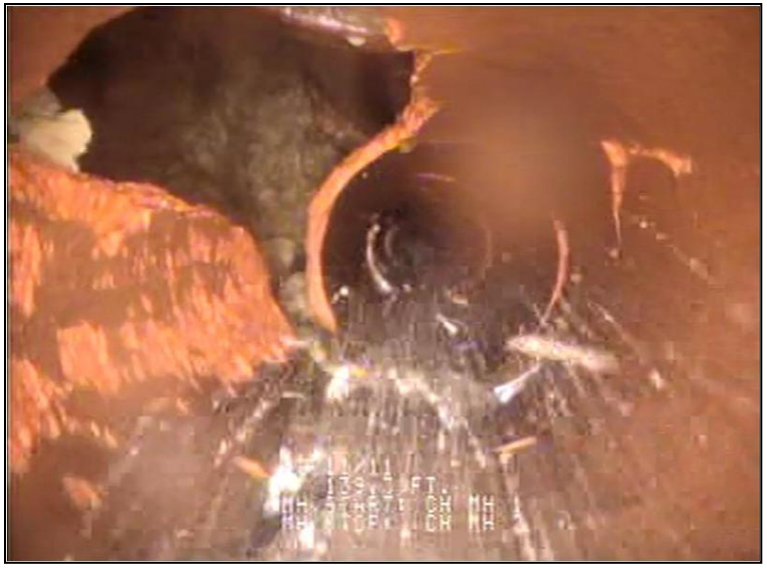
Bacteria Results

Location Description	Fecal coliform count/100 mL 20-Jul	21-Jul	22-Jul	8-Aug
Sta. 1+27	520,000	700,000	727,000	
Sta. 2+38	964,000	773,000	390,000	
Sta. 5+40	240,000	390,000	900,000	
Sta. 8+32	77,500	39,000	111,000	
Sta. 12+66	12,300	23,000	23,000	
Sta. 16+45	6,910	5,500	3,500	
205 Junction chamber	5,400	2,500	12,700	
Sta. 19+82	2,600	2,900	2,000	
Sta. 17+08	1,230	2,100	2,400	
Sta. 10+08	380	490	380	
Sta. 03+82	480	370	90	
Outfall before tide gate	240	3,500	1,030	
Mystic R., at 205 outfall pi	991	1,350	1,330	
Upstream of Amelia Earha	10	115	150	

TV inspection images, August 2011

CCTV image showing a collapse 8" sewer Middlesex Avenue





Somerville Sewer Line Repair

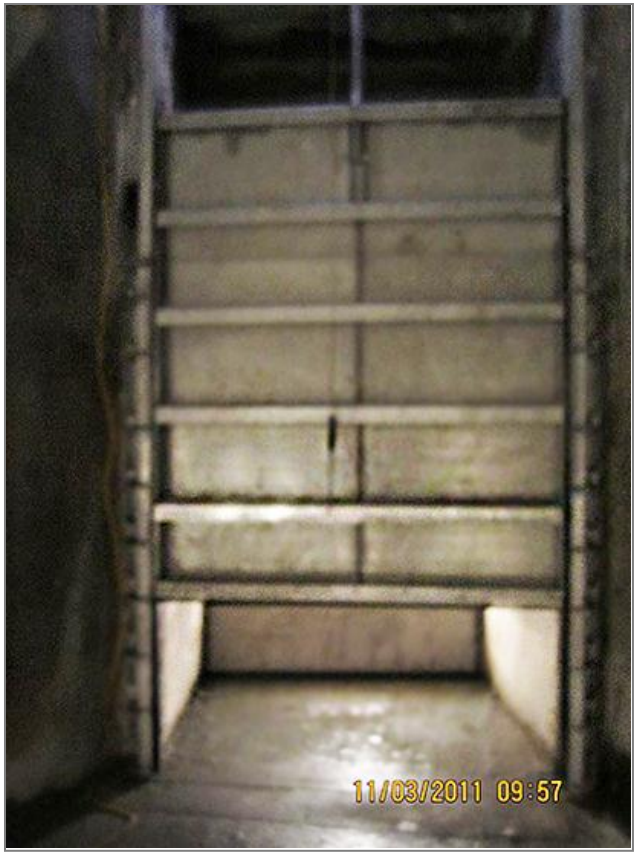
MWRA Somerville Marginal Gate Repair

- Influent gate and stop log replacement included installation of two main influent sluice gates, four sets of stop logs, and installation of two channel dewatering pumps to maintain air gap between influent channel and the Somerville Marginal conduit in dry weather.
- Started in August 2011 and finished November 2011.
- Project cost - $364,000

Top of gate in screening room (one of two new influent gates)

MWRA Somerville Marginal Gate Repair

One of two new dewatering pumps in influent channel downstream of gate.



Influent chamber with new gate installed, downstream side

205 Investigations: Summary

MWRA and Somerville worked together and responded quickly to investigate a complex hydraulic system subject to weather and tidal impacts.

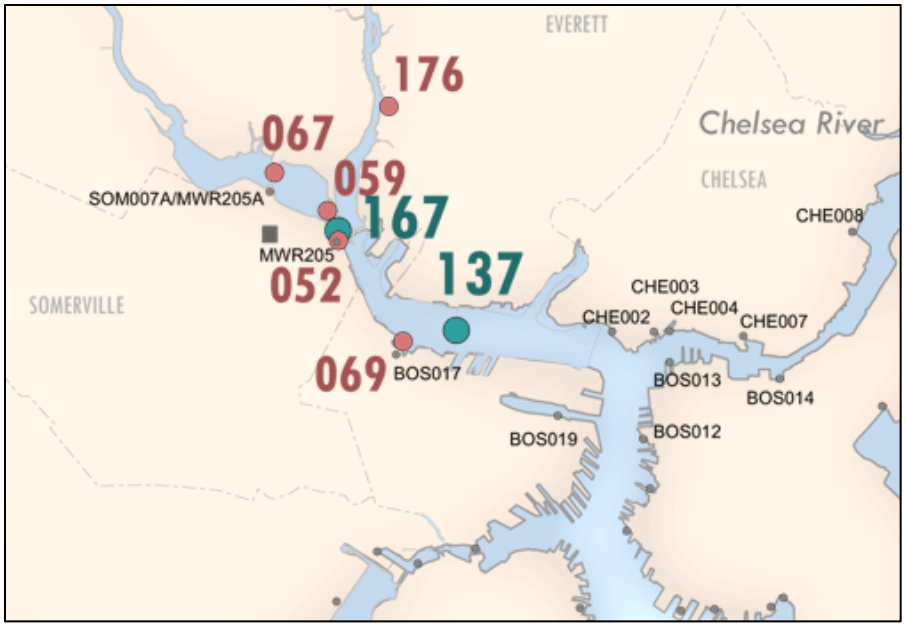
- Samples were collected from 28 sites, with 10 separate sampling events, over 300 analytical tests performed
- TV inspected 9,125 feet of outfall and local sewer and drain lines
- Cleaned 4,142 feet.
- Somerville dye-tested nearby buildings to rule out illicit connections
- $364,000 spent on influent gate repairs
- $640,000 spent on Somerville sewer repairs (Middlesex Ave.)

Current status

- **MWRA continues its receiving water monitoring in the vicinity of the 205 outfall to evaluate water quality conditions.**

Samples are collected at locations near the 205 outfall and in the Mystic River mouth >20 times per year. Sampling for 2013 will begin in April.

In 2012, 93% of dry weather samples met water quality standards for *Enterococcus* at receiving water location nearest 205 outfall



Mystic River mouth MWRA receiving water locations