NEWEA CLEAN WATER CASE STUDY SERIES

INFILTRATION AND INFLOW CONTROL PLANS

2021 WEBINAR SERIES

This presentation will review the origin and current status of the infiltration and inflow (I/I) Control Plans required under Massachusetts 314 CMR 12.04.

Supported by practitioners from Weston & Sampson, Kevin Brander (MassDEP) will speak about the regulations and provide an update on current and future strategies MassDEP will be using to achieve I/I reduction.

Several examples will be presented of successful programs in both small and large communities. The examples will allow the participants to learn a variety of techniques that are being used to achieve compliance

Tuesday
May 25, 2021
Noon – 1:00 PM ET
$20 Members
$30 Non-Members

Register Online:
https://sforce.co/3vxsLaF

1.0 TCH for CT*/MA/ME/NH/RI/VT will be awarded for operator recertification.

*up to 1.0 TCH for CT annual training requirement

Speaker: Kevin Brander, P.E., Section Chief, Wastewater Management, MassDEP's northeast regional office. Kevin has over 15 years experience overseeing wastewater management in 90 towns in the northeast region of MA, including compliance and enforcement activities.

Speaker: David Elmer, P.E., Discipline Leader, Wastewater, W&S. David has more than 26 years of experience with wastewater collection and storm drain systems.

Moderator: Donald G. Gallucci, P.E., Practice Leader, Collection Systems, W&S. Don has 30 years of experience and specializes in I/I reduction programs, SSES, CMOM programs, sewer rehabilitation, and trenchless construction technologies.

Speaker: Hillary Lacirignola, P.E., Principal, Wastewater, W&S. Hillary has 24 years of experience in the planning, design, construction, and evaluation of wastewater, stormwater, infrastructure management, as well as water resource engineering projects.

Speaker: John Potts, P.E., Senior Project Manager, Wastewater, W&S. John has more than 30 years of engineering experience. He is currently involved in the management, design, construction, rehabilitation, and permitting of various wastewater collection systems and pump stations.

Weston & Sampson

Weston & Sampson is a NEWEA Gold Sponsor

NEWEA

Infiltration and Inflow Control Plans

Where are we now?

Kevin Brander, P.E.
Wastewater Section Chief
MassDEP Northeast Regional Office

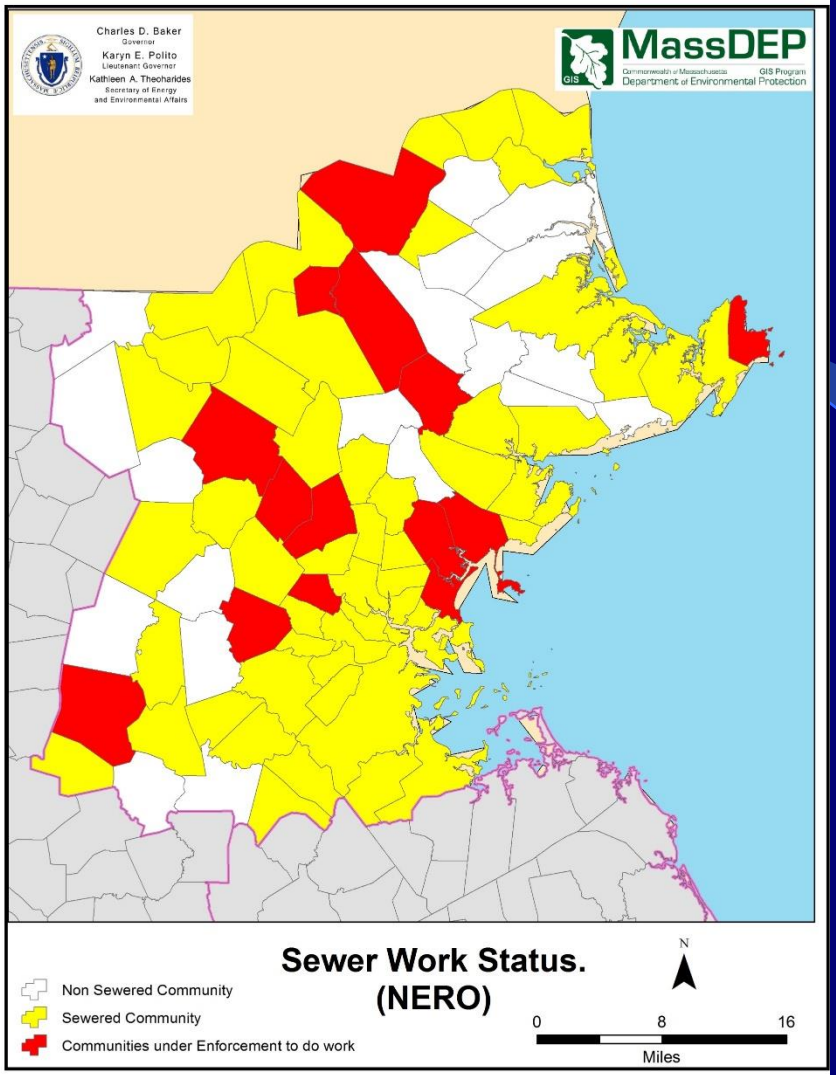
I/I Plans Required…..
2014 Regulation Changes

- 314 CMR 12.04(2):
  - Develop and implement ongoing I/I Plan
  - By 12/31/2017, I/I Analysis, with recommendations to identify and remove excessive I/I

Revised I/I Plan Guidance

May 2017

- Recommends four step approach:
  - Infiltration and Inflow Analysis
  - Sewer System Evaluation Survey
  - Sewer System Rehabilitation
  - Post-Construction Monitoring


Charles D. Baker
Governor
Karyn E. Polito
Lieutenant Governor
Kathleen A. Theoharides
Secretary of Energy and Environmental Affairs
MassDEP
GIS
Commonwealth of Massachusetts
Department of Environmental Protection
GIS Program
Sewer Work Status.
(NERO)
Non Sewered Community
Sewered Community
Communities under Enforcement to do work
N
0
8
16
Miles

I/I Plan Submittals

- 15 already under enforcement order
- 6 submitted nothing – NON's issued
- 49 submittals in response to deadline:
  - 37 I/I plans
  - 12 Extension Requests

MassDEP Plan Reviews

- Prioritized reviews:
  - SSO History
  - I/I flow information (MWRA, other technical reports)
  - Any DEP information on I/I Plan implementation (SRF, NPDES reports, etc)
  - Flows vs. NPDES Flow limits

Approvals/RFIs

- DEP approved 18 plans received
- Requests for Information for 37 plans

In most cases, phased I/I programs were already underway, and DEP actions established scope and schedule for work, reporting

Recurring Issues 1

- Many communities had not metered in many, many years.

If no metering, or metering > 20 years old, MassDEP generally required system metering.

MassDEP favors systemwide metering over use of other methods (e.g. pump station run time data)

Recurring Issues 2

- 4:1 I/I Removal Requirement for new connections or new flows > 15,000 gpd, for any authority conveying flows to a combined sewer system/permittee.

Many did not have programs in place; those that did primarily did so by charging mitigation fees. Fees can only be used for I/I identification/removal.

Recurring Issues 3

- In many cases, private inflow identification and removal programs weak

Sewer system authorities must have some manner of private inflow identification/removal program. It should be targeted in subareas based on meter data and will need to be more aggressive where SSO risks are greater.

Range of different approaches – amnesty, grant program, property owner pays

Recurring Issues 4

- Cost Effectiveness Assessment (CEA) – costs to transport/treat vs. remove for infiltration sources

  CEA should use design life of fix in making determination. This generally will be different for different technologies, e.g. CIPP vs. grouting

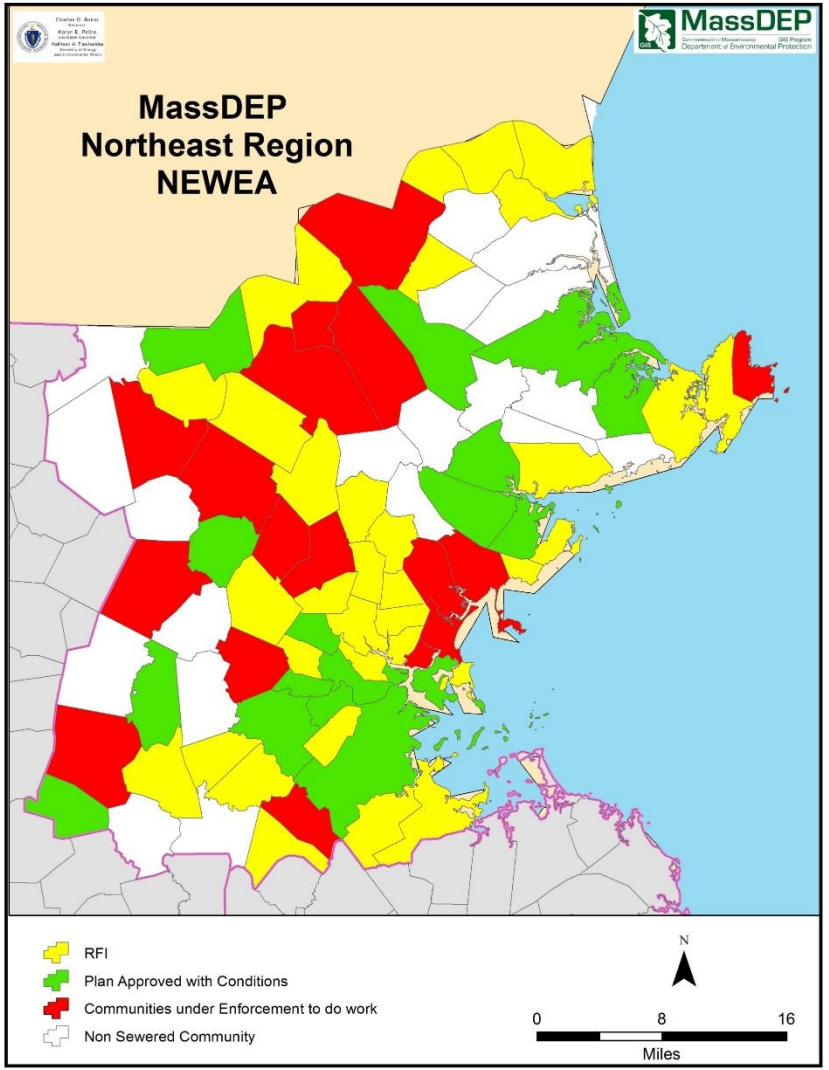
  CEA not the only driver!

  Comprehensive approaches have been the most effective!

Recurring Issues 5

- *4,000 gpdim is not direct measurement of cost-effectiveness, but still useful in segregating subareas to prioritize*

Carried forward from past guidance. Some sources, even less than this threshold will still be cost-effective to remove


MassDEP
Northeast Region
NEWEA
RFI
Plan Approved with Conditions
Communities under Enforcement to do work
Non Sewered Community
N
0
8
16
Miles

Next Steps

- Next layer of DEP review:
- Meetings, follow up on RFI, or conditional approvals
- SSO inspection events
- DMR reviews and flow assessments

Enforcement Factors

- Prominence of SSO events, and any sensitive uses impacted by SSO events;
- Availability of data (e.g. MWRA I/I data) – comparison to peers
- Scope and implementation schedule of I/I program

Kevin Brander, P.E.
Wastewater Section Chief
MassDEP Northeast Regional Office

kevin.brander@state.ma.us

Weston & Sampson SM

transform your environment

David M. Elmer, PE
Discipline Leader / Vice President
elmerd@wseinc.com

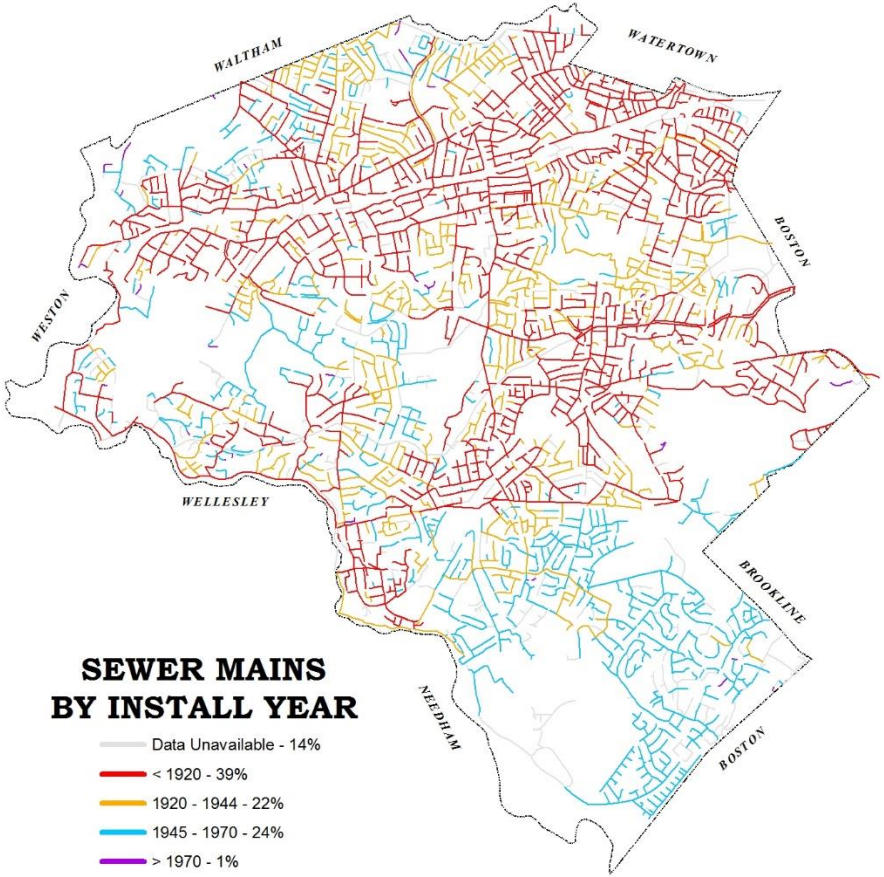
Weston & Sampson's I/I Control Plan Experience

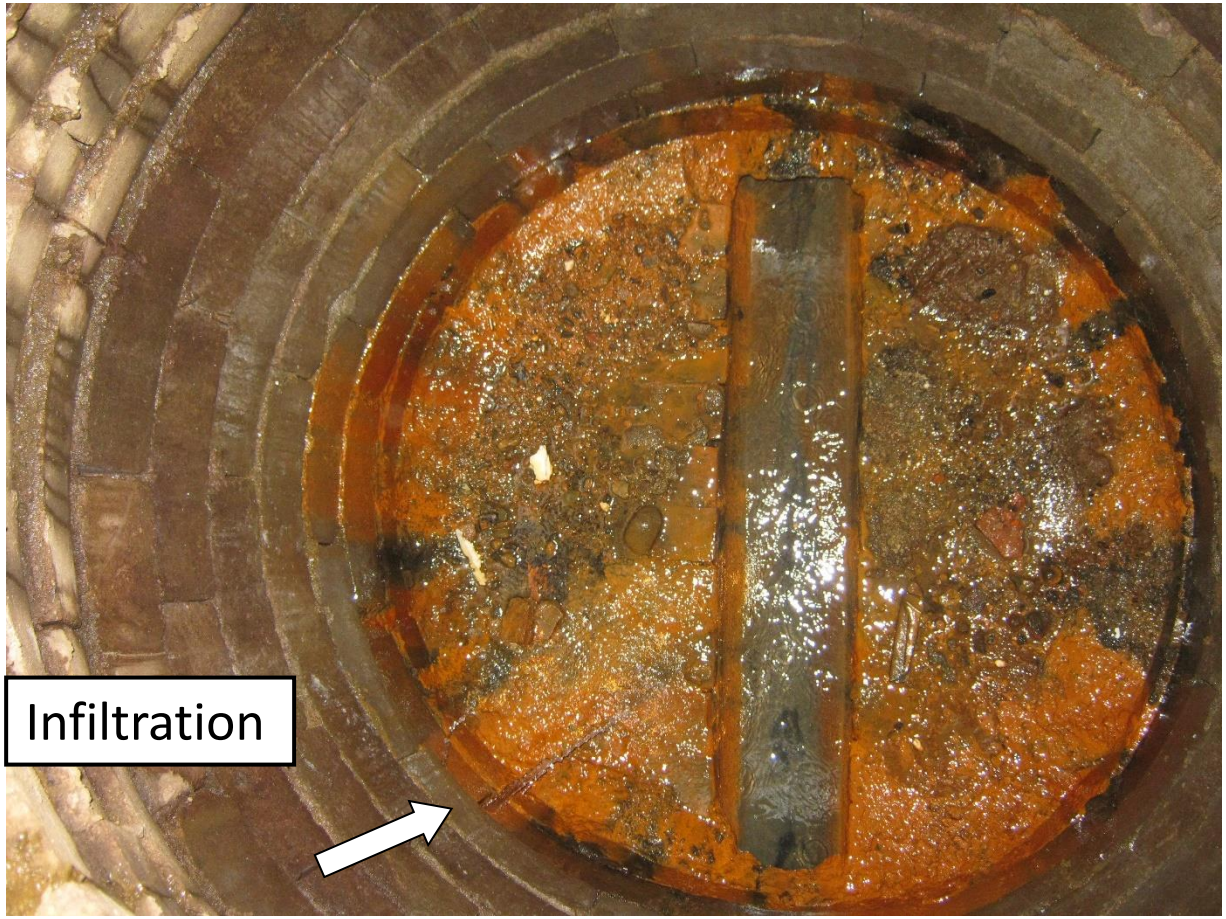
- Assisted 43 Communities prepare I/I control Plans
- Perform more than 1 million feet of TV per year
- Perform more than 7,000 MH inspections per year

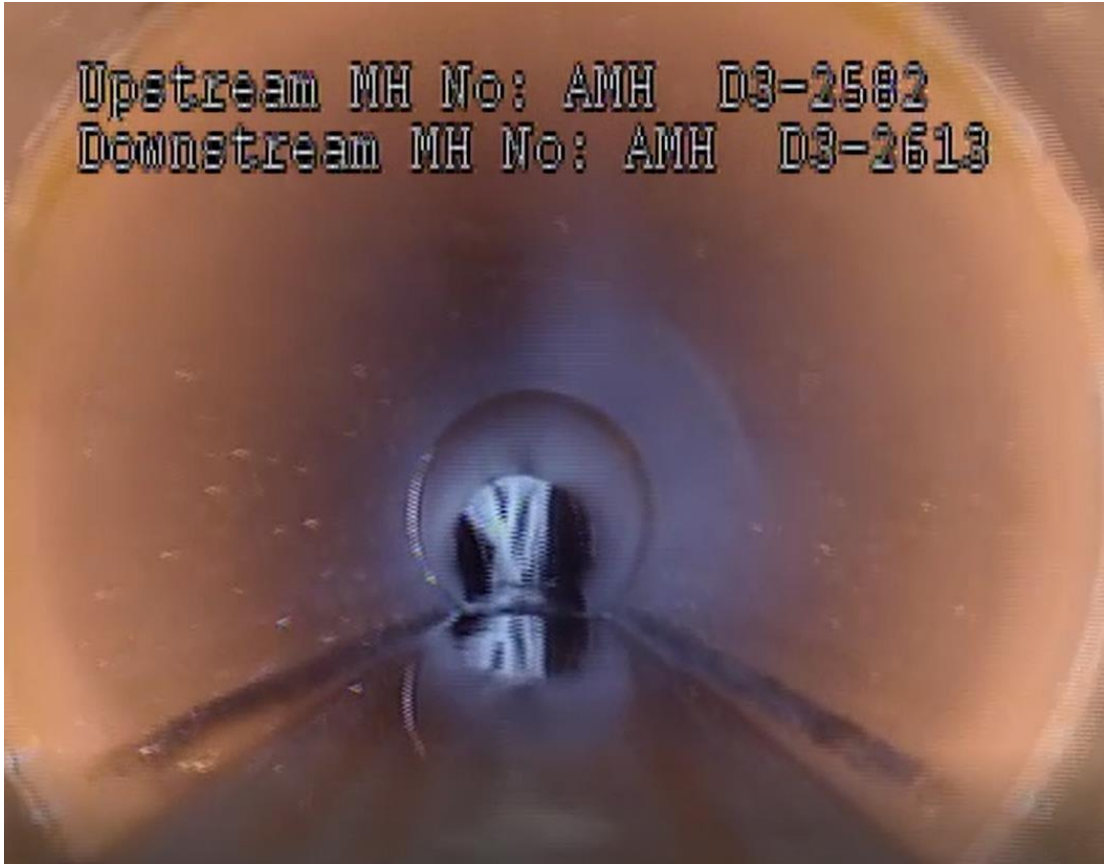
Newton’s I/I Control Plan

Newton's System

- 18.2 square miles
- 88,000 people
- 1.5 million feet of sewer
- First sewers constructed in 1892


WALTHAM
WATERTOWN
BOSTON
WESTON
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
SEWER MAINS
BY INSTALL YEAR
Data Unavailable - 14%
< 1920 - 39%
1920 - 1944 - 22%
1945 - 1970 - 24%
> 1970 - 1%

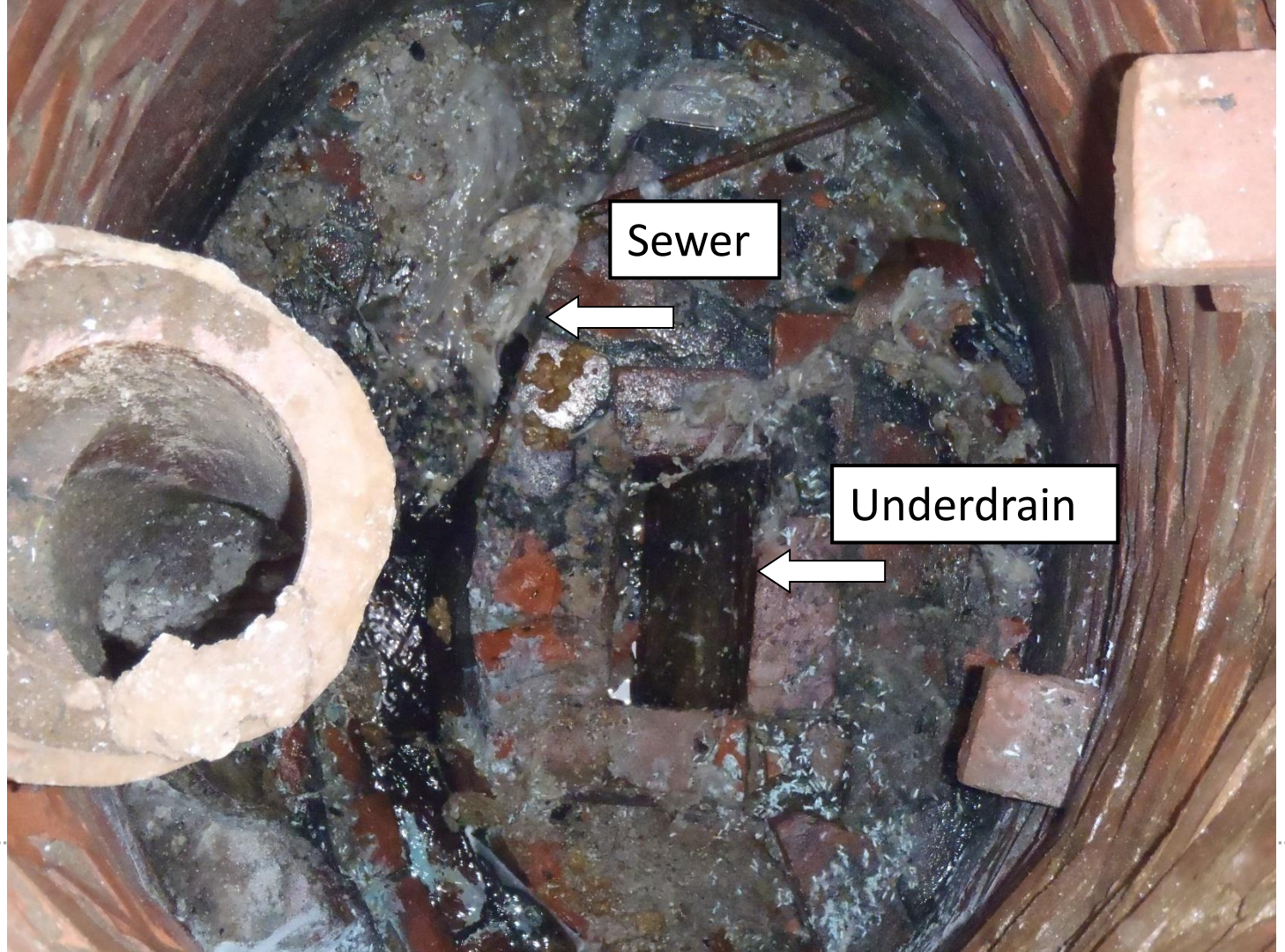

Infiltration

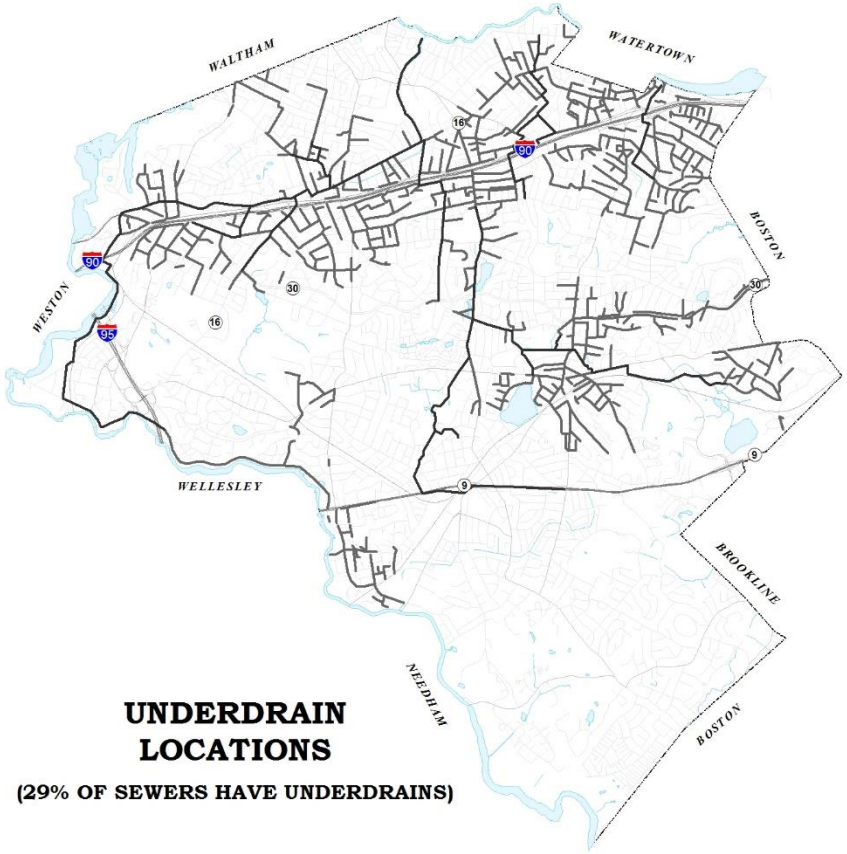

Upstream MH No: AMH D3-2582
Downstream MH No: AMH D3-2613


8


1
1
9/17/2003

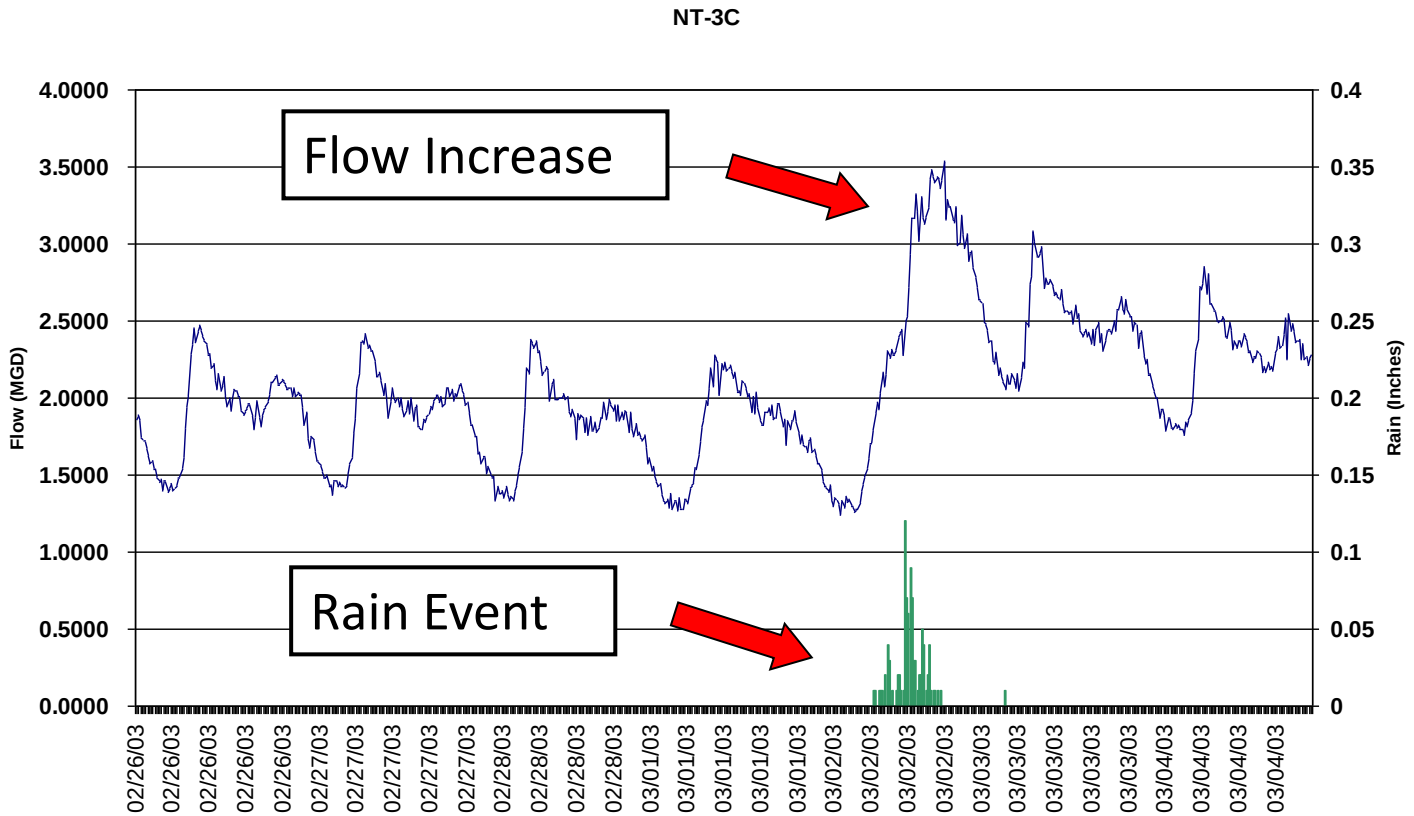
Sump Pump Connected to Sewer


Sewer
Underdrain



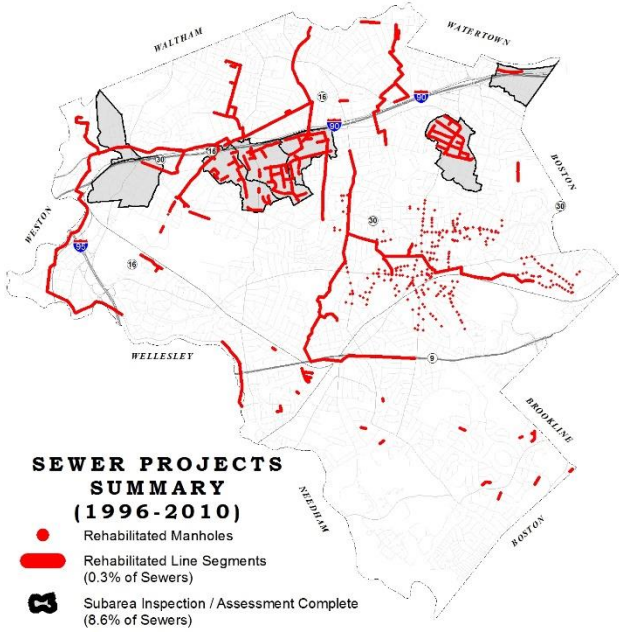
UNDERDRAIN LOCATIONS

(29% OF SEWERS HAVE UNDERDRAINS)


NT-3C
Flow Increase
Rain Event
Flow (MGD)
Rain (Inches)
4.0000
3.5000
3.0000
2.5000
2.0000
1.5000
1.0000
0.5000
0.0000
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
02/26/03
02/26/03
02/26/03
02/26/03
02/26/03
02/27/03
02/27/03
02/27/03
02/27/03
02/27/03
02/28/03
02/28/03
02/28/03
02/28/03
03/01/03
03/01/03
03/01/03
03/01/03
03/01/03
03/02/03
03/02/03
03/02/03
03/02/03
03/03/03
03/03/03
03/03/03
03/03/03
03/03/03
03/04/03
03/04/03
03/04/03
03/04/03


3/23/2001

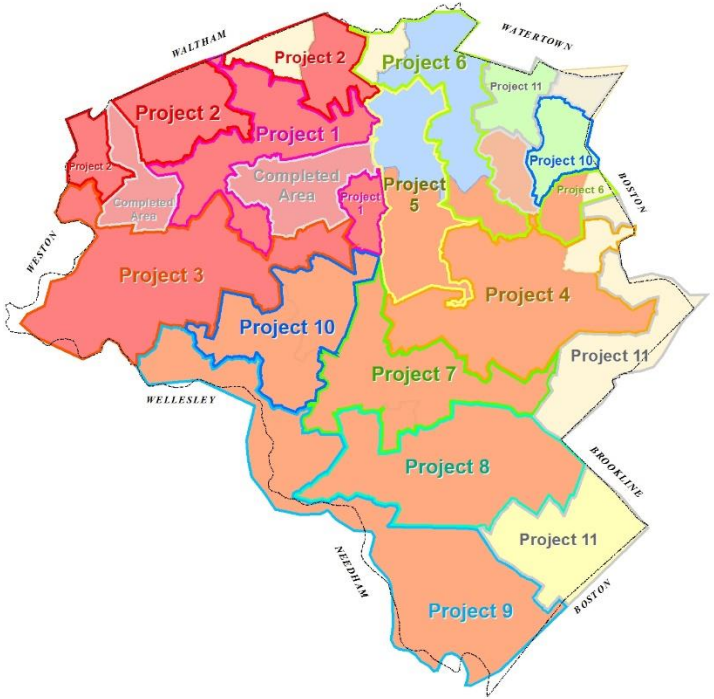
Previous Work



Weston & Sampson SM

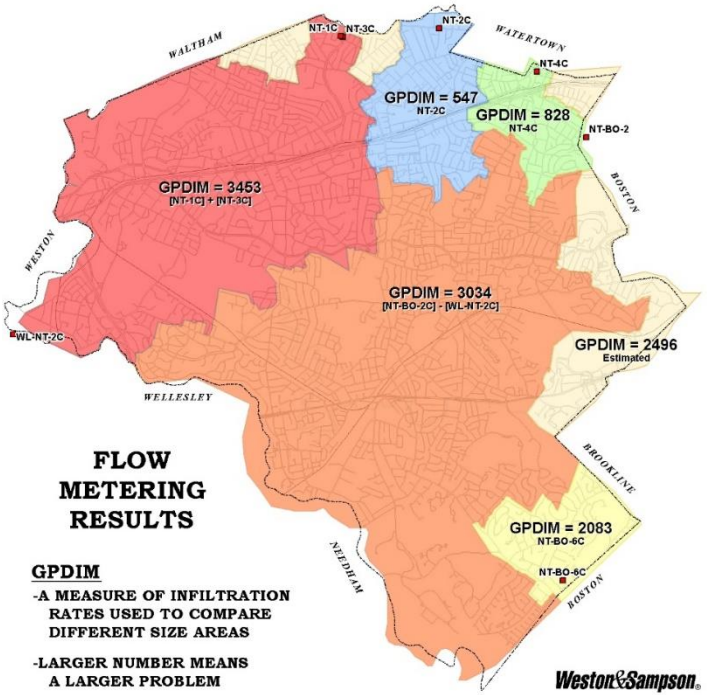
The Plan

11 Project Areas

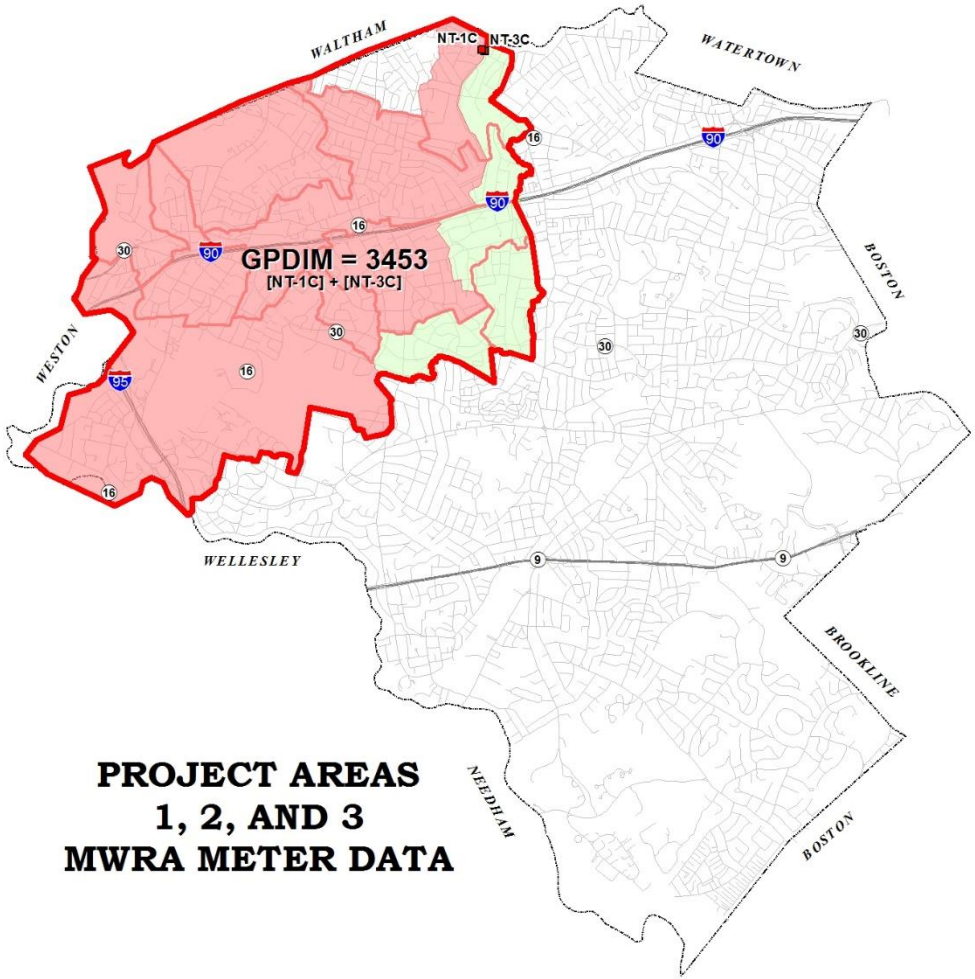


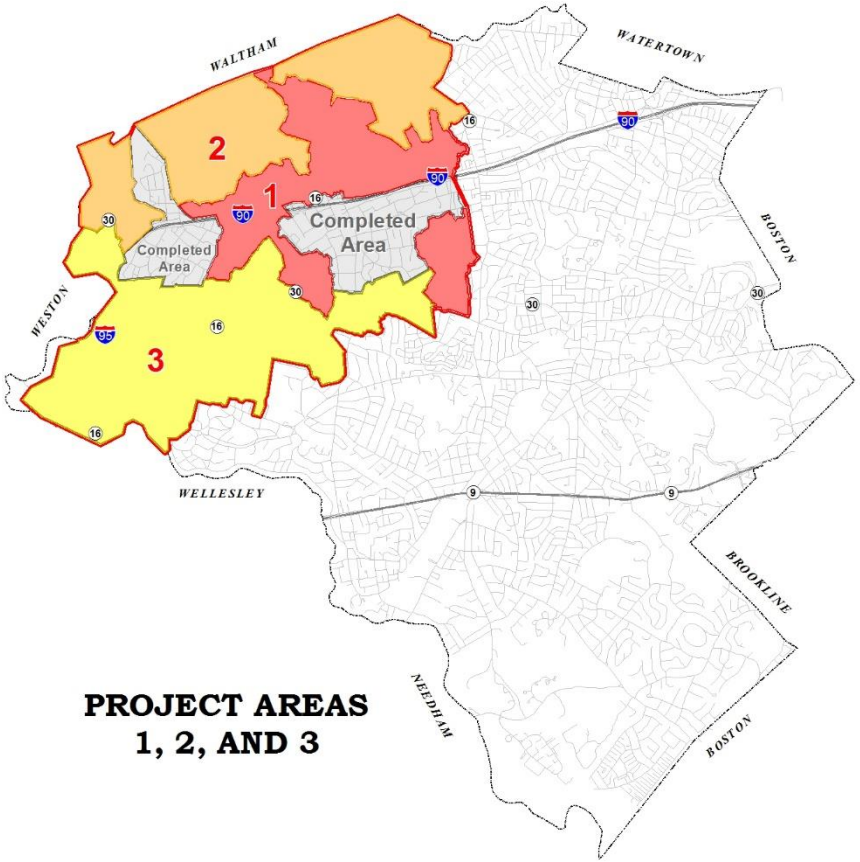
Weston & Sampson SM

Flow Metering Data

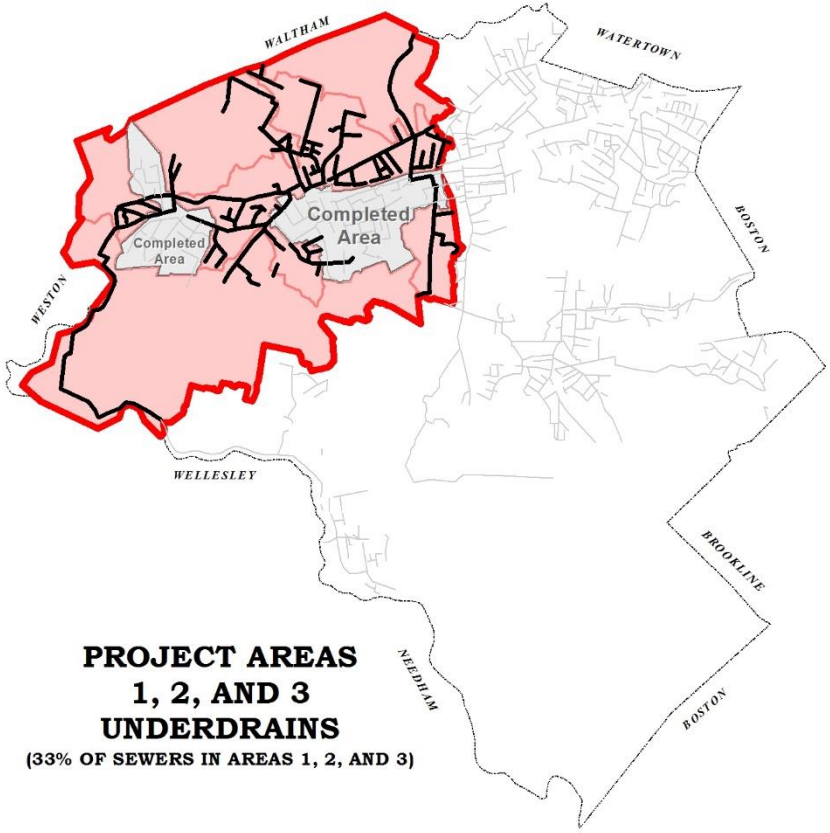


Weston & Sampson SM


WALTHAM
NT-1C
NT-3C
WATERTOWN
GPDIM = 3453
[NT-1C] + [NT-3C]
BOSTON
WESTON
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
PROJECT AREAS
1, 2, AND 3
MWRA METER DATA

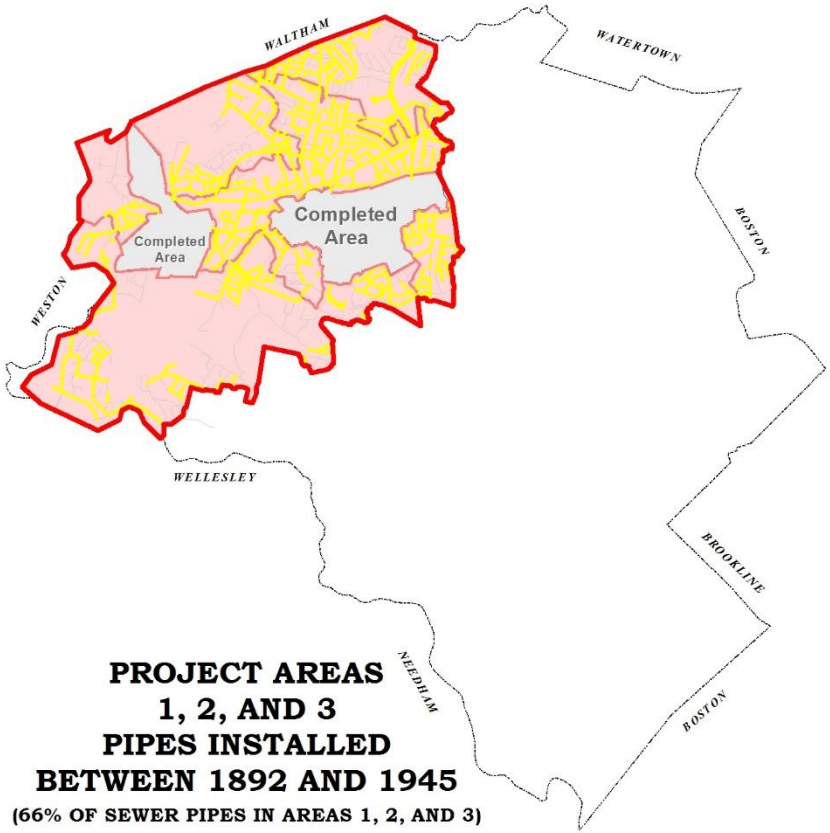


PROJECT AREAS
1, 2, AND 3

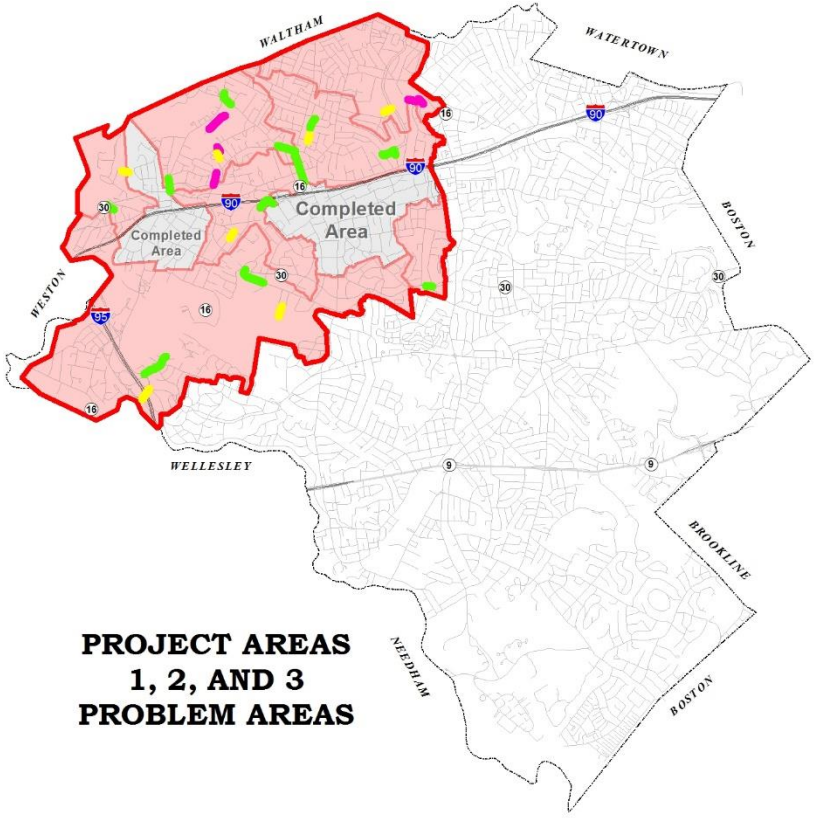


PROJECT AREAS 1, 2, AND 3 UNDERDRAINS

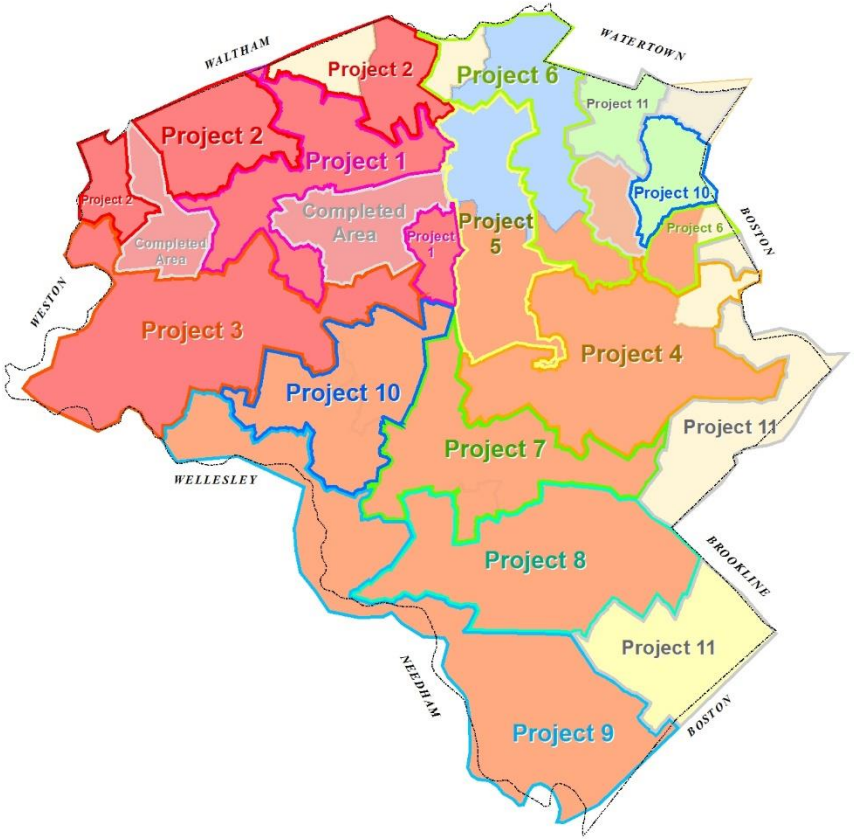
(33% OF SEWERS IN AREAS 1, 2, AND 3)



PROJECT AREAS
1, 2, AND 3
PIPES INSTALLED
BETWEEN 1892 AND 1945
(66% OF SEWER PIPES IN AREAS 1, 2, AND 3)



PROJECT AREAS
1, 2, AND 3
PROBLEM AREAS


WALTHAM
WATERTOWN
Project 2
Project 6
Project 11
Project 2
Project 1
Project 10
Project 2
Completed Area
Completed Area
Project 1
Project 5
Project 6
BOSTON
WESTON
Project 3
Project 4
Project 10
Project 11
Project 7
WELLESLEY
BROOKLINE
Project 8
Project 11
NEEDHAM
Project 9
BOSTON

Program Details

- Comprehensive Approach starting 2012
- 125,000’ per year investigation
  - MH, FI and TV
- Smoke/Dye performed as 2 large projects
- Building inspections performed as part of water meter replacement program

Program Details

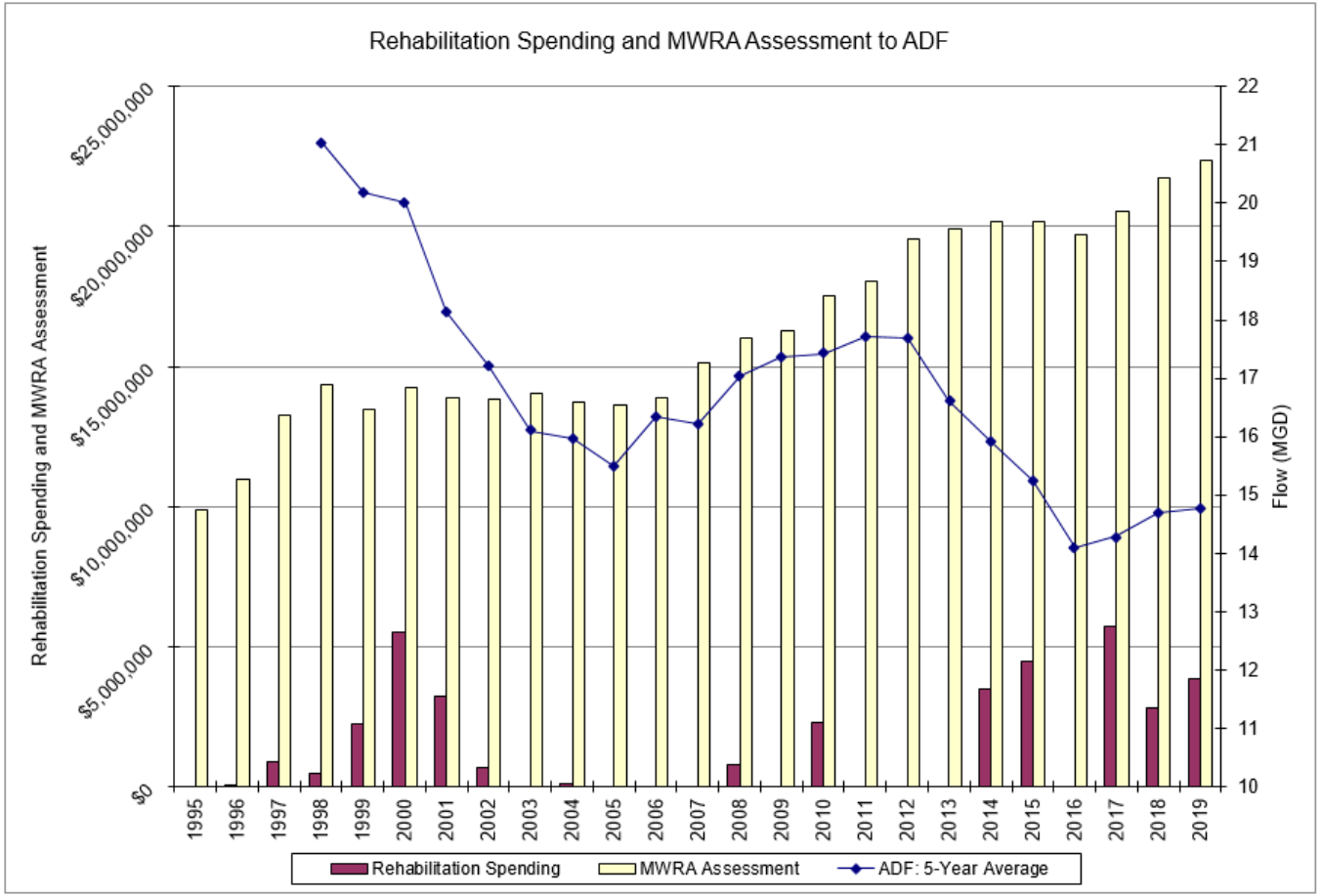
- Design and Construction Projects each year
- 1-year Retest Inspection
- Post Construction Flow Evaluation

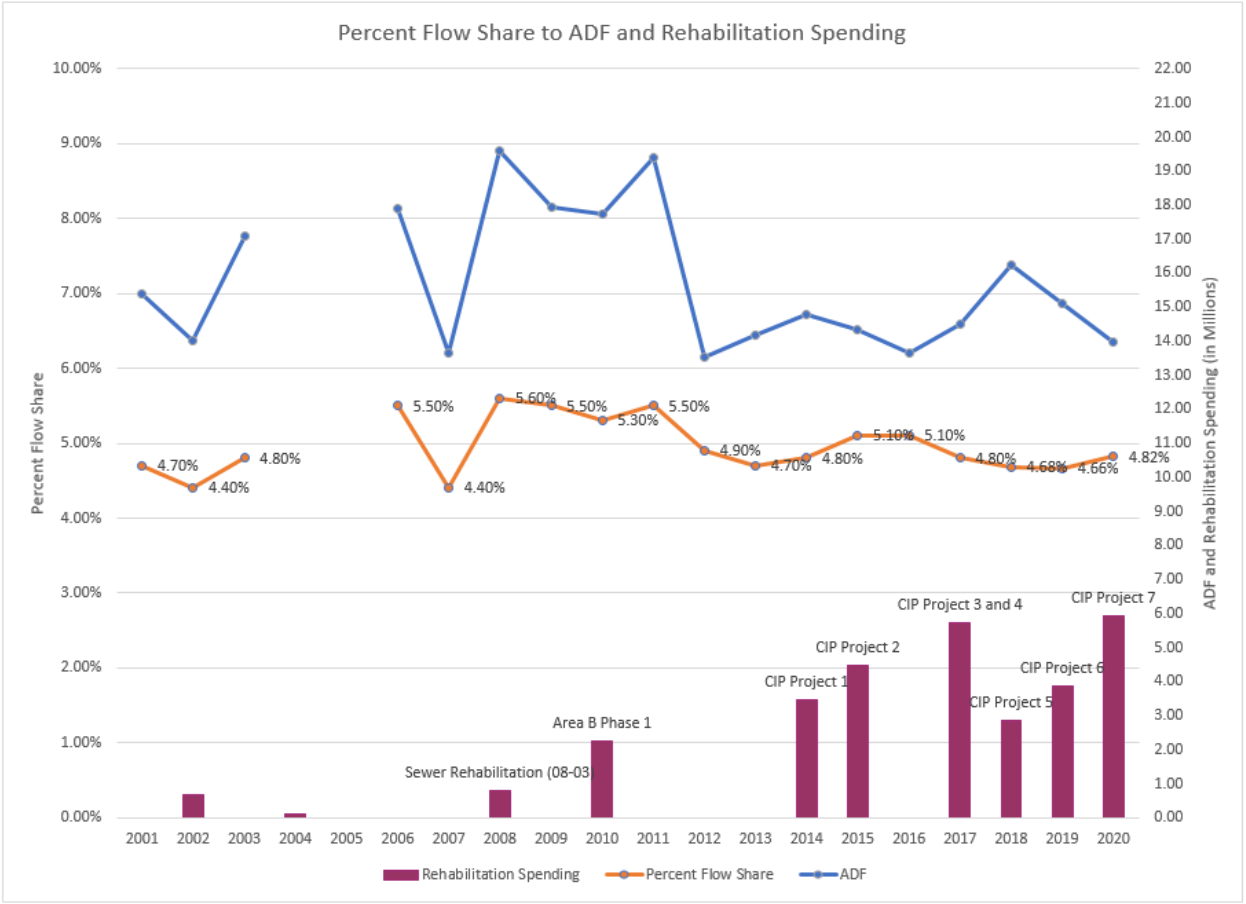
How did it work out?

- Completing Project 11 Inspection
- Project 7 Construction ongoing
- Project 8 Design

Project Stats

- 1,367,482’ of TV/Clean
- 122,235’ Heavy Cleaning
- 8,172 MH Inspections
- 198 Excavation Point Repairs
- 403,894’ CIPP
- 3,090 MH Rehabs
- 877 Underdrain Repairs


Rehabilitation Spending and MWRA Assessment to ADF
Rehabilitation Spending and MWRA Assessment
$25,000,000
$20,000,000
$15,000,000
$10,000,000
$5,000,000
$0
Flow (MGD)
22
21
20
19
18
17
16
15
14
13
12
11
10
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Rehabilitation Spending
MWRA Assessment
ADF: 5-Year Average


Percent Flow Share to ADF and Rehabilitation Spending
Percent Flow Share
ADF and Rehabilitation Spending (in Millions)
10.00%
9.00%
8.00%
7.00%
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
22.00
21.00
20.00
19.00
18.00
17.00
16.00
15.00
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
4.70%
4.40%
4.80%
5.50%
4.40%
5.60%
5.50%
5.30%
5.50%
4.90%
4.70%
4.80%
5.10%
5.10%
4.80%
4.68%
4.66%
4.82%
Sewer Rehabilitation (08-03)
Area B Phase 1
CIP Project 1
CIP Project 2
CIP Project 3 and 4
CIP Project 5
CIP Project 6
CIP Project 7
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Rehabilitation Spending
Percent Flow Share
ADF

Newton –Infiltration Percentage (2009)

2009 MWRA COMMUNITY WASTEWATER FLOW COMPONENT ESTIMATES (CY09-12 MONTHS)

28-Jan-10

						2009 Averages (1)			Components of Average Daily Flow (Estimated) (2)							
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
COMMUNITY	Community Demographics		No. of Connects to MWRA	Miles of Local	No. of Meters for Permanent	Average Daily Flow ADF	Percent Average Daily Flow	Selected Dry Day ADF	Average Daily Infiltration	Infiltration As a % of Average	Average Sanitary Flow	Sanitary As a % of Average	Average Daily Inflow (4)	Inflow As a % of Average	Peak Month ADF	Percent Peak Month
	Total Population	Sewered Population	System	Sewers (3)	System	(MGD)	(6)	(MGD)	(MGD)	Daily Flow	(MGD)	Daily Flow	(MGD)	Daily Flow	(MGD)	ADF (6)
Arlington	41,144	40,733	321	106	7	5.05	1.54%	4.61	2.01	39.8%	2.60	51.5%	0.44	8.7%	6.47	1.62%
Ashland	15,796	11,847	2	43	2	1.23	0.38%	1.15	0.35	28.5%	0.80	65.0%	0.08	6.5%	1.49	0.37%
Bedford	13,146	12,357	2	68	2	2.60	0.79%	2.47	1.27	48.8%	1.20	46.2%	0.13	5.0%	3.30	0.83%
Belmont	23,356	22,912	2	78	2	3.46	1.06%	3.03	1.43	41.3%	1.60	46.2%	0.43	12.4%	4.54	1.14%
BWSC (5)	608,352	607,744	234	840	33	92.32	28.17%	79.16	22.16	24.0%	57.00	61.7%	13.16	14.3%	103.12	25.88%
Braintree	34,422	34,388	15	133	7	6.76	2.06%	6.21	3.01	44.5%	3.20	47.3%	0.55	8.1%	8.26	2.07%
Brookline (5)	54,809	54,699	9	102	12	10.51	3.21%	9.50	5.00	47.6%	4.50	42.8%	1.00	9.5%	13.18	3.31%
Burlington	25,034	25,009	0	115	1	3.74	1.14%	3.52	1.52	40.6%	2.00	53.5%	0.22	5.9%	4.58	1.15%
Cambridge (5)	101,388	101,287	116	150	9	19.21	5.86%	15.73	4.73	24.6%	11.00	57.3%	3.48	18.1%	23.13	5.80%
Canton	21,916	14,355	63	62	6	2.53	0.77%	2.20	1.00	39.5%	1.20	47.4%	0.34	13.4%	2.99	0.75%
Chelsea (5)	38,203	38,203	40	41	5	4.08	1.24%		0.68	16.7%	2.50		0.91	22.3%	4.86	1.22%
Dedham	24,132	22,684	25	76	6	3.89	1.19%		1.65	42.4%			0.44	11.3%	5.41	1.36%
Everett	37,269	37,269	20	57	7	5.46	1.67%		1.41	25.8%			0.55	10.1%	6.06	1.52%
Framingham	64,786	59,603	4	275	4	6.97	2.13%		2.00	28.7%			0.47	6.7%	8.40	2.11%
Hingham	7,555	6,869	1	31	1	1.22	0.37%		0.58	47.5%			0.24	19.7%	2.01	0.50%
Holbrook	10,663	8,991	2	31	2	0.86	0.26%		0.30	34.9%			0.06	7.0%	1.02	0.26%
Lexington	30,332	30,211	17	151	4	6.02	1.84%		2.68	44.5%			0.53	8.8%	7.83	1.96%
Malden	55,712	55,656	242	99	6	9.26	2.83%		3.56	38.4%			0.70	7.6%	10.76	2.70%
Medford	55,565	55,509	71	113	6	9.17	2.80%		3.76	41.0%	4.50		0.92	10.0%	10.97	2.75%
Melrose	26,782	26,755	187	74	5	4.43	1.35%	3.56		44.2%	1.90	42.9%		12.9%	5.89	1.48%
Milton	26,272	24,433	45	83	14	3.67	1.12%	3.18		48.5%	1.40	38.1%		13.4%	5.20	1.30%
Natick	31,975	27,786	27	107	4	2.83	0.86%	2.72	0.92	32.5%	1.80	63.6%	0.11	3.9%	3.10	0.78%
Needham	28,263	27,246	21	115	2	4.09	1.25%	3.73	1.73	42.3%	2.00	48.9%	0.36	8.8%	5.12	1.28%
Newton	83,271	82,022	51	271	7	18.28	5.58%	16.90	10.30	56.3%	6.60	36.1%	1.38	7.5%	24.92	6.25%
Norwood	28,172	27,665	30	83	6	5.02	1.53%	4.33	1.93	38.4%	2.40	47.8%	0.69	13.7%	6.38	1.60%
Quincy	91,622	91,613	56	202	6	14.69	4.48%	13.54	5.04	34.3%	8.50	57.9%	1.15	7.8%	17.18	4.31%
Randolph	30,168	30,138	2	101	2	3.79	1.16%	3.46	1.46	38.5%	2.00	52.8%	0.33	8.7%	4.94	1.24%
Reading	23,129	22,158	2	86	2	3.14	0.96%	2.88	1.38	43.9%	1.50	47.8%	0.26	8.3%	4.07	1.02%
Revere	55,341	55,286	3	78	1	7.08	2.16%	5.79	1.99	28.1%	3.80	53.7%	1.29	18.2%	8.97	2.25%
Somerville (5)	74,405	74,405	43	107	7	10.06	3.07%	7.73	2.43	24.2%	5.30	52.7%	2.33	23.2%	12.77	3.20%
Stoneham	21,508	21,121	23	63	7	3.52	1.07%	3.08	1.28	36.4%	1.80	51.1%	0.44	12.5%	4.49	1.13%
Stoughton	26,951	17,922	1	60	2	3.83	1.17%	3.57	2.07	54.0%	1.50	39.2%	0.26	6.8%	4.86	1.22%
Wakefield	24,706	23,965	10	82	2	4.70	1.43%	4.30	2.60	55.3%	1.70	36.2%	0.40	8.5%	6.12	1.54%
Walpole	23,086	16,391	1	56	2	2.26	0.69%	2.14	0.94	41.6%	1.20	53.1%	0.12	5.3%	2.70	0.68%
Waltham	60,325	60,265	3	138	3	10.34	3.15%	9.62	4.02	38.9%	5.60	54.2%	0.72	7.0%	12.98	3.26%
Watertown	32,521	32,521	14	75	3	3.80	1.16%	3.53	1.23	32.4%	2.30	60.5%	0.28	7.4%	4.69	1.18%
Wellesley	26,985	26,364	2	130	3	3.55	1.08%	3.23	1.23	34.6%	2.00	56.3%	0.32	9.0%	4.62	1.16%
Westwood	14,010	13,310	3	77	3	1.64	0.50%	1.49	0.69	42.1%	0.80	48.8%	0.15	9.1%	2.18	0.55%
Weymouth	53,272	51,088	17	238	4	8.32	2.54%	7.56	3.76	45.2%	3.80	45.7%	0.77	9.3%	10.80	2.71%
Wilmington	21,679	4,032	2	19	1	1.24	0.38%	1.18	0.38	30.6%	0.80	64.5%	0.06	4.8%	1.71	0.43%
Winchester	21,137	21,116	72	83	7	2.52	0.77%	2.30	1.20	47.6%	1.10	43.7%	0.22	8.7%	3.62	0.91%
Winthrop	20,154	20,154	21	36	6	2.17	0.66%	1.96	0.86	39.6%	1.10	50.7%	0.20	9.2%	2.55	0.64%
Woburn	37,042	35,190	18	141	13	8.42	2.57%	7.95	3.45	41.0%	4.50	53.4%	0.47	5.6%	10.26	2.57%
Totals/Averages	2,146,356	2,073,272	1,840	5,076	234	327.75	100.00%	289.73	113.73	34.7%	176.00	53.7%	38.02	11.6%	398.50	100.00%

Weston & Sampson SM

Newton –Infiltration Percentage (2019)

TABLE 2 - 2019 MWRA COMMUNITY WASTEWATER FLOW COMPONENT ESTIMATES (CY19-12 MONTHS) 2/7/2020

	A	B	C	D	E	2019 Averages (1) F	G	H	Components of Average Daily Flow (Estimated) (2) I	J	K	L	M	N	O	P
	Community		No. of		No. of	Average	Percent	Selected	Average			Sanitary	Average	Inflow	Peak	Percent
	Average Daily Flow ADF (MGD)	Percent Average Daily Flow (6)		Selected Dry Day ADF (MGD)		Average Daily Infiltration (MGD)			Infiltration As a % of Average Daily Flow			Average Sanitary Flow (MGD)			Sanitary As a % of Average Daily Flow	Average Daily Inflow (4) (MGD)	Inflow As a % of Average Daily Flow
	15.09	4.66%		13.85		6.05			40.1%			7.80			51.7%	1.23	8.2%
Malden	61,246	60,970	242	100	6	8.71	2.69%	8.07	3.17	36.4%	4.90	56.3%	0.64	7.3%	11.56	2.70%
Medford	57,797	57,757	74	113	6	7.47	2.31%	6.57	2.[illegible]	31.7%	[illegible]	56.2%	0.90	12.0%	10.96	2.56%
Melrose	28,367	28,333	188	74	5	4.40	1.36%	3.84	2.04	[illegible]	1.80	40.9%	0.55	12.5%	7.23	1.69%
Milton	27,575	26,941	56	83	13	3.44	1.06%	3.03	1.63	47.4%	1.40	40.7%	0.41	11.9%	5.10	1.19%
Natick	36,246	32,324	30	135	4	3.04	0.94%	2.87	1.07	35.2%	1.80	59.2%	0.17	5.6%	4.02	0.94%
Needham	30,999	29,492	21	132	2	3.91	1.21%	3.64	1.74	44.5%	1.90	48.6%	0.27	6.9%	5.05	1.18%
Newton	88,994	88,104	52	271	7	15.09	4.66%	13.85	6.05	40.1%	7.80	51.7%	1.23	8.2%	21.15	4.95%
Norwood	29,195	29,026	31	108	6	5.97	1.84%	5.46	3.06	51.3%	2.40	40.2%	0.50	8.4%	7.99	1.87%
Quincy	94,166	94,166	56	202	6	13.77	4.25%	12.75	4.55	33.0%	8.20	59.5%	1.03	7.5%	17.33	4.05%
Randolph	34,272	34,210	2	101	2	3.67	1.13%	3.45	1.55	42.2%	1.90	51.8%	0.22	6.0%	5.09	1.19%
Reading	26,106	25,850	2	96	2	2.96	0.91%	2.79	1.49	50.3%	1.30	43.9%	0.16	5.4%	4.32	1.01%
Revere	53,993	53,761	3	98	2	6.84	2.11%	6.09	2.59	37.9%	3.50	51.2%	0.75	11.0%	9.08	2.12%
Somerville (5)	81,360	81,360	43	128	8	9.51	2.94%	6.93	1.43	15.0%	5.50	57.8%	2.58	27.1%	13.00	3.04%
Stoneham	22,036	21,816	27	63	7	3.43	1.06%	3.11	1.71	49.9%	1.40	40.8%	0.32	9.3%	5.55	1.30%
Stoughton	28,528	20,472	1	88	2	3.05	0.94%	2.85	1.45	47.5%	1.40	45.9%	0.20	6.6%	4.31	1.01%
Wakefield	27,157	27,067	11	93	2	4.53	1.40%	4.23	2.73	60.3%	1.50	33.1%	0.29	6.4%	5.98	1.40%
Walpole	25,073	18,554	1	59	2	2.28	0.70%	2.19	0.99	43.4%	1.20	52.6%	0.08	3.5%	2.82	0.66%
Waltham	62,442	61,599	5	138	4	9.41	2.91%	8.80	3.20	34.0%	5.60	59.5%	0.61	6.5%	12.27	2.87%
Watertown	35,756	35,756	14	75	3	3.55	1.10%	3.26	1.06	29.9%	2.20	62.0%	0.30	8.5%	4.52	1.06%
Wellesley	29,479	28,801	2	134	3	3.58	1.11%	3.29	1.59	44.4%	1.70	47.5%	0.28	7.8%	4.92	1.15%
Westwood	16,056	15,056	3	77	3	1.80	0.56%	1.69	0.79	43.9%	0.90	50.0%	0.11	6.1%	2.44	0.57%
Weymouth	56,664	55,202	19	238	4	8.96	2.77%	8.23	4.53	50.6%	3.70	41.3%	0.73	8.1%	12.50	2.92%
Wilmington	23,803	4,889	2	29	1	1.57	0.49%	1.53	0.73	46.5%	0.80	51.0%	0.04	2.5%	1.73	0.40%
Winchester	22,838	22,790	102	83	7	2.45	0.76%	2.30	1.20	49.0%	1.10	44.9%	0.16	6.5%	3.46	0.81%
Winthrop	18,625	18,625	22	36	4	2.37	0.73%	2.08	0.98	41.4%	1.10	46.4%	0.29	12.2%	2.71	0.63%
Woburn	39,701	38,867	18	141	13	6.89	2.13%	6.41	2.71	39.3%	3.70	53.7%	0.48	7.0%	9.71	2.27%
Totals/Averages	2,344,877	2,278,245	1,958	5,365		323.62	100.00%	287.02	111.33	34.4%	175.69	54.3%	36.57	11.3%	427.50	100.00%

FOOTNOTES:

(1) Figures tabulated using data from the MWRA Wastewater Metering System for Calendar Year 2019.

(2) Wastewater flow components are estimated through engineering analysis by MWRA staff.

(3) Miles of Local Sewers are from MWRA's regional collection system database or as reported by the Community and do not include service laterals.

(4) Average Daily Inflow is calculated as a total inflow over the period of January through December 2019 divided by 365 days. Actual inflow during a specific storm event must be calculated separately.

(5) Community with combined sewers. Inflow figures include combined flow during storm events tributary to MWRA's WWTP.

Weston & Sampson SM

Weston & Sampson SM

transform your environment

Hillary Lacirignola, PE
Vice President
lacirignolah@wseinc.com

Milton’s I/I Control Plan

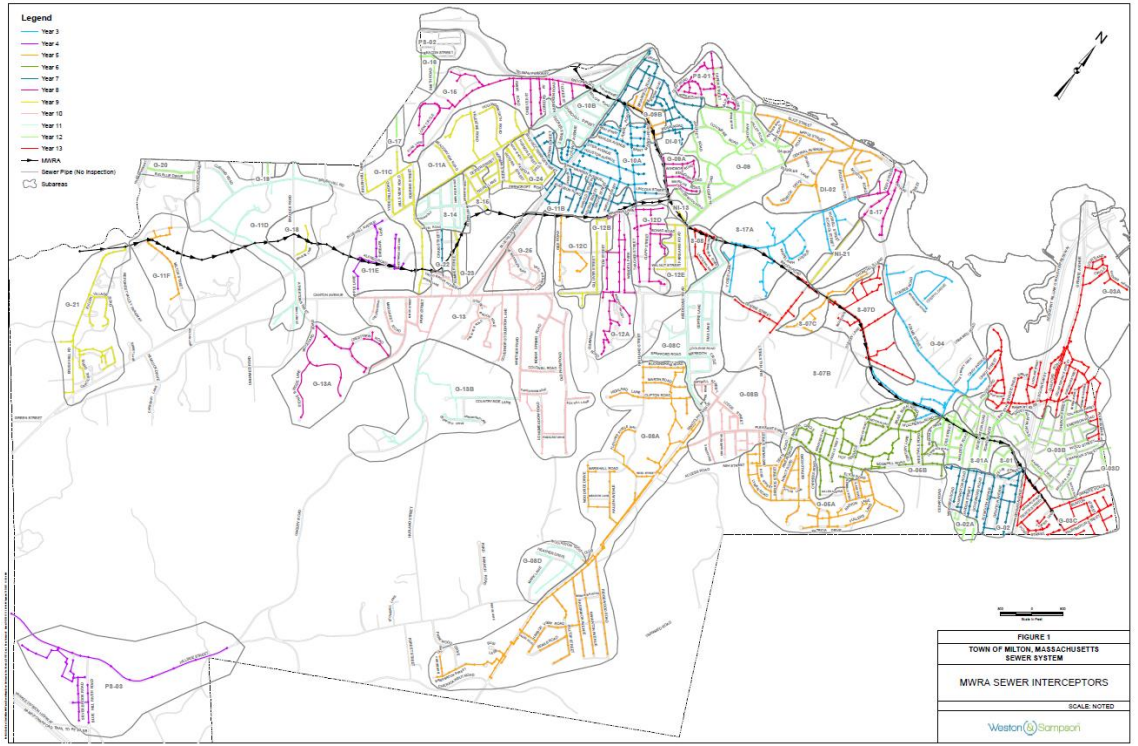
Weston & Sampson℠

Milton's System

- Located southeast of Boston
- MWRA sewer community
- 500,000 lf of sewers
- Population ~28,000
- 3.4 MGD average daily flow

I/I History

- 1999 – one of the highest percentages of infiltration flow component in the MWRA system
- 2000 – established an annual rehabilitation and investigation program focused on identifying and removing infiltration
- Various inflow projects



Weston & Sampson SM

Annual I/I Investigation & Rehabilitation Program

- Comprehensive approach to investigate a set quantity of sewers and manholes each year
- Quantity of sewers per year based on town's desired budget
- Subareas prioritized based on
  - Known problem areas
  - High I/I
  - Not recently rehabilitated

Annual Program

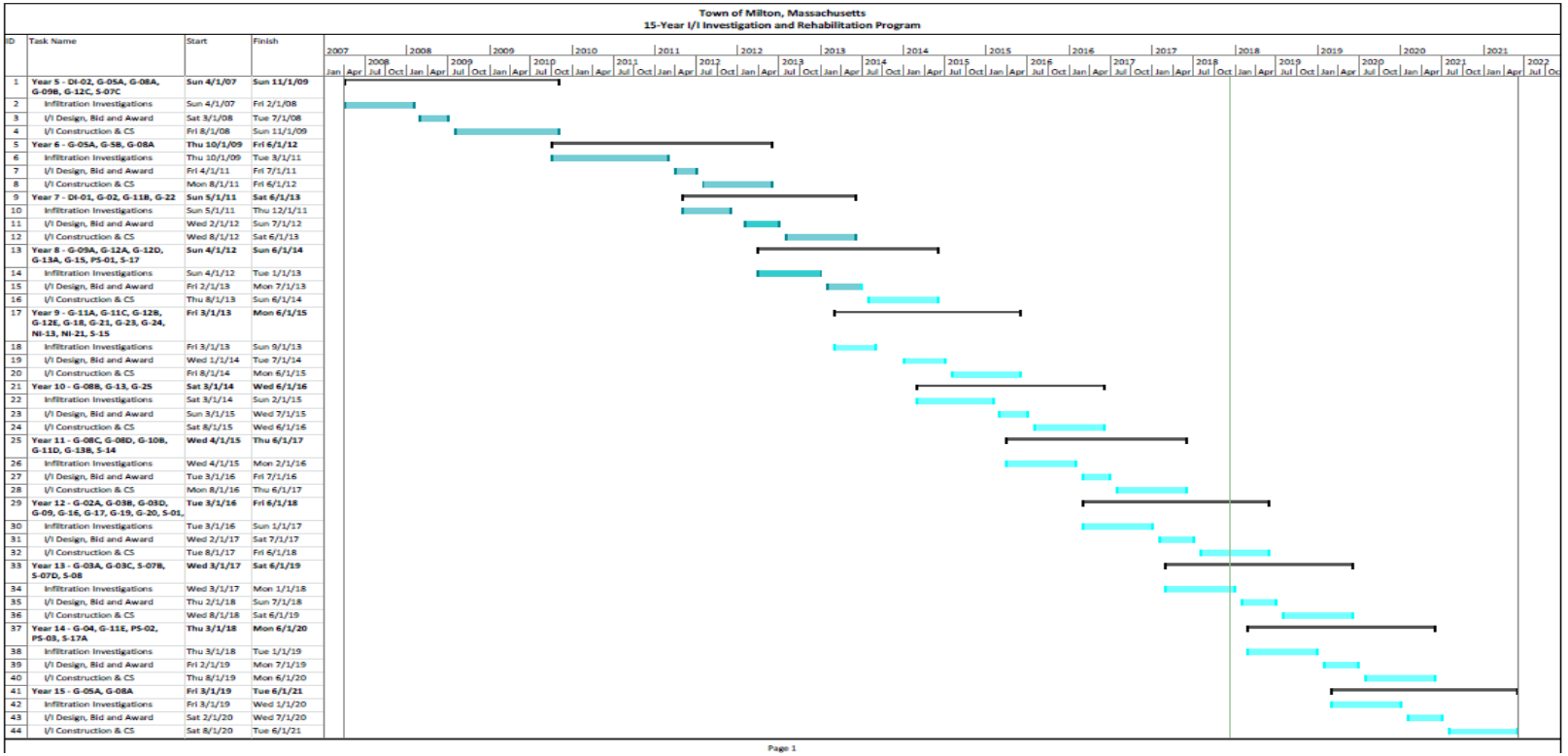
- Manhole Inspections
- Flow Isolation
- Television Inspection
- Infrastructure Inventory and Database – linked to GIS
- Data Review, Preliminary Design & Cost Effectiveness Analysis
- Final Design
- Construction
- ~50,000 lf project area per year

Weston & Sampson℠

Annual Program

- Years 1-14 between 2002 – 2018
- Investigated entire town +
- Assessed and reprioritized subareas in 2009 and 2018
- Restarted in 2019 with CIP 1
- **Currently in CIP 2 Construction Phase, CIP 3 Investigation Phase**

Where Are We Now?



ID	Task Name	Start	Finish
1	**Year 5 - DI-02, G-05A, G-08A, G-09B, G-12C, S-07C**	**Sun 4/1/07**	**Sun 11/1/09**
2	Infiltration Investigations	Sun 4/1/07	Fri 2/1/08
3	I/I Design, Bid and Award	Sat 3/1/08	Tue 7/1/08
4	I/I Construction & CS	Fri 8/1/08	Sun 11/1/09
5	**Year 6 - G-05A, G-5B, G-08A**	**Thu 10/1/09**	**Fri 6/1/12**
6	Infiltration Investigations	Thu 10/1/09	Tue 3/1/11
7	I/I Design, Bid and Award	Fri 4/1/11	Fri 7/1/11
8	I/I Construction & CS	Mon 8/1/11	Fri 6/1/12
9	**Year 7 - DI-01, G-02, G-11B, G-22**	**Sun 5/1/11**	**Sat 6/1/13**
10	Infiltration Investigations	Sun 5/1/11	Thu 12/1/11
11	I/I Design, Bid and Award	Wed 2/1/12	Sun 7/1/12
12	I/I Construction & CS	Wed 8/1/12	Sat 6/1/13
13	**Year 8 - G-09A, G-12A, G-12D, G-13A, G-15, PS-01, S-17**	**Sun 4/1/12**	**Sun 6/1/14**
14	Infiltration Investigations	Sun 4/1/12	Tue 1/1/13
15	I/I Design, Bid and Award	Fri 2/1/13	Mon 7/1/13
16	I/I Construction & CS	Thu 8/1/13	Sun 6/1/14
17	**Year 9 - G-11A, G-11C, G-12B, G-12E, G-18, G-21, G-23, G-24, NI-13, NI-21, S-15**	**Fri 3/1/13**	**Mon 6/1/15**
18	Infiltration Investigations	Fri 3/1/13	Sun 9/1/13
19	I/I Design, Bid and Award	Wed 1/1/14	Tue 7/1/14
20	I/I Construction & CS	Fri 8/1/14	Mon 6/1/15
21	**Year 10 - G-08B, G-13, G-25**	**Sat 3/1/14**	**Wed 6/1/16**
22	Infiltration Investigations	Sat 3/1/14	Sun 2/1/15
23	I/I Design, Bid and Award	Sun 3/1/15	Wed 7/1/15
24	I/I Construction & CS	Sat 8/1/15	Wed 6/1/16
25	**Year 11 - G-08C, G-08D, G-10B, G-11D, G-13B, S-14**	**Wed 4/1/15**	**Thu 6/1/17**
26	Infiltration Investigations	Wed 4/1/15	Mon 2/1/16
27	I/I Design, Bid and Award	Tue 3/1/16	Fri 7/1/16
28	I/I Construction & CS	Mon 8/1/16	Thu 6/1/17
29	**Year 12 - G-02A, G-03B, G-03D, G-09, G-16, G-17, G-19, G-20, S-01,**	**Tue 3/1/16**	**Fri 6/1/18**
30	Infiltration Investigations	Tue 3/1/16	Sun 1/1/17
31	I/I Design, Bid and Award	Wed 2/1/17	Sat 7/1/17
32	I/I Construction & CS	Tue 8/1/17	Fri 6/1/18
33	**Year 13 - G-03A, G-03C, S-07B, S-07D, S-08**	**Wed 3/1/17**	**Sat 6/1/19**
34	Infiltration Investigations	Wed 3/1/17	Mon 1/1/18
35	I/I Design, Bid and Award	Thu 2/1/18	Sun 7/1/18
36	I/I Construction & CS	Wed 8/1/18	Sat 6/1/19
37	**Year 14 - G-04, G-11E, PS-02, PS-03, S-17A**	**Thu 3/1/18**	**Mon 6/1/20**
38	Infiltration Investigations	Thu 3/1/18	Tue 1/1/19
39	I/I Design, Bid and Award	Fri 2/1/19	Mon 7/1/19
40	I/I Construction & CS	Thu 8/1/19	Mon 6/1/20
41	**Year 15 - G-05A, G-08A**	**Fri 3/1/19**	**Tue 6/1/21**
42	Infiltration Investigations	Fri 3/1/19	Wed 1/1/20
43	I/I Design, Bid and Award	Sat 2/1/20	Wed 7/1/20
44	I/I Construction & CS	Sat 8/1/20	Tue 6/1/21

Weston & Sampson℠

Where Are We Now?

- Program continues to comply with 314 CMR 12.04
- Added pre- and post-construction flow isolation to measure rehabilitation effectiveness
- Significantly lowered overall infiltration %
- $1.2M per year (investigation, design, construction)
- Doing even more to incorporate data to GIS for efficiency

Weston & Sampson SM

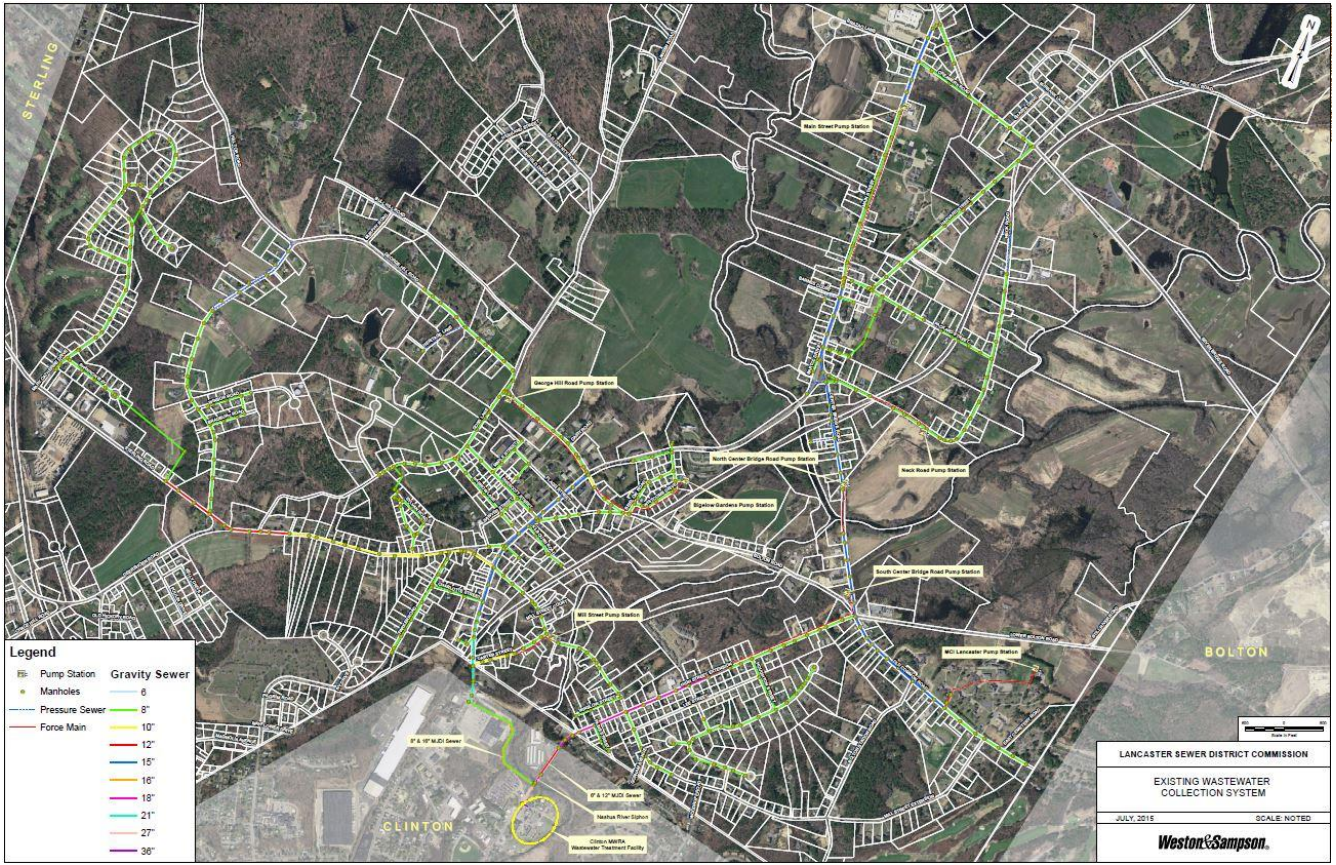
transform your environment

John Potts, PE
Senior Project Manager
pottsj@wseinc.com

Lancaster Sewer District Commission (LSDC)

- Formed in 1967
- Constructed between late 1970s and 2017
- Approximately 85,000-feet of sewer and 8 pump stations
- Wastewater flows to MWRA Clinton WWTP
  - Allowable ADF = 370,000 gallons per day (gpd)
  - Approximately ADF = 290,000 gpd
- Approximately 850 sewer users

LSDC Sewer Map

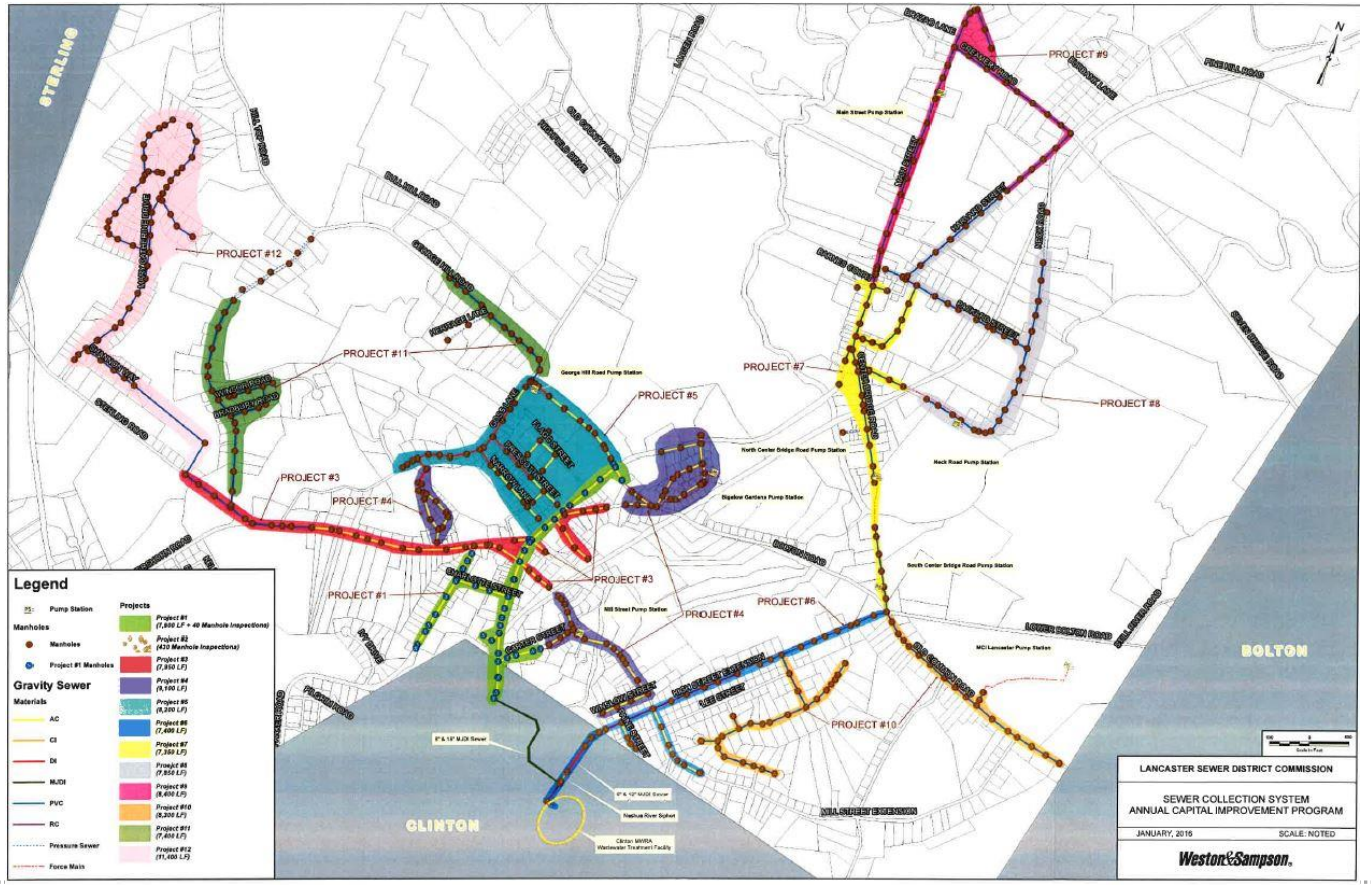


Weston & Sampson SM

LSDC Annual Plan and 314 CMR 12.04

- Completed in April 2016
- Created a 15-year investigation plan
- Approx. 8,000-feet of CCTV per year
- Submitted to MassDEP as an alternate plan in accordance with 314 CMR 12.04

LSDC Annual Sewer Plan Map



Weston & Sampson℠

LSDC SSES – Project #1

- Completed in 2017
- CCTV of approximately 8,400-feet of 8-, 10-, 15-, and 21-inch asbestos cement (AC) pipe
- Inspected approximately 40 sewer manholes

LSDC Sewer Manhole Inspection Program – Project #2

- Conducted in May-June 2020
- Inspected approximately 340 sewer manholes
- Identified 64 sewer manholes with one or more of the following:
  - Grease and debris
  - Roots
  - Structural issues
  - Infiltration

LSDC Sewer Manhole Inspection Program – Project #2

Wall Staining

Excessive Debris

Infiltration

LSDC Smoke Testing Program – Project #3

- Scheduled for October 2018 but delayed due to funding
- Conducted in October 2020
- Smoke tested approximately 75,000-feet of sewers
- Identified 7 confirmed defects and 11 suspected defects

LSDC Smoke Testing Program – Project #3

Abandoned Pump Station (former AUC college campus)

LSDC Annual Sewer Program

- LSDC has completed the first three (3) recommended projects in their annual plan (which received approval by MassDEP).

- LSDC is in the process of addressing issues that have been found (specifically on the former college campus).

- LSDC plans to continue with the next phase of the annual plan next Spring 2022.

Presenter Information

- Kevin Brander – kevin.brander@state.ma.us
- David Elmer – elmerd@wseinc.com
- Hillary Lacirignola – lacirignolah@wseinc.com
- John Potts – pottsj@wseinc.com
- Don Gallucci – galluccid@wseinc.com