City of Newton
Underground Infrastructure
Strategic Improvement Plan

February 2012

Goals:
Sewer, Water, Stormwater

- Good Physical Condition
  - Well Maintained
  - Updated Appropriately
  - Predictable, Preventive Maintenance
- Operationally Sound & Efficient
  - Sufficient flow for life services, fire flow
  - Eliminate cross-contamination
- Appropriate Reserves
- Stabilized and Sustainable Rates

What are the Problems?

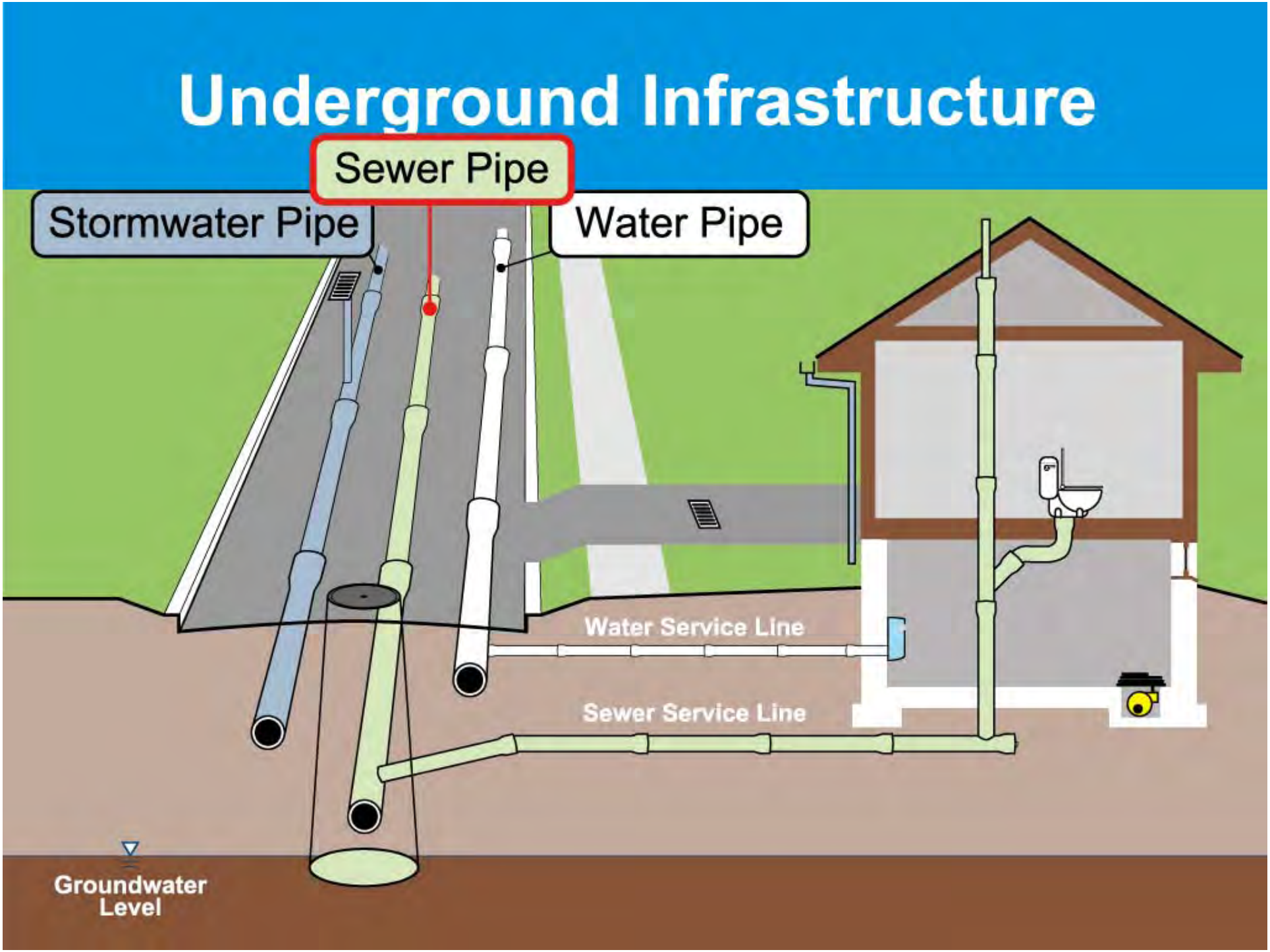
- Infiltration and Inflow (I/I)
- Sewer Back-ups and Overflows
- Steadily increasing MWRA Sewer Assessments
- Approximately 165 miles of unlined, corroded cast iron water pipe
- Fire flow deficiencies
- Increasing Federal requirements for Stormwater management

What are the Solutions?

- 11-year plan to investigate, repair, seal, re-line Sewer System ($49M)
- 10-year plan to investigate, replace, clean and line Water System ($40M)
- Re-structure Stormwater Fee and develop and institute a Master Plan for Capital Projects

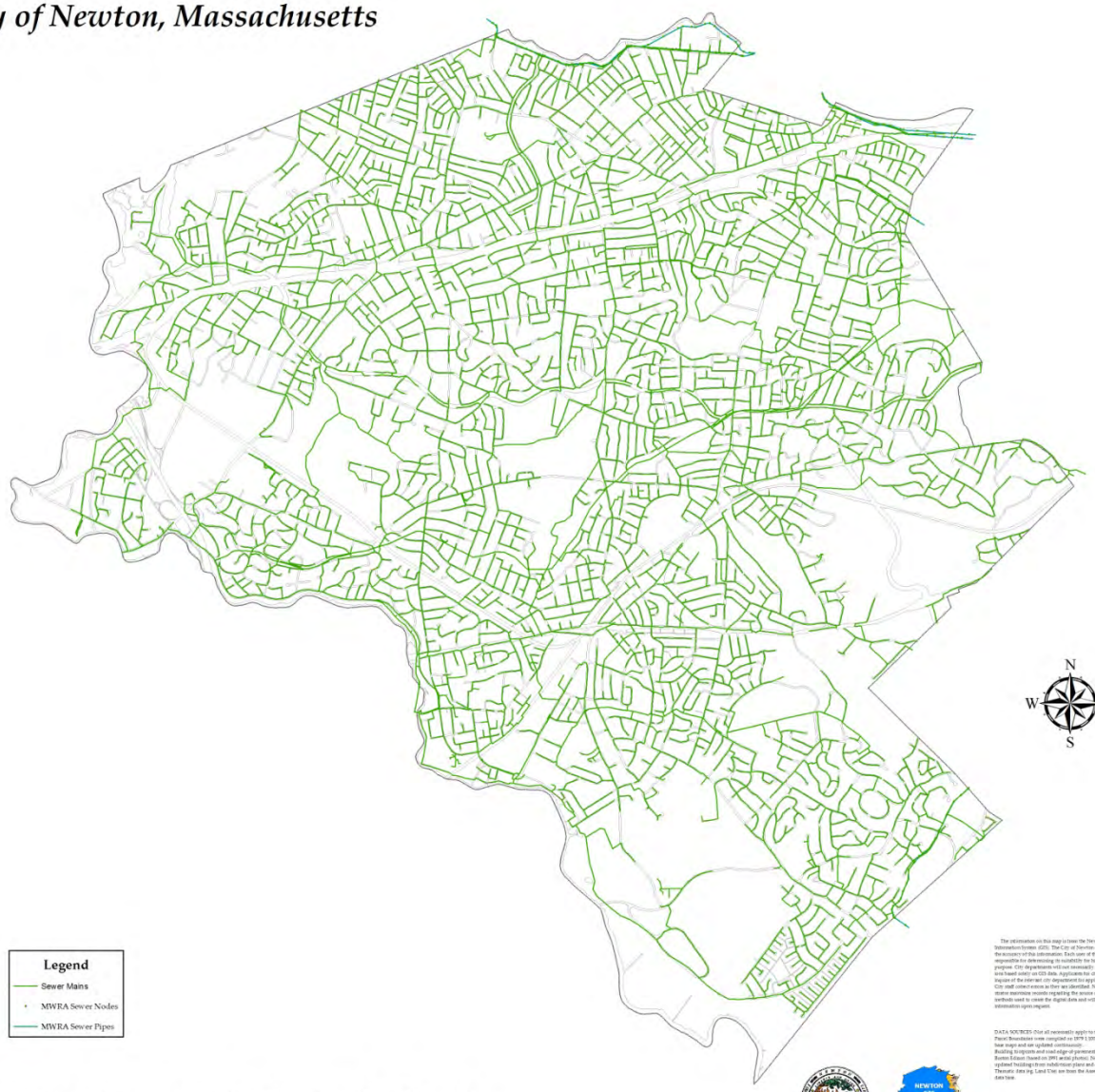
Sewer System
Strategic Improvement Plan

February 2012


Underground Infrastructure
Sewer Pipe
Stormwater Pipe
Water Pipe
Water Service Line
Sewer Service Line
Groundwater Level

Sewer Collection System

City of Newton, Massachusetts



The information on this map is from the Newton Geographic Information System (GIS). The City of Newton cannot guarantee the accuracy of this information. Each user of this map is responsible for determining its suitability for his or her intended purpose. City departments will not reasonably approve applications based solely on GIS data. Applicants for city permits must inquire of the relevant city department for applicable requirements. City staff correct errors as they are identified. Newton's GIS Administrator maintains records regarding the source materials and methods used to create the digital data and will disclose this information upon request.

DATA SOURCES: (Not all necessarily apply to this map) Parcel Boundaries were compiled on 1979 1:1200 scale orthophoto base maps and are updated continuously. Building footprints and road edge-of-pavement originally from Boston Edison (based on 1991 aerial photos). Newton staff have updated building from subdivision plans and orthophotography. Thematic data (eg. Land Use) are from the Assessor's CAMA data base.

CITY OF NEWTON, MASSACHUSETTS
Mayor - Setti D. Warren
GIS Administrator - Douglas Greenfield

Map Date: February 29, 2012

Sewer System

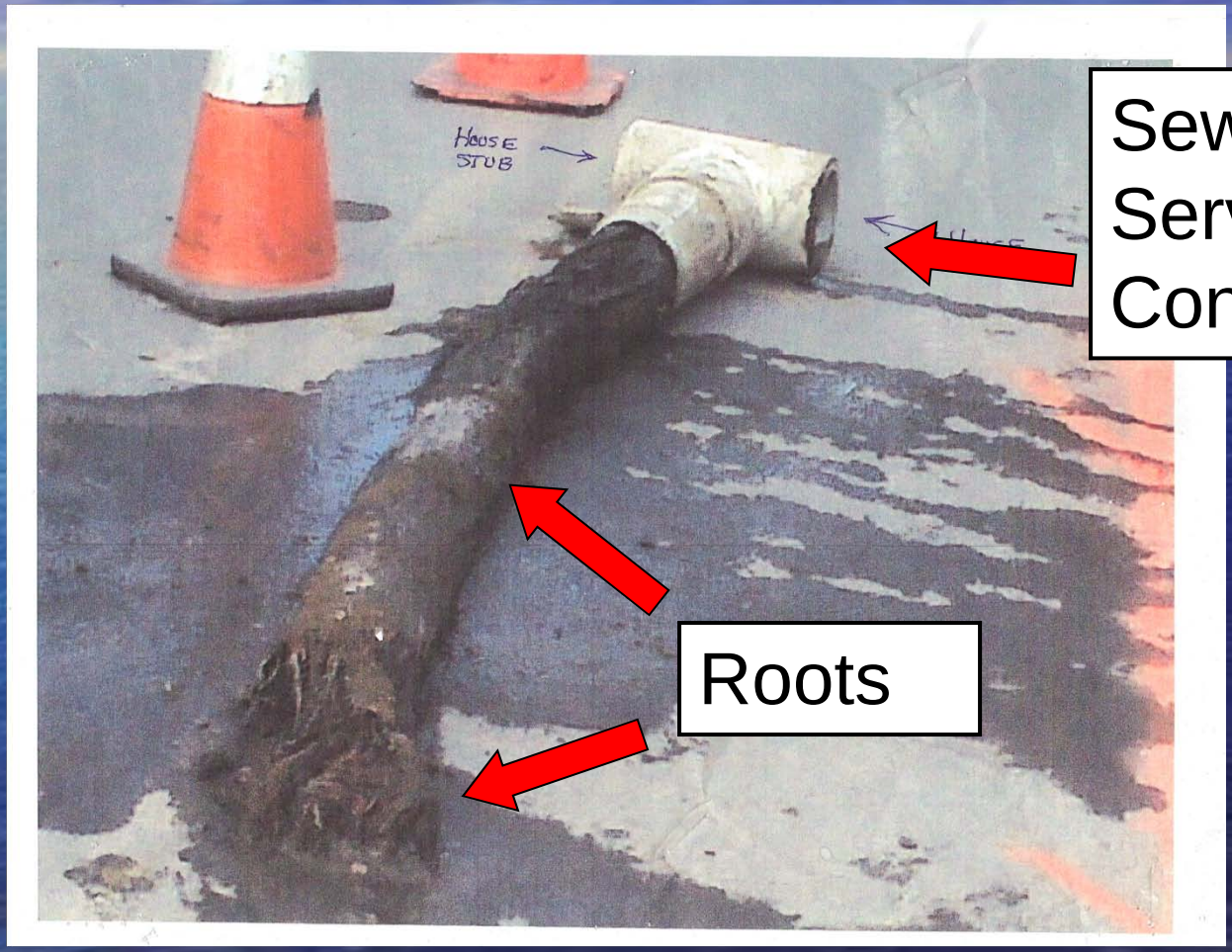
- 1.5 million linear feet (284 miles) of pipe
- 9,100 manholes
- 400,000 linear feet (75 miles) of underdrains
- 25,000+ service connections
- 10 Pump Stations
- 19 million gallons of average daily flow

What are the Problems?

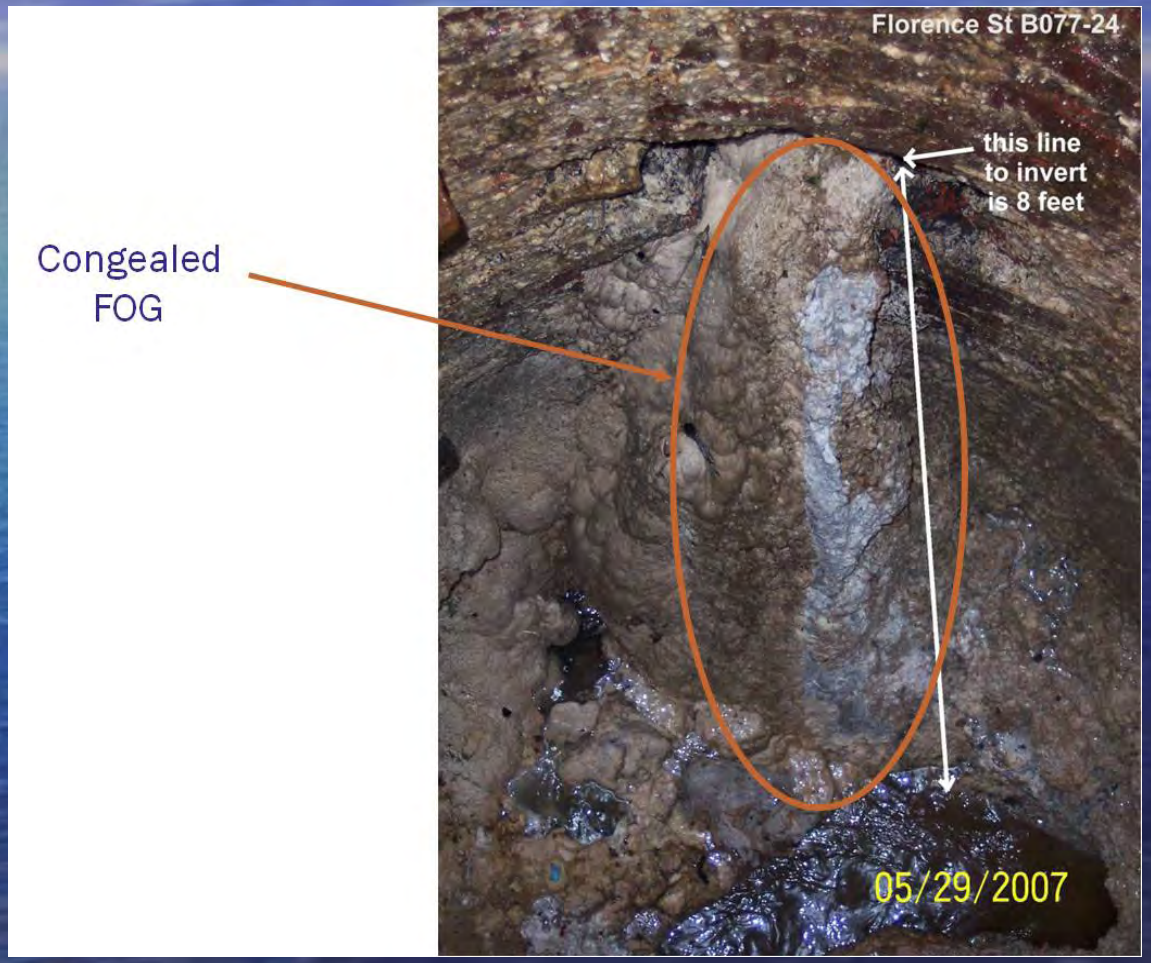
- Infiltration and Inflow (I/I)
  - Contamination through pipes and underdrains
- Sewer Overflow and Back-ups
- Aging Infrastructure
  - Structural problems (breaks, sagging)
  - Intrusion/blockages (roots, grease)
- Steadily increasing MWRA Sewer Assessments

- **When sanitary sewer pipes suddenly fill with clean water from heavy rain, overflows and backups occur**

Sewer Roots



Fats, Oils and Grease (F.O.G.)



What is Infiltration & Inflow (I/I)?

- **Infiltration:** Groundwater that enters the sewer system through damaged or deteriorated infrastructure.
- **Inflow:** Rainwater that enters the sewer system through improperly connected pipes.
- I/I impacts both public and private sewer lines

Newton – Very High Infiltration Moderate Inflow

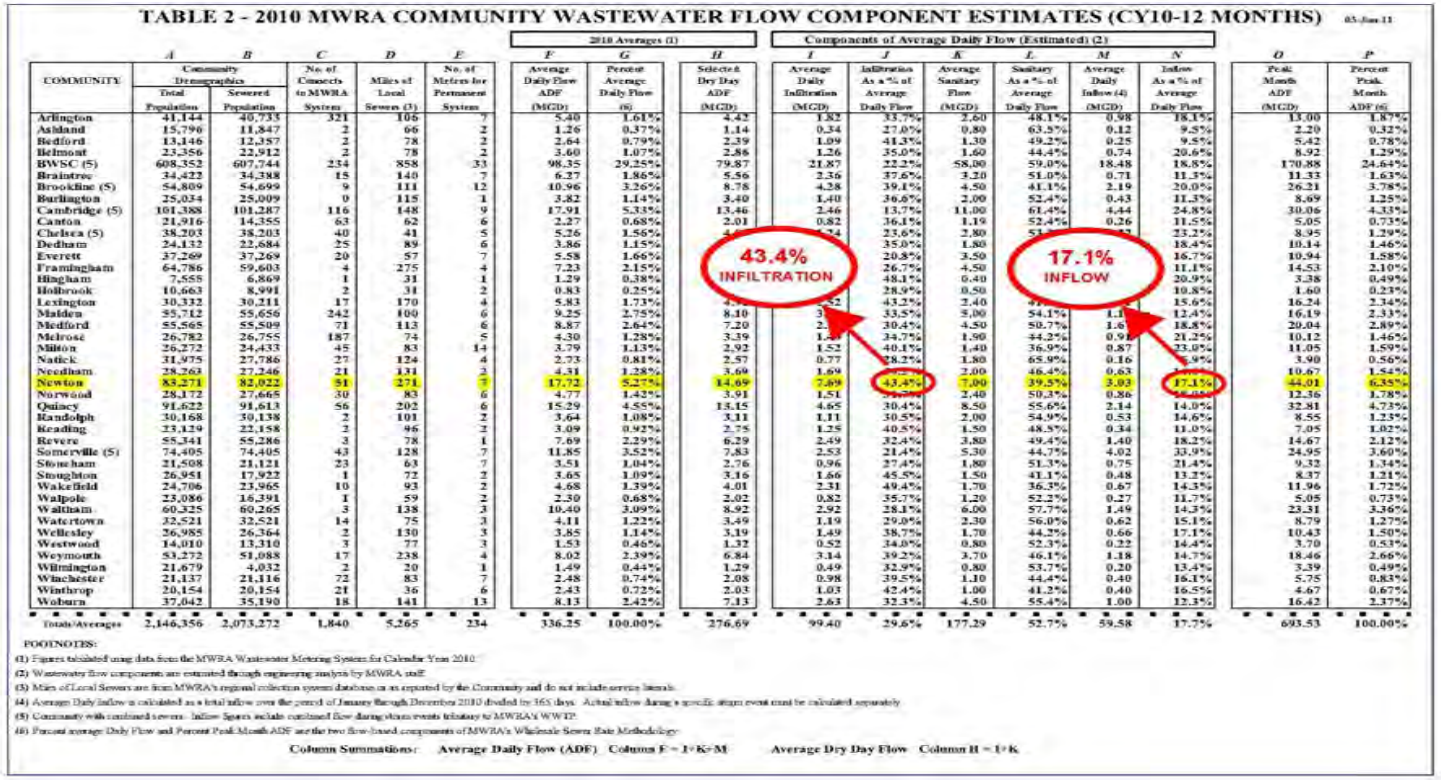


TABLE 2 - 2010 MWRA COMMUNITY WASTEWATER FLOW COMPONENT ESTIMATES (CY10-12 MONTHS)

						2010 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 System	Miles of Local Sewers (3)	No. of Meters for Permanent System	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	Peak Month ADF (MGD)	Percent Peak Month ADF (6)
	Total Population	Sewered Population														
Arlington	41,144	40,733	321	106	7	5.40	1.61%	4.42	1.82	33.7%	2.60	48.1%	0.98	18.1%	13.00	1.87%
Ashland	15,796	11,847	2	66	2	1.26	0.37%	1.14	0.34	27.0%	0.80	63.5%	0.12	9.5%	2.20	0.32%
Bedford	13,146	12,357	2	78	2	2.64	0.79%	2.39	1.09	41.3%	1.30	49.2%	0.25	9.5%	5.42	0.78%
Belmont	23,356	22,912	2	78	2	3.60	1.07%	2.86	1.26	35.0%	1.60	44.4%	0.74	20.6%	8.92	1.29%
BWSC (5)	608,352	607,744	234	858	33	98.35	29.25%	79.87	21.87	22.2%	58.00	59.0%	18.48	18.8%	170.88	24.64%
Braintree	34,422	34,388	15	140	7	6.27	1.86%	5.56	2.36	37.6%	3.20	51.0%	0.71	11.3%	11.33	1.63%
Brookline (5)	54,809	54,699	9	111	12	10.96	3.26%	8.78	4.28	39.1%	4.50	41.1%	2.19	20.0%	26.21	3.78%
Burlington	25,034	25,009	9	115	1	3.82	1.14%	3.40	1.40	36.6%	2.00	52.4%	0.43	11.3%	8.69	1.25%
Cambridge (5)	101,388	101,287	116	148	9	17.91	5.33%	13.46	2.46	13.7%	11.00	61.4%	4.44	24.8%	30.06	4.33%
Canton	21,916	14,355	63	62	6	2.27	0.68%	2.01	0.82	36.1%	1.19	52.4%	0.26	11.5%	5.05	0.73%
Chelsea (5)	38,203	38,203	40	41	5	5.26	1.56%	[illegible]	[illegible]	23.6%	2.80	[illegible]	[illegible]	23.2%	8.95	1.29%
Dedham	24,132	22,684	25	89	6	3.86	1.15%	[illegible]	[illegible]	35.0%	1.80	[illegible]	[illegible]	18.4%	10.14	1.46%
Everett	37,269	37,269	20	57	7	5.58	1.66%	[illegible]	[illegible]	20.8%	3.50	[illegible]	[illegible]	16.7%	10.94	1.58%
Framingham	64,786	59,603	4	275	4	7.23	2.15%	[illegible]	[illegible]	26.7%	4.50	[illegible]	[illegible]	11.1%	14.53	2.10%
Hingham	7,555	6,869	1	31	1	1.29	0.38%	[illegible]	[illegible]	48.1%	0.40	[illegible]	[illegible]	20.9%	3.38	0.49%
Holbrook	10,663	8,991	2	31	2	0.83	0.25%	[illegible]	[illegible]	28.9%	0.50	[illegible]	[illegible]	10.8%	1.60	0.23%
Lexington	30,332	30,211	17	170	4	5.83	1.73%	[illegible]	[illegible]	43.2%	2.40	[illegible]	[illegible]	15.6%	16.24	2.34%
Malden	55,712	55,656	242	100	6	9.25	2.75%	8.10	[illegible]	33.5%	5.00	54.1%	[illegible]	12.4%	16.19	2.33%
Medford	55,565	55,509	71	113	6	8.87	2.64%	7.20	[illegible]	30.4%	4.50	50.7%	[illegible]	18.8%	20.04	2.89%
Melrose	26,782	26,755	187	74	5	4.30	1.28%	3.39	[illegible]	34.7%	1.90	44.2%	[illegible]	21.2%	10.12	1.46%
Milton	26,272	24,433	45	83	14	3.79	1.13%	2.92	1.52	40.1%	1.40	36.9%	0.87	23.0%	11.05	1.59%
Natick	31,975	27,786	27	124	4	2.73	0.81%	2.57	0.77	28.2%	1.80	65.9%	0.16	5.9%	3.90	0.56%
Needham	28,263	27,246	21	131	3	4.31	1.28%	3.69	1.59	[illegible]	2.00	46.4%	0.63	[illegible]	10.67	1.54%
Newton	83,271	82,922	51	271	7	17.72	5.27%	14.69	7.69	43.4%	7.00	39.5%	3.03	17.1%	44.01	6.35%
Norwood	28,172	27,665	30	83	6	4.77	1.42%	3.91	1.51	[illegible]	2.40	50.3%	0.86	[illegible]	12.36	1.78%
Quincy	91,622	91,613	56	202	6	15.29	4.55%	13.15	4.65	30.4%	8.50	55.6%	2.14	14.0%	32.81	4.73%
Randolph	30,168	30,138	2	101	2	3.64	1.08%	3.11	1.11	30.5%	2.00	54.9%	0.53	14.6%	8.55	1.23%
Reading	23,129	22,158	2	96	2	3.09	0.92%	2.75	1.25	40.5%	1.50	48.5%	0.34	11.0%	7.05	1.02%
Revere	55,341	55,286	3	78	1	7.69	2.29%	6.29	2.49	32.4%	3.80	49.4%	1.40	18.2%	14.67	2.12%
Somerville (5)	74,405	74,405	43	128	7	11.85	3.52%	7.83	2.53	21.4%	5.30	44.7%	4.02	33.9%	24.95	3.60%
Stoneham	21,508	21,121	23	63	7	3.51	1.04%	2.76	0.96	27.4%	1.80	51.3%	0.75	21.4%	9.32	1.34%
Stoughton	26,951	17,922	1	72	2	3.65	1.09%	3.16	1.66	45.5%	1.50	41.1%	0.48	13.2%	8.37	1.21%
Wakefield	24,706	23,965	10	93	2	4.68	1.39%	4.01	2.31	49.4%	1.70	36.3%	0.67	14.3%	11.96	1.72%
Walpole	23,086	16,391	1	59	2	2.30	0.68%	2.02	0.82	35.7%	1.20	52.2%	0.27	11.7%	5.05	0.73%
Waltham	60,325	60,265	3	138	3	10.40	3.09%	8.92	2.92	28.1%	6.00	57.7%	1.49	14.3%	23.31	3.36%
Watertown	32,521	32,521	14	75	3	4.11	1.22%	3.49	1.19	29.0%	2.30	56.0%	0.62	15.1%	8.79	1.27%
Wellesley	26,985	26,364	2	130	3	3.85	1.14%	3.19	1.49	38.7%	1.70	44.2%	0.66	17.1%	10.43	1.50%
Westwood	14,010	13,310	3	77	3	1.53	0.46%	1.32	0.52	34.0%	0.80	52.3%	0.22	14.4%	3.70	0.53%
Weymouth	53,272	51,088	17	238	4	8.02	2.39%	6.84	3.14	39.2%	3.70	46.1%	1.18	14.7%	18.46	2.66%
Wilmington	21,679	4,032	2	20	1	1.49	0.44%	1.29	0.49	32.9%	0.80	53.7%	0.20	13.4%	3.39	0.49%
Winchester	21,137	21,116	72	83	7	2.48	0.74%	2.08	0.98	39.5%	1.10	44.4%	0.40	16.1%	5.75	0.83%
Winthrop	20,154	20,154	21	36	6	2.43	0.72%	2.03	1.03	42.4%	1.00	41.2%	0.40	16.5%	4.67	0.67%
Woburn	37,042	35,190	18	141	13	8.13	2.42%	7.13	2.63	32.3%	4.50	55.4%	1.00	12.3%	16.42	2.37%
Totals/Averages	2,146,356	2,073,272	1,840	5,265	234	336.25	100.00%	276.69	99.40	29.6%	177.29	52.7%	59.58	17.7%	693.53	100.00%

43.4% INFILTRATION

17.1% INFLOW

FOOTNOTES:

(1) Figures tabulated using data from the MWRA Wastewater Metering System for Calendar Year 2010.

(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 as 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 2010 divided by 365 days. Actual inflow during a specific storm event must be calculated separately.

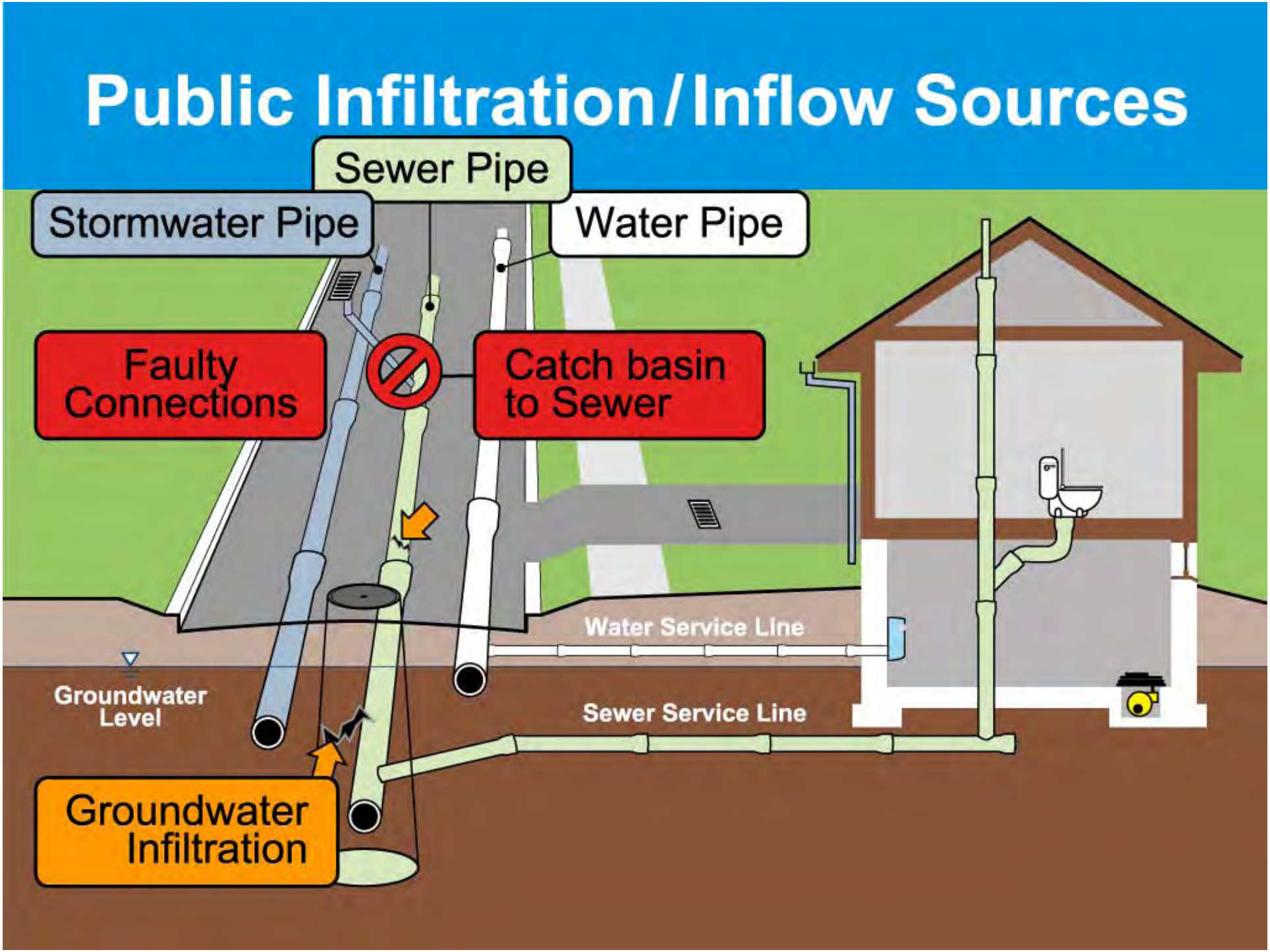
(5) Community with combined sewers. Inflow figures include combined flow during storm events tributary to MWRA's WWTP.

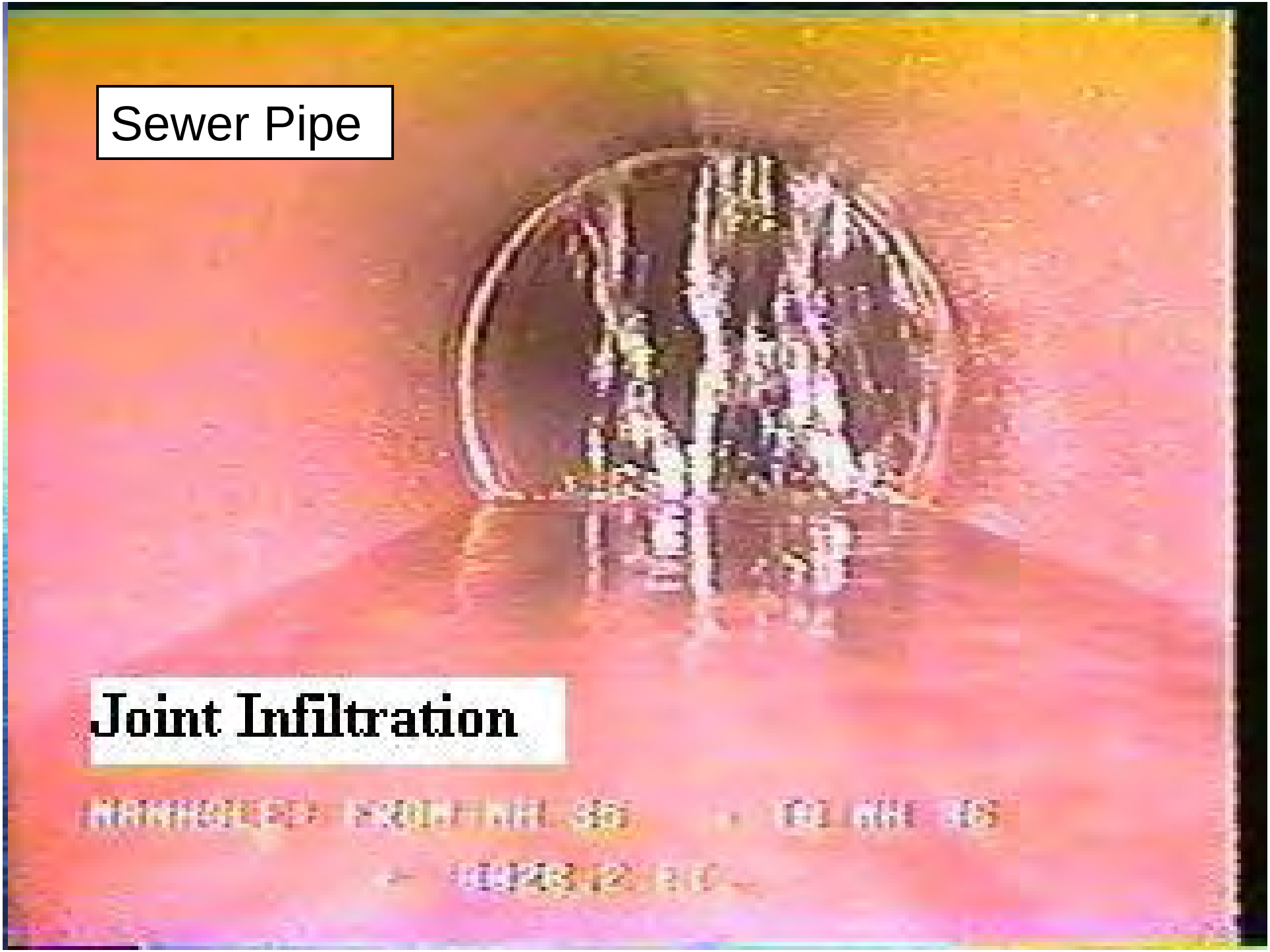
(6) Percent Average Daily Flow and Percent Peak Month ADF are the two flow-based components of MWRA's Wholesale Sewer Rate Methodology.

Column Summations: Average Daily Flow (ADF) Column F = I+K+M Average Dry Day Flow Column H = I+K

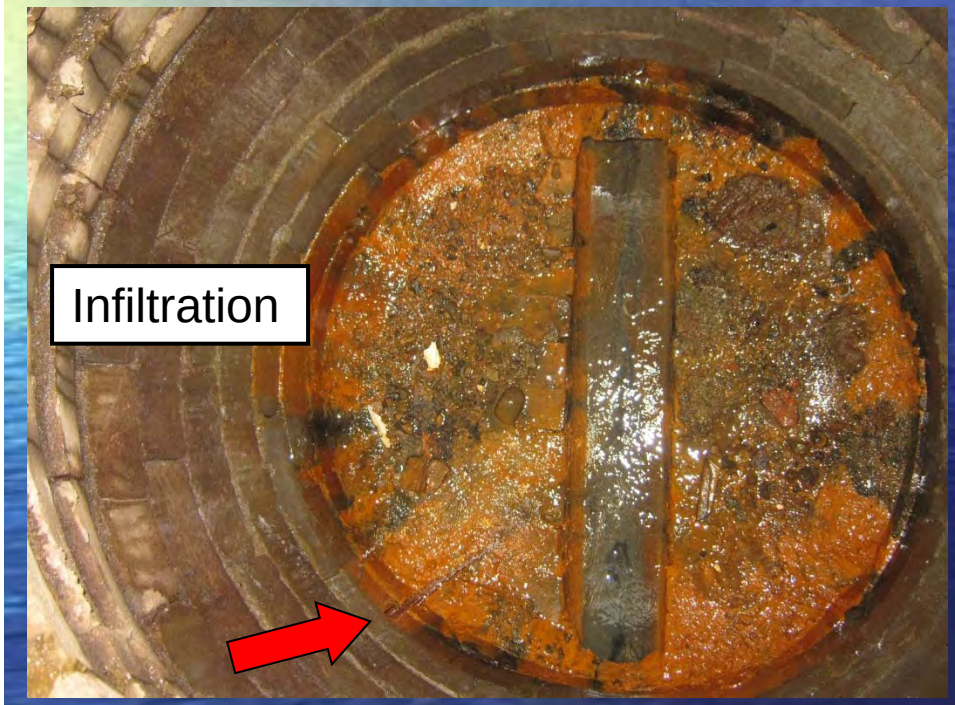
3

- 60.5% of Newton's flow to the MWRA treatment facility is clean water, not wastewater/sewerage

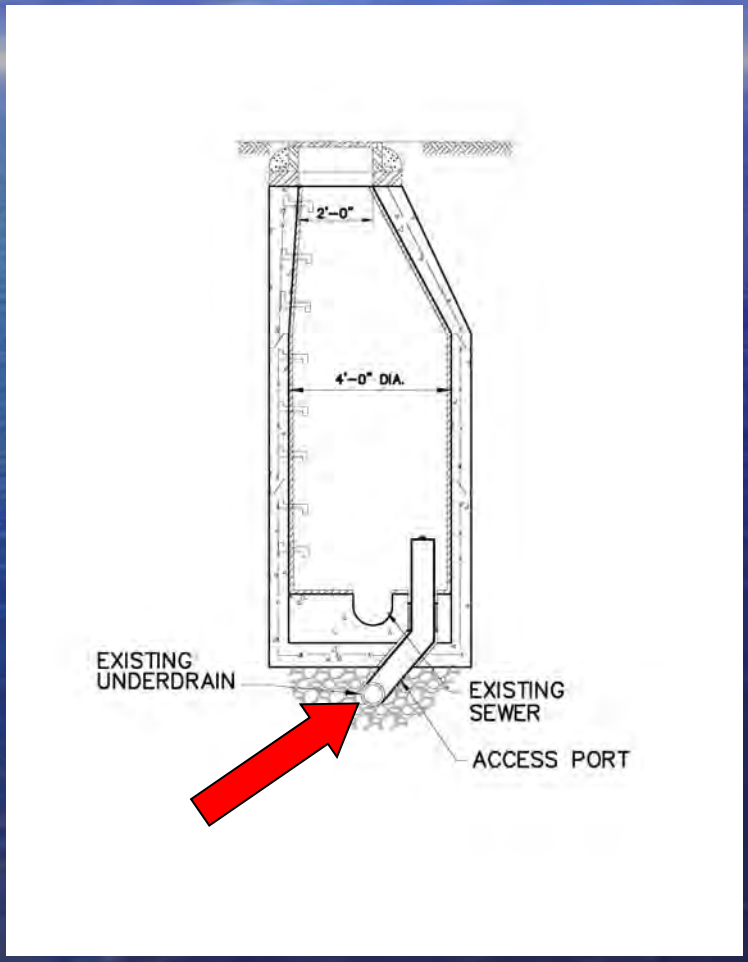

Public Infiltration/Inflow Sources
Sewer Pipe
Stormwater Pipe
Water Pipe
Faulty Connections
Catch basin to Sewer
Water Service Line
Groundwater Level
Sewer Service Line
Groundwater Infiltration


Sewer Pipe
Joint Infiltration

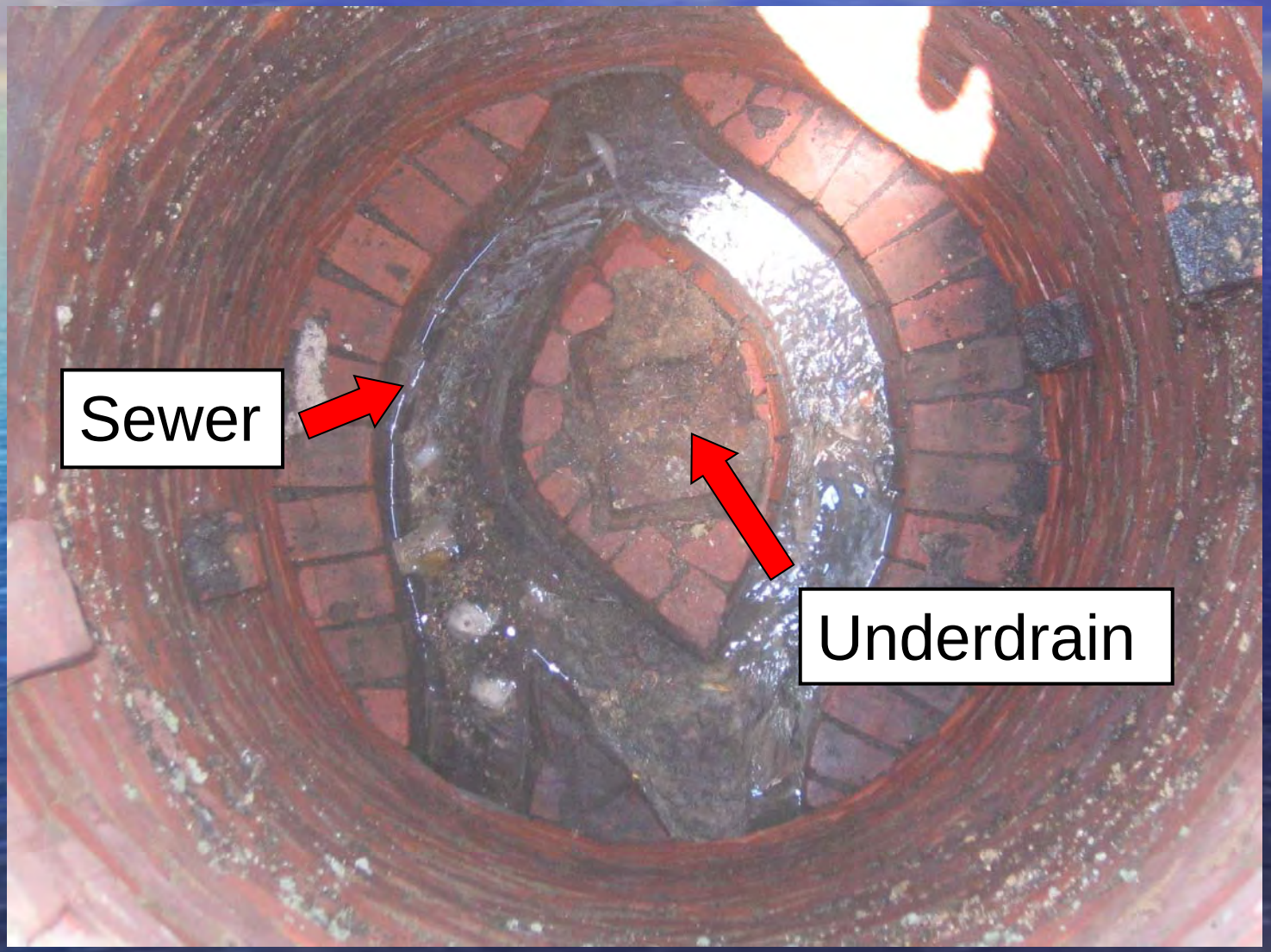
Leaking Manhole
Before & After



Underdrain



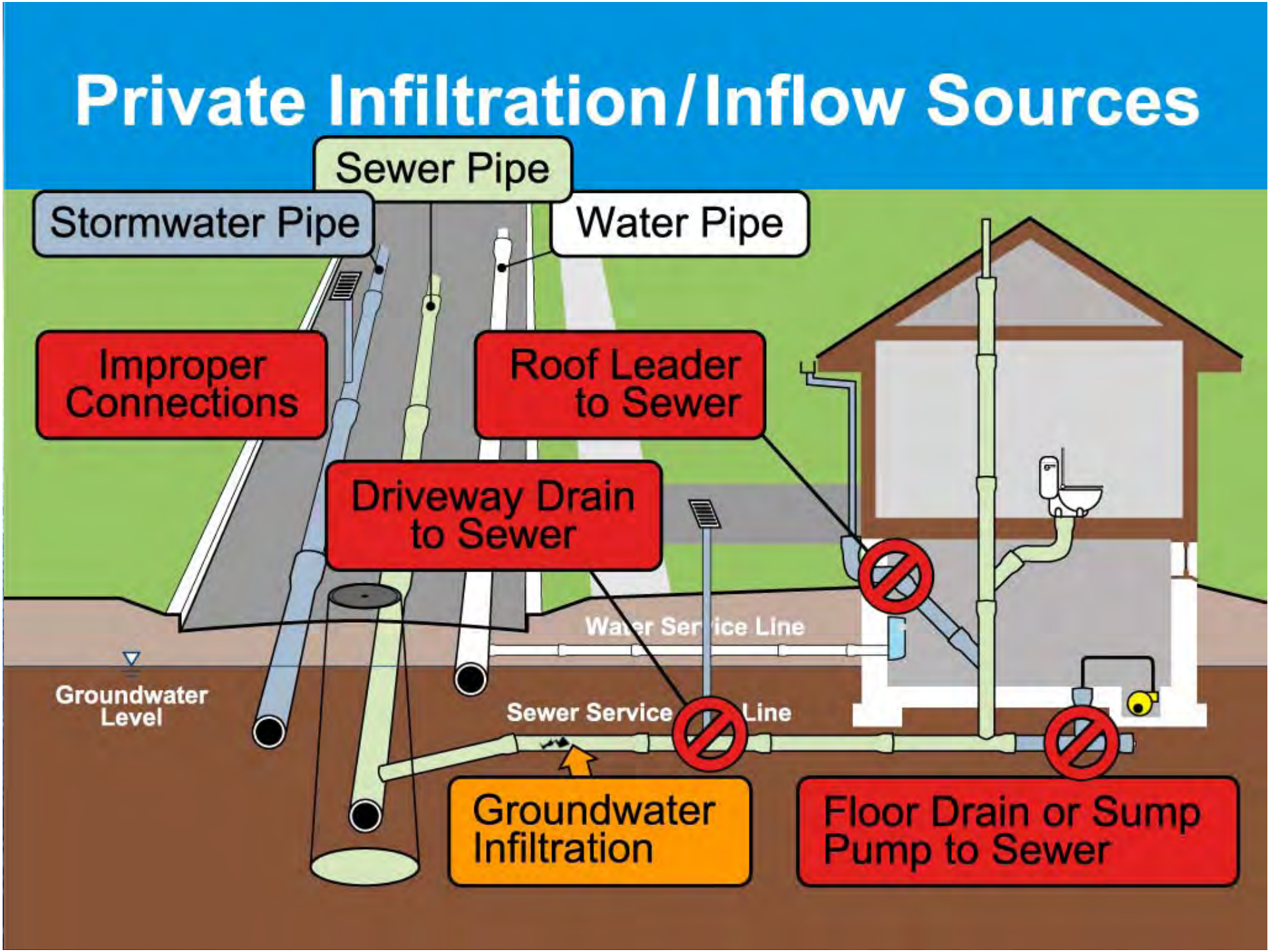
Underdrain

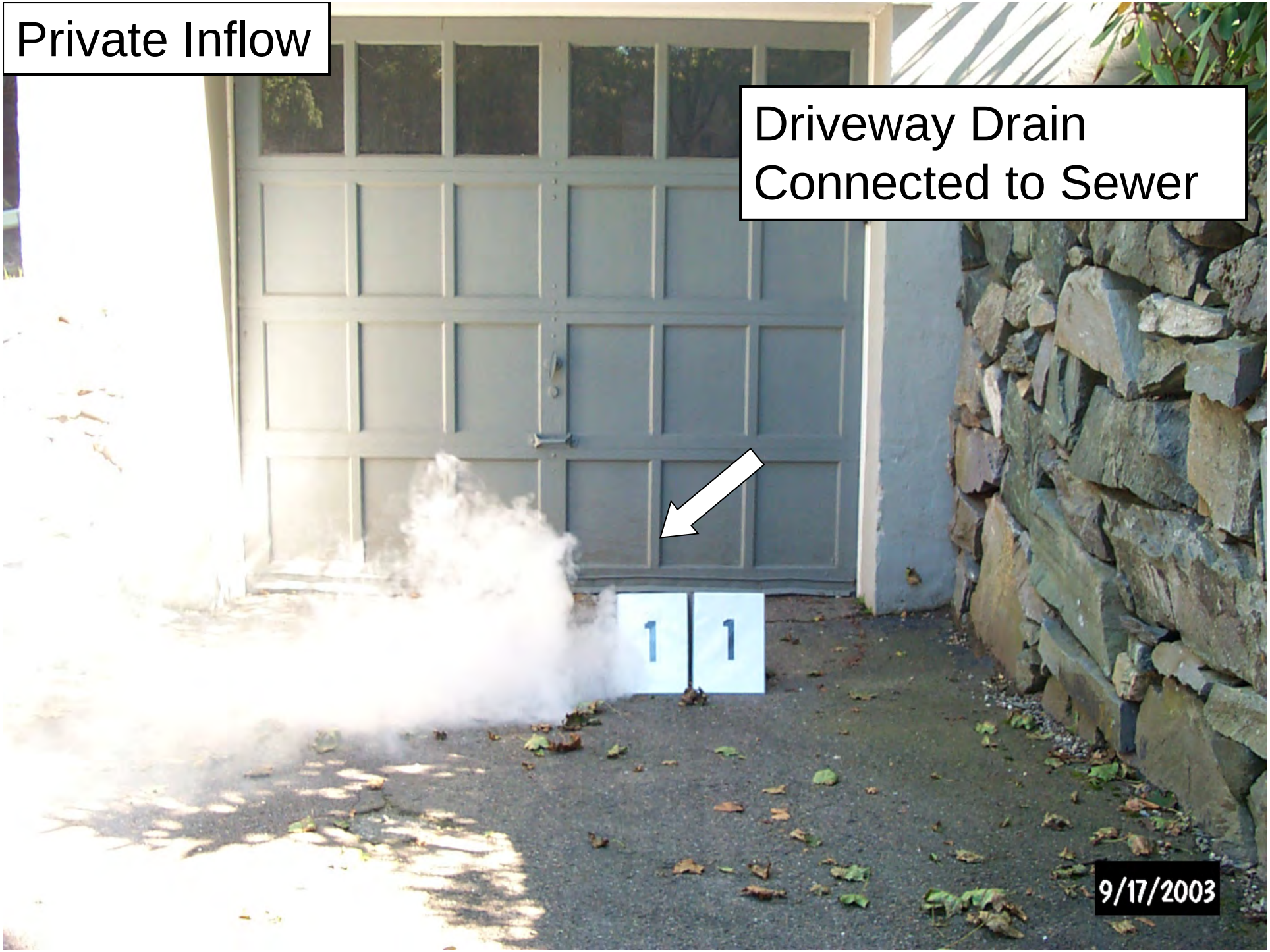


Identifying Public Inflow

- Smoke Testing
  - Smoke Forced into Sewer System with a Blower:
  - Smoke from plumbing vents is normal
  - Smoke from drainage infrastructure indicates an improper connection

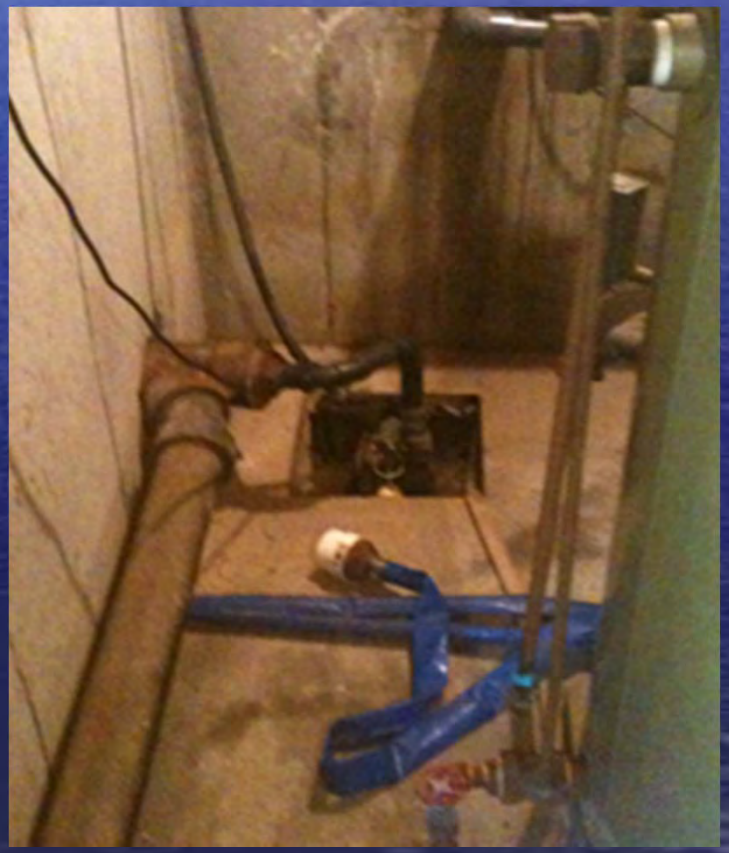

Public Inflow
Catch Basin
Connected to Sewer


Private Infiltration/Inflow Sources
Sewer Pipe
Stormwater Pipe
Water Pipe
Improper Connections
Roof Leader to Sewer
Driveway Drain to Sewer
Water Service Line
Groundwater Level
Sewer Service Line
Groundwater Infiltration
Floor Drain or Sump Pump to Sewer

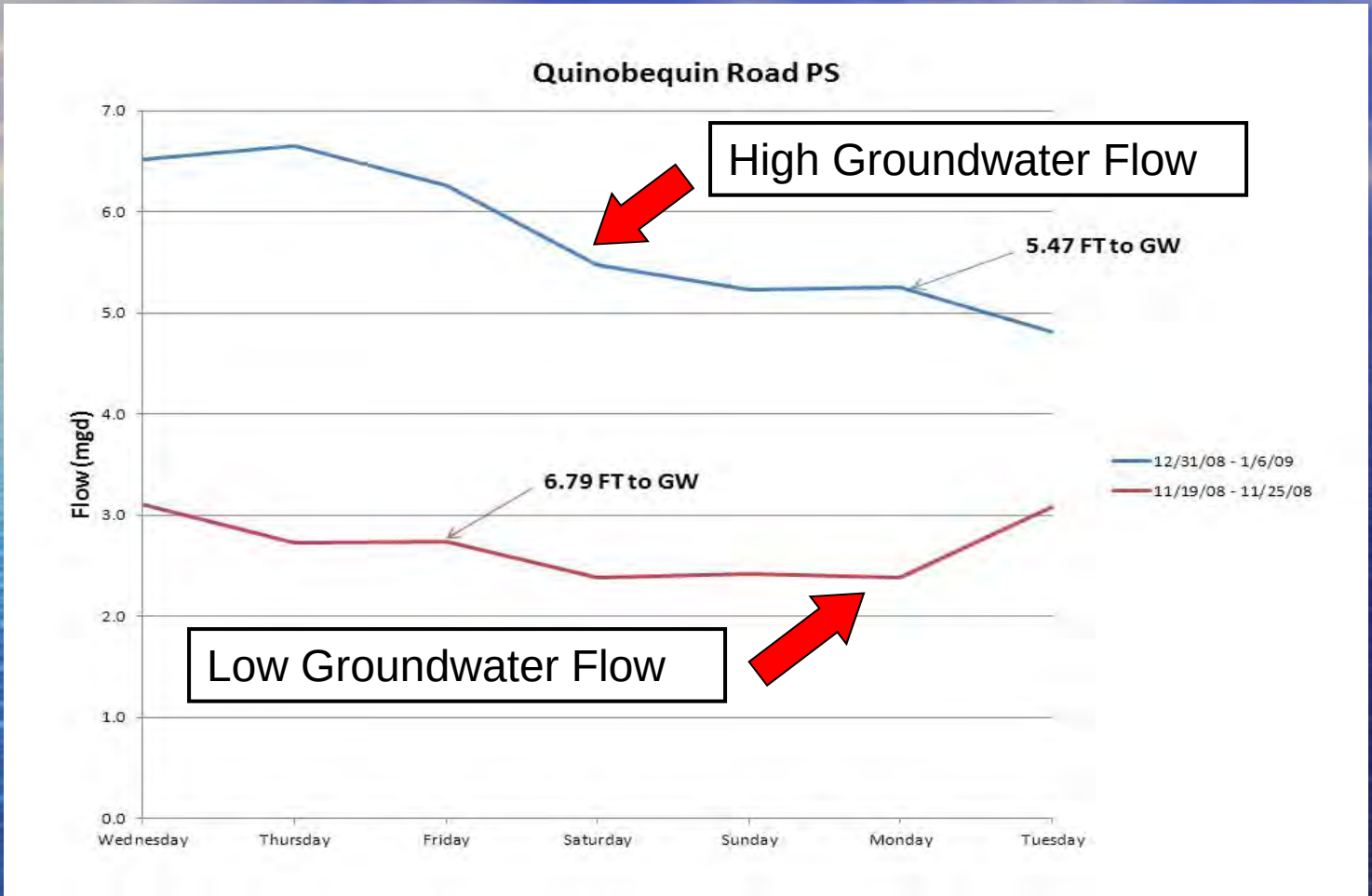

Private Inflow
Driveway Drain
Connected to Sewer
1
1
9/17/2003

Private Inflow

Sump Pump Connected to Sewer

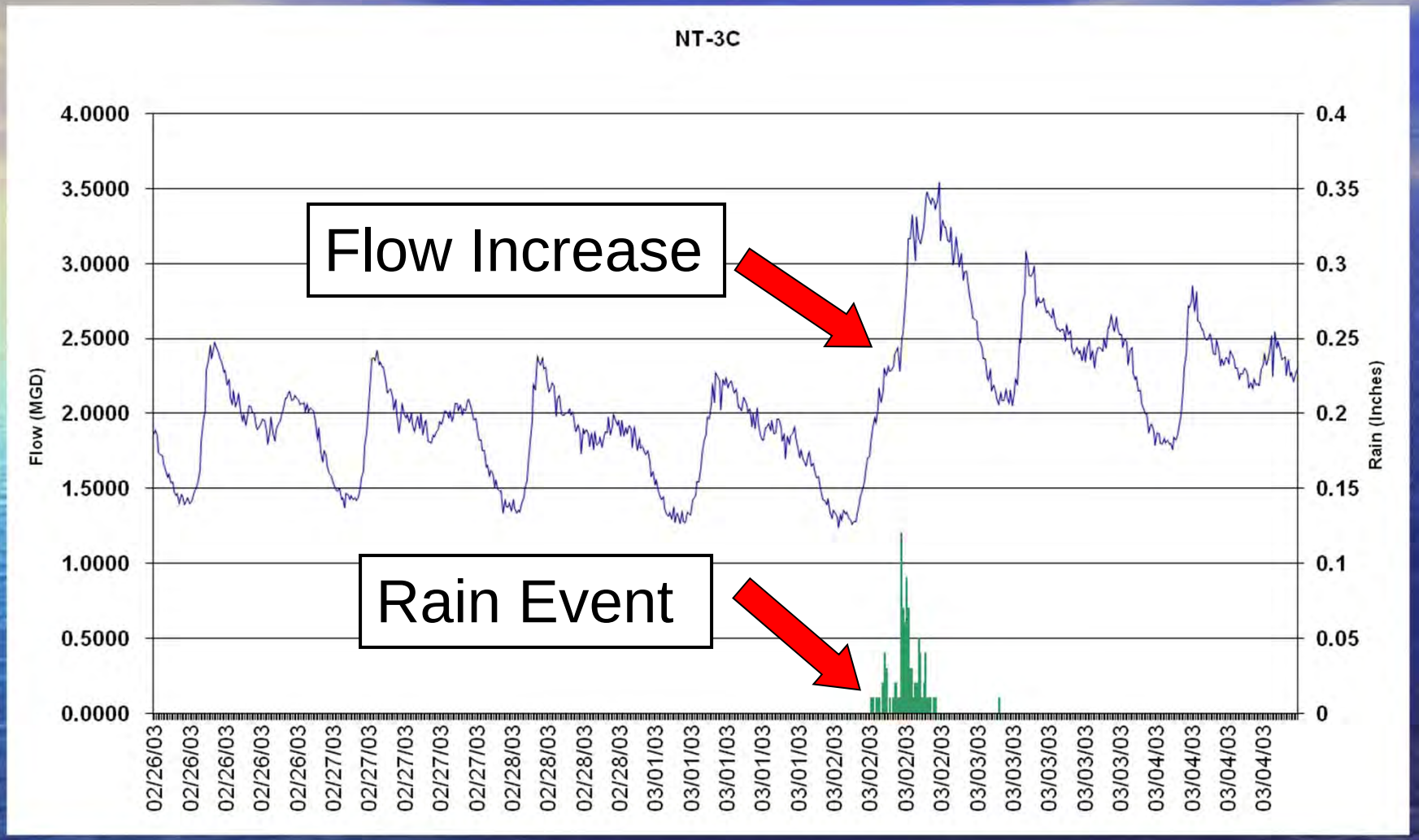


Infiltration (Area A)



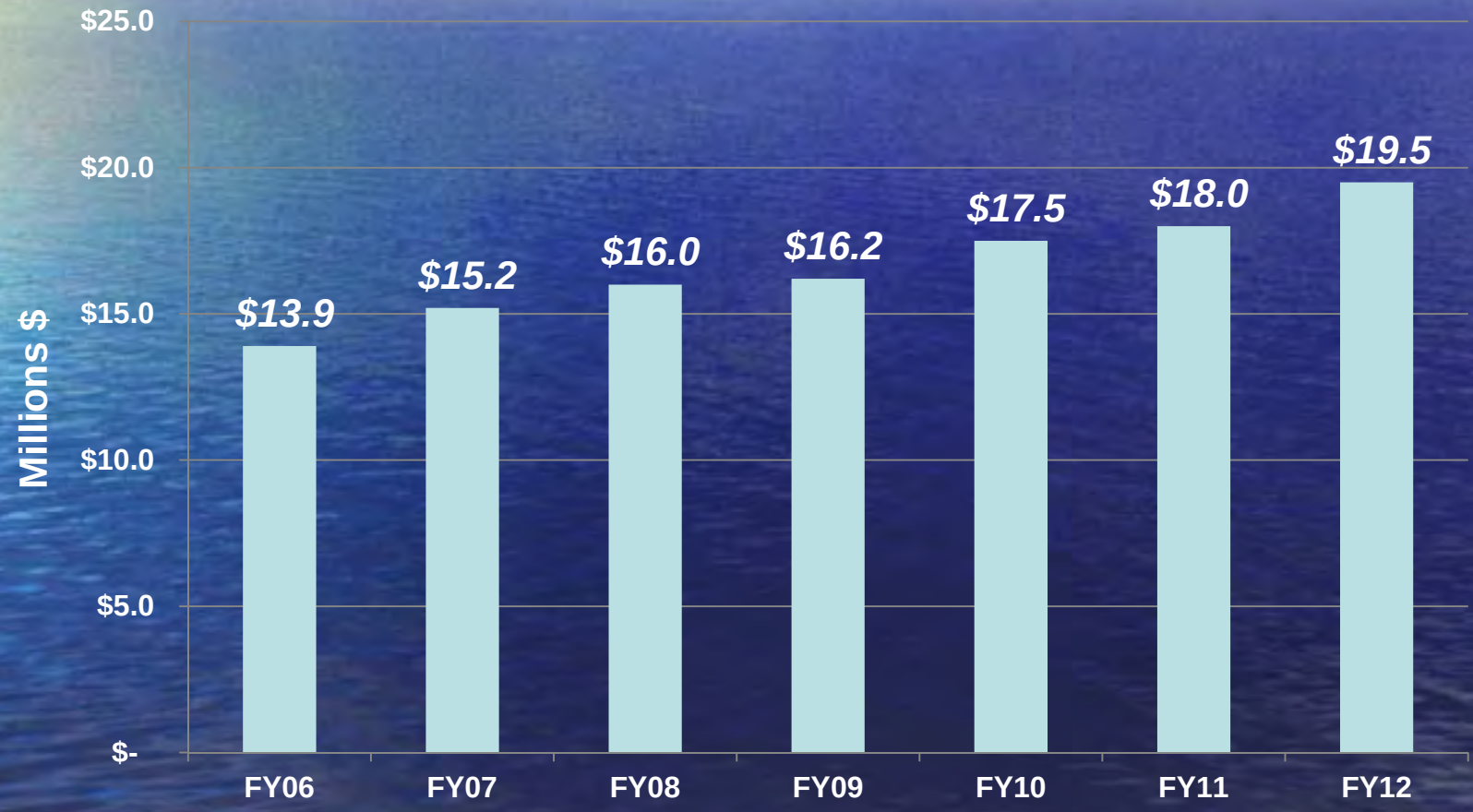
- Sewer flow increases significantly with high groundwater-infiltration

Inflow (Albemarle Road Flow Meter)



- Sewer flow increases significantly when it rains - inflow

Problem-Steadily Increasing MWRA Assessments



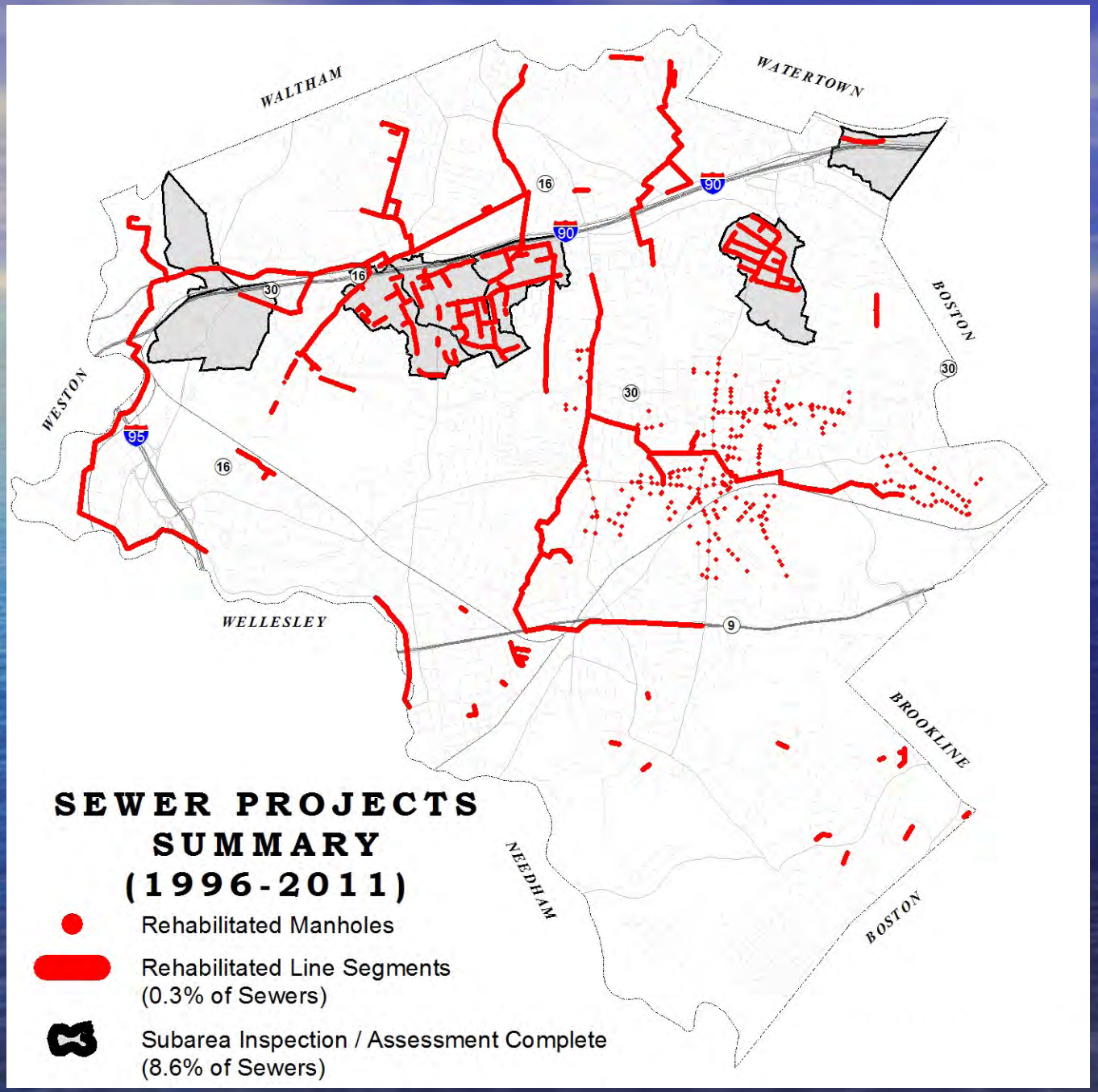
MWRA Assessment Methodology

- Population
- Average Daily Flow (Infiltration)
- Peak Monthly Flow (Inflow)
- Strength of Flow

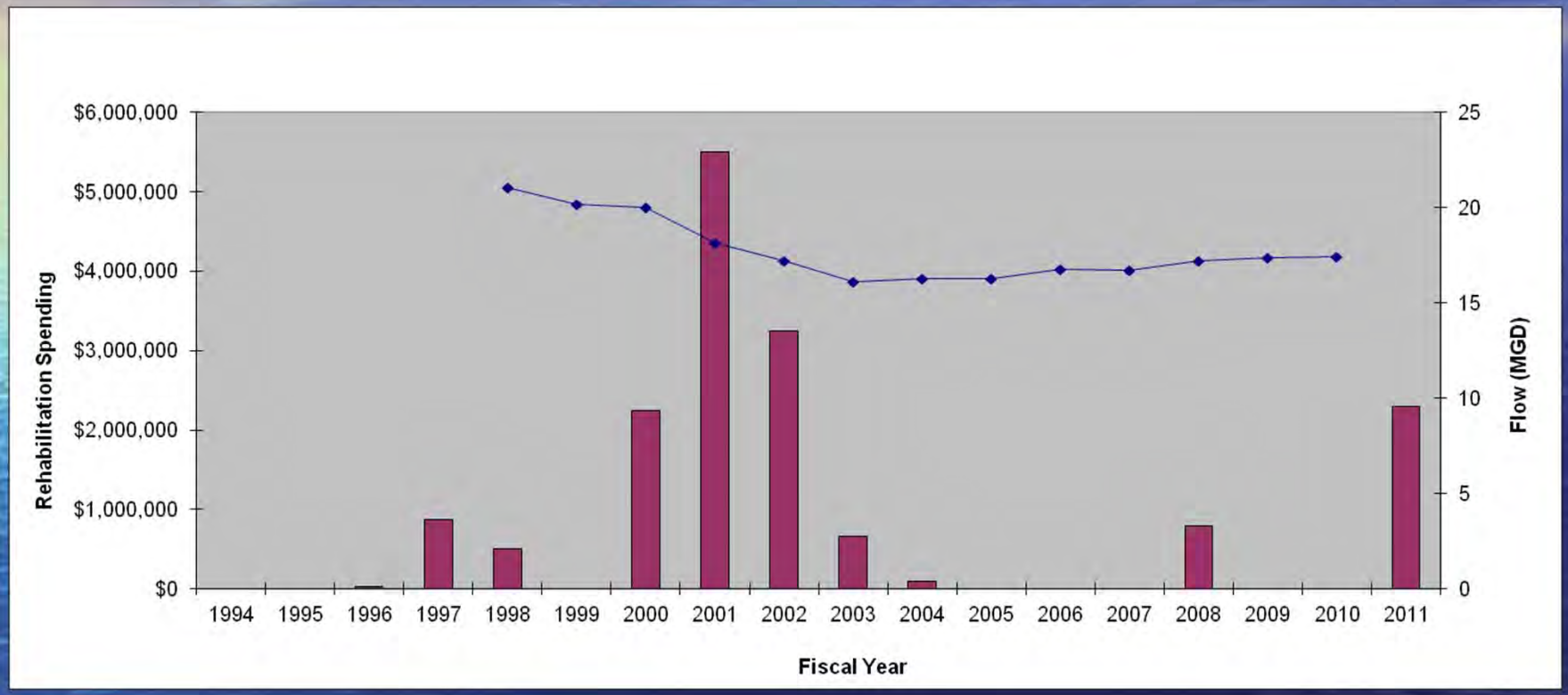
Potential Impact on Newton's MWRA Assessment from I/I Reduction

FY12 Assessment	Average Flow		Peak Flow	Assessment	Savings
	Mgd (daily)	Mg (yearly)	mgd		
Actual FY12 Assessment	18.42	6,728	32.43	$ 19,545,906	
5% I/I Reduction	17.83	6,514	31.13	$ 19,153,466	$ 392,440
10% I/I Reduction	17.25	6,302	29.86	$ 18,764,859	$ 781,047
15% I/I Reduction	16.67	6,090	28.58	$ 18,373,716	$ 1,172,190
30% I/I Reduction	14.91	5,447	24.71	$ 17,178,663	$ 2,367,243
50% I/I Reduction	12.57	4,592	19.56	$ 15,566,703	$ 3,979,203

What has Newton done to date?

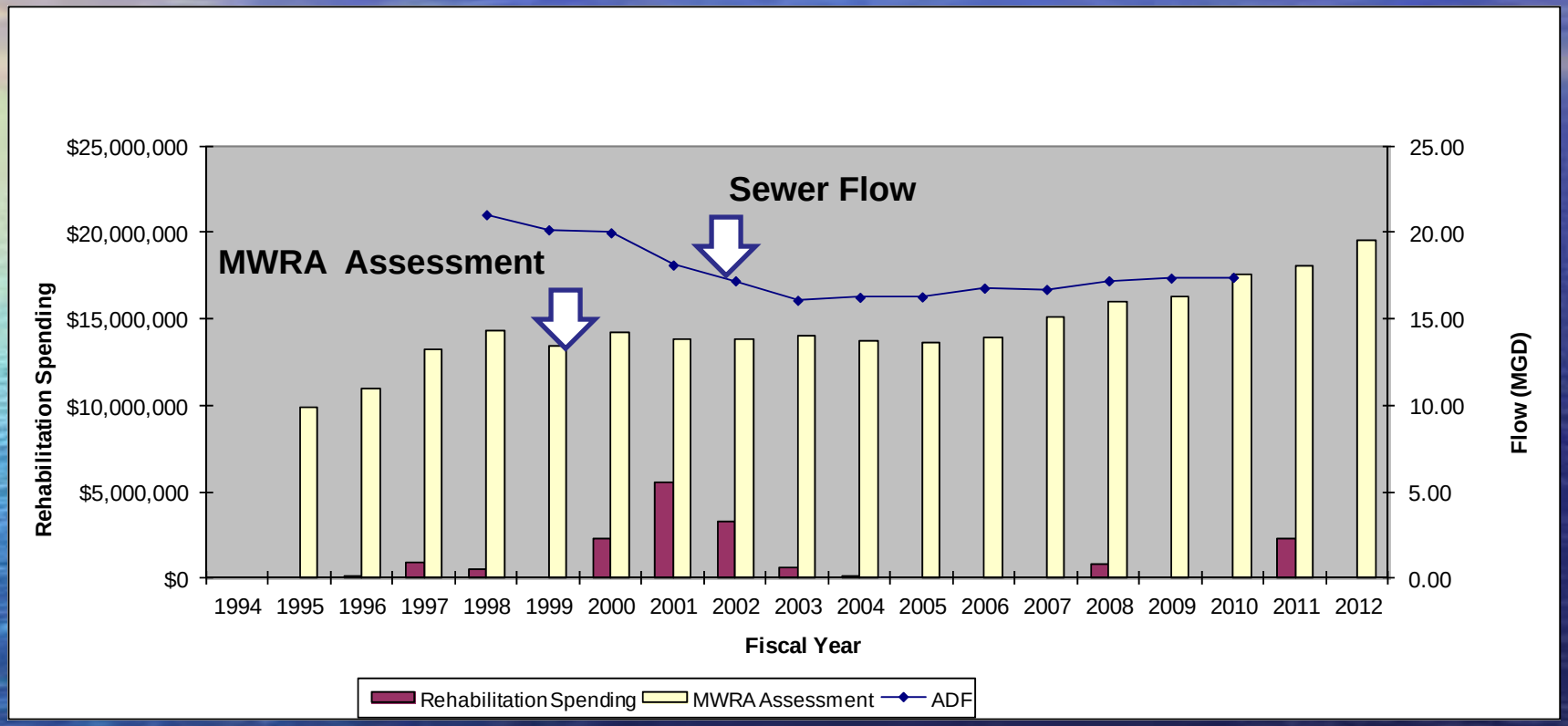

WALTHAM
WATERTOWN
WESTON
BOSTON
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
16
90
30
95
9
SEWER PROJECTS SUMMARY (1996-2011)
Rehabilitated Manholes
Rehabilitated Line Segments (0.3% of Sewers)
Subarea Inspection / Assessment Complete (8.6% of Sewers)

Newton I/I Rehabilitation Investment and Sewer Flow



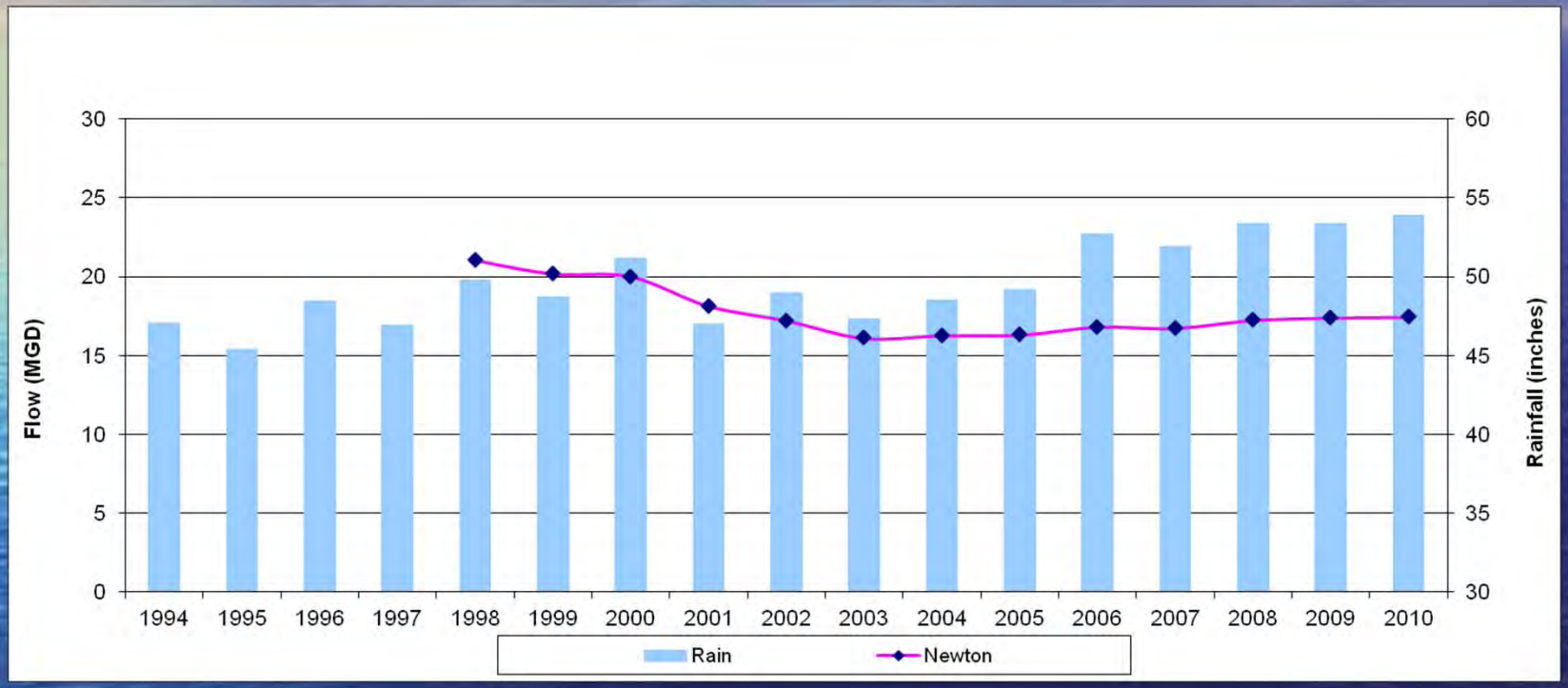
- Rehabilitation Investment Decreased Sewer Flow, but…
- Reduced Investment resulted in Increased Sewer Flow

Newton Sewer Flow and Newton MWRA Sewer Assessment



- Rehabilitation Investment Reduced and then Stabilized MWRA Assessments in early 2000's
- Assessments have increased with Reduced Investment in mid 2000's

Newton Sewer Flow vs. Annual Rainfall



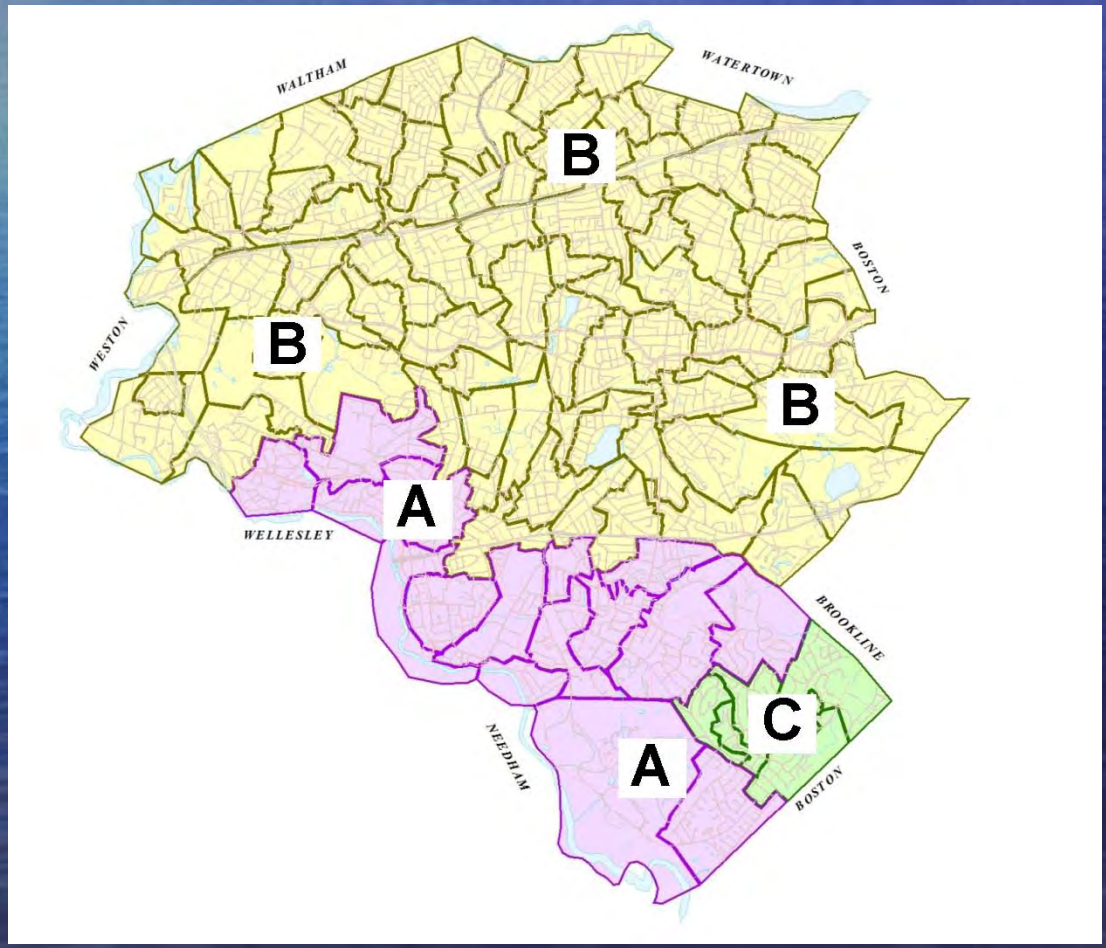
- Annual Rainfall has Increased
- Annual Flow has Decreased

Reducing I/I

- Public:
  - Infiltration/Inflow Removal Program
- Private:
  - Inflow Removal Program
  - Infiltration Inspection Program

Inflow Removal Program

- Focused on Area A (Quinobequin Road) and on Area C (Old Farm Road)



Area A and Area C

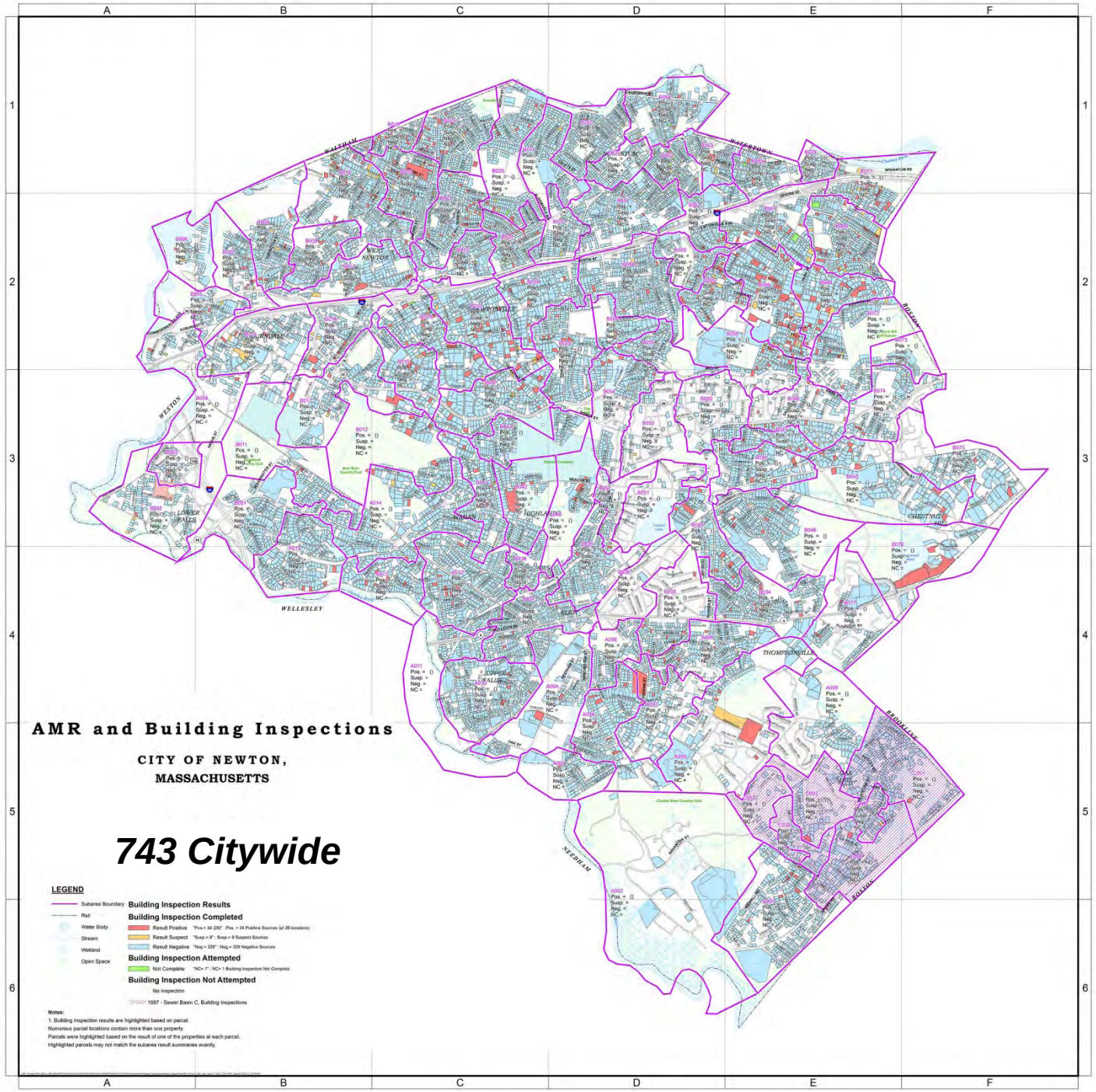
- Sanitary Sewer Overflows and Sewer Back-ups into homes during Wet Weather
- Flow meter studies show primary problem is Inflow

Area A and Area C

- Smoke Testing Complete for all Sewers
- Building Inspections Complete at all Properties
- All Public Inflow Sources Repaired
- Smoke Testing – 58 Private Driveway Drains connected to the Sewer
- Building Inspections - 136 Private Sump Pumps connected to the Sewer

Area A and Area C

- **A Program to reduce Inflow is underway**
- Property Owners with Private Inflow Sources are being notified
- 22 Sump Pumps already removed


AMR and Building Inspections
CITY OF NEWTON,
MASSACHUSETTS
743 Citywide
LEGEND
Subarea Boundary
Rail
Water Body
Stream
Wetland
Open Space
Building Inspection Results
Building Inspection Completed
Result Positive
Result Suspect
Result Negative
Building Inspection Attempted
Not Complete
Building Inspection Not Attempted
No Inspection
1997 - Sewer Basin C, Building Inspections
Notes:
1. Building inspection results are highlighted based on parcel.
Numerous parcel locations contain more than one property.
Parcels were highlighted based on the result of one of the properties at each parcel.
Highlighted parcels may not match the subarea result summaries exactly.
WEST NEWTON
NEWTON
WELLESLEY
WESTON
NEEDHAM
BOSTON
BROOKLINE
WATERTOWN
NEWTON UPPER FALLS
NEWTON LOWER FALLS
AUBURNDALE
WABAN
CHESTNUT HILL
THOMPSONVILLE
HIGHLANDS
OAK HILL

Sewer Strategic Plan
Investment in 11-year Sewer Capital Improvement Program (CIP)

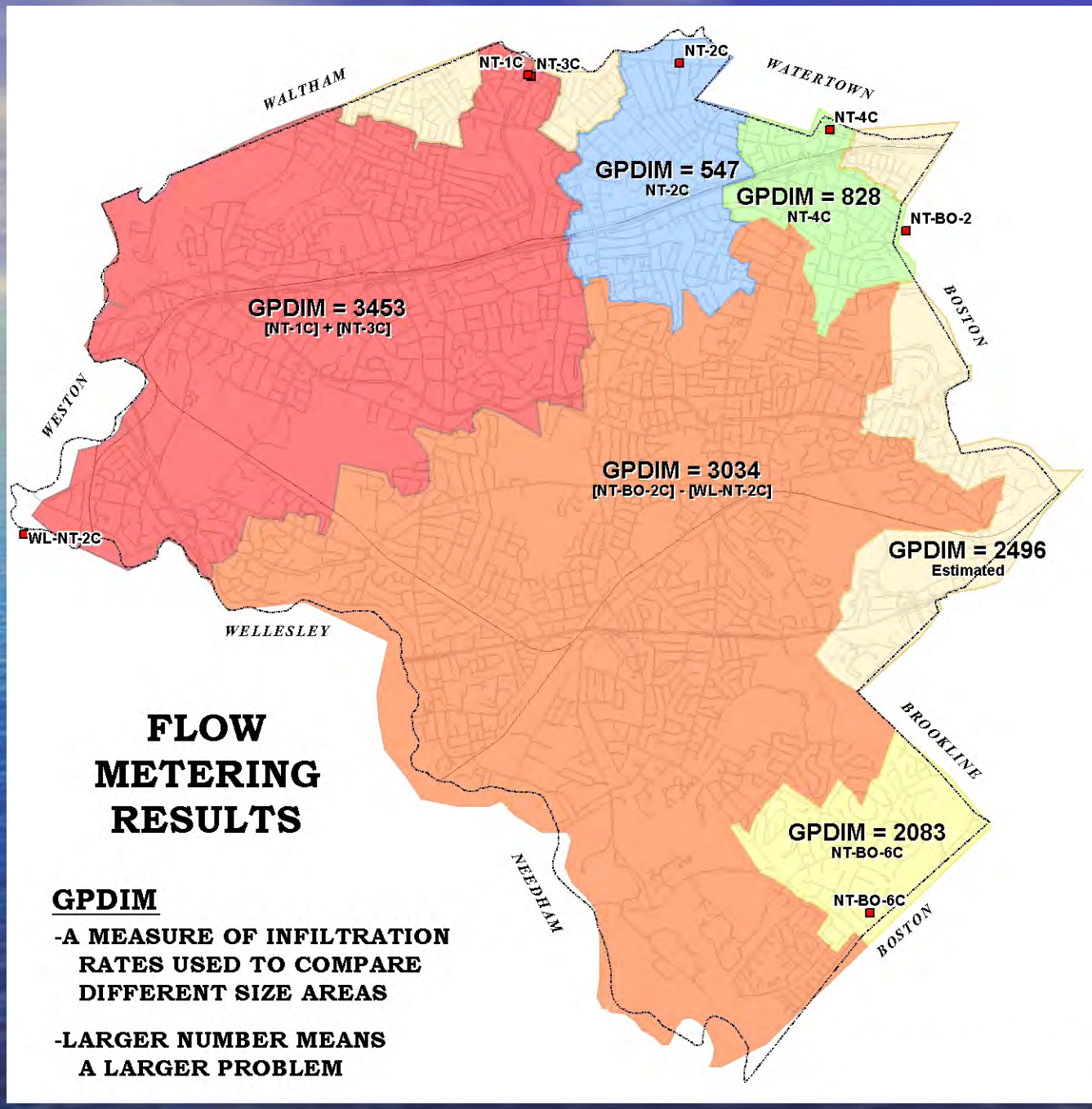
- Remove Public Infiltration/Inflow Sources
- Improve Sewer System Performance
- Reduce Costly Emergency Repairs
- Update Aging Infrastructure
- Mitigate MWRA Rate Increases
- Reduce Energy Consumption

Sewer Strategic Plan
Private Sewer Improvements

- Continue to identify and stop Private Inflow
- Initiate a program to inspect and repair damaged private sewer laterals to reduce Private Infiltration

How do we prioritize the Public Sewer infrastructure work?

- MWRA Flow Meter Data
- Underdrain Areas
- Pipe Material & Age
- Operation & Maintenance Problem Areas

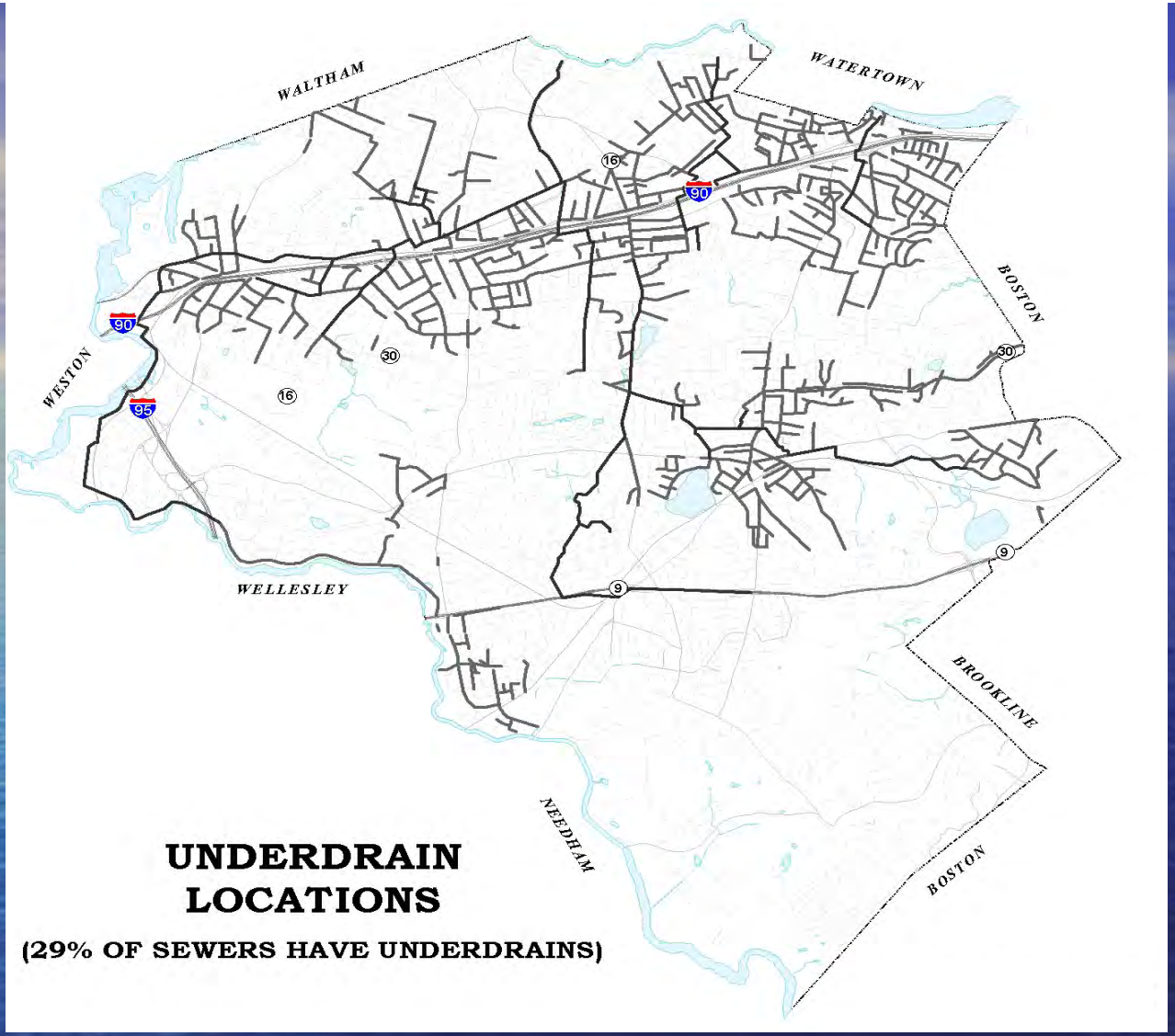


FLOW METERING RESULTS

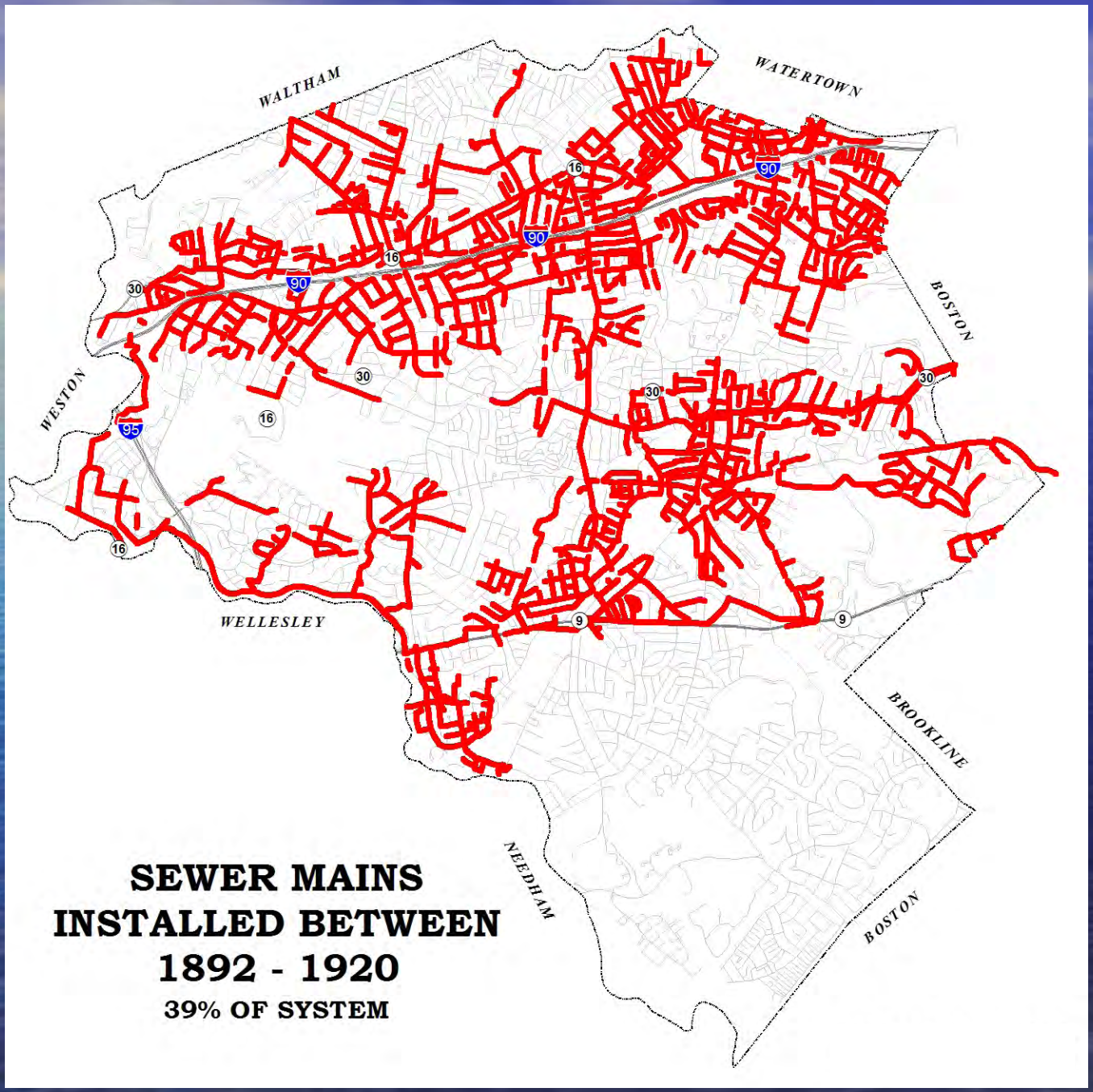
GPDIM

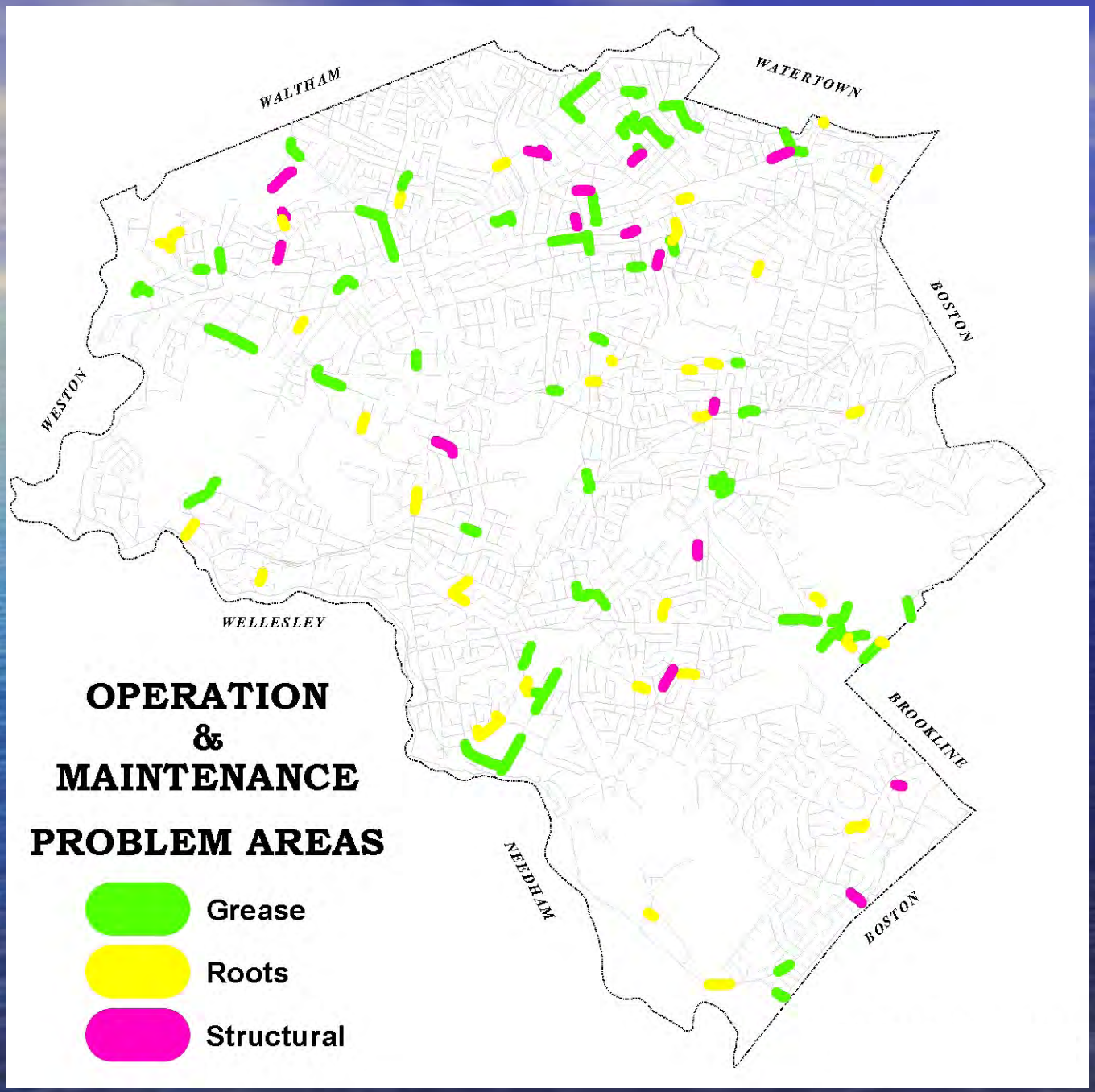
-A MEASURE OF INFILTRATION RATES USED TO COMPARE DIFFERENT SIZE AREAS

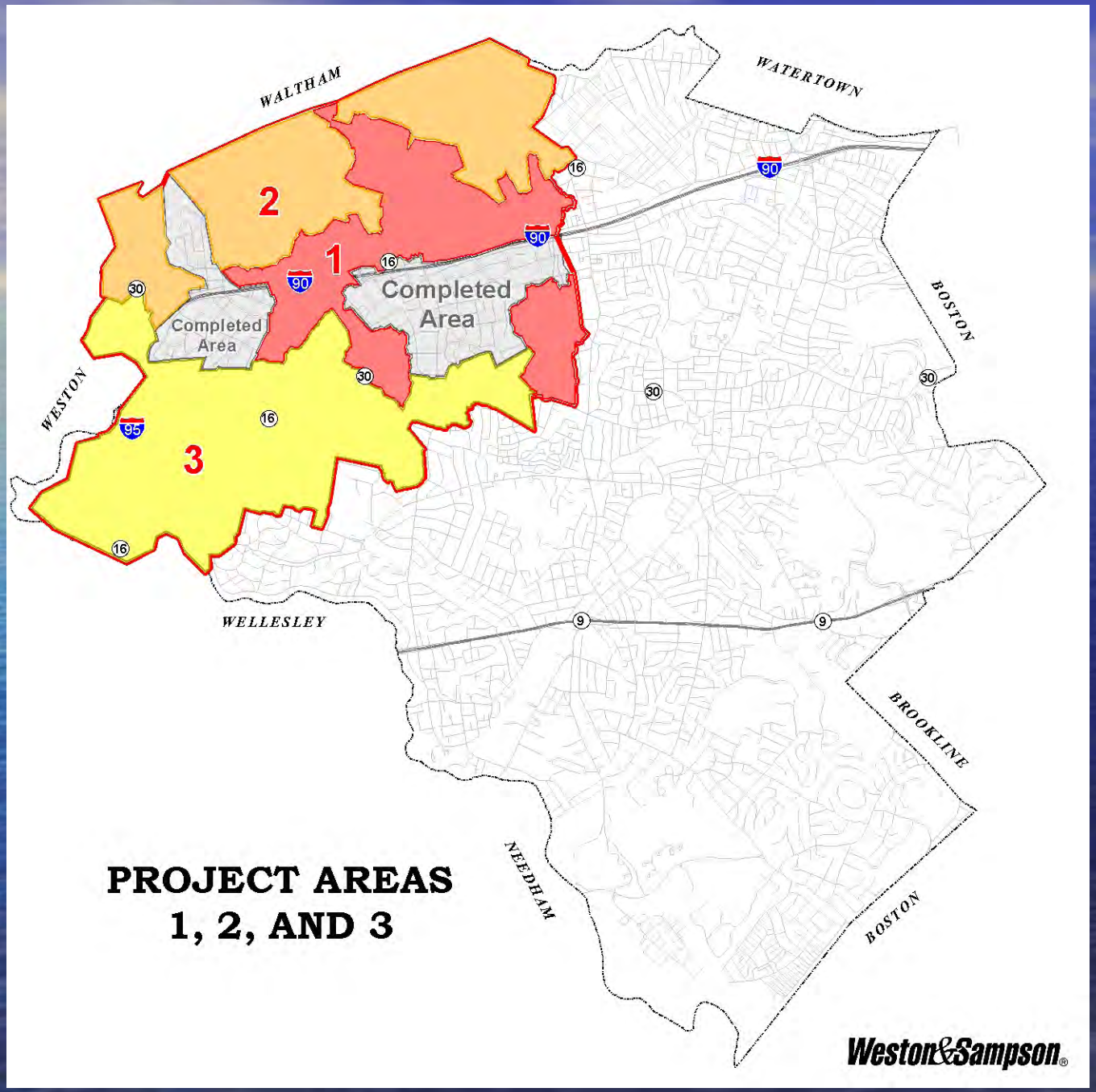
-LARGER NUMBER MEANS A LARGER PROBLEM

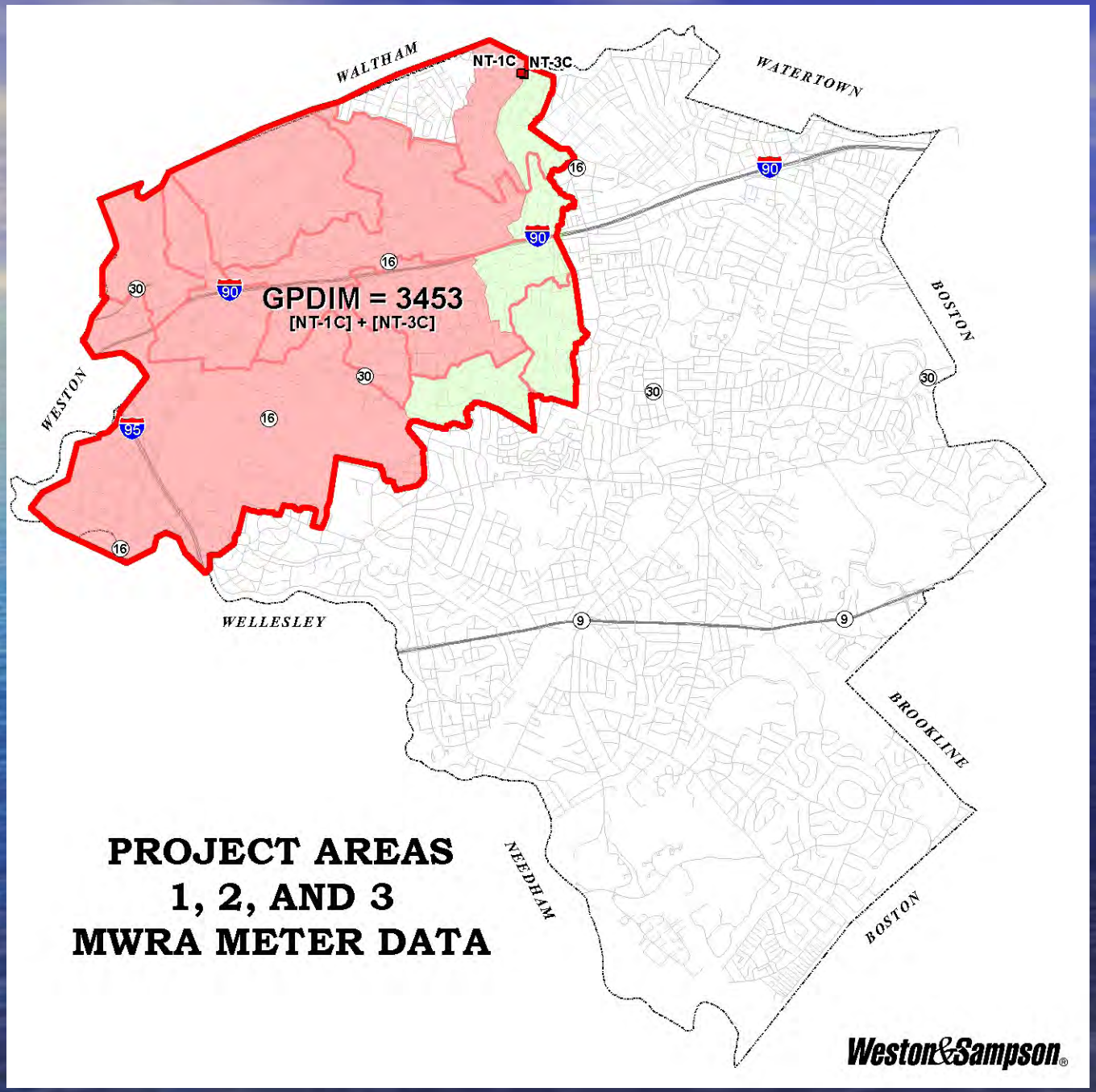


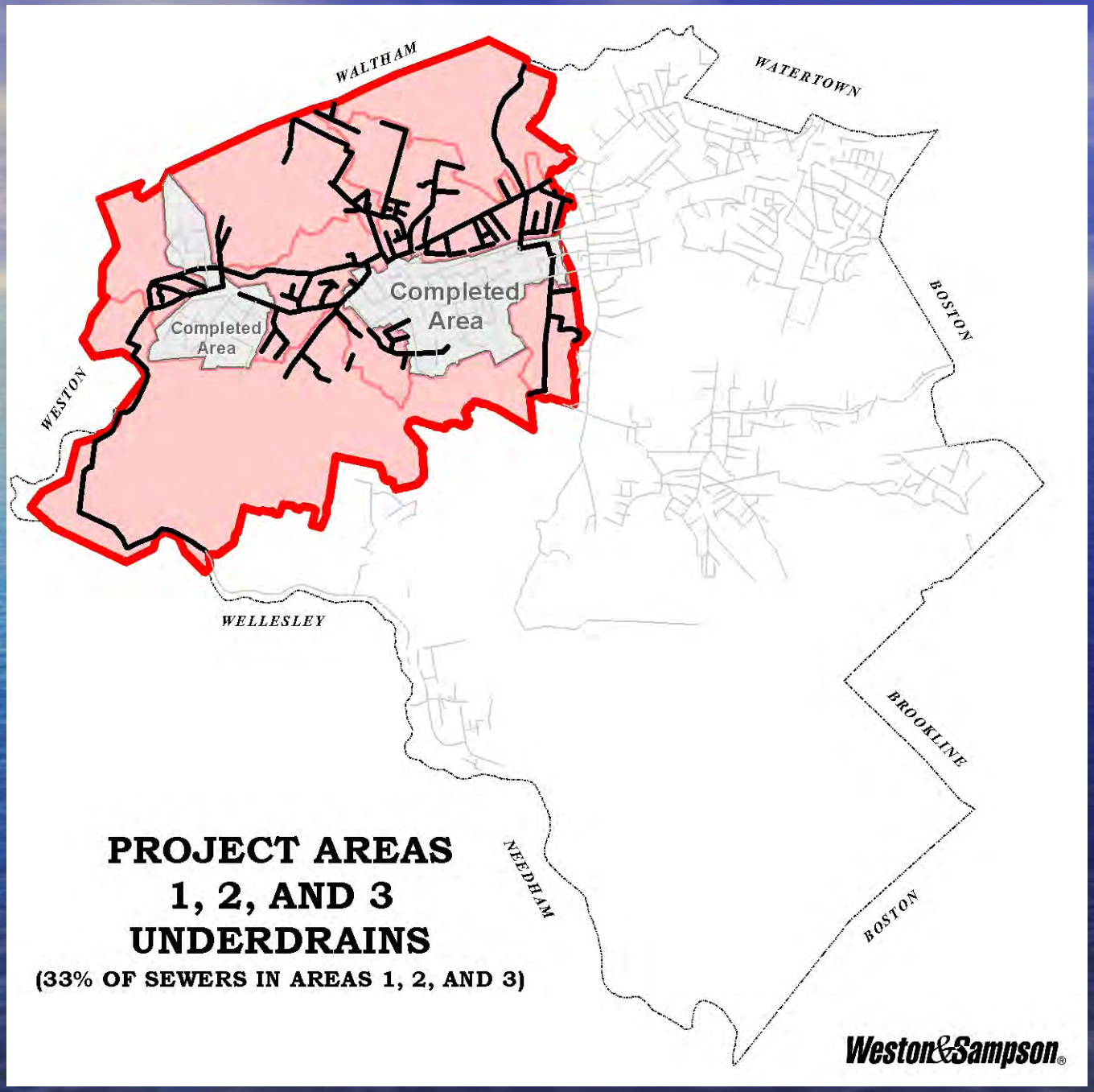
- Installed 100+ years ago to:
  - Dewater during sewer line installation
- Problem – Some underdrains connected to sanitary sewer system
  - Infiltration of groundwater to wastewater
  - Contamination of stormwater by wastewater

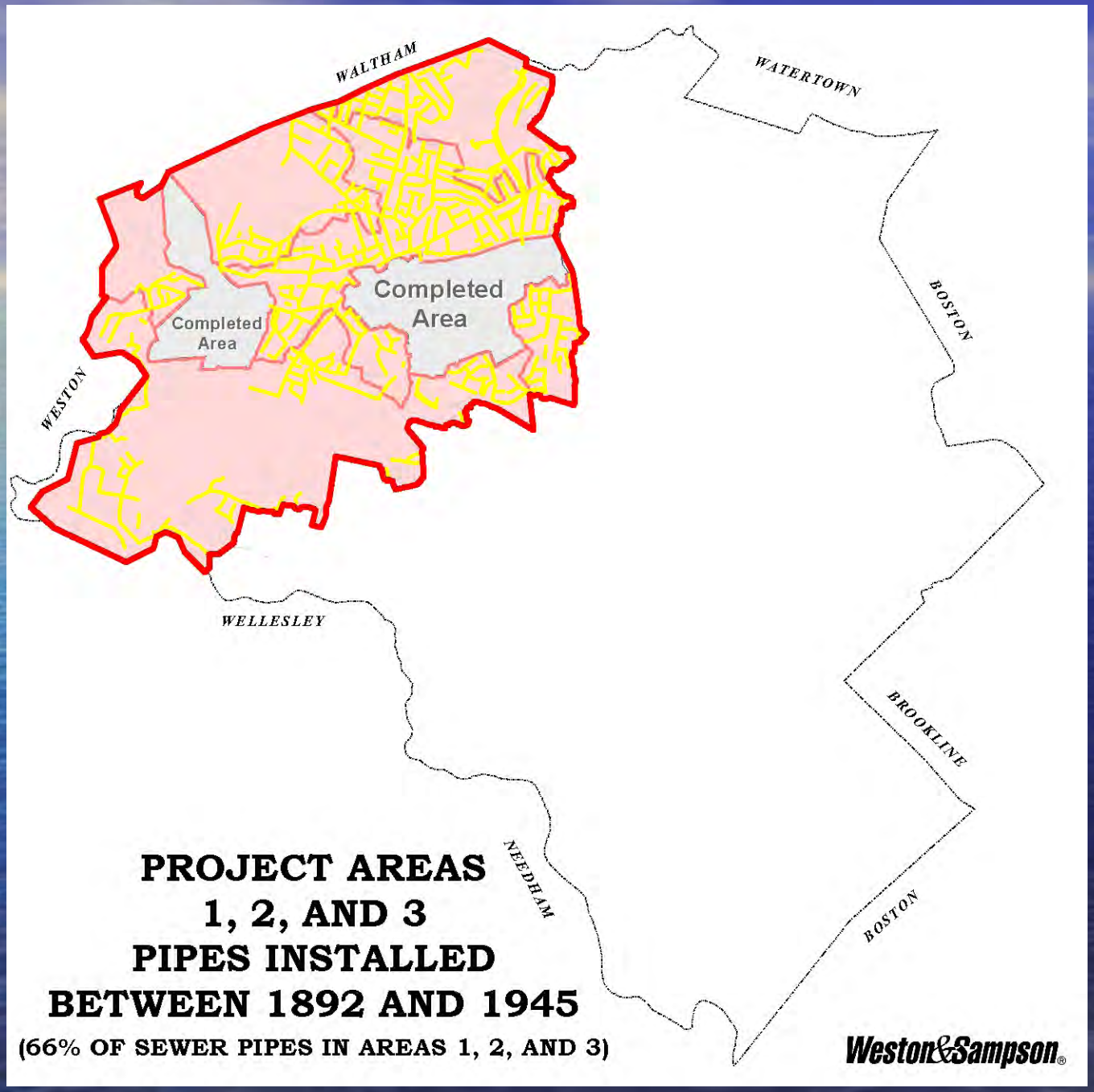

WALTHAM
WATERTOWN
BOSTON
WESTON
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
SEWER MAINS
INSTALLED BETWEEN
1892 - 1920
39% OF SYSTEM

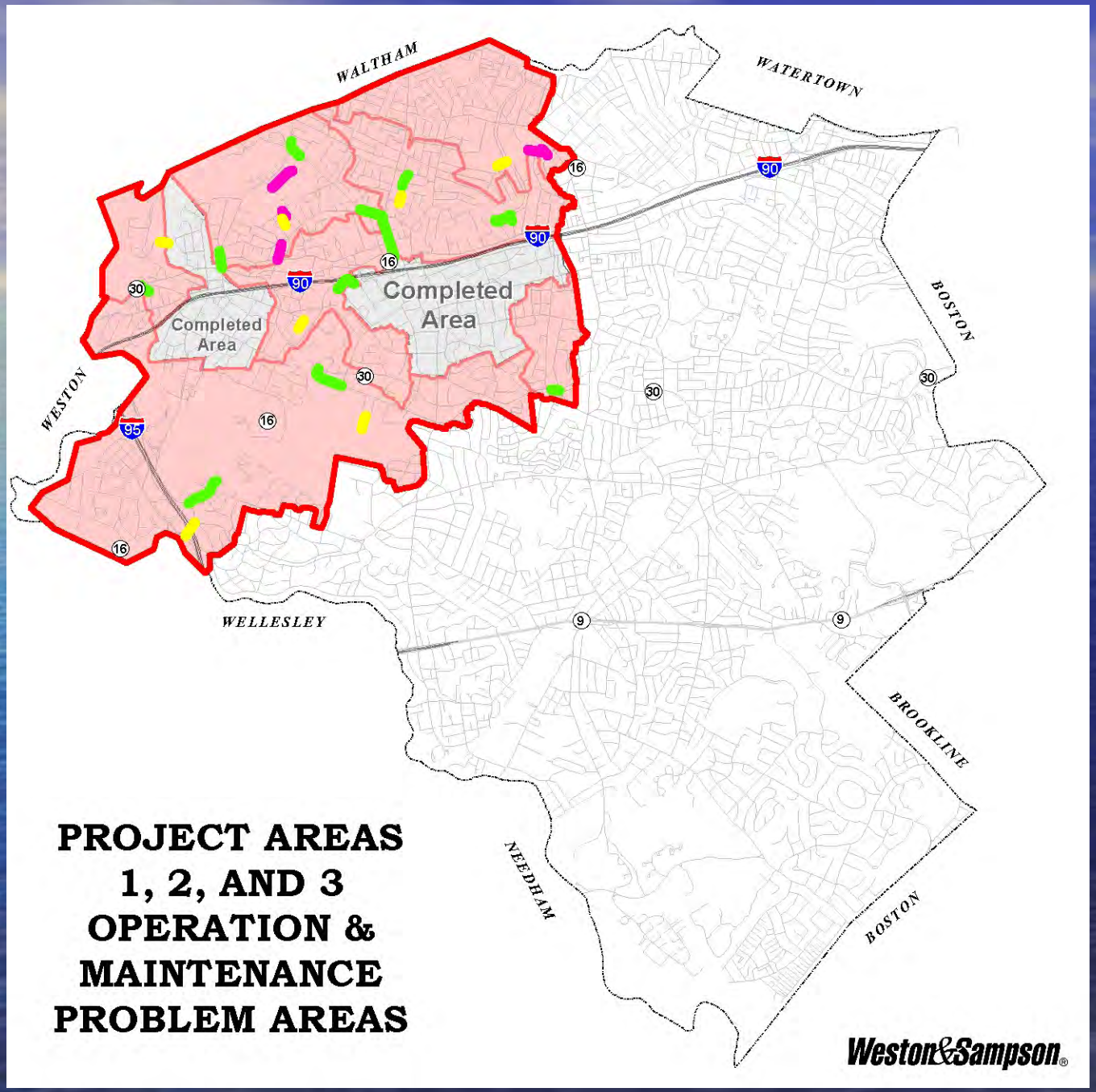

WALTHAM
WATERTOWN
BOSTON
WESTON
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
OPERATION
&
MAINTENANCE
PROBLEM AREAS
Grease
Roots
Structural


WALTHAM
WATERTOWN
2
1
3
Completed Area
Completed Area
WESTON
BOSTON
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
PROJECT AREAS
1, 2, AND 3
Weston&Sampson


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
Weston&Sampson


WALTHAM
WATERTOWN
BOSTON
WESTON
Completed Area
Completed Area
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
PROJECT AREAS
1, 2, AND 3
UNDERDRAINS
(33% OF SEWERS IN AREAS 1, 2, AND 3)
Weston&Sampson


WALTHAM
WATERTOWN
BOSTON
Completed Area
Completed Area
WESTON
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
PROJECT AREAS
1, 2, AND 3
PIPES INSTALLED
BETWEEN 1892 AND 1945
(66% OF SEWER PIPES IN AREAS 1, 2, AND 3)
Weston&Sampson

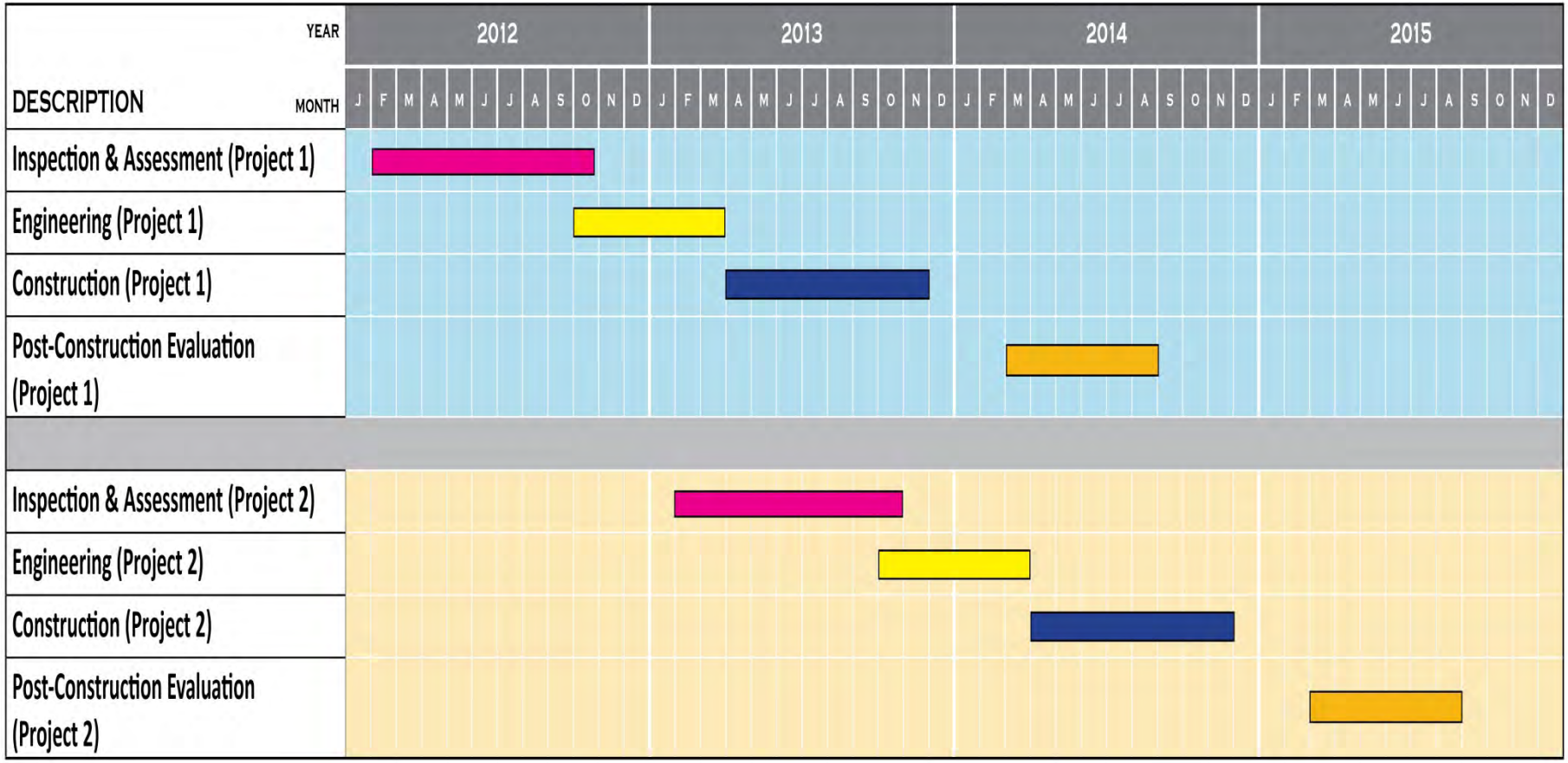

WALTHAM
WATERTOWN
BOSTON
WESTON
WELLESLEY
NEEDHAM
BROOKLINE
BOSTON
Completed Area
Completed Area
90
95
16
30
9
PROJECT AREAS
1, 2, AND 3
OPERATION &
MAINTENANCE
PROBLEM AREAS
Weston&Sampson

Prioritization of Project Areas

Project Sequence

- Inspection & Assessment
  - Flow Isolation, Pipe Cleaning, Manhole & Television Inspection, Smoke Testing, Dye Testing
- Engineering Design
- Construction
- Post Construction Re-test & Flow Evaluation

Typical Project Schedule



Sewer Program Investment

- $49 million over 11 years
- Annual Investment $3.4 - $5.9 million

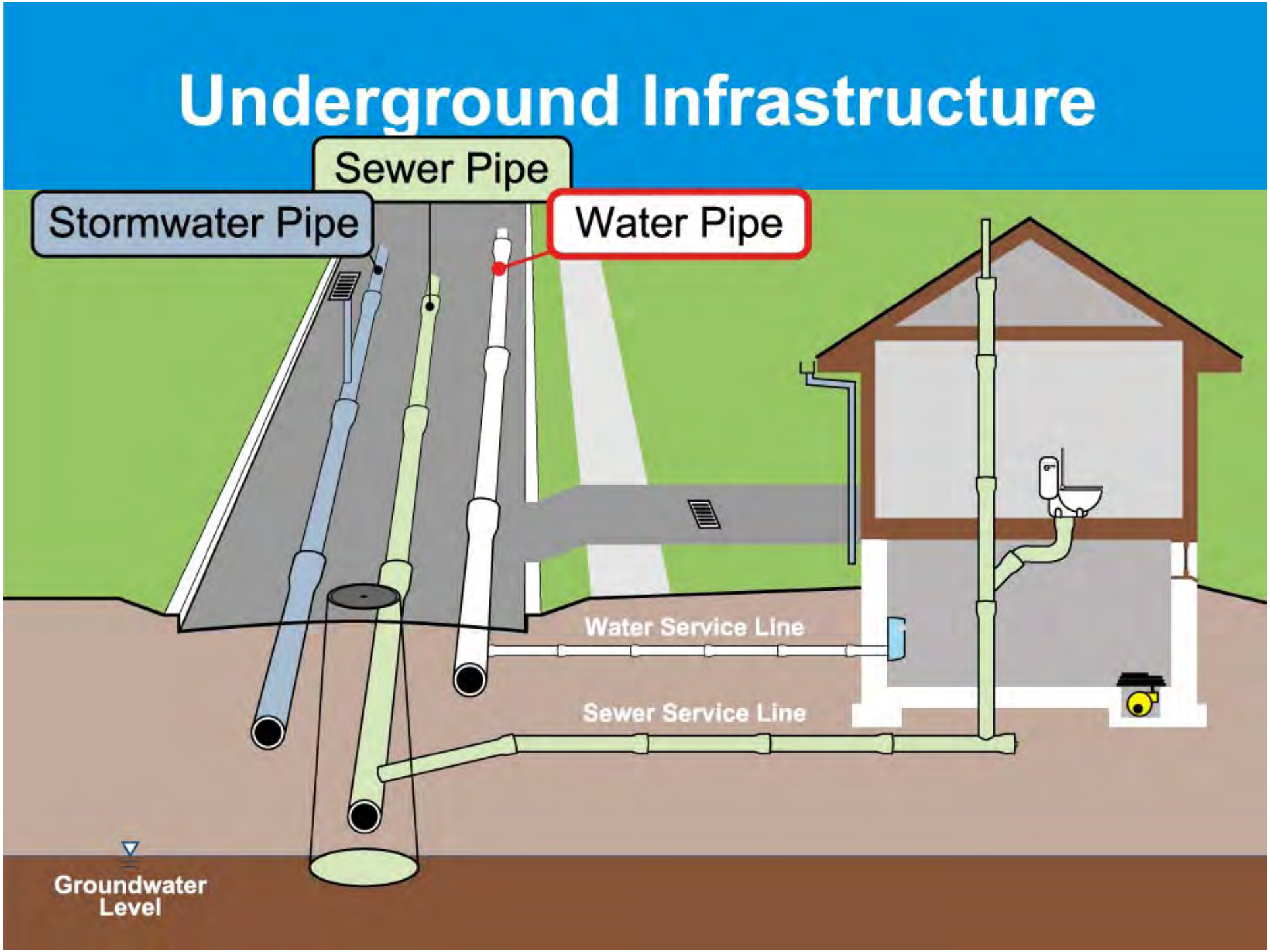
Sewer Investment Benefits

- Rehabilitate Aging Sewer Infrastructure
  - Reduce costly future repairs
  - Reduce costs of reactive maintenance
  - Reduce costly emergency repairs
  - Improve sewer service to residents
- Reduce Infiltration and Inflow
- Mitigate MWRA Rate Increases
- Reduce Sewer Overflows and pollution of water bodies

Sewer System

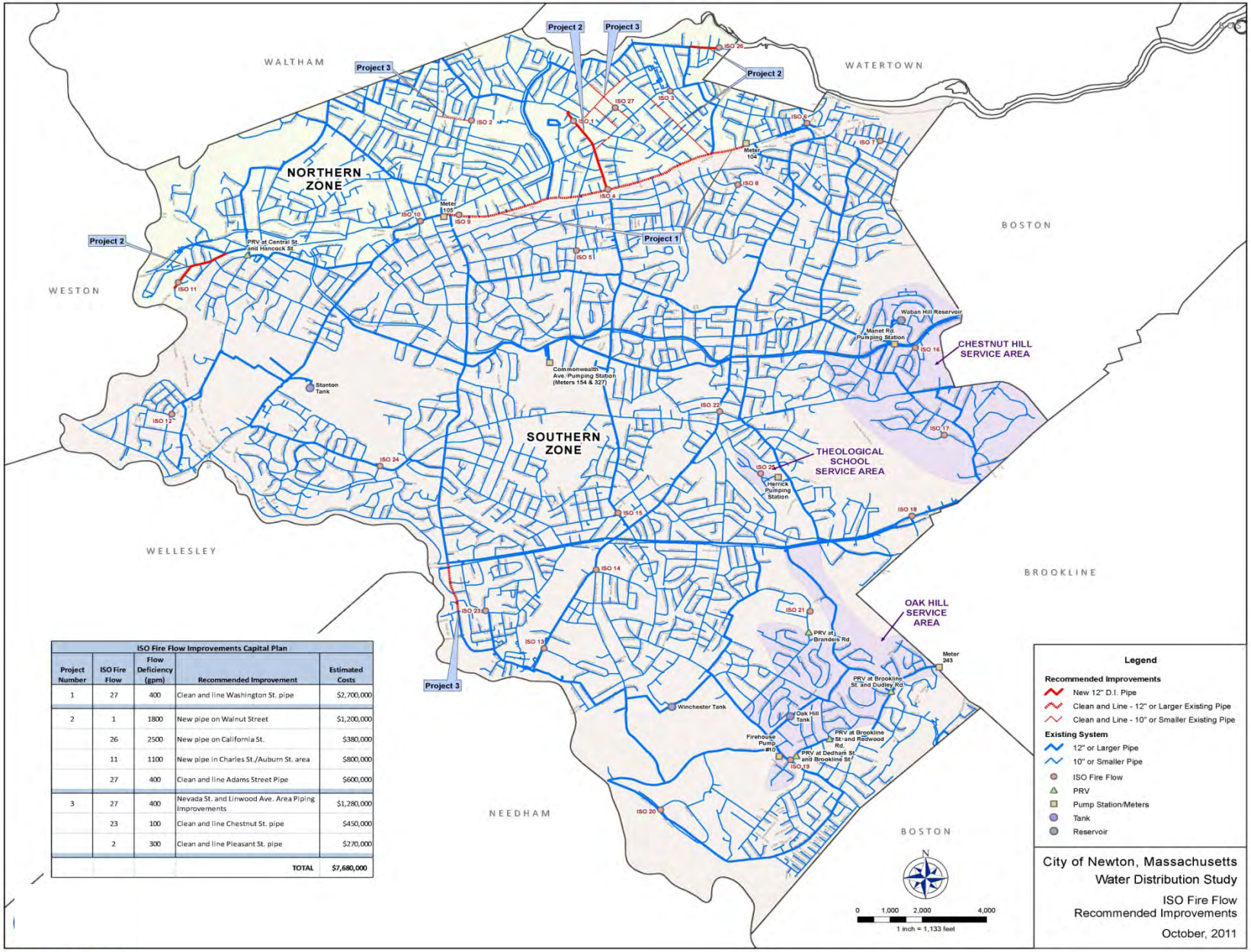
QUESTIONS??


Water System
Strategic Improvement Plan
February 2012


Underground Infrastructure
Sewer Pipe
Stormwater Pipe
Water Pipe
Water Service Line
Sewer Service Line
Groundwater Level

Water System

- 318 miles of water main
- 3 Elevated water storage tanks
- 1 Underground reservoir
- 3 Water Booster stations
- 2,500 fire hydrants
- 10 million gallons of average daily flow
- 25,000+ new water meters



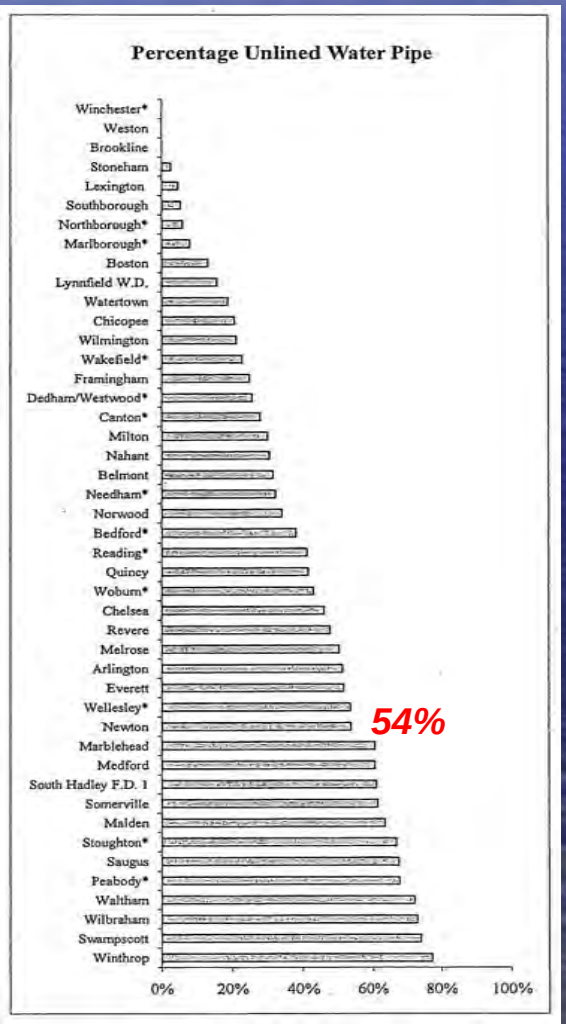
ISO Fire Flow Improvements Capital Plan

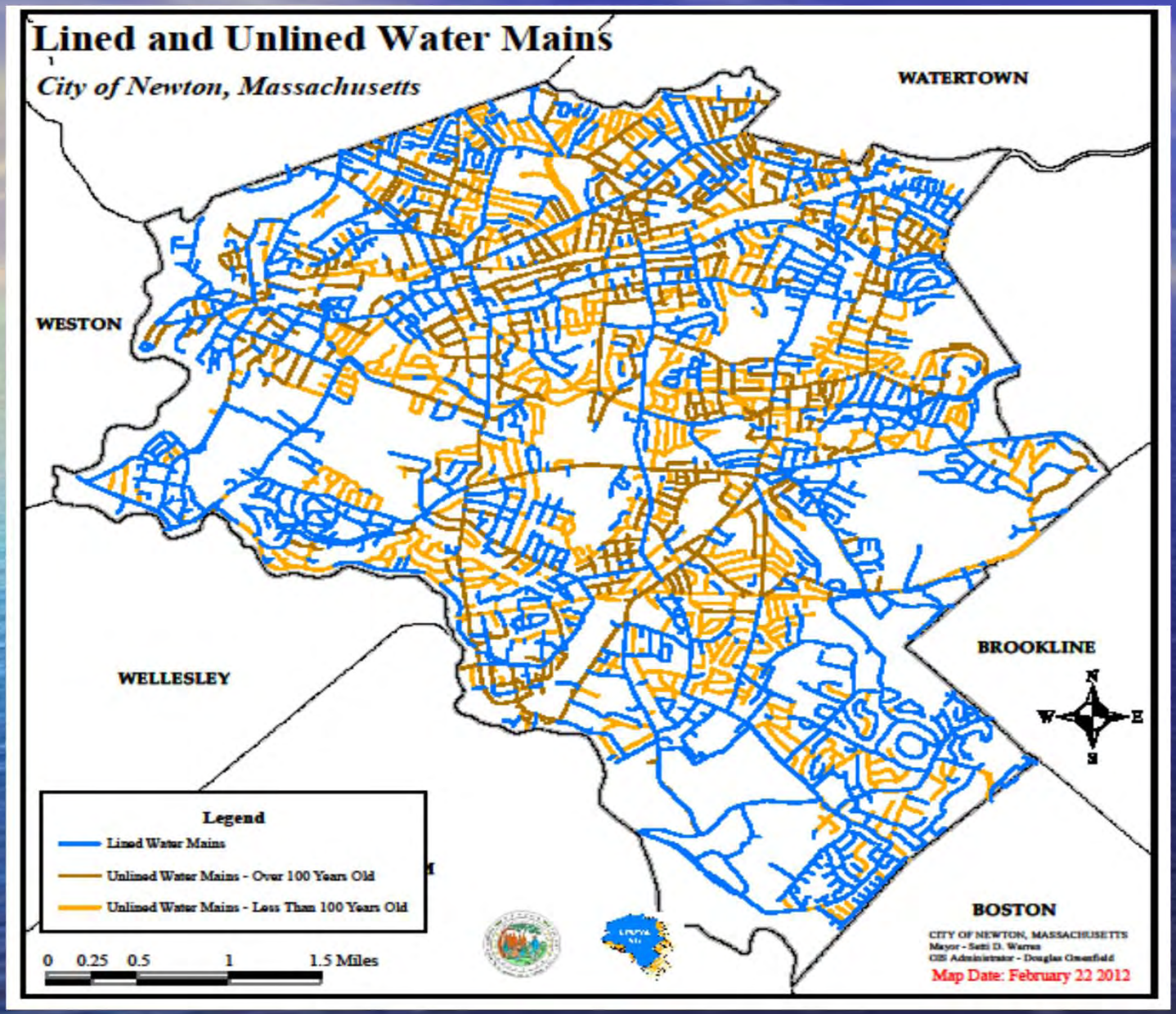
Project Number	ISO Fire Flow	Flow Deficiency (gpm)	Recommended Improvement	Estimated Costs
1	27	400	Clean and line Washington St. pipe	$2,700,000
2	1	1800	New pipe on Walnut Street	$1,200,000
	26	2500	New pipe on California St.	$380,000
	11	1100	New pipe in Charles St./Auburn St. area	$800,000
	27	400	Clean and line Adams Street Pipe	$600,000
3	27	400	Nevada St. and Linwood Ave. Area Piping Improvements	$1,280,000
	23	100	Clean and line Chestnut St. pipe	$450,000
	2	300	Clean and line Pleasant St. pipe	$270,000
			TOTAL	$7,680,000

What are the Problems?

- Approximately 165 miles of unlined cast iron pipe that needs to be replaced or cleaned & lined due to tuberculation
- Fire hydrant flow deficiencies
- Winchester Ave and Stanton Ave tank costly rehabilitation
- Oldest pipes still in service from 1876
- 25% of water currently “unbilled”

Problem – 165 miles of unlined water mains




Lined and Unlined Water Mains
City of Newton, Massachusetts
WATERTOWN
WESTON
WELLESLEY
BROOKLINE
BOSTON
N
W
E
S
Legend
Lined Water Mains
Unlined Water Mains - Over 100 Years Old
Unlined Water Mains - Less Than 100 Years Old
0 0.25 0.5 1 1.5 Miles
CITY OF NEWTON, MASSACHUSETTS
Mayor - Setti D. Warren
GIS Administrator - Douglas Greenfield
Map Date: February 22 2012

What has Newton done to date?

- Participated in MWRA's Local Pipeline Assistance Program since 1998
  - Newton has spent approximately $26 million since 1998 replacing and/or relining 47 +/- miles of unlined cast iron pipe
  - Zero Interest MWRA Loans
- Completed Water Distribution Hydraulic Analysis

Completed Water Distribution Analysis in 2011

- Reviewed growth/water demand impacts
- Incorporated benefits from past piping improvement projects
- Identified deficiencies in fire flows
- Considered storage/supply requirements
- Created long-term capital investment program to maintain water system

Water Strategic Plan

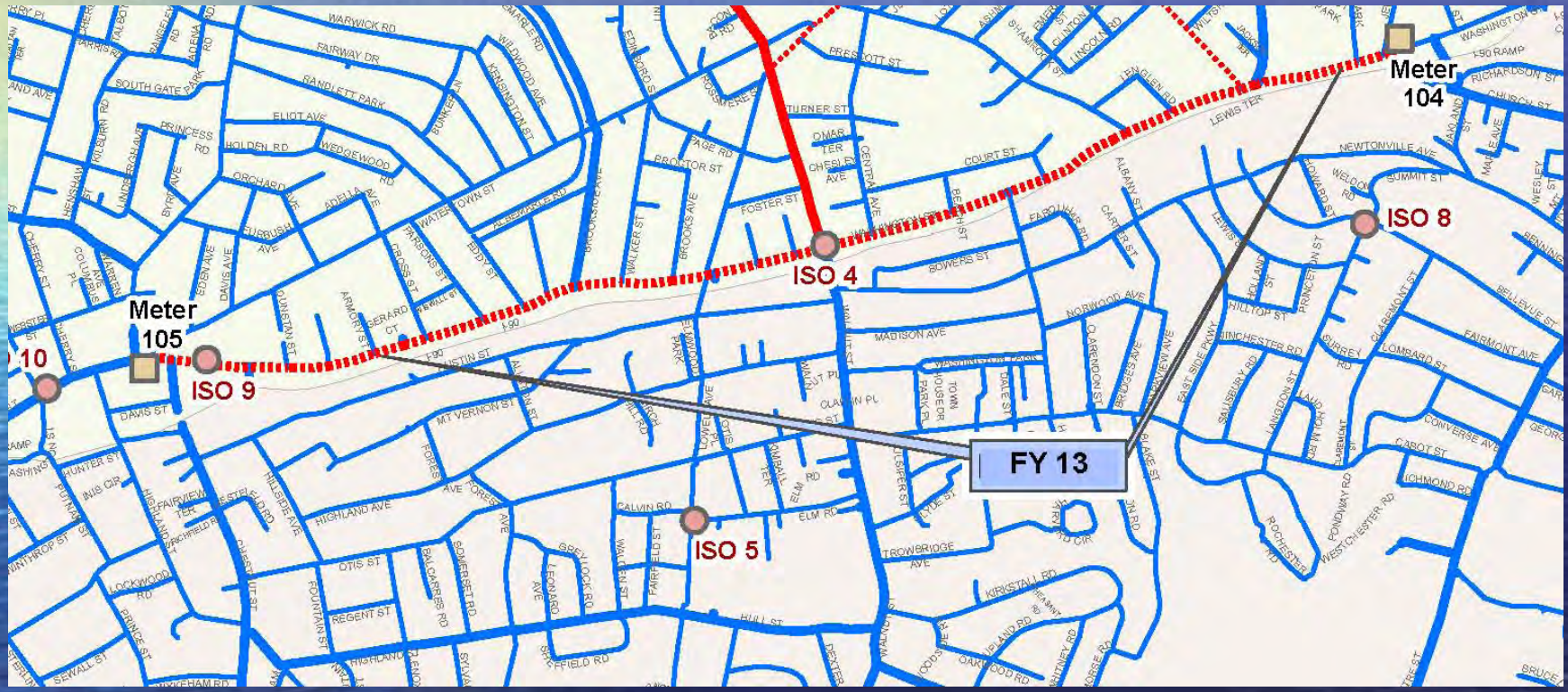
- Invest over first 3 years to address fire flow deficiencies
- Decommission Stanton and Winchester Tanks
- Increase investment in piping system
- Continue annual cleaning and lining or pipe replacement program
- Eliminate or rehabilitate aging mains that contribute to water quality problems
- Continue Annual Infrastructure Maintenance
  - Tanks, Valves, Hydrants, Pump Stations
  - Water main flushing program
- Develop plan to reduce unbilled water

Fire Flow Projects
(FY13-FY15)

Fire Flow Improvement Capital Plan			
FY	**Flow Deficiency (gpm)**	**Recommended Improvement**	**Estimated Costs**
13	400	Clean and line Washington St. pipe	$2,700,000
14	1800	New pipe on Walnut Street	$1,200,000
	2500	New pipe on California St.	$380,000
	1100	New pipe in Charles St./Auburn St. area	$800,000
	400	Clean and line Adams St. pipe	$600,000
15	400	Nevada St. and Linwood Ave. area piping improvements	$1,280,000
	100	Clean and line Chestnut St. pipe	$450,000
	300	Clean and line Pleasant St. pipe	$270,000

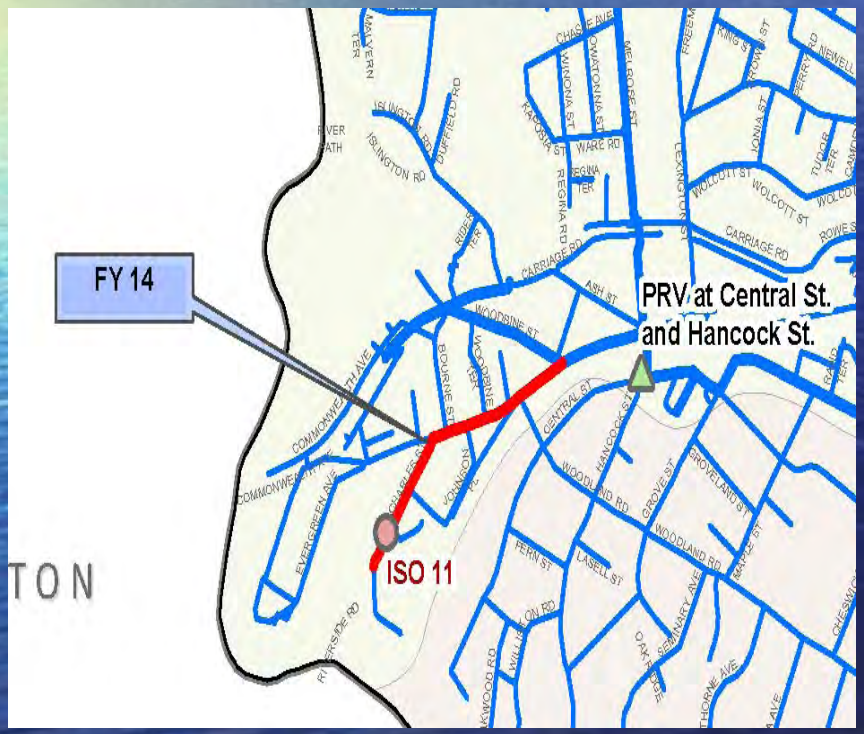
Fire Flow Project FY 13

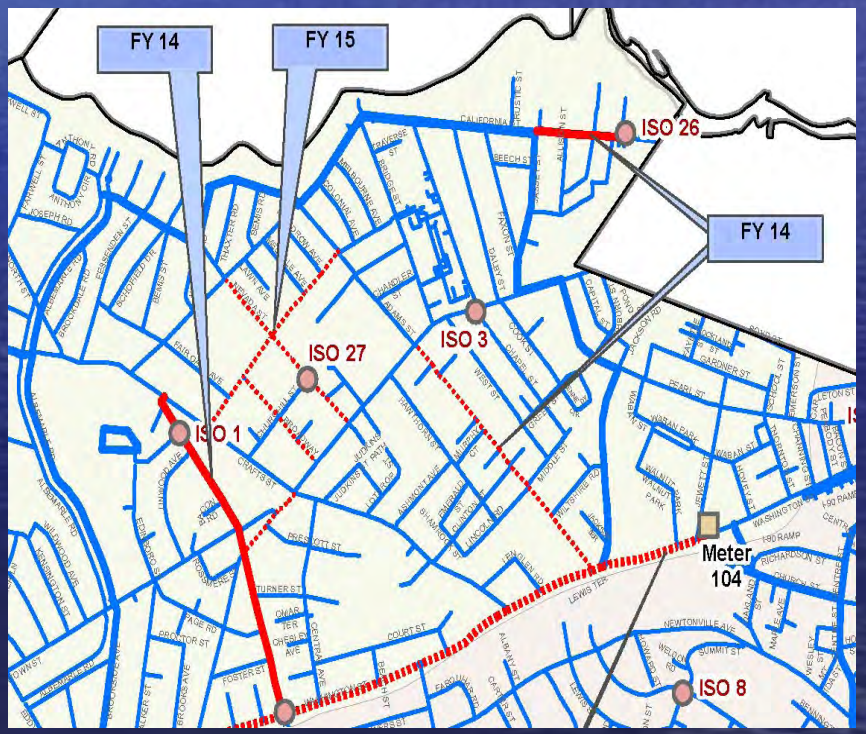
-Clean & line 9500 lf of 12” water main on Washington Street (MWRA meter 104 to MWRA meter 105)



Fire Flow Project FY 14

-Install new 12” water main on Charles & Auburn Streets -Install new 12” water main on Walnut Street (Crafts to Washington)
Install new 12” water main on California Street (Jasset to Riverdale)

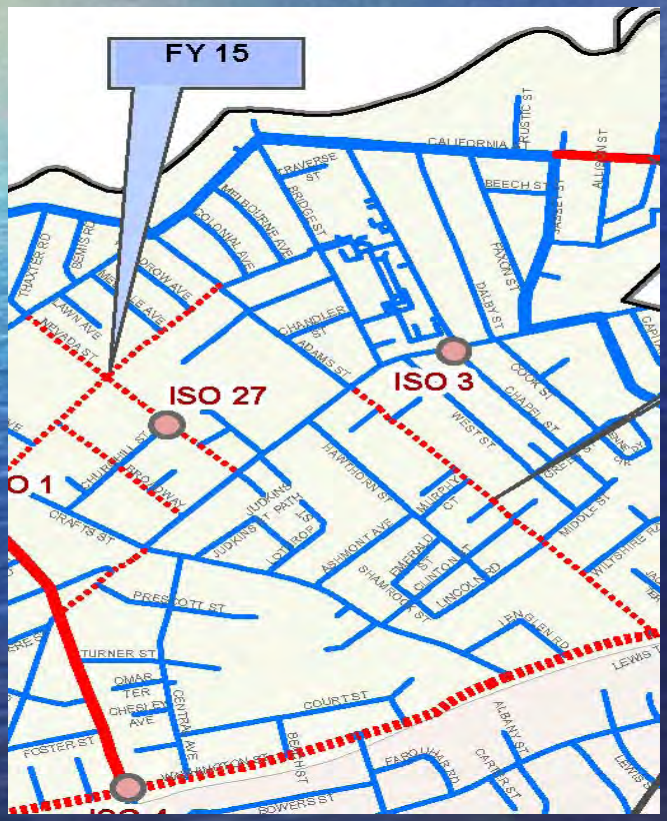


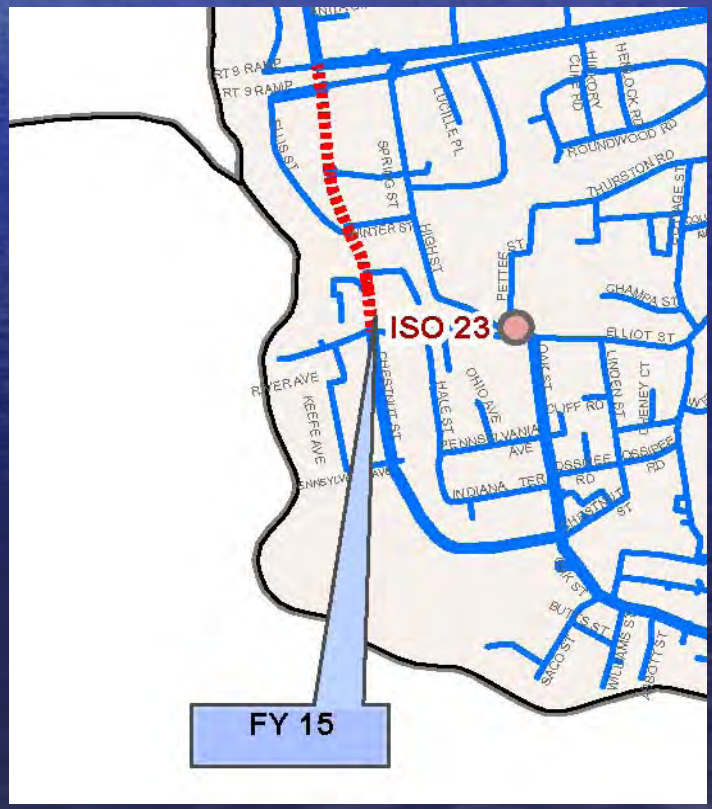


Fire Flow Project FY 15

-

-Clean and line mains on Adams Street, Linwood Avenue, Lowell Avenue, Broadway, Nevada Street, Chestnut Street

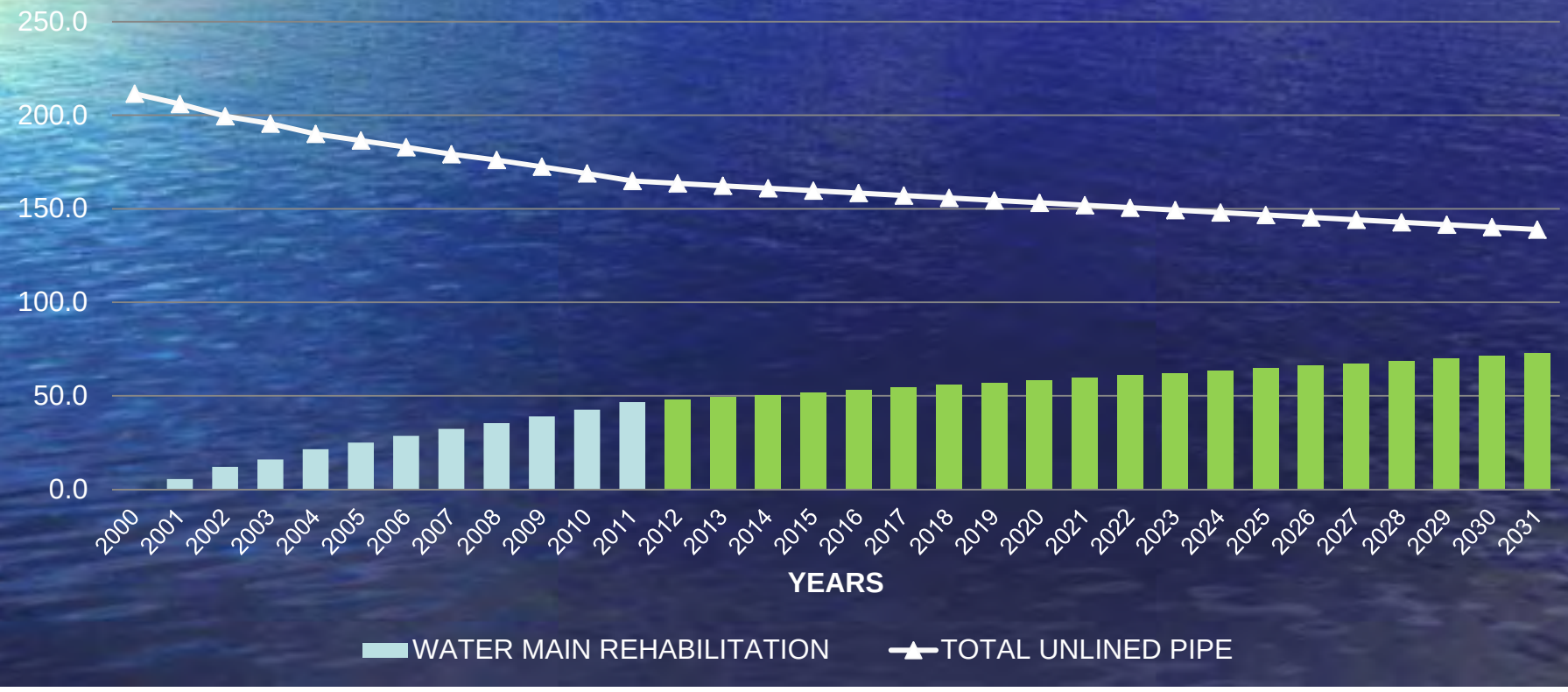




Water System Capital Improvement Program

Current Spending

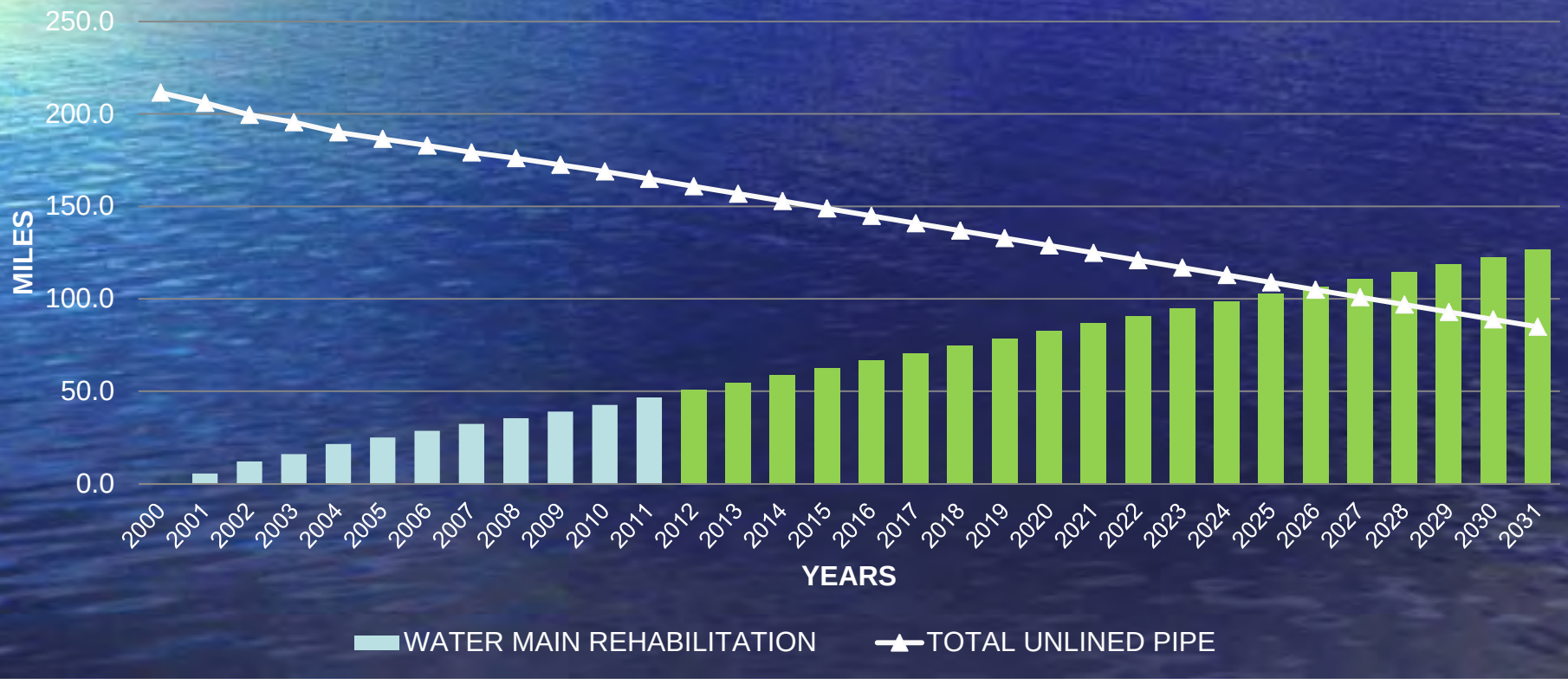
WATER MAIN IMPROVEMENTS
total miles pipe= 318.5
miles lined pipe = 153.6
miles unlined pipe = 164.9 (52%)
1.3 miles per year over 20 years
Miles of unlined pipe in 2032: 44%



Water System Capital Improvement Program

Proposed Spending

WATER MAIN IMPROVEMENTS
total miles pipe= 318.5
miles lined pipe = 153.6
miles unlined pipe = 164.9 (52%)
4 miles per year over 20 years
Miles of unlined pie in 2032: 27%



Water Program Investment

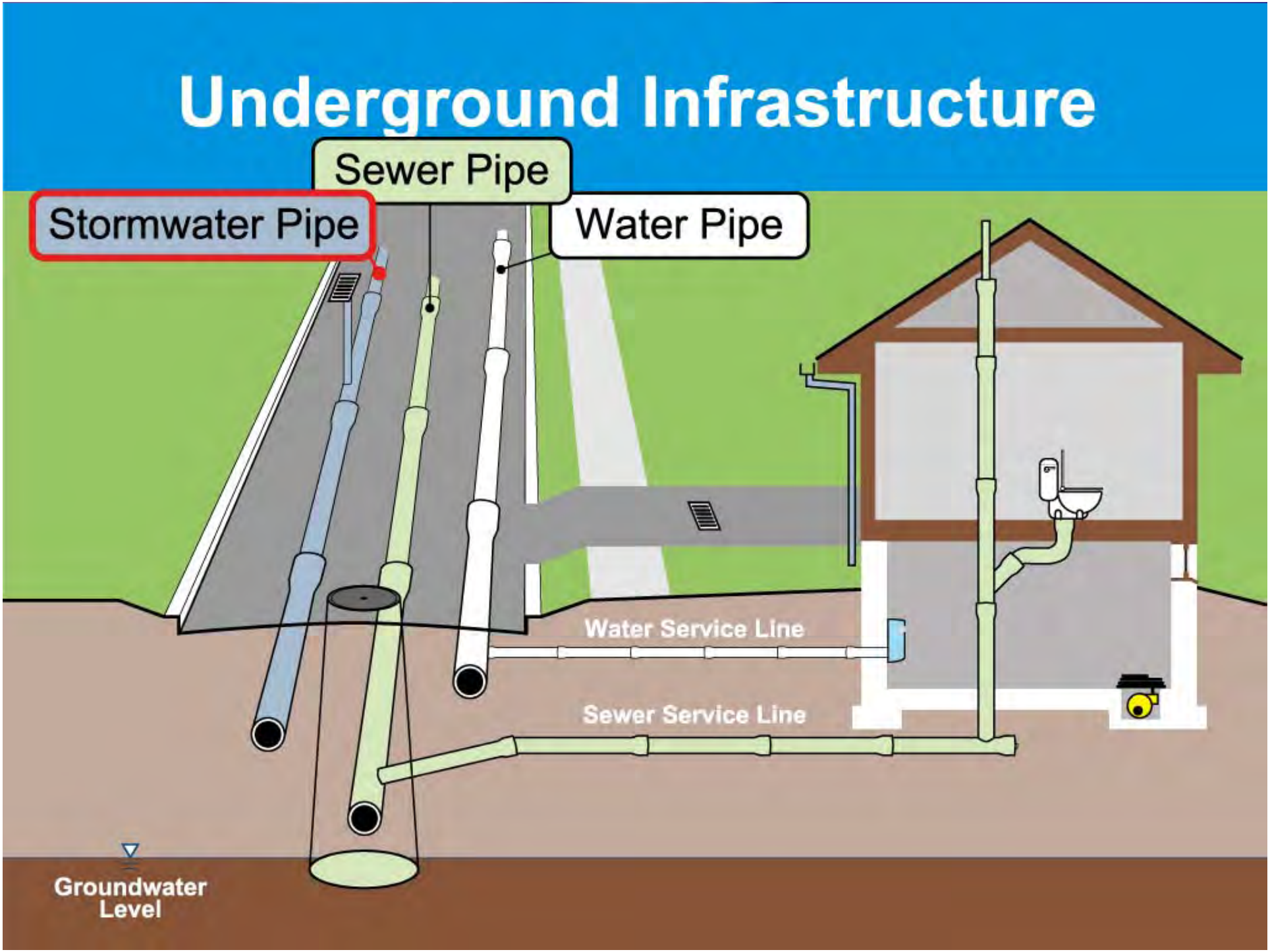
- Annual Investment $4 million

Water System

QUESTIONS??

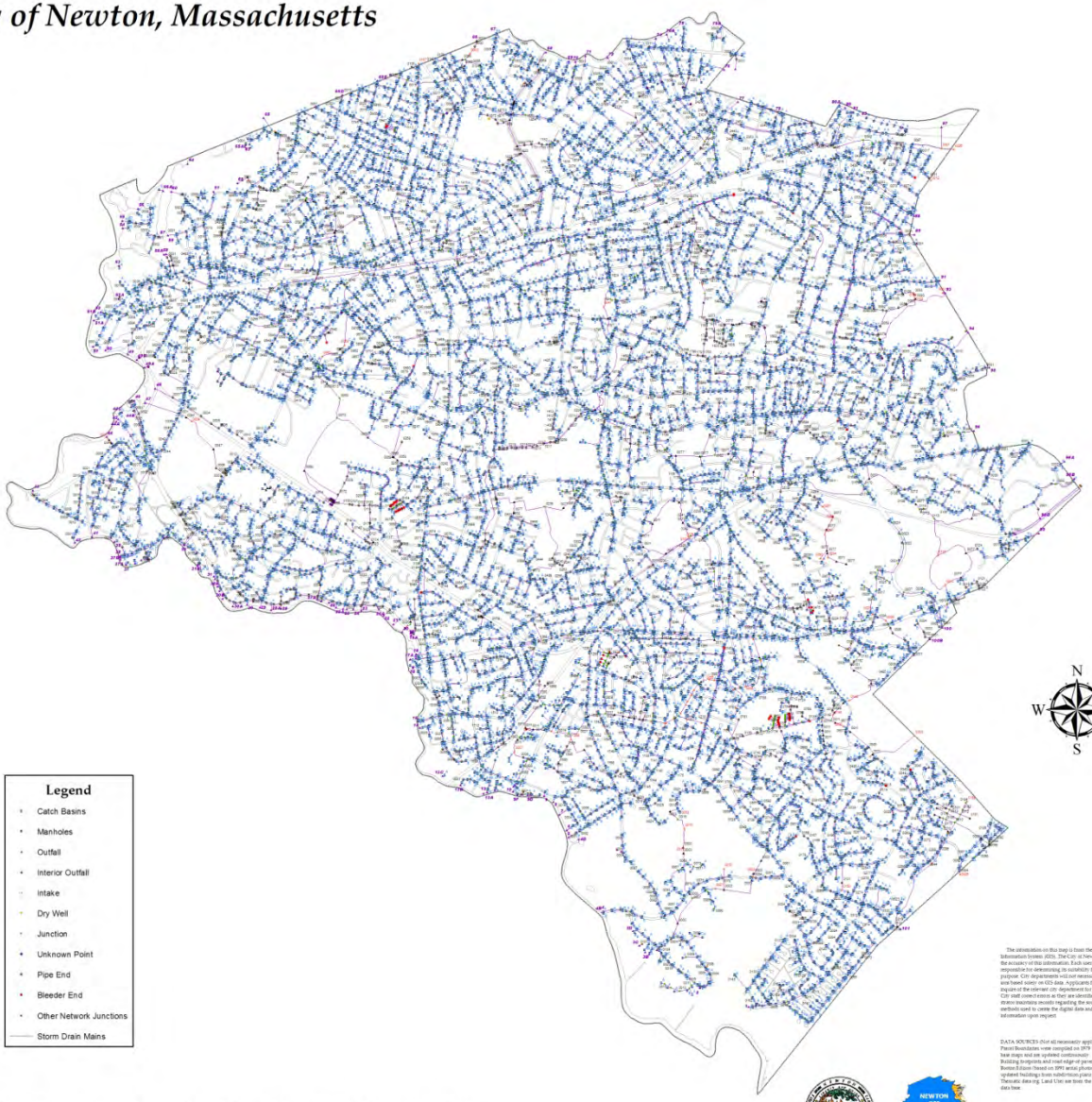
Stormwater System Action Plan

February 2012


Underground Infrastructure
Sewer Pipe
Stormwater Pipe
Water Pipe
Water Service Line
Sewer Service Line
Groundwater Level

Storm Drain System

City of Newton, Massachusetts



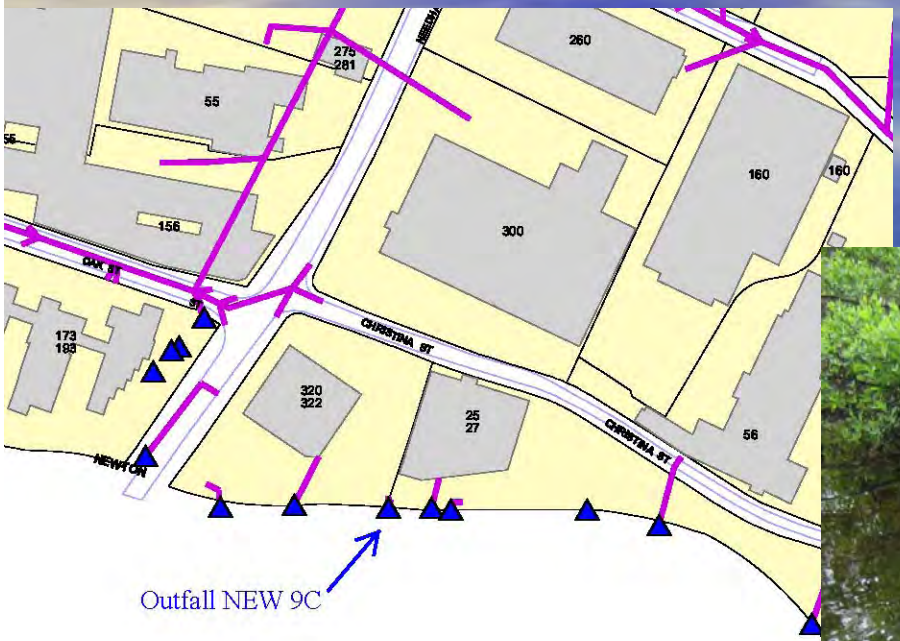
Stormwater System

- 320 miles of drain pipe
- 12,750 catch basins
- 2 Pump stations
- 155 major outfalls
- 200+ interior outfalls
- 7 miles of streams
- Stormwater fee established in 2006
  - $25 residential; $150 commercial

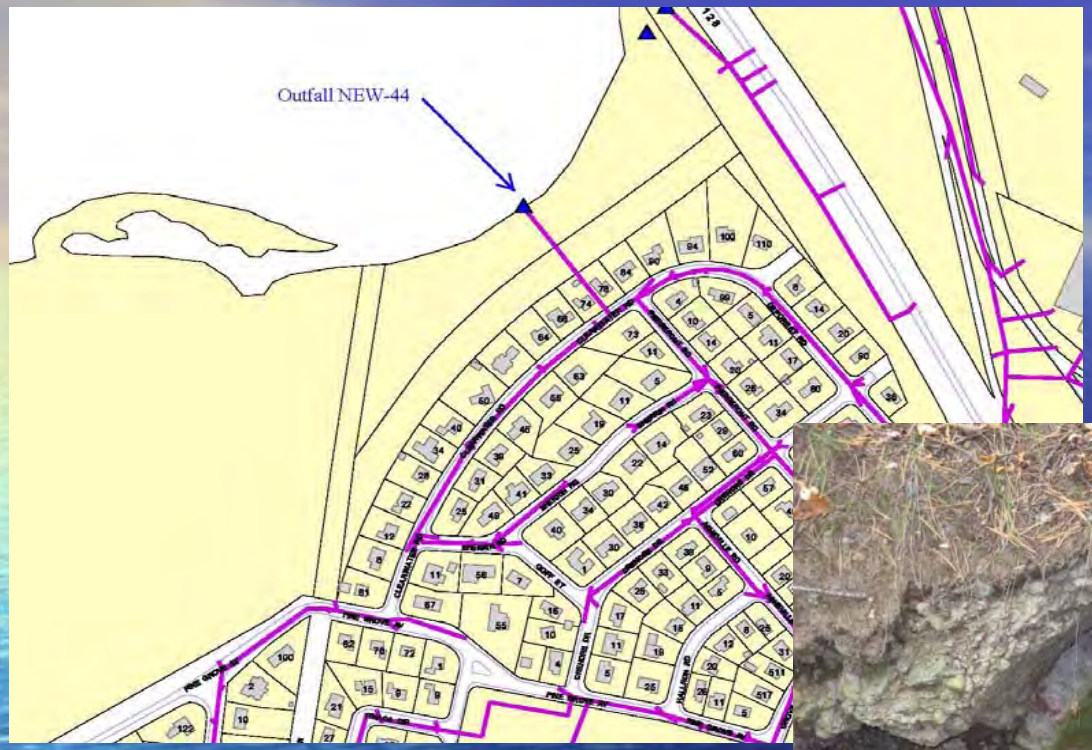
What are the Problems?

- Inequitable Stormwater Fee structure
- Need to conduct infrastructure assessment of the drain system
- Need long-term capital program
- Insufficient funds to repair and maintain drain system
- New EPA Stormwater Permit requires more stringent pollution prevention requirements

Problem-Aging Infrastructure:



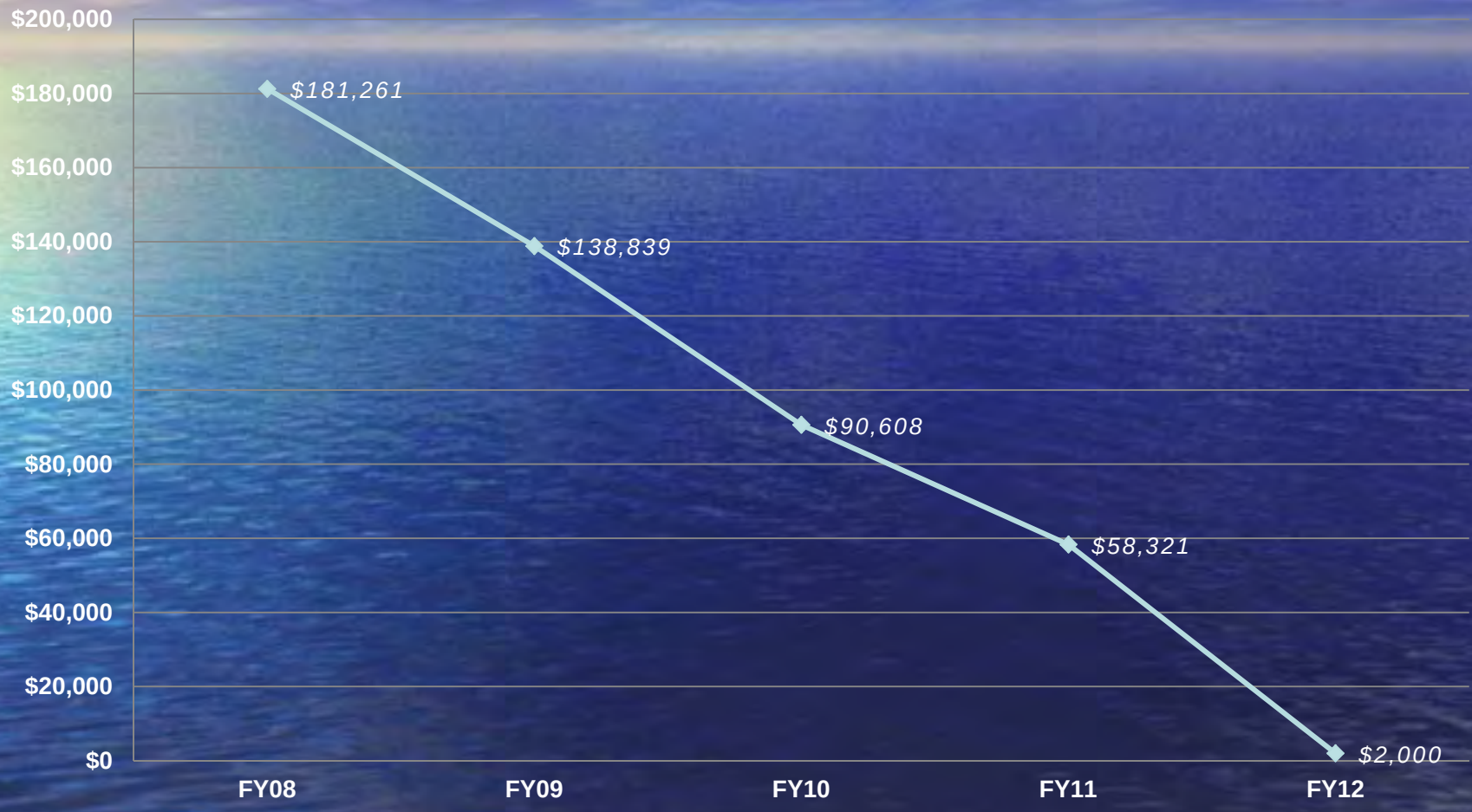
Problem-Aging Infrastructure:



Problem-Increasing Mandated Pollution Controls:

- New EPA Stormwater Permit requires:
  - Phosphorous Control Plan
    - Requires City to reduce phosphorous loads by 65% using various forms of treatment
  - Stormwater Pollution Prevention Plan
    - Requires City to develop plans for municipal properties
  - Update Stormwater Management Plan
    - Requires City to develop abatement protocols

Problem-Insufficient Funds for Infrastructure Investment



- **Capital Investment funding shrinking**

Problem - Stormwater Fee structure not based on impervious cover

Both businesses currently pay $150

Stormwater Action Plan

- Create more equitable fee structure based on impervious cover
  - Hold single family residential fees level
  - Modify fees for multi-family residential and commercial businesses based on impervious cover
- Use increased revenues to:
  - Fund assessment of stormwater system
  - Invest in infrastructure rehabilitation and improvements
  - Comply with requirements of new EPA Stormwater Permit

Stormwater System

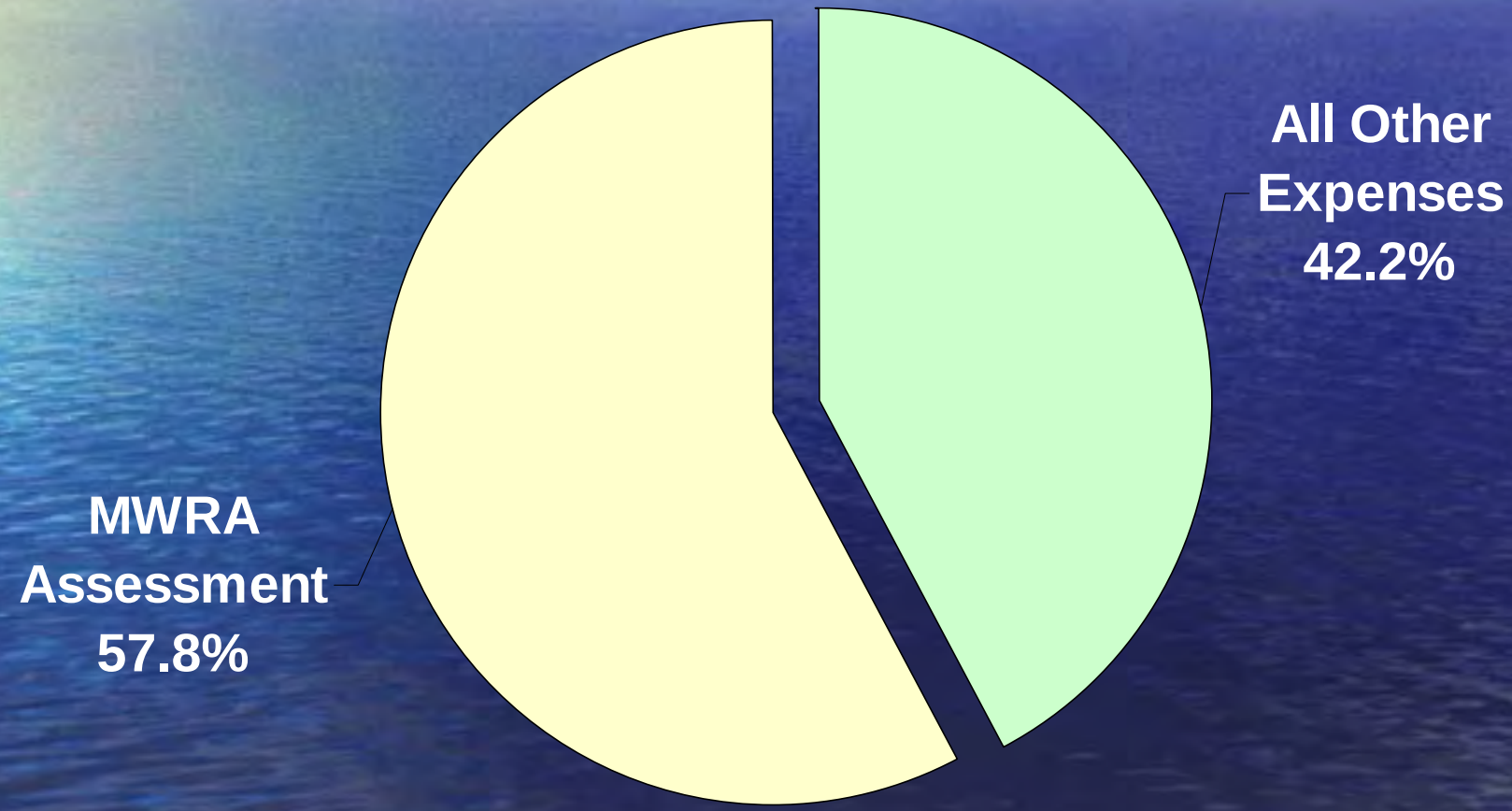
QUESTIONS??

Impact of Strategic Plan on Water/Sewer Rates

Impact on Water/Sewer Rates

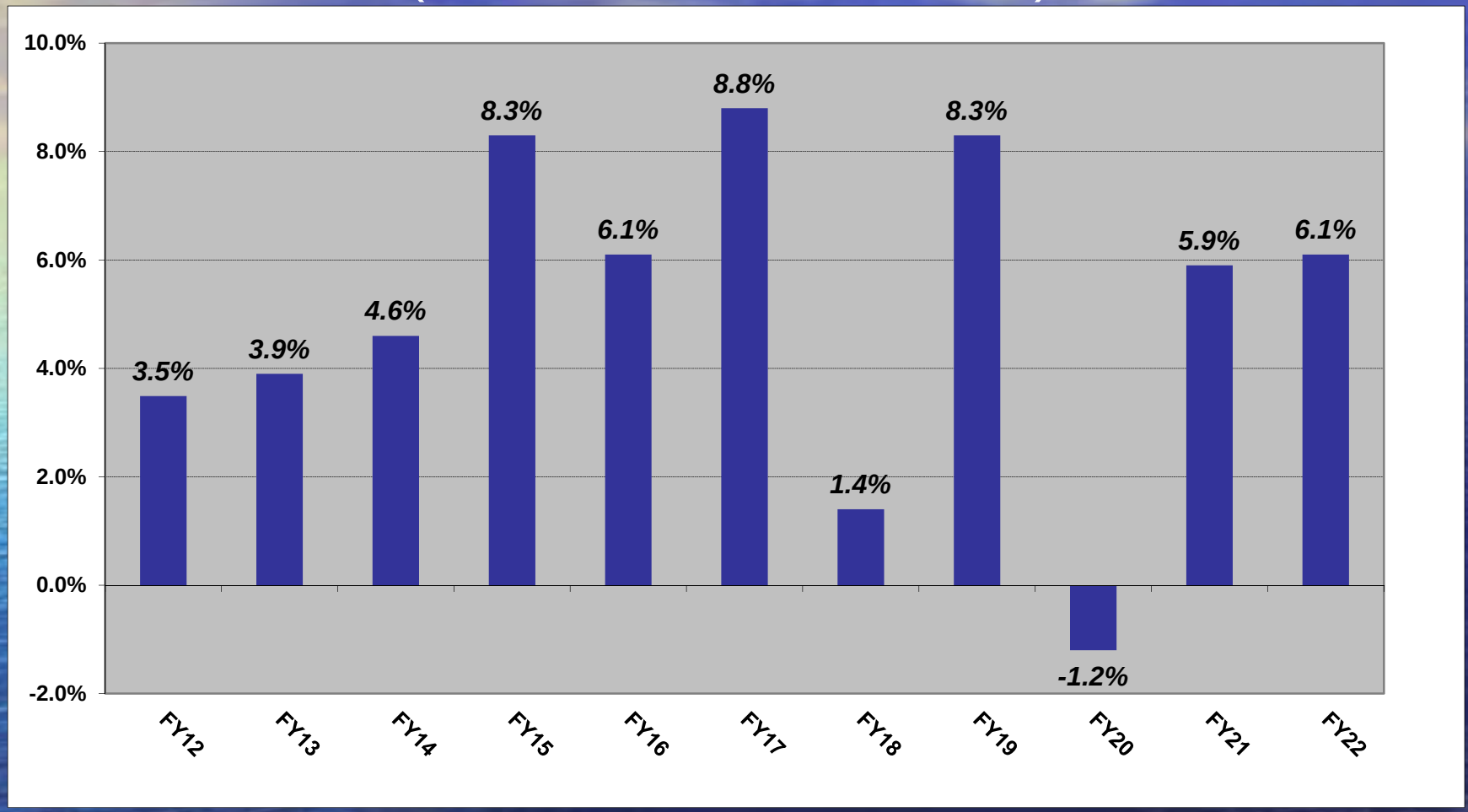
- $89m investment in Sewer and Water
- MWRA assessments forecast range from -1.2% to 8.8%
- Adequate Reserves
- Sustainable and Stabilized annual increase in Water/Sewer rates

MWRA Assessment as a % of Total FY12 Water/Sewer Budget



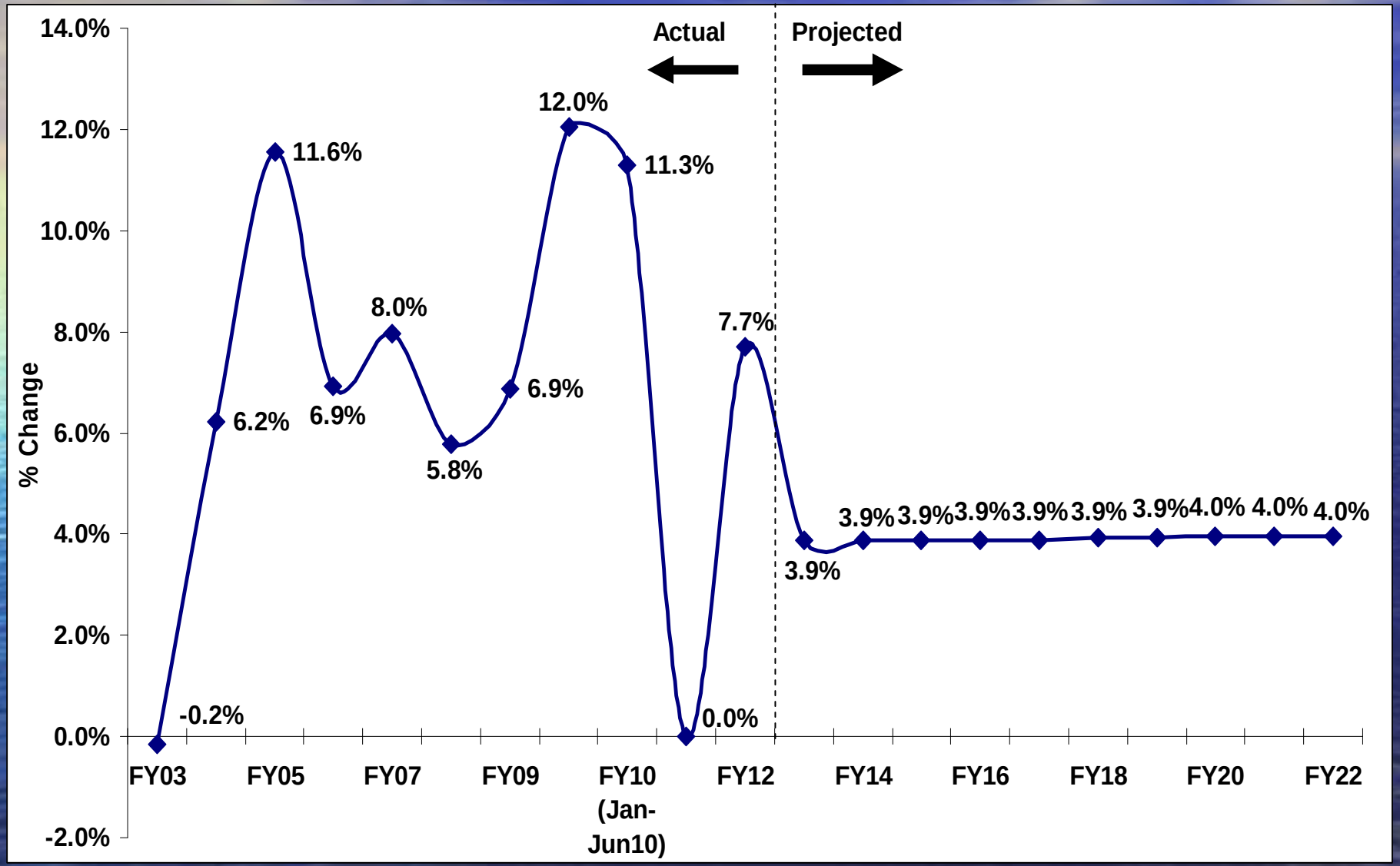
MWRA Rate Projections

(Water & Sewer combined)

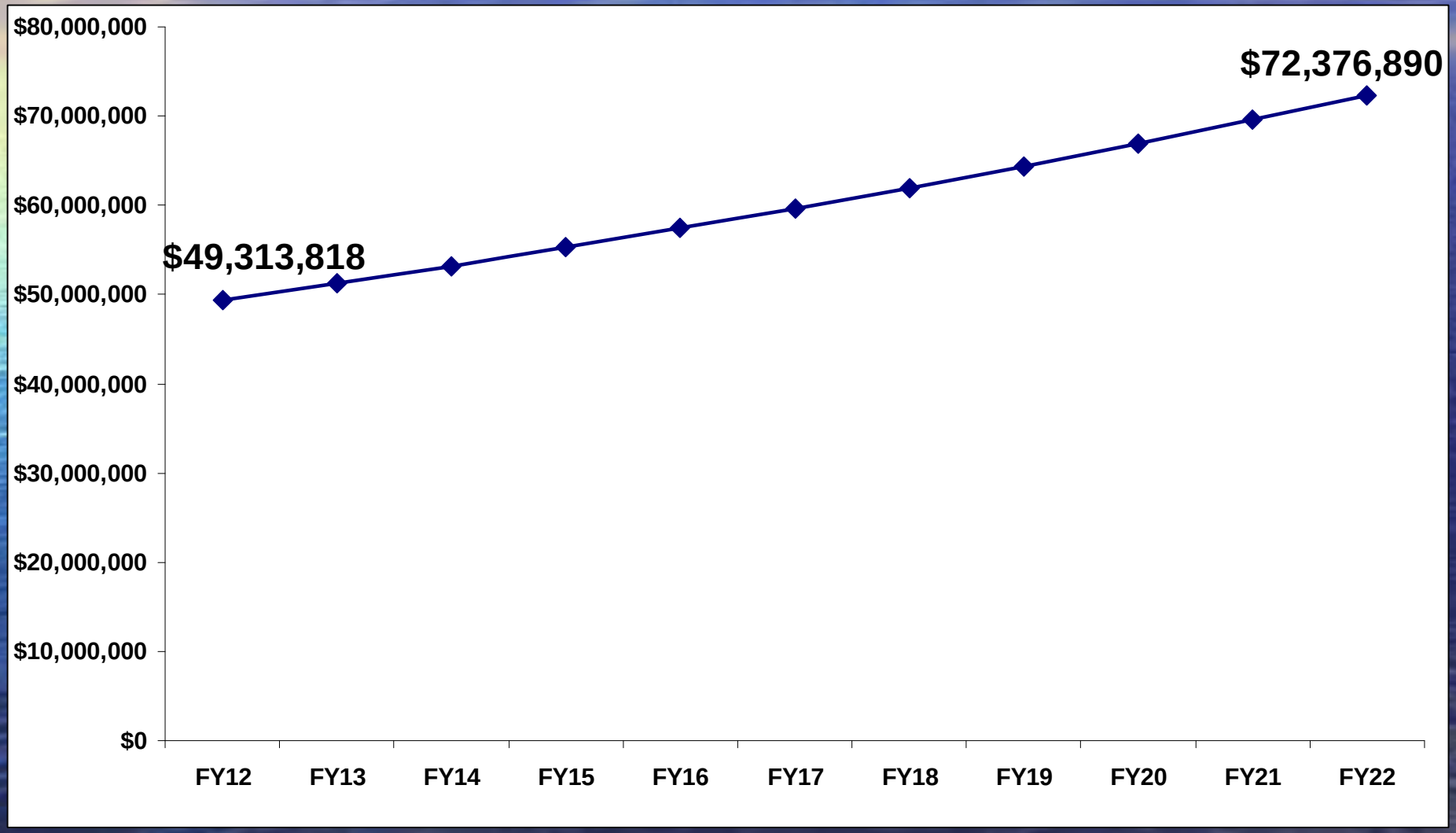


- MWRA forecasts Rate Increases between 1.4% and 8.8% over the next 10 years

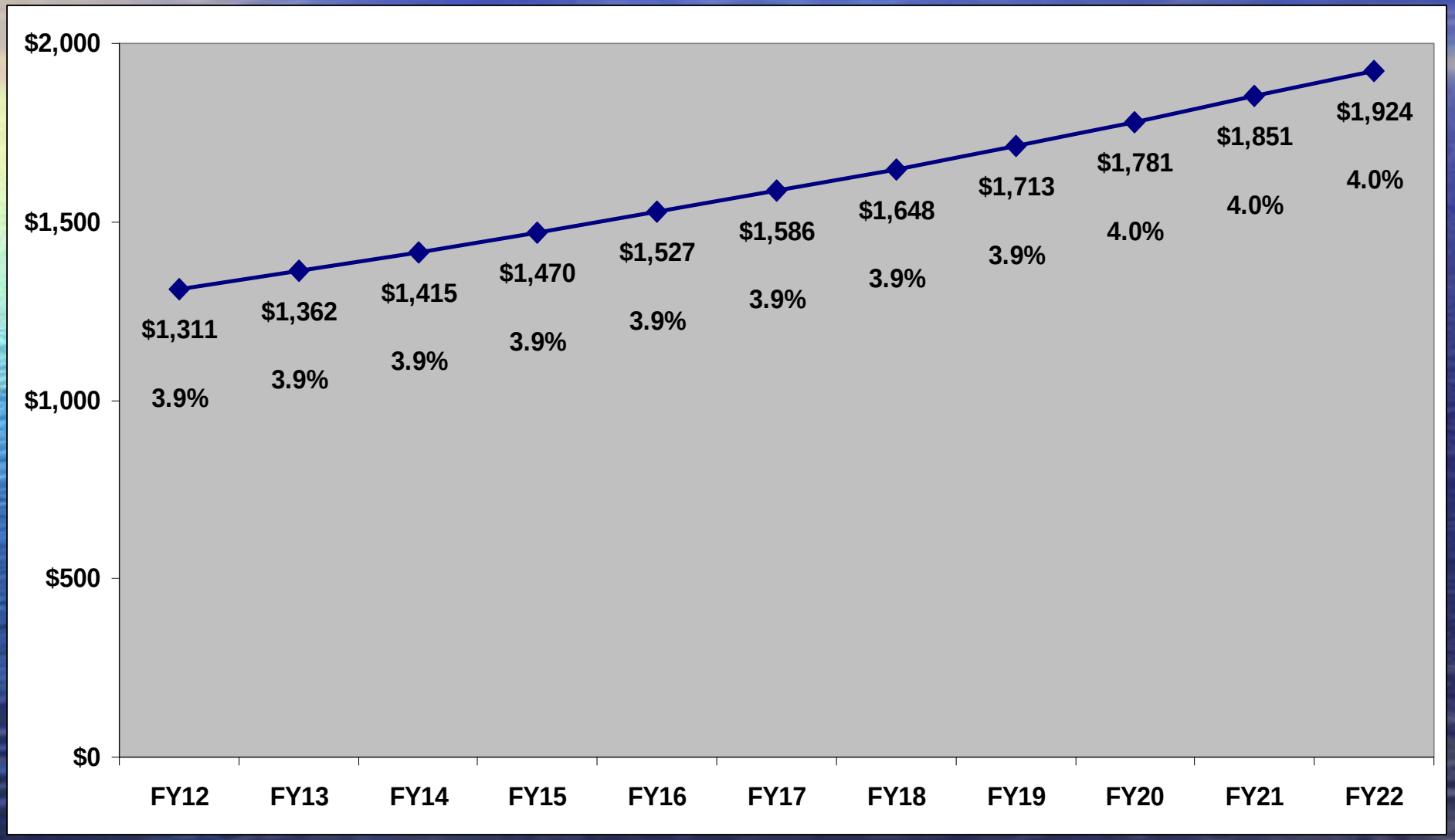
Newton Combined WS Rate Projections



Newton Combined Water and Sewer Revenue Projection



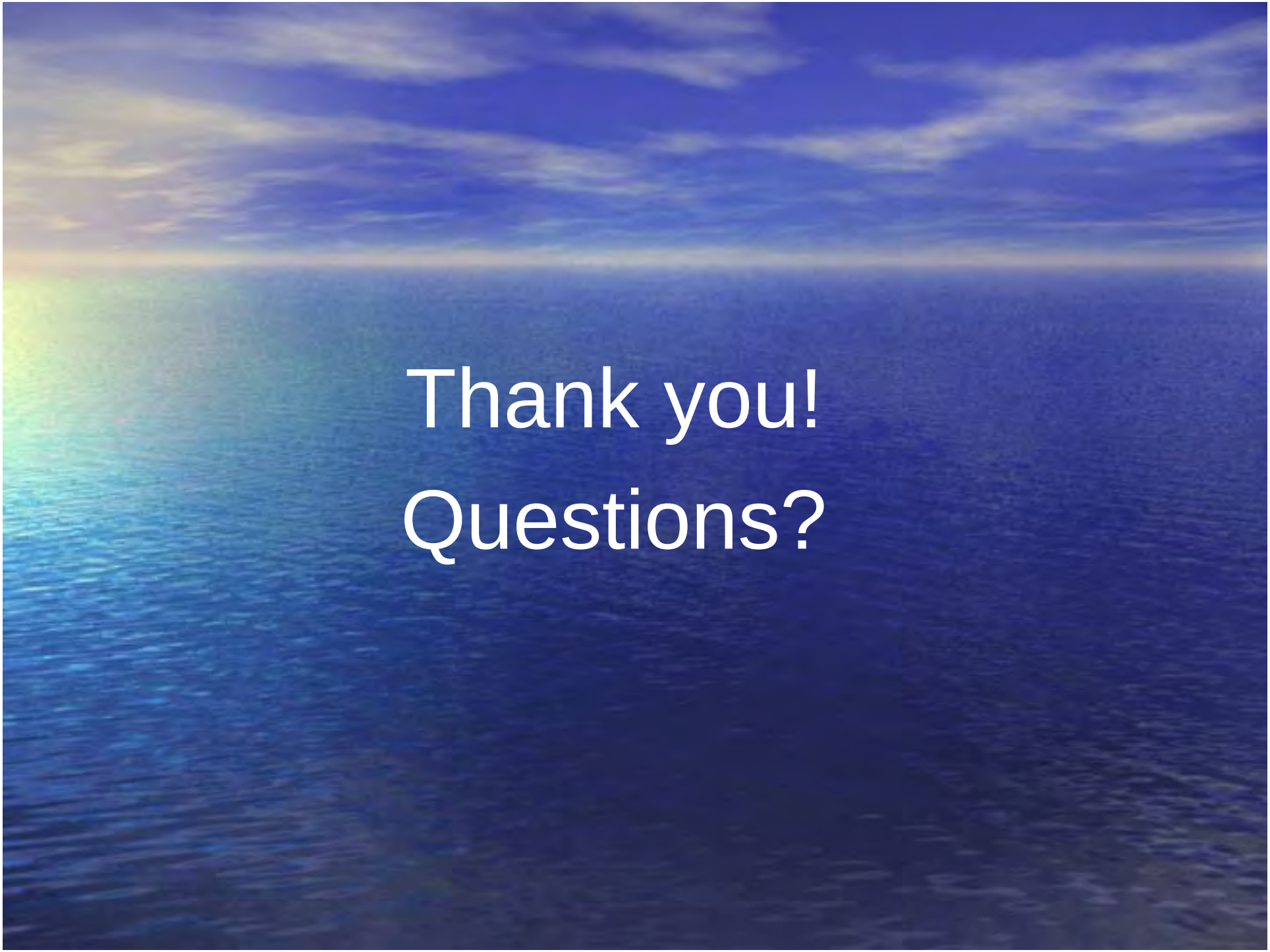
Estimated Annual Household Impact at 95 Hundred Cubic Feet



Recommended Projected Rates

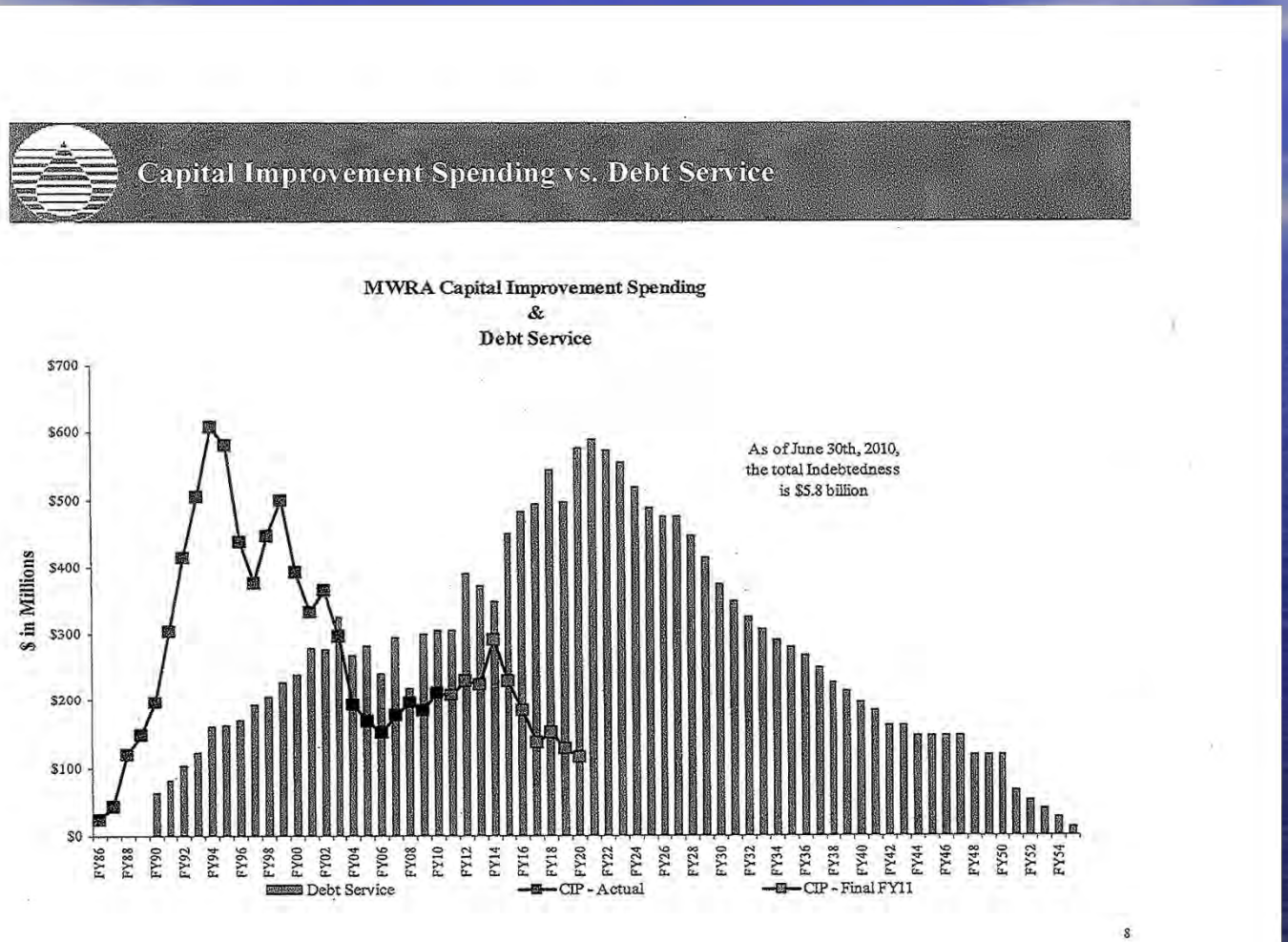
Provides for:

- $89 M investment in Sewer and Water
  - $49M plan – Sewer - to reduce I/I, upgrade infrastructure
  - $40M Plan – Water – to clean and line unlined cast iron pipe
- Maintains respective water and sewer reserve fund target of 15% of total operating revenue
- Provides residents with predictable and sustainable rates ~ 4% increase


Thank you!
Questions?

Back-Up Slides

MWRA Cost Projections



- MWRA Debt Service will Increase through 2021

Recommended Projected Rates

Accounts for:

- $93 million water and sewer capital plan
- Maintains respective water and sewer reserve fund target of 15% of total operating revenue
- Provides residents with predictable and sustainable rates ~ 4% increase

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22
Combined Water and Sewer Spending											
Total Spending	$49,313,818	$51,226,450	$53,213,371	$55,277,470	$57,421,748	$59,649,325	$61,987,393	$64,417,164	$66,968,044	$69,619,952	$72,376,890
$ Change		$1,912,632	$1,986,921	$2,064,098	$2,144,278	$2,227,577	$2,338,069	$2,429,771	$2,550,879	$2,651,908	$2,756,939
% Change		3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	4.0%	4.0%	4.0%
Projected Impact on Households - Combined Water and Sewer Rates											
Estimated Average Household Impact Based on Annual Water Household Use @ 95 HCF	$1,311.15	$1,362.00	$1,414.83	$1,469.71	$1,526.72	$1,585.95	$1,648.11	$1,712.71	$1,780.54	$1,851.05	$1,924.35
$ Change		$50.85	$52.83	$54.88	$57.01	$59.23	$62.16	$64.60	$67.82	$70.51	$73.30
% Change		3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	4.0%	4.0%	4.0%

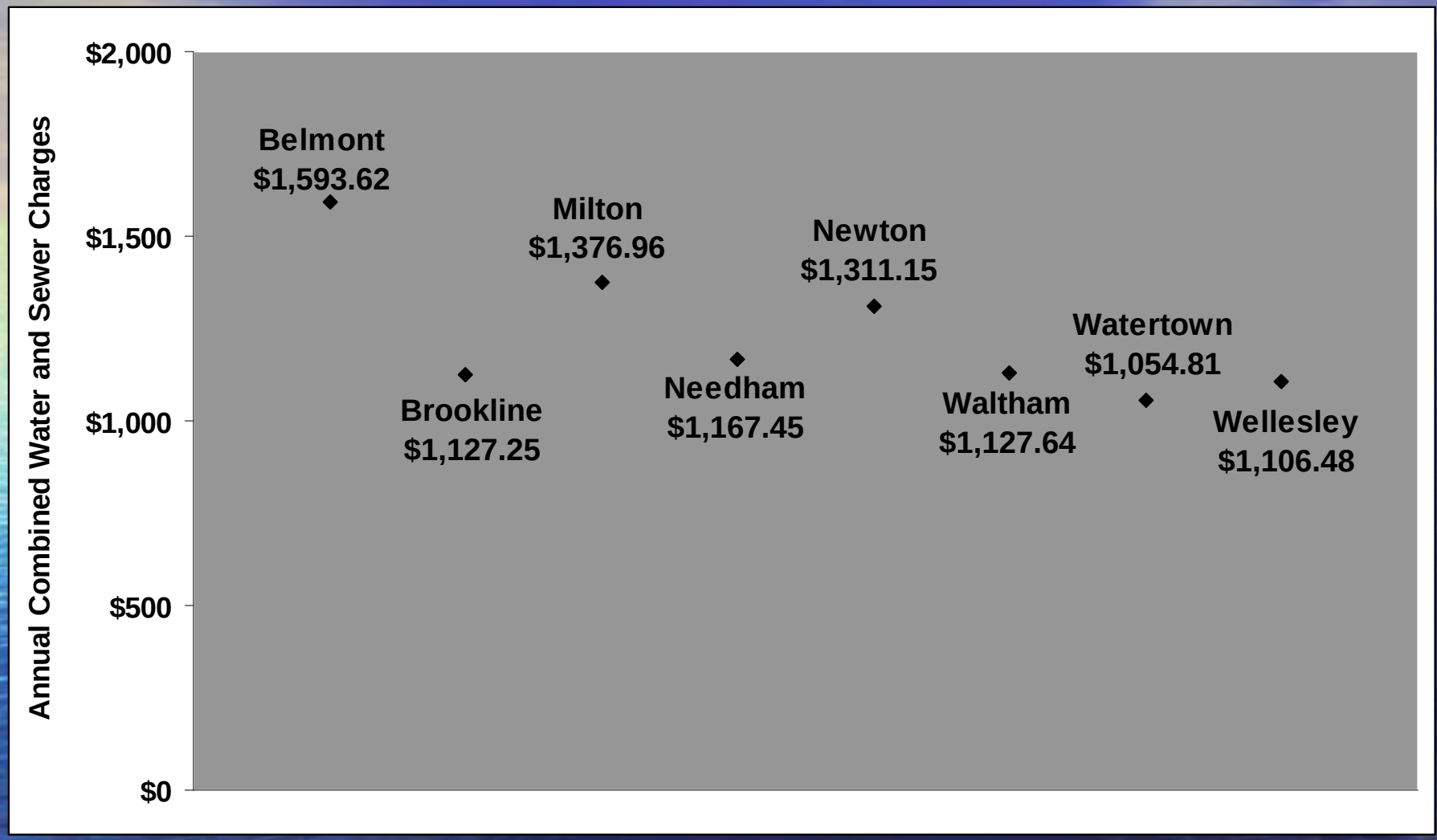
FY2012 Proposed Water and Sewer Rates

FY 2012 Water/Sewer Revenue Needs

	Water	Sewer	Total
Proposed Budget	18,558,420	27,161,128	45,719,548
Other Costs			
Allowance for Uncollectibles	$1,415,000	$2,172,800	$3,587,800
Contribution to Reserves	0	814,800	814,800
Administrative Overhead From Water Fund	0	(808,330)	(808,330)
Subtotal	$1,415,000	$2,179,270	$3,594,270
Total Revenue Needed	$19,973,420	$29,340,398	$49,313,818

HCF	Consumption	Water Rate	Sewer Rate	Water Revenue	Sewer Revenue	Total Est. Revenue
0 - 20	1,005,513	$5.42	$7.96	$5,449,880	$8,003,883	$13,453,763
21 - 70	1,236,669	$6.50	$9.55	$8,038,349	$11,810,189	$19,848,537
> 70	831,947	$7.80	$11.46	$6,489,187	$9,534,113	$16,023,299
	3,074,129	$0.28	$0.68	$19,977,415	$29,348,185	$49,325,600
% Change				5.4%	9.3%	7.7%
Surplus/(Deficit)				$3,995	$7,787	$11,782

2011 Comparative Water and Sewer Rates



-Based on annual estimated average household use of 95 hundred cubic feet

-Information from 2011 MWRA AB 'Annual Water and Sewer Retail Rate Survey'

FY2012 Proposed Water and Sewer Rates

FY 2012 Water/Sewer Revenue Needs

	Water	Sewer	Total
Proposed Budget	18,558,420	27,161,128	45,719,548
Other Costs			
Allowance for Uncollectibles	$1,415,000	$2,172,800	$3,587,800
Contribution to Reserves	0	814,800	814,800
Administrative Overhead From Water Fund	0	(808,330)	(808,330)
Subtotal	$1,415,000	$2,179,270	$3,594,270
Total Revenue Needed	$19,973,420	$29,340,398	$49,313,818

Represents 7.6% of Water budget

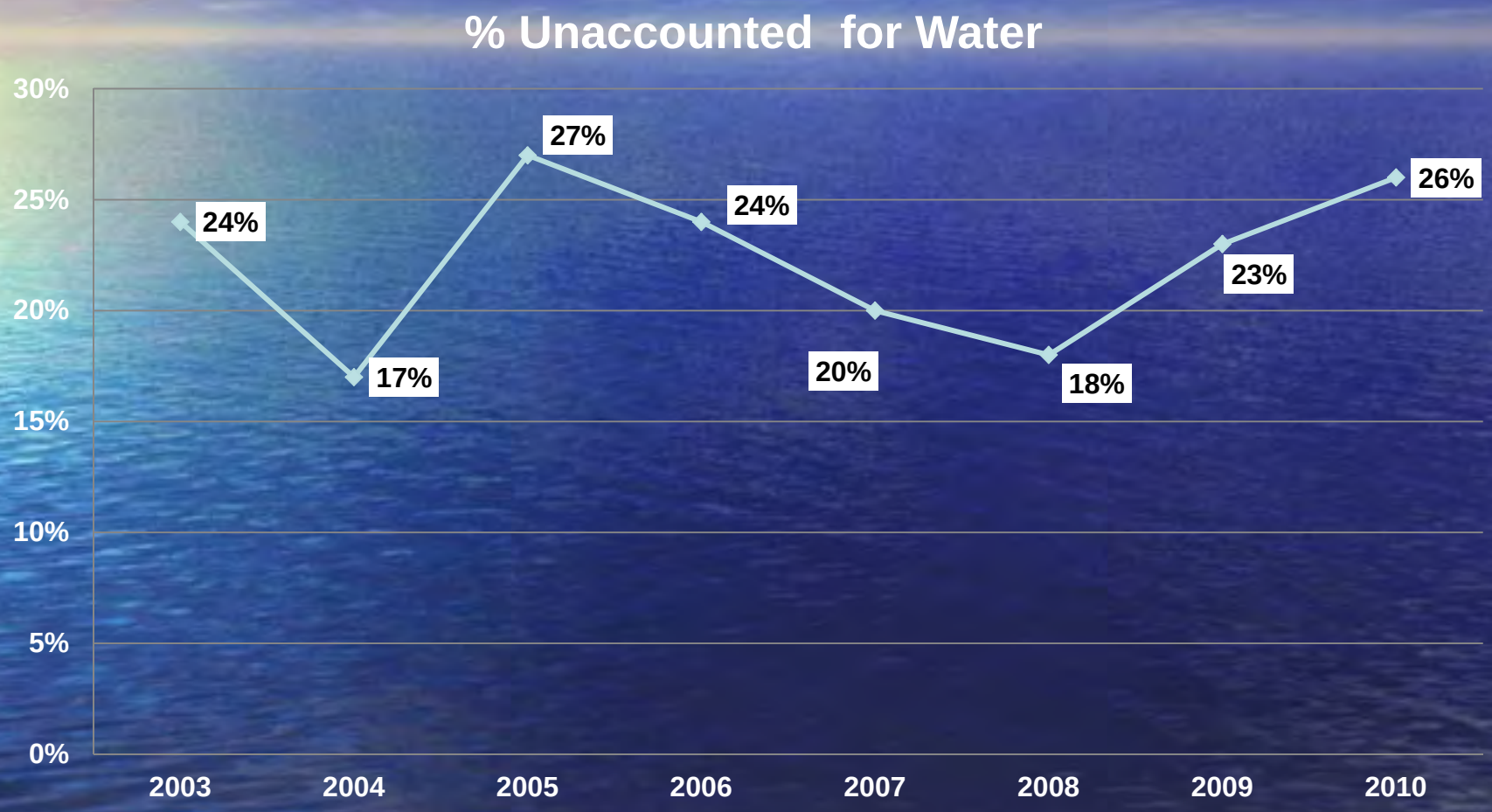
Represents 10.2% of Sewer budget

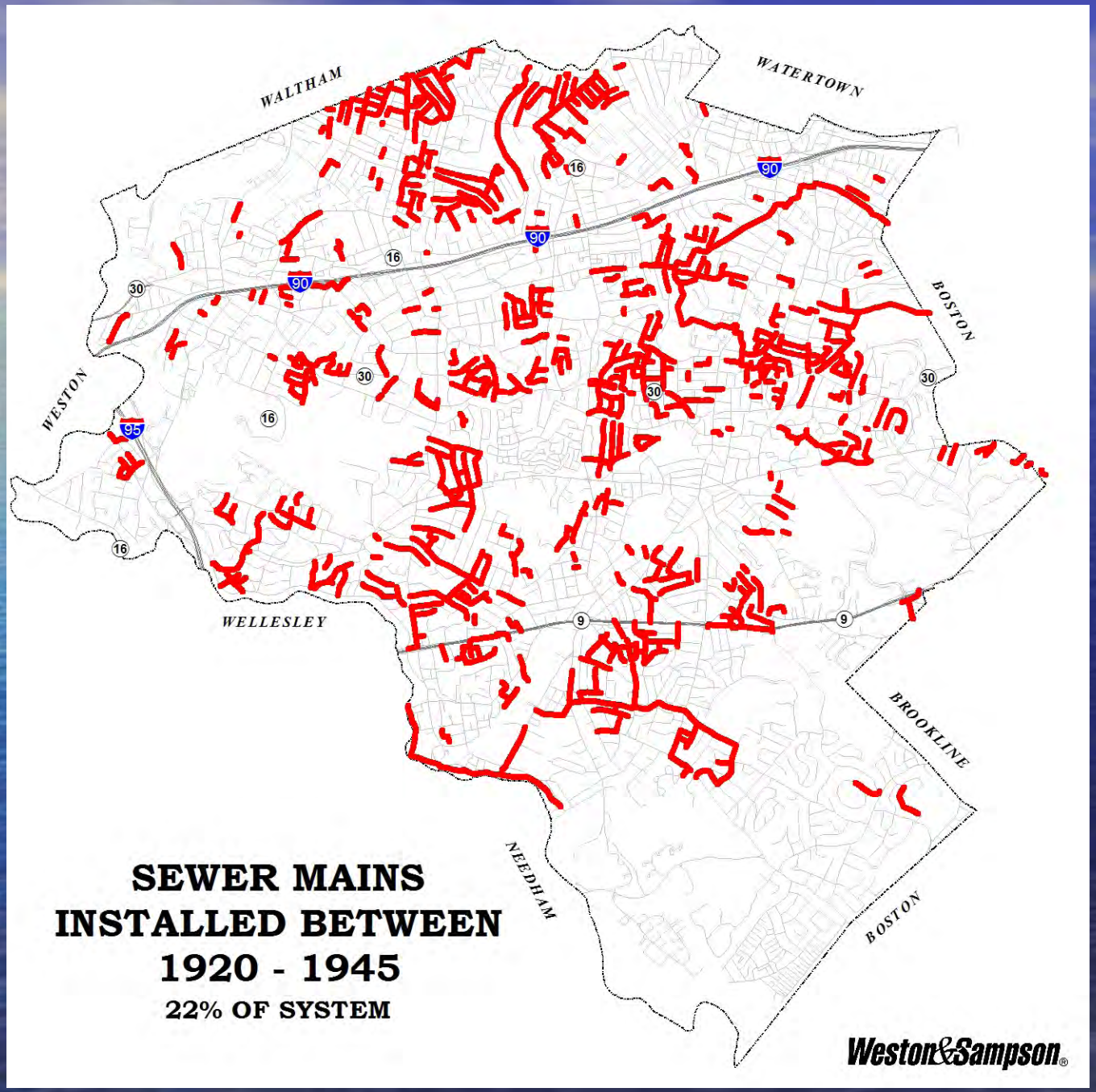
HCF	Consumption	Water Rate	Sewer Rate	Water Revenue	Sewer Revenue	Total Est. Revenue
0 - 20	1,005,513	$5.42	$7.96	$5,449,880	$8,003,883	$13,453,763
21 - 70	1,236,669	$6.50	$9.55	$8,038,349	$11,810,189	$19,848,537
> 70	831,947	$7.80	$11.46	$6,489,187	$9,534,113	$16,023,299
	3,074,129	$0.28	$0.68	$19,977,415	$29,348,185	$49,325,600
% Change				5.4%	9.3%	7.7%
Surplus/(Deficit)				$3,995	$7,787	$11,782

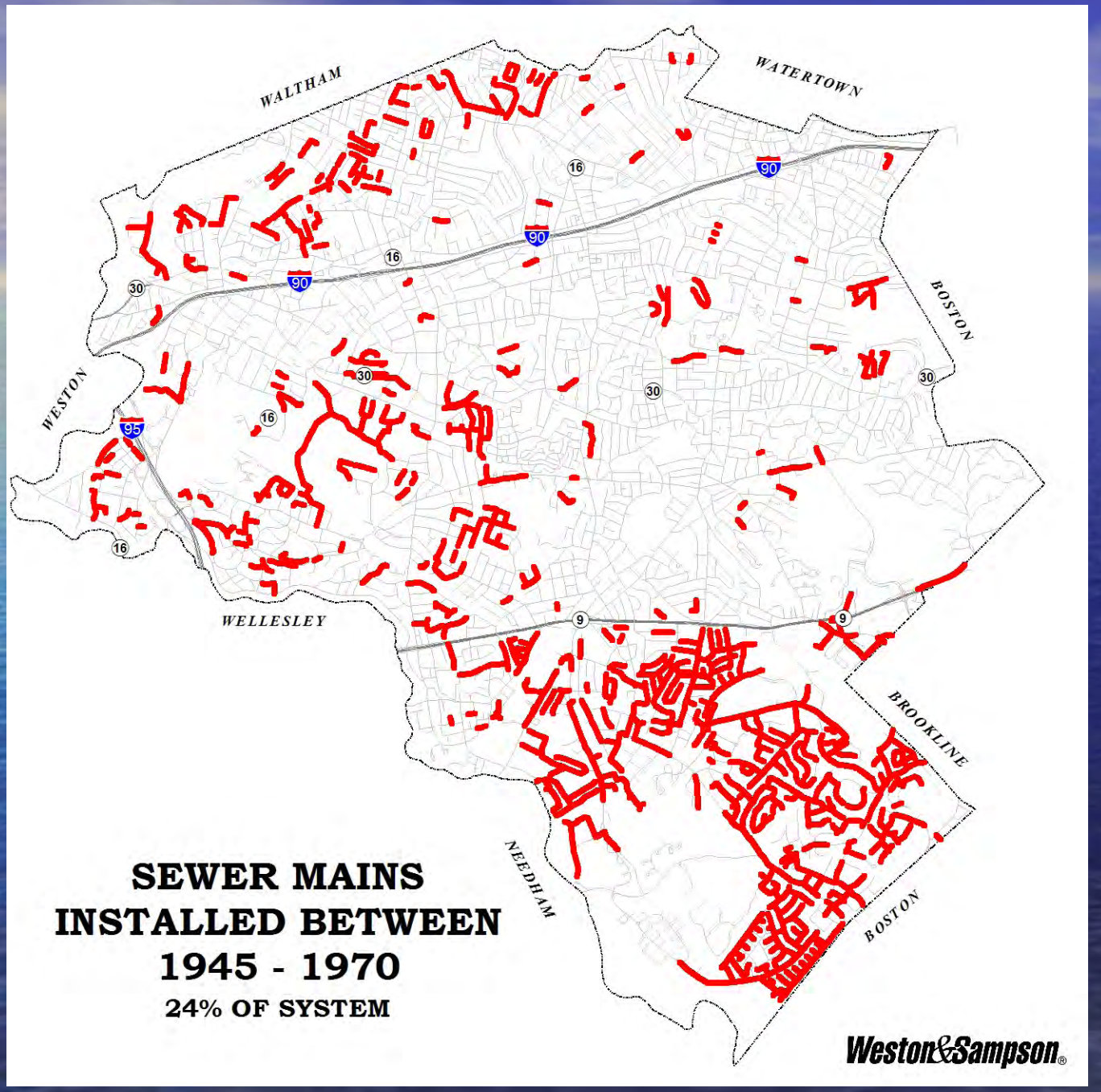
- Actual reads provided by the new meters will allow ‘Allowance for Uncollectibles’ to be reduced as a % of total operating revenue to 4% in FY13 and 2% thereafter

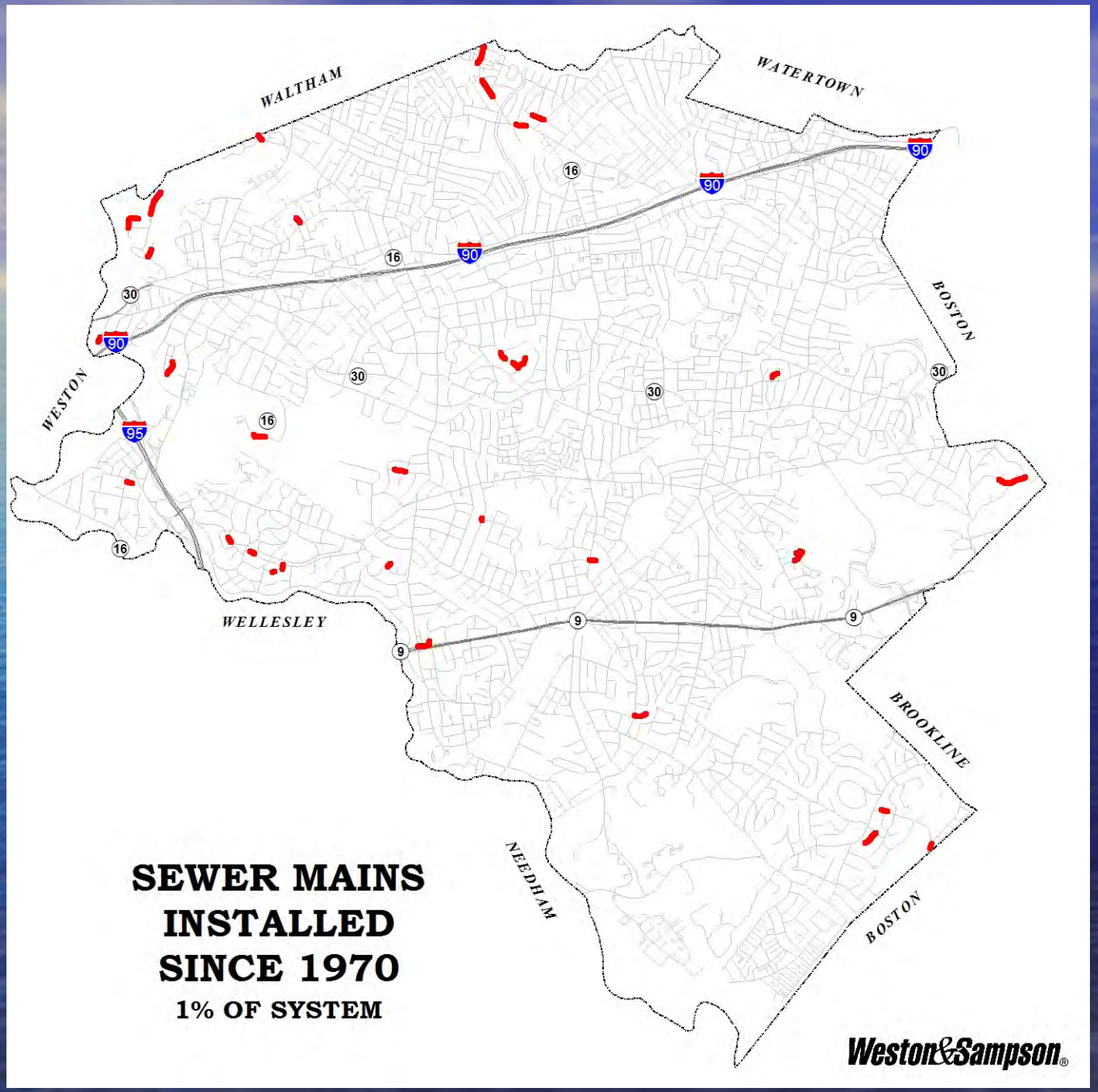
- Funds will be reallocated to maintain reserve fund target of 15% of total operating revenue and stabilize rates

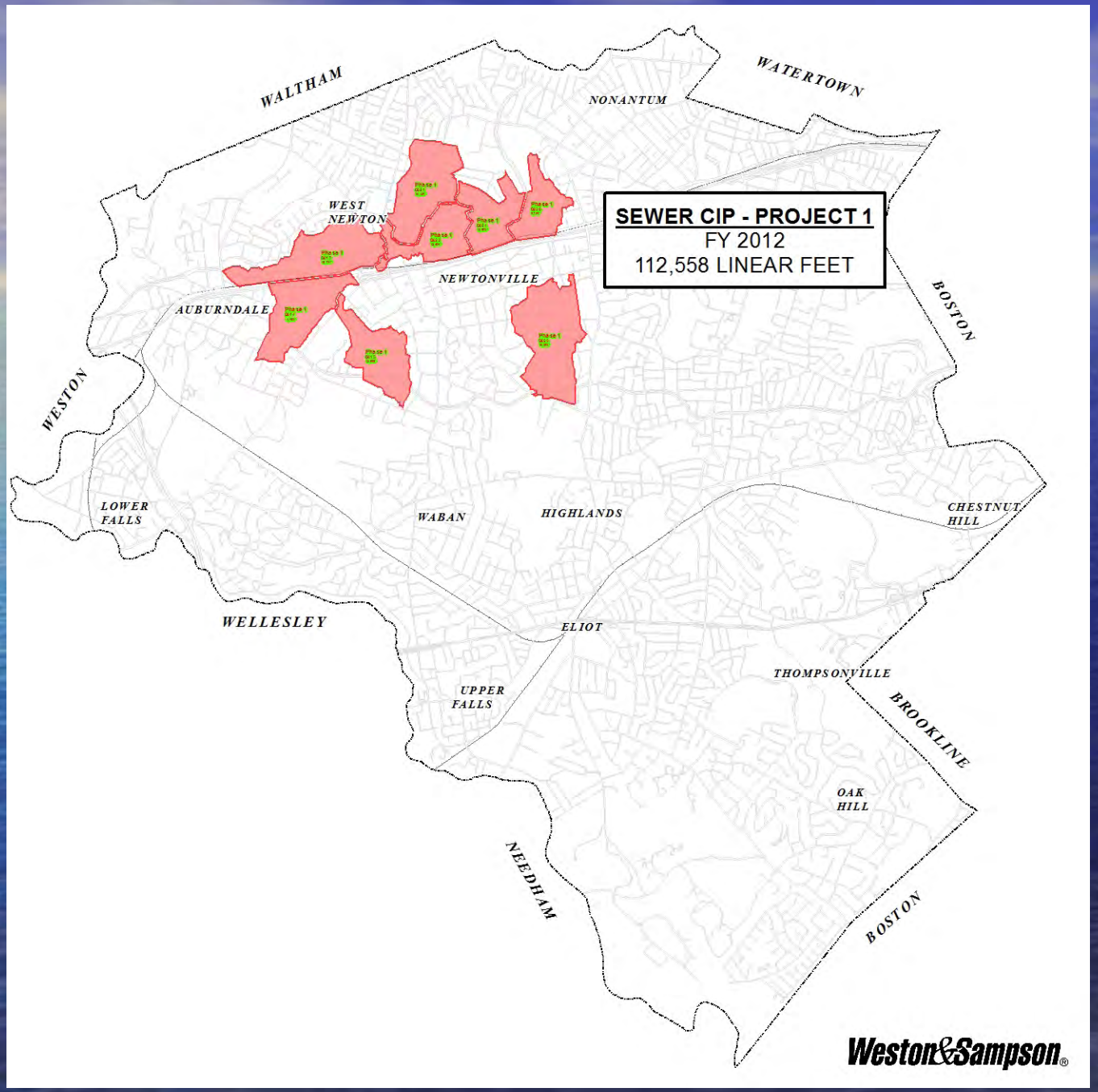
Unbilled Water (UW)

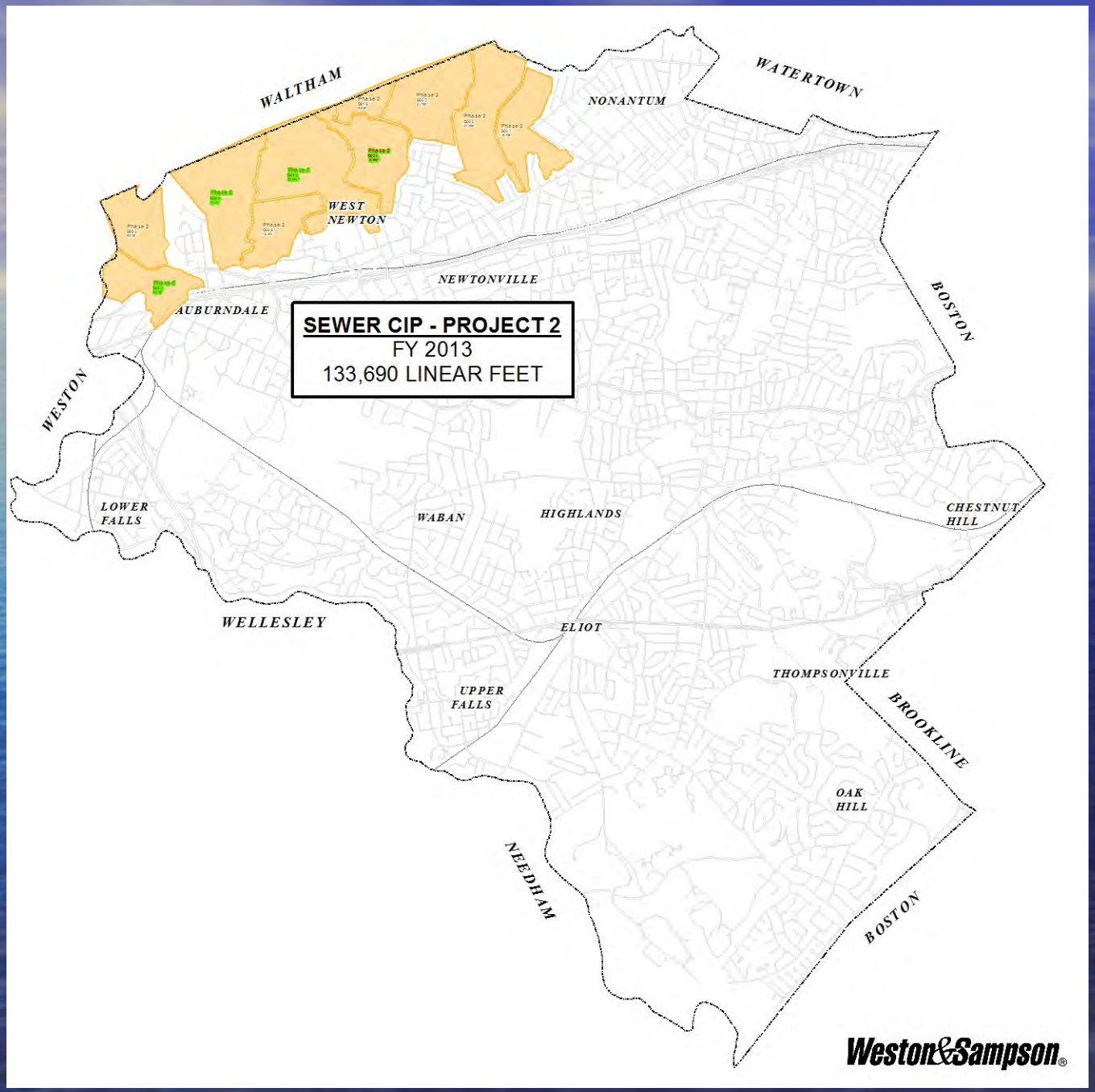


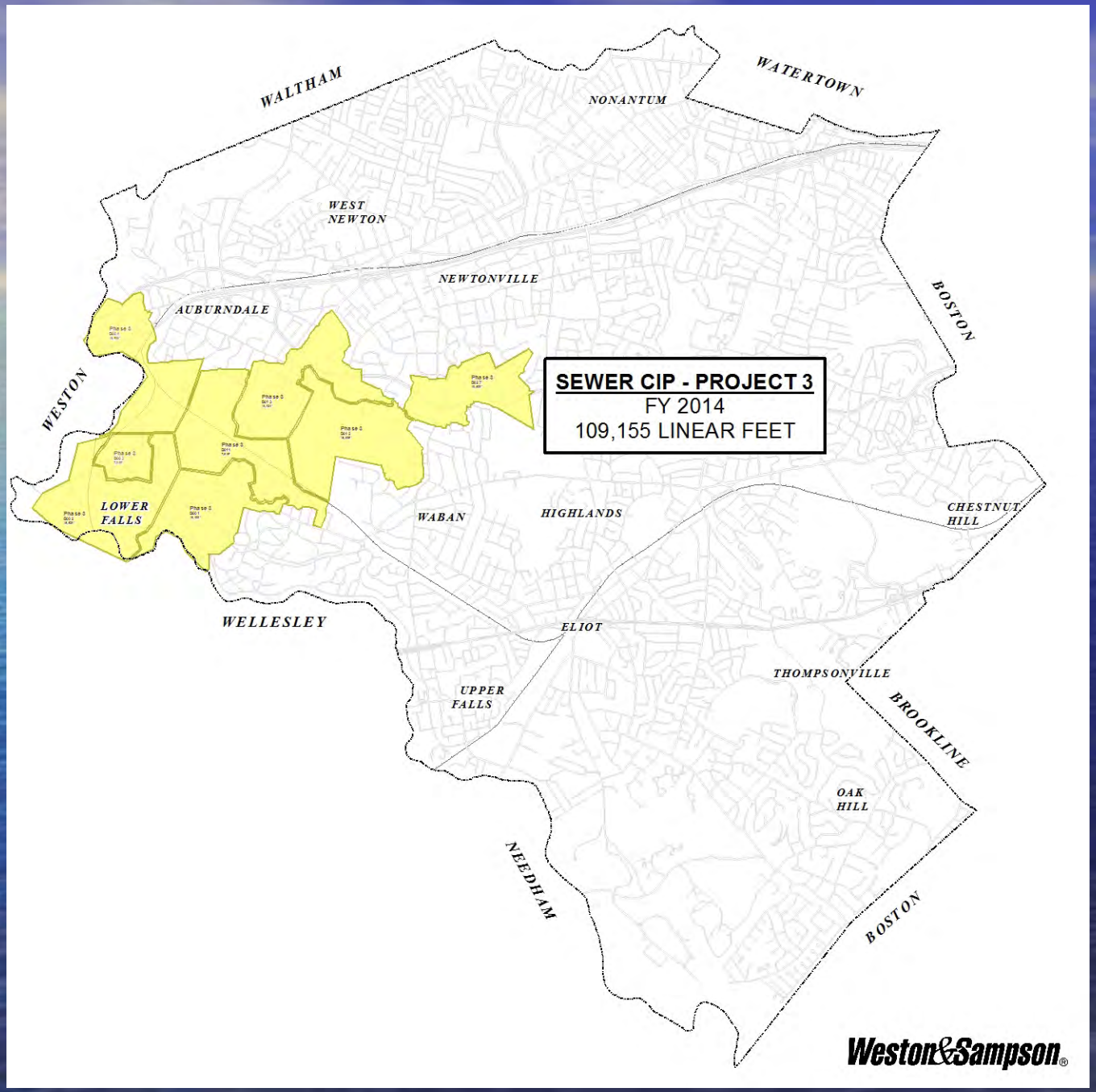

WALTHAM
WATERTOWN
BOSTON
WESTON
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
SEWER MAINS
INSTALLED BETWEEN
1920 - 1945
22% OF SYSTEM
Weston&Sampson

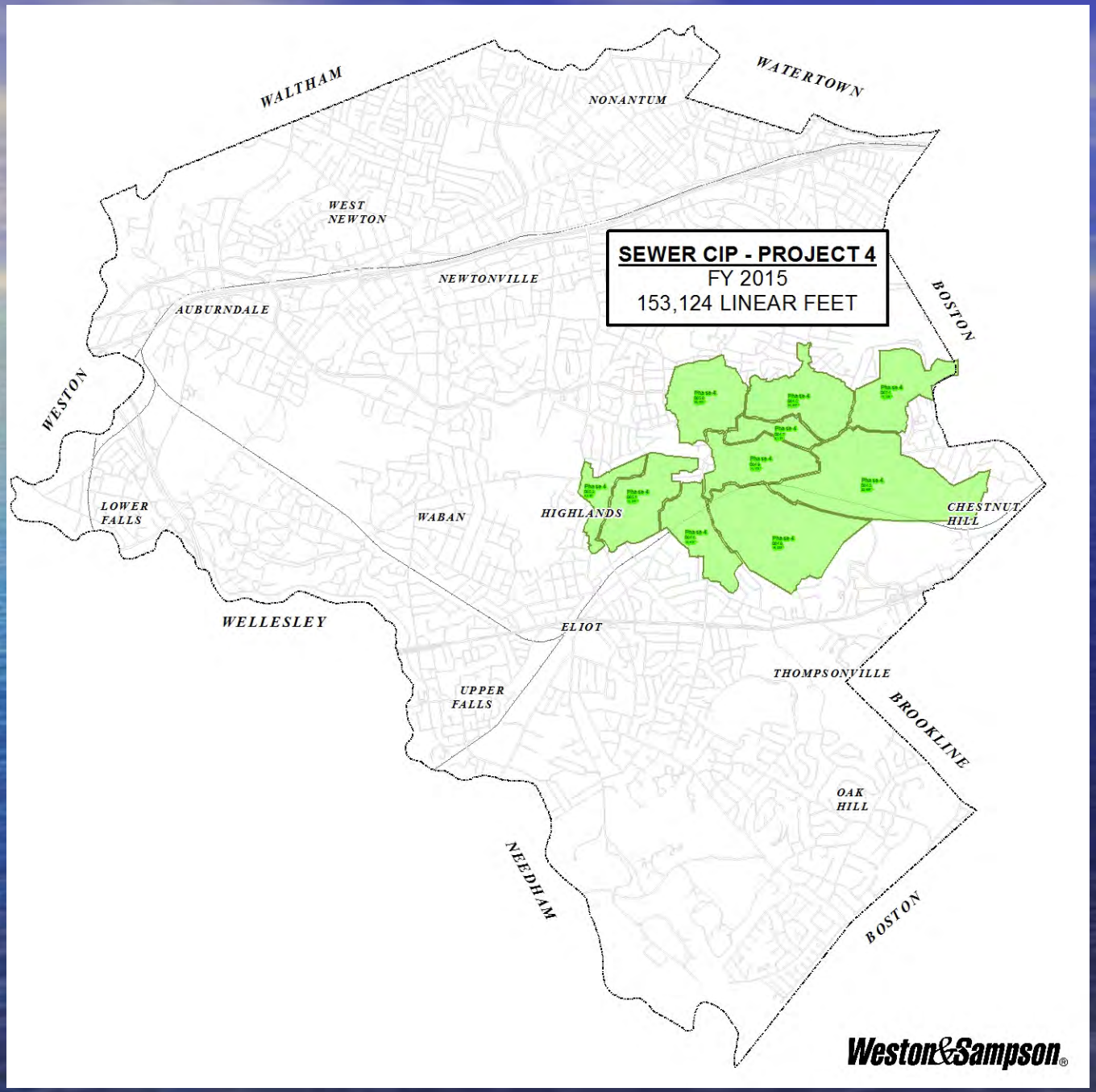

WALTHAM
WATERTOWN
BOSTON
WESTON
WELLESLEY
NEEDHAM
BROOKLINE
BOSTON
SEWER MAINS
INSTALLED BETWEEN
1945 - 1970
24% OF SYSTEM
Weston&Sampson

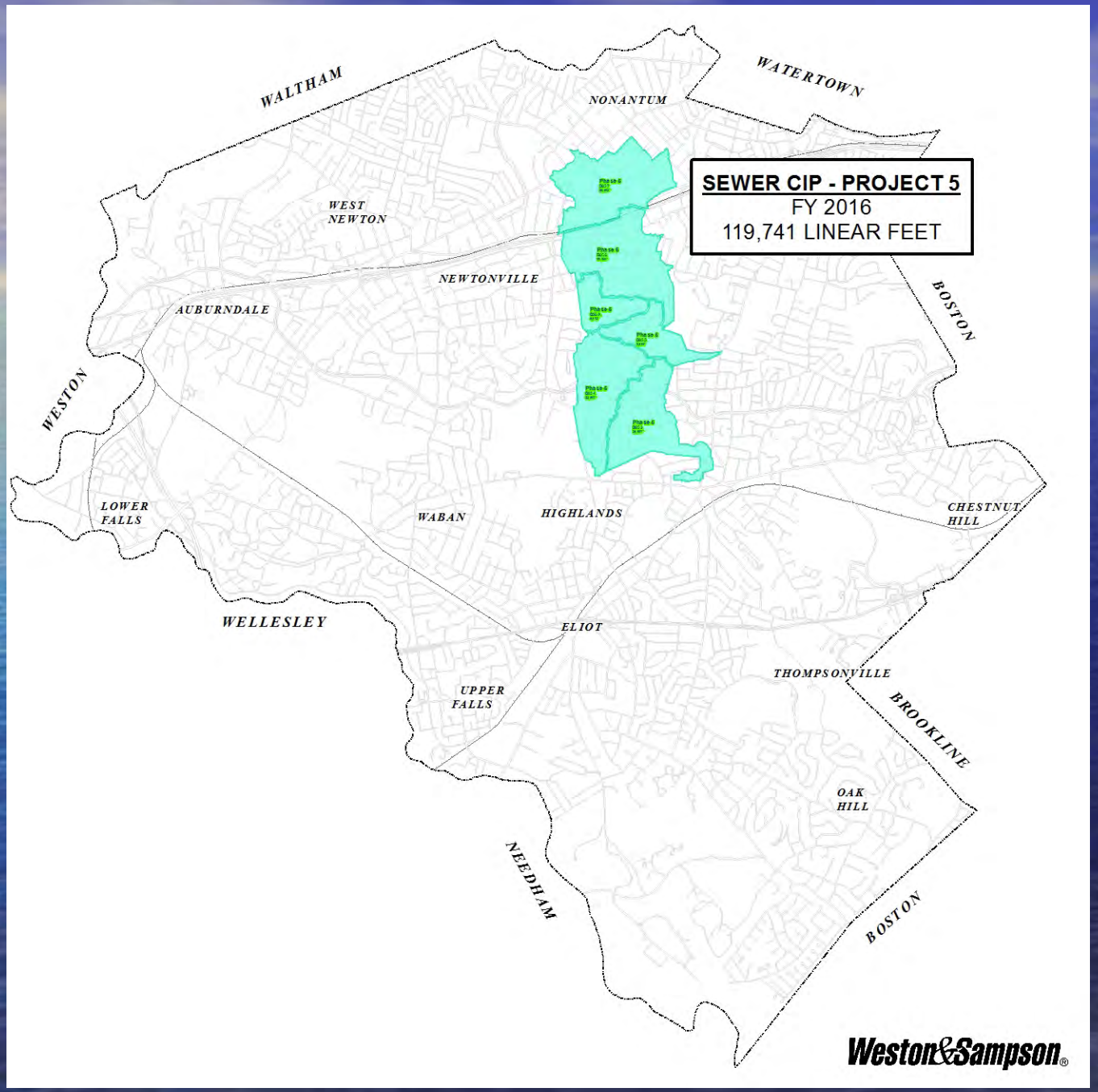

WALTHAM
WATERTOWN
BOSTON
WESTON
WELLESLEY
NEEDHAM
BROOKLINE
BOSTON
90
95
16
30
9
SEWER MAINS
INSTALLED
SINCE 1970
1% OF SYSTEM
Weston&Sampson

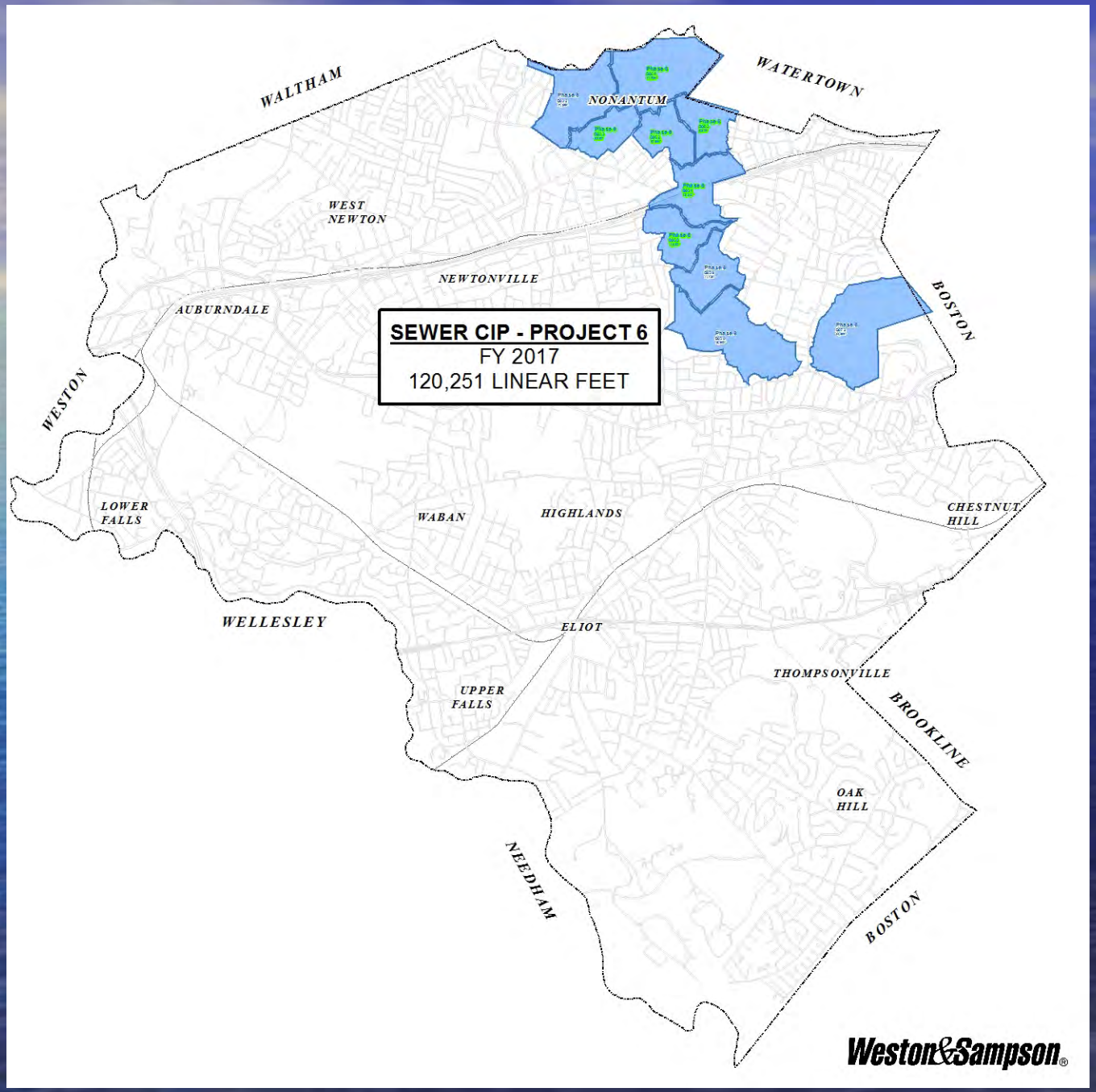

WALTHAM
WATERTOWN
NONANTUM
WEST NEWTON
NEWTONVILLE
AUBURNDALE
WESTON
BOSTON
LOWER FALLS
WABAN
HIGHLANDS
CHESTNUT HILL
WELLESLEY
ELIOT
THOMPSONVILLE
UPPER FALLS
BROOKLINE
OAK HILL
NEEDHAM
BOSTON
SEWER CIP - PROJECT 1
FY 2012
112,558 LINEAR FEET
Weston&Sampson

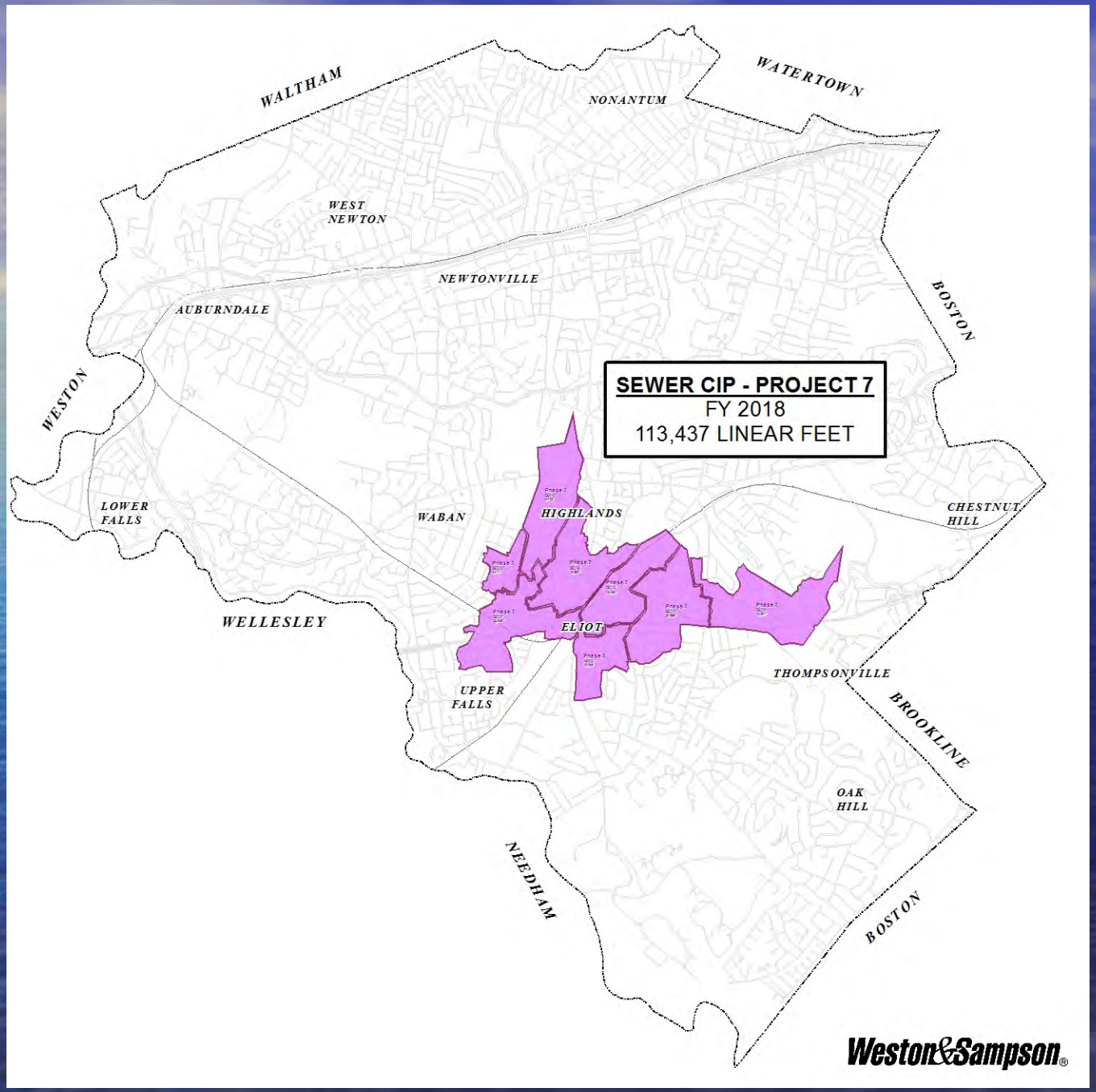

WALTHAM
WATERTOWN
NONANTUM
WEST NEWTON
NEWTONVILLE
AUBURNDALE
SEWER CIP - PROJECT 2
FY 2013
133,690 LINEAR FEET
BOSTON
WESTON
LOWER FALLS
WABAN
HIGHLANDS
CHESTNUT HILL
WELLESLEY
ELIOT
THOMPSONVILLE
UPPER FALLS
BROOKLINE
OAK HILL
NEEDHAM
BOSTON
Weston&Sampson

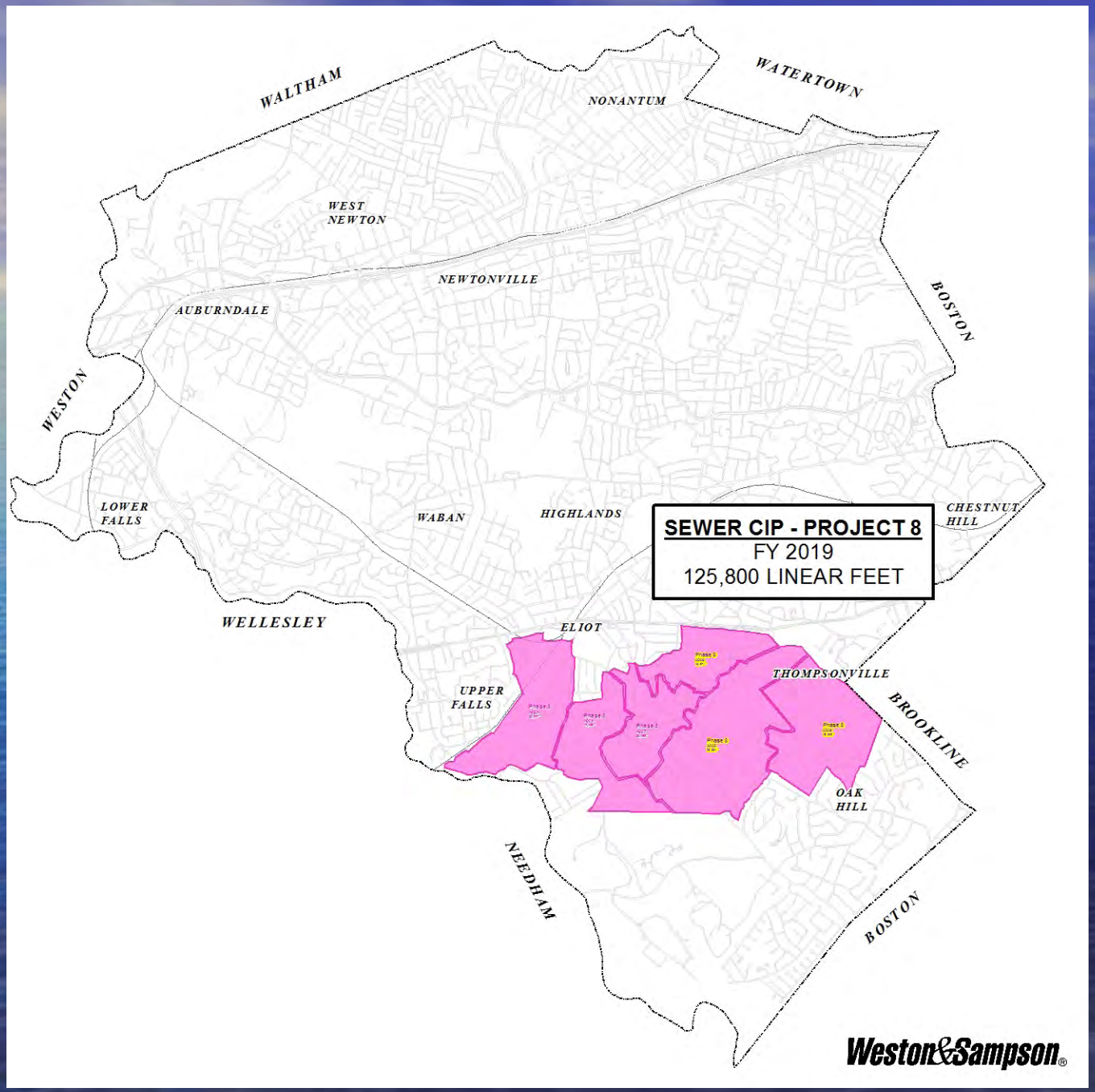

WALTHAM
WATERTOWN
NONANTUM
WEST NEWTON
NEWTONVILLE
AUBURNDALE
BOSTON
WESTON
SEWER CIP - PROJECT 3
FY 2014
109,155 LINEAR FEET
LOWER FALLS
WABAN
HIGHLANDS
CHESTNUT HILL
WELLESLEY
ELIOT
THOMPSONVILLE
UPPER FALLS
BROOKLINE
OAK HILL
NEEDHAM
BOSTON
Weston&Sampson

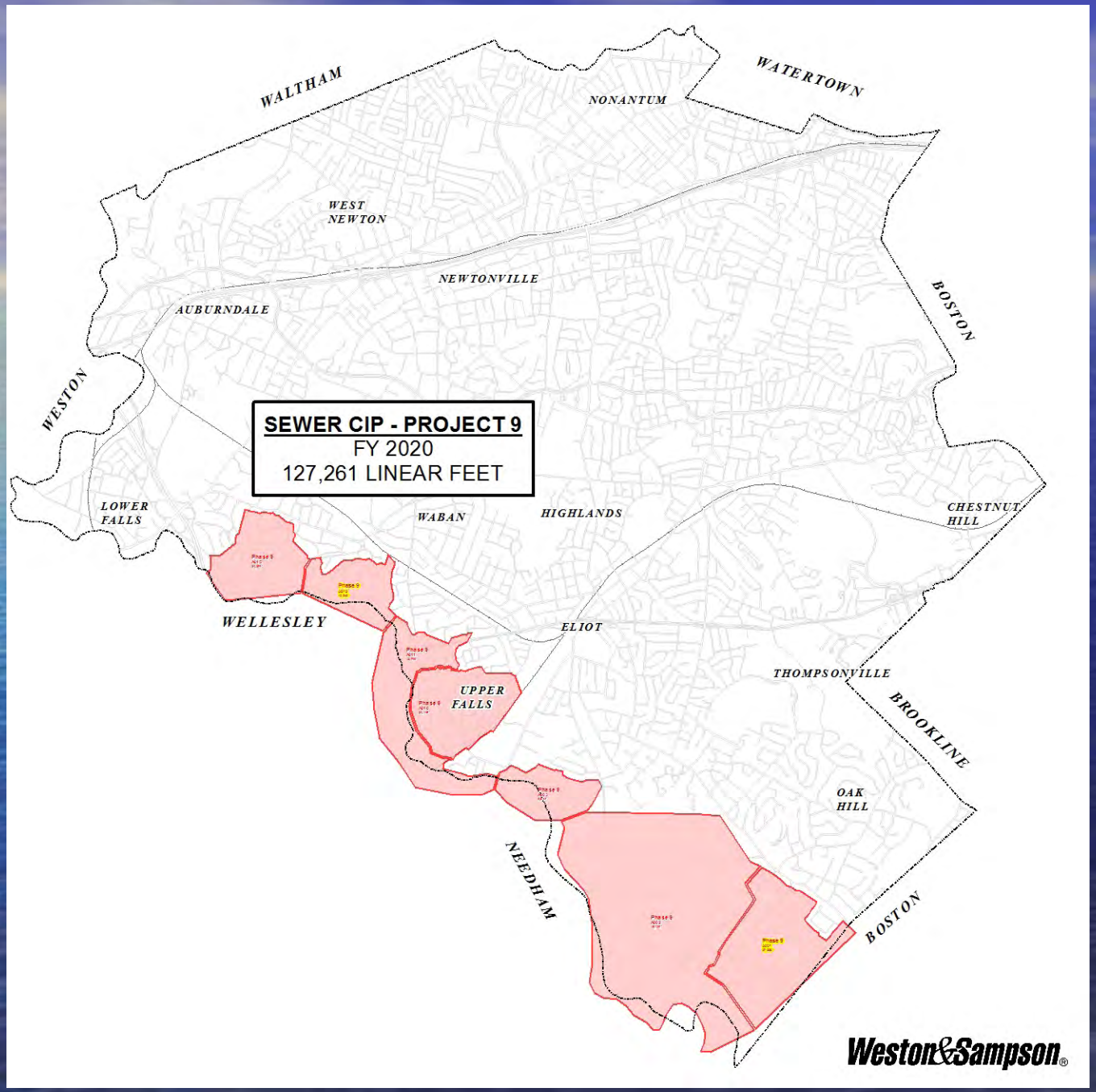

SEWER CIP - PROJECT 4
FY 2015
153,124 LINEAR FEET
WALTHAM
WATERTOWN
NONANTUM
WEST NEWTON
NEWTONVILLE
AUBURNDALE
WESTON
BOSTON
LOWER FALLS
WABAN
HIGHLANDS
CHESTNUT HILL
WELLESLEY
ELIOT
THOMPSONVILLE
UPPER FALLS
BROOKLINE
OAK HILL
NEEDHAM
BOSTON
Weston&Sampson

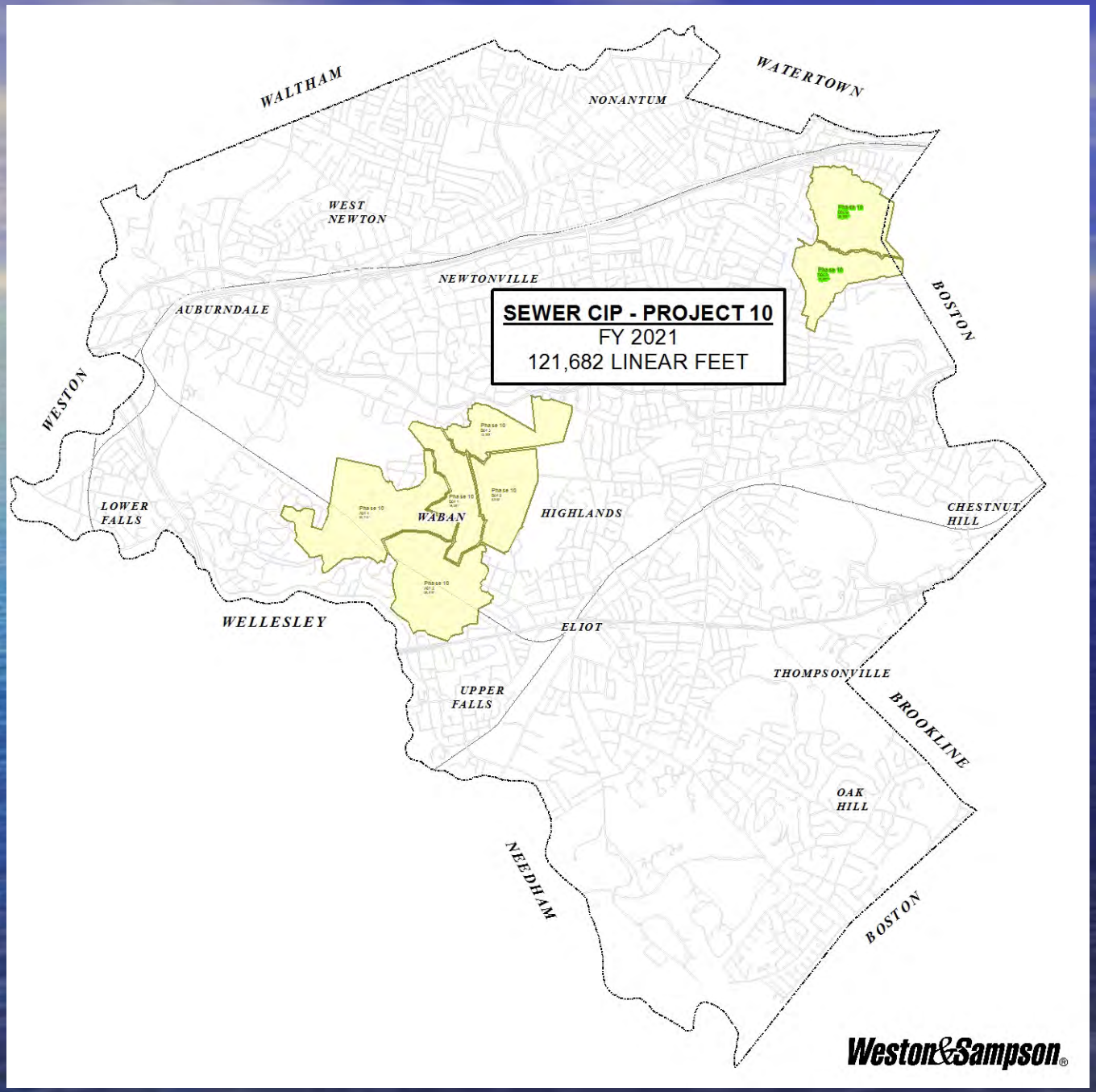

SEWER CIP - PROJECT 5
FY 2016
119,741 LINEAR FEET
WALTHAM
WATERTOWN
NONANTUM
WEST NEWTON
NEWTONVILLE
AUBURNDALE
BOSTON
WESTON
LOWER FALLS
WABAN
HIGHLANDS
CHESTNUT HILL
WELLESLEY
ELIOT
THOMPSONVILLE
UPPER FALLS
BROOKLINE
OAK HILL
NEEDHAM
BOSTON
Weston&Sampson

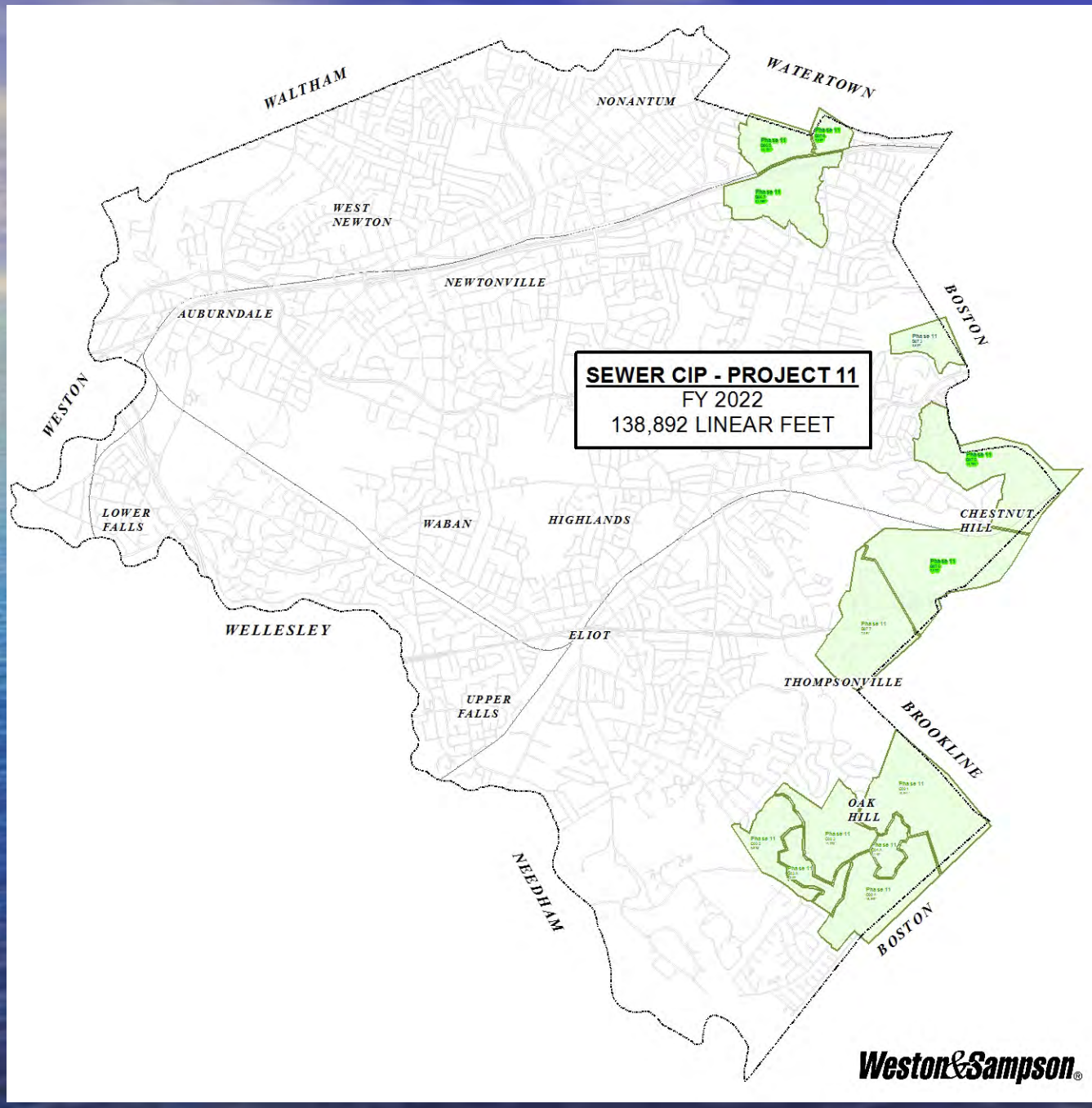

WALTHAM
WATERTOWN
NONANTUM
WEST NEWTON
NEWTONVILLE
AUBURNDALE
BOSTON
WESTON
SEWER CIP - PROJECT 6
FY 2017
120,251 LINEAR FEET
LOWER FALLS
WABAN
HIGHLANDS
CHESTNUT HILL
WELLESLEY
ELIOT
THOMPSONVILLE
UPPER FALLS
BROOKLINE
OAK HILL
NEEDHAM
BOSTON
Weston&Sampson

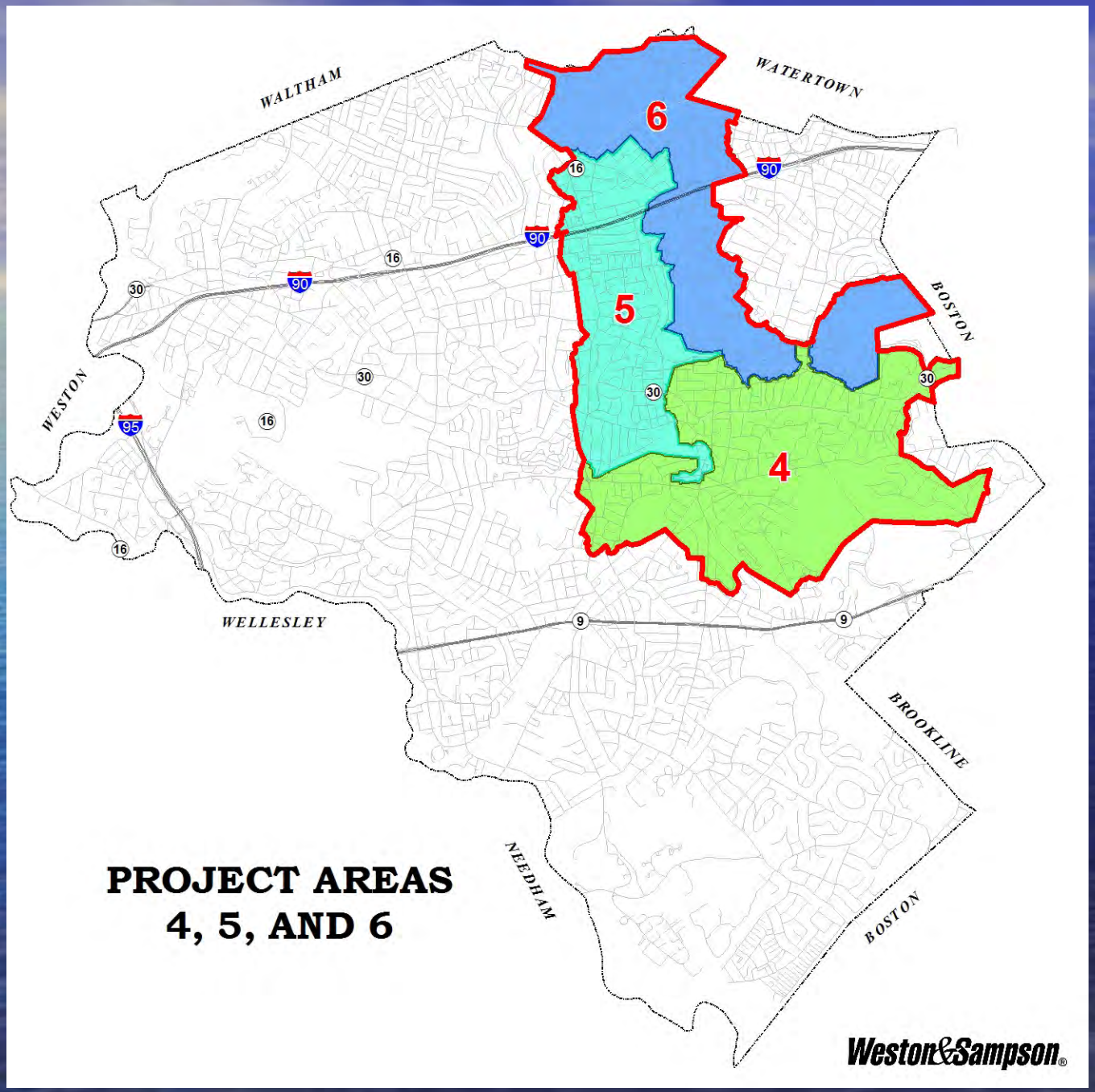

WALTHAM
NONANTUM
WATERTOWN
WEST NEWTON
NEWTONVILLE
AUBURNDALE
BOSTON
WESTON
SEWER CIP - PROJECT 7
FY 2018
113,437 LINEAR FEET
LOWER FALLS
WABAN
HIGHLANDS
CHESTNUT HILL
WELLESLEY
ELIOT
THOMPSONVILLE
UPPER FALLS
BROOKLINE
OAK HILL
NEEDHAM
BOSTON
Weston&Sampson

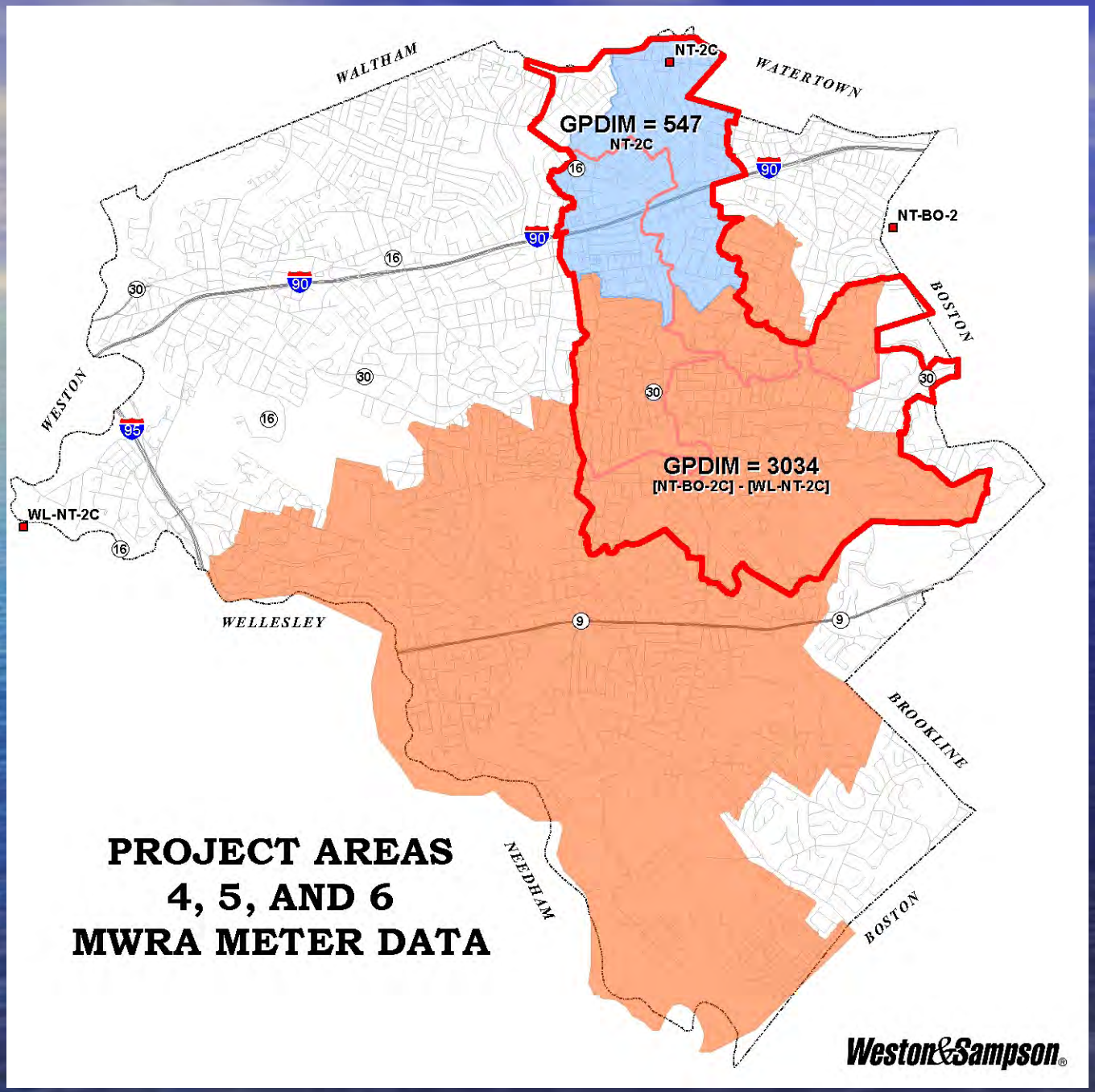

WALTHAM
NONANTUM
WATERTOWN
WEST NEWTON
NEWTONVILLE
AUBURNDALE
BOSTON
WESTON
LOWER FALLS
WABAN
HIGHLANDS
CHESTNUT HILL
SEWER CIP - PROJECT 8
FY 2019
125,800 LINEAR FEET
WELLESLEY
ELIOT
THOMPSONVILLE
UPPER FALLS
BROOKLINE
OAK HILL
NEEDHAM
BOSTON
Weston&Sampson

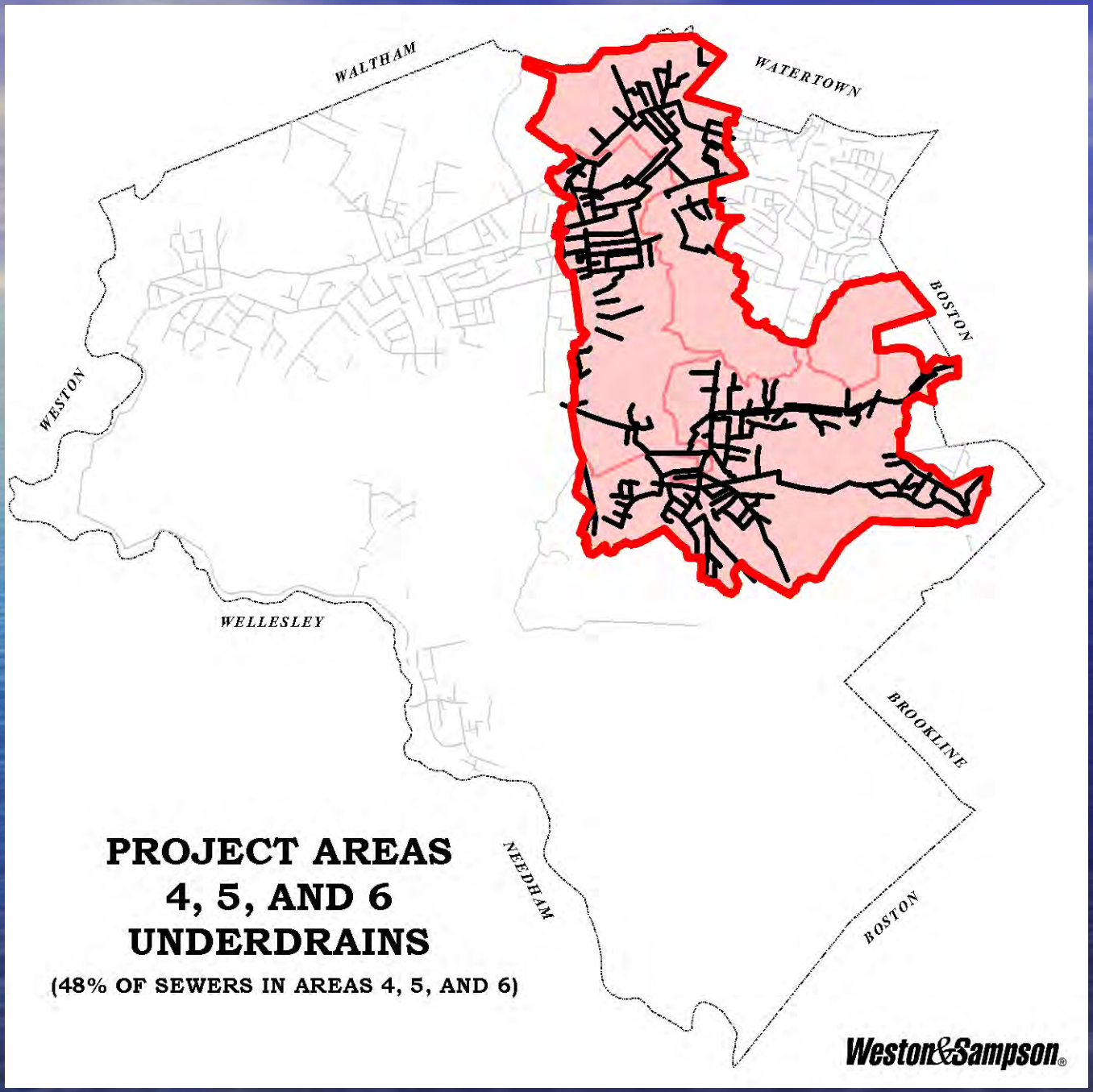

WALTHAM
NONANTUM
WATERTOWN
WEST NEWTON
NEWTONVILLE
AUBURNDALE
BOSTON
WESTON
SEWER CIP - PROJECT 9
FY 2020
127,261 LINEAR FEET
LOWER FALLS
WABAN
HIGHLANDS
CHESTNUT HILL
WELLESLEY
ELIOT
THOMPSONVILLE
UPPER FALLS
BROOKLINE
OAK HILL
NEEDHAM
BOSTON
Weston&Sampson

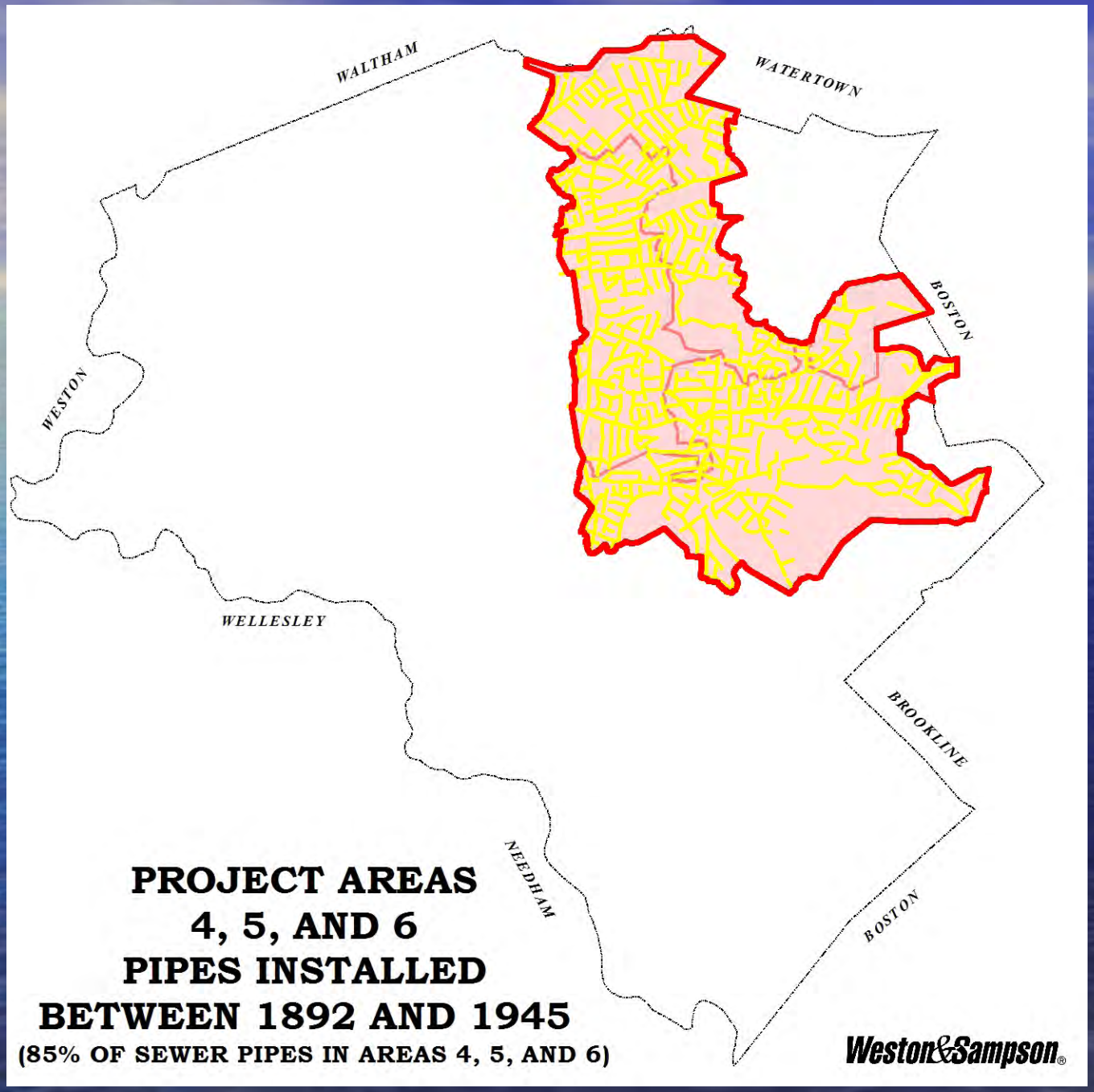

WALTHAM
NONANTUM
WATERTOWN
WEST NEWTON
NEWTONVILLE
AUBURNDALE
BOSTON
WESTON
SEWER CIP - PROJECT 10
FY 2021
121,682 LINEAR FEET
LOWER FALLS
WABAN
HIGHLANDS
CHESTNUT HILL
WELLESLEY
ELIOT
THOMPSONVILLE
UPPER FALLS
BROOKLINE
OAK HILL
NEEDHAM
BOSTON
Weston&Sampson

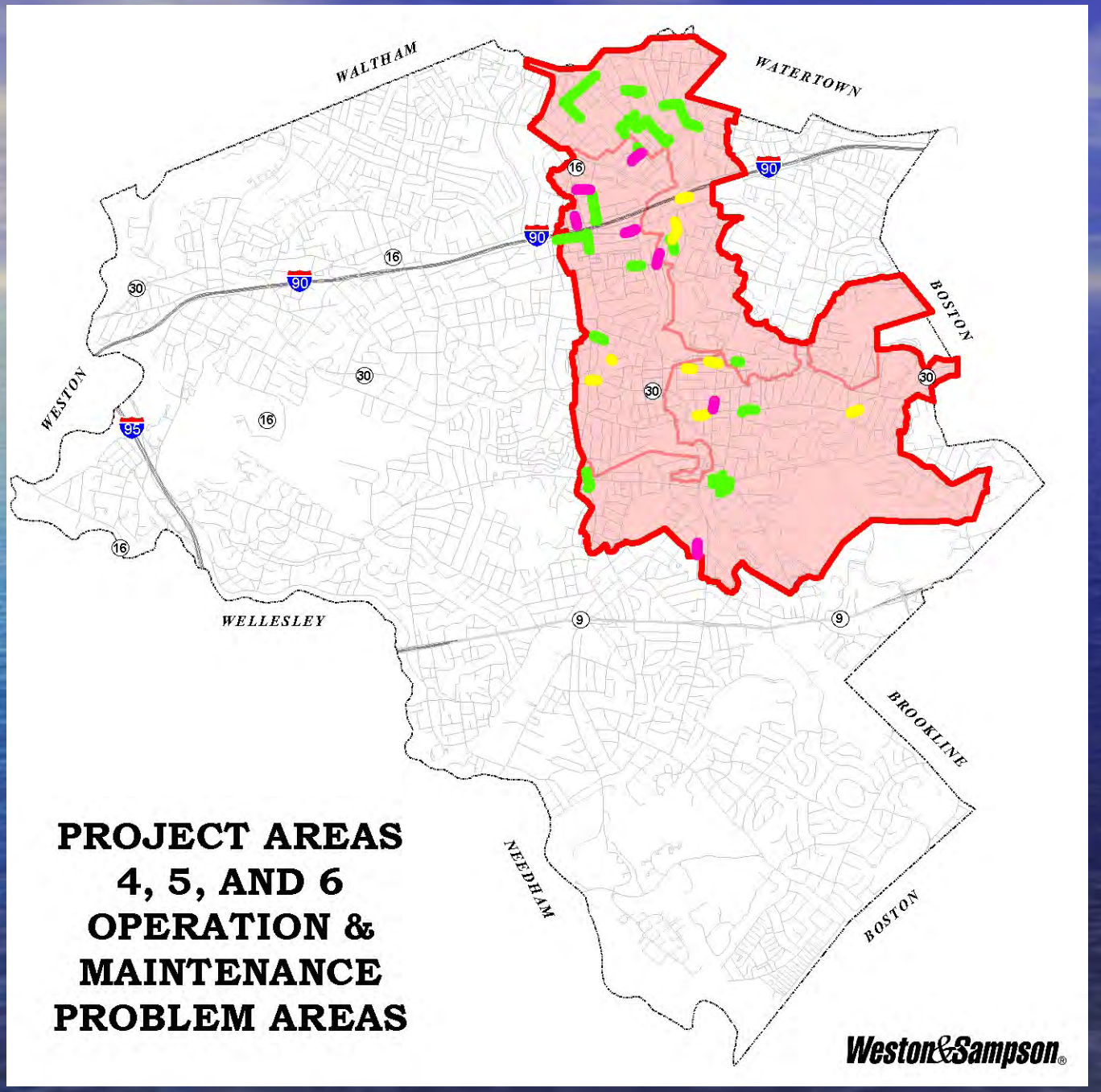

WALTHAM
WATERTOWN
NONANTUM
WEST NEWTON
NEWTONVILLE
AUBURNDALE
BOSTON
WESTON
SEWER CIP - PROJECT 11
FY 2022
138,892 LINEAR FEET
LOWER FALLS
WABAN
HIGHLANDS
CHESTNUT HILL
WELLESLEY
ELIOT
THOMPSONVILLE
UPPER FALLS
BROOKLINE
OAK HILL
NEEDHAM
BOSTON
Weston&Sampson


WALTHAM
WATERTOWN
BOSTON
WESTON
WELLESLEY
NEEDHAM
BROOKLINE
BOSTON
6
5
4
16
90
30
95
9
PROJECT AREAS
4, 5, AND 6
Weston&Sampson


WALTHAM
NT-2C
WATERTOWN
GPDIM = 547
NT-2C
NT-BO-2
BOSTON
WESTON
GPDIM = 3034
[NT-BO-2C] - [WL-NT-2C]
WL-NT-2C
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
PROJECT AREAS
4, 5, AND 6
MWRA METER DATA
Weston&Sampson


WALTHAM
WATERTOWN
BOSTON
WESTON
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
PROJECT AREAS
4, 5, AND 6
UNDERDRAINS
(48% OF SEWERS IN AREAS 4, 5, AND 6)
Weston&Sampson


WALTHAM
WATERTOWN
BOSTON
WESTON
WELLESLEY
BROOKLINE
NEEDHAM
BOSTON
PROJECT AREAS
4, 5, AND 6
PIPES INSTALLED
BETWEEN 1892 AND 1945
(85% OF SEWER PIPES IN AREAS 4, 5, AND 6)
Weston&Sampson


WALTHAM
WATERTOWN
BOSTON
WESTON
WELLESLEY
NEEDHAM
BROOKLINE
BOSTON
90
95
16
30
9
PROJECT AREAS
4, 5, AND 6
OPERATION &
MAINTENANCE
PROBLEM AREAS
Weston&Sampson

Water Analysis Elements

- Assessed system facilities –pipes, pumping facilities, storage tanks
- Updated the water distribution simulation model
- Analyzed the piping system and identified deficiencies
- Evaluated relative need for Stanton and Winchester tanks (to reduce future maintenance costs)
- Recommended system improvements to address:
  - Water quality
  - Demand conditions
  - Fire flow requirements
  - Pressure
  - System reliability

Criteria

- Fire flow analysis based on Insurance Services Office (ISO) requirements
  - Identify city's fire fighting capability including rating specific locations in Newton for flow availablity
  - ISO analysis sets insurance rates for building properties
- Pumping/Storage analysis based on maintenance of adequate pressure in system during a range of peak demand conditions