

Ms. Susan Studlien, Director
Office of Environmental Stewardship
US EPA, Region 1
OES04-5
5 Post Office Square, Suite 100
Boston, MA 02109-3912

August 25, 2017

Ms. Susannah King
Acting Director, Watershed Permitting
Division of Watershed Management
Department of Environmental Protection
1 Winter Street
Boston, MA 02108

**RE: Massachusetts Water Resources Authority NPDES Permit Number MA0103284 – MWRA
Annual Infiltration and Inflow (I/I) Reduction Report for Fiscal Year 2017**

Dear Ms. Studlien and Ms. King:

In compliance with the requirements of MWRA's NPDES Permit MA0103284 - Part I, Item 18.bb (ii) "Infiltration/Inflow" (page 28 of 32), the Authority submits this cover letter and the six Attachments listed below that together comprise the MWRA Annual Infiltration and Inflow (I/I) Reduction Report for Fiscal Year 2017.

Attachment 1 – Overview of MWRA Regional I/I Reduction Plan
Attachment 2 – MWRA Regional I/I Reduction Plan – FY17 Progress Update and Detailed
Implementation Schedule for FY18 Activities
Attachment 3 – MWRA Actions Taken to Reduce I/I During FY17
Attachment 4 – Status Update on MWRA's I/I Local Financial Assistance Program
Attachment 5 – I/I Reduction Status Update for Member Communities
Attachment 6 – CY16 Community Wastewater Flow Data

Should you require additional information, please contact Carl H. Leone, Senior Program Manager, Community Support Program at (617) 788-4356.

Sincerely,

Michael J. Hornbrook
Chief Operating Officer

cc: MassDEP - Regulatory Branch, Boston Betsy Reilley, MWRA, Environmental Quality
MassDEP - SERO Wendy Leo, MWRA, Environmental Quality
MassDEP - NERO Carl H. Leone, MWRA, Planning
Kevin Brander, MassDEP, NERO
David Butler, MassDEP, NERO

ATTACHMENT 1
TO
MWRA ANNUAL I/I REDUCTION REPORT FOR FY17
Reporting Period – July 2016 Through June 2017

OVERVIEW OF MWRA REGIONAL I/I REDUCTION PLAN

The MWRA Board of Directors approved the Regional Infiltration/Inflow (I/I) Reduction Plan on May 23, 2001 and authorized staff to submit the Plan to EPA and DEP as required under MWRA's NPDES Permit. The plan was submitted to EPA and DEP in June 2001 and DEP approved the plan in a letter dated November 19, 2002. A full copy of the Regional I/I Reduction Plan (dated September 2002) was included as Attachment 2 to the August 29, 2003 MWRA Annual I/I Reduction Report for FY03. The Regional I/I Reduction Plan is available at <http://www.mwra.com/comsupport/communitysupportmain.html>.

The Regional I/I Reduction Plan combines recommendations from the I/I Task Force Report (March 2001) with ongoing MWRA I/I reduction initiatives. The updated plan replaces the Authority's 1990 I/I Reduction Policy. Implementation of the Regional I/I Reduction Plan focuses on the cooperative efforts of member communities, DEP, EPA and MWRA to develop and implement I/I reduction and sewer system rehabilitation projects.

Under the plan, MWRA has full legal and fiscal responsibility for implementation of operation, maintenance, and I/I reduction programs for the MWRA-owned interceptor system. Each member community retains full legal and fiscal responsibility for implementation of operation, maintenance and I/I reduction programs for community-owned sewers. MWRA will provide technical and financial assistance to member communities and work cooperatively with DEP, EPA and other stakeholders to help solve local and regional sewer problems. MWRA's Regional I/I Reduction Plan is organized into five major goals:

1. MWRA will continue its current operation and maintenance program for the MWRA-owned interceptor system leading to the identification, prioritization and rehabilitation of structural and I/I problems.
2. MWRA will work cooperatively with member communities, DEP and EPA to eliminate sewer system backups into homes and other buildings and to minimize health and environmental impacts of SSOs related to I/I.
3. MWRA will work cooperatively with member communities, DEP and EPA to reduce I/I in the regional collection system with emphasis on the following: (1) inflow reduction in areas tributary to sewer backups and SSOs, (2) private source inflow reduction, (3) infiltration that may impact groundwater or surface water resources, and (4) excessive infiltration as defined in DEP regulations or guidance documents.
4. MWRA will work cooperatively with member communities, DEP and EPA to expand existing efforts to educate and involve the public regarding regional sewer backup, SSO and I/I reduction issues.
5. MWRA will provide technical assistance and work cooperatively with member communities, DEP and EPA regarding guidance on local operation and maintenance and capital improvement programs intended to provide a reasonable level of sewer service to local sewer users/ratepayers.

ATTACHMENT 2
TO
MWRA ANNUAL I/I REDUCTION REPORT FOR FY17
Reporting Period – July 2016 Through June 2017

**MWRA REGIONAL I/I REDUCTION PLAN -
FY17 PROGRESS UPDATE AND DETAILED
IMPLEMENTATION SCHEDULE FOR FY18 ACTIVITIES**

This document provides a progress update for FY17 accomplishments and a description of the activities to be accomplished during FY18 for each of the I/I reduction strategies in the MWRA Regional I/I Reduction Plan. The update appears in bold type directly below each I/I reduction strategy. This document is intended to satisfy condition 5 of DEP's November 19, 2002 letter approving the MWRA Regional I/I Reduction Plan.

Goal 1 under MWRA's Regional I/I Reduction Plan is:

MWRA will continue its current operation and maintenance program for the MWRA-owned interceptor system leading to the identification, prioritization, and rehabilitation of structural and I/I problems.

Strategy A: Utilize MWRA's internal TV inspection equipment that currently includes one fully outfitted internal TV inspection vehicles equipped with 6000 feet of multi-conductor cable. MWRA also utilizes an OZ-camera that has a 200X zoom capability. Annual inspection schedules are outlined in MWRA's Collection System O&M Manual. This strategy has an ongoing schedule that has been initiated.

Strategy B: Utilize MWRA's sonar camera to inspect siphons and force mains. Annual inspection schedules are outlined in MWRA's Collection System O&M Manual. This strategy has an ongoing schedule that has been initiated.

Strategy C: Physical inspection of collection system manholes and structures by Operations Division field crews. Annual inspection schedules are outlined in MWRA's Collection System O&M Manual. This strategy has an ongoing schedule that has been initiated.

Work by MWRA under these three Strategies is ongoing.

During FY17, MWRA properly operated and maintained the MWRA-owned interceptor system. Annual performance targets and ongoing accomplishments are tracked as part of the Authority's MAXIMO maintenance database and are reported monthly to MWRA senior management. Specific activities undertaken by MWRA for FY17 are detailed in Attachment 3. Additional information on MWRA's FY17 maintenance activities is provided under separate submittal - NPDES Part I.18.g Annual Maintenance Status Sheets.

During FY18, MWRA will continue to properly operate and maintain the MWRA-owned interceptor system.

Goal 2 under MWRA's Regional I/I Reduction Plan is:

MWRA will work cooperatively with member communities, DEP, and EPA to eliminate sewer system backups into homes and other buildings and to minimize health and environmental impacts of SSOs related to I/I.

Strategy A: MWRA will provide technical assistance to DEP to develop a uniform format for use by communities for reporting wastewater backup and sewer system overflow information. A representative group of communities should be consulted for review. MWRA will provide technical assistance to DEP to develop a system to record the information reported by communities into a usable database format. This database may have the capability to be linked to GIS mapping and the information may be made available to communities, MWRA, DEP, EPA, watershed groups, the general public, etc. upon appropriate request. This strategy has an ongoing schedule that should be initiated in the short-term. Completion of this strategy requires a significant resource commitment by DEP. Collection and recording of sewer backup and SSO information from member community sewer systems is the responsibility of DEP. DEP will be responsible for management of collection and distribution of these records. (Cross-reference this strategy to the I/I Task Force Report recommendations 4.1 Strategy A-2 and 5.2 Strategy B-2)

Work by MWRA under this Strategy is complete as noted below.

During spring 2001 MWRA provided MassDEP a draft SSO reporting/record keeping electronic database format that was developed by Malcolm-Pirnie, Inc. under contract to MWRA. This work was completed by MWRA as technical assistance to MassDEP. A follow-up letter dated June 20, 2001 requested MassDEP identify the format for finalizing the SSO reporting/record keeping electronic database.

During FY04, MassDEP (in conjunction with staff in the Massachusetts Information Technology Division), developed a revised format SSO electronic database package. This project was part of statewide efforts to upgrade computerized resources and electronic access. The system was demonstrated at an April 8, 2004 MassDEP/MWRA joint community workshop.

In May 2005, MassDEP developed a revised Reporting Form "Sanitary Sewer Overflow/Bypass/Backup Notification Form (rev 05/2005)." This form was made available on the MassDEP web site and reporting was via FAX or by mail. Following development of the web based reporting form by MassDEP, roll-out of the SSO reporting/record keeping electronic database was not completed.

In January 2013, MassDEP developed the most recent revised Reporting Form "Sanitary Sewer Overflow (SSO)/Bypass Notification Form (rev 01/2013)." As of July 2017, this form is available on the MassDEP web site and reporting using the form is via FAX or by mail. As of July 2017, an SSO reporting/record keeping electronic database is not included among the searchable databases available on the MassDEP web site.

As requested by MassDEP, on August 22, 2011 MWRA provided MassDEP specific SSO site location information for SSO's on MWRA-owned northern system sewers (for events during the period January 2000 through June 2011), including street location, longitude and latitude location, and GIS site maps.

During FY16, MWRA added more specific information on SSOs on the MWRA web site at: <http://www.mwra.com/03sewer/html/sso.html>. This information includes information on what an SSO is, public health impacts, how SSOs can be prevented, and what MWRA does when an SSO occurs. The web site also includes an interactive GIS site map for SSOs that have been reported by MWRA for the following SSO event display selections: currently active, past 2 days, past 30 days, and past 12 months.

Strategy B: Once a central information database is established (see Strategy A), MWRA will periodically delineate areas which may be “at risk” for backups and SSOs that may be impacted by the MWRA-owned collection system. MWRA will evaluate potential improvements to the MWRA-owned collection system that may reduce the risk of sewer backups and SSOs. This strategy should be completed in the mid to long-term. (Cross-reference this strategy to the I/I Task Force Report recommendations 4.3 Strategy C-2 and 5.5 Strategy E-2)

Work by MWRA under this Strategy is complete as noted below. Some ongoing work performed by MWRA that is associated with this Strategy is also noted.

MWRA utilizes MassDEP’s Sanitary Sewer Overflow (SSO)/Bypass Notification Form (rev 01/2013) to report SSOs from MWRA’s collection system.

MWRA does not have SSOs related to dry weather sewer system capacity issues. MWRA does not have SSOs related to wet weather sewer capacity issues for rainfall events at or below the MassDEP recommended standard design storm for inflow having a one year recurrence interval and a duration of six hours (see MassDEP’s Guidelines for Performing I/I Analyses and Sewer System Evaluation Surveys – Revised May 2017). The one-year, six-hour storm produces approximately 1.72 inches of rainfall in the Boston area. During extreme storm events that exceed the MassDEP recommended design storm, I/I entering the upstream community-owned collection systems may cause an occasional SSO in the MWRA regional interceptor system.

During FY17, MWRA continued its ongoing priority program to clean and inspect all inverted siphons in the MWRA-owned collection system. This program is intended to minimize potential SSOs upstream of siphons and reduce the risk of hydraulic limitations and/or blockage from debris buildup in siphon barrels. The cleaning and inspection program will continue in FY18.

Strategy C: Once a central information database is established (see Strategy A) and member communities have delineated areas which may be “at risk” for backups and SSOs, MWRA - jointly with DEP - will provide technical assistance to member communities to evaluate potential improvements to local infrastructure that may reduce the risk of sewer backups and SSOs. MWRA will assist communities to determine if impacts from the regional collection system are an issue. The schedule for this strategy is dependent on prior actions by DEP and member communities. (Cross-reference this strategy to the I/I Task Force Report recommendations 4.3 Strategy C-1 and 5.5 Strategy E-1)

MassDEP’s roll-out of the SSO reporting/record keeping electronic database was not completed (see Strategy A above).

As part of its ongoing program to support member community I/I reduction and sewer system rehabilitation programs, MWRA offers technical assistance to communities to review local I/I reduction plans and regional SSO problems. MWRA also offers member communities financial assistance for I/I reduction projects. During FY18, at the request of member communities, MWRA will continue to provide technical and financial assistance on local sewer system projects.

Strategy D: For the MWRA-owned interceptor system, MWRA will review and analyze the health and environmental impacts of existing SSO sites. SSO sites will be prioritized based on the frequency and duration of activations and the resulting health and environmental impacts, including: potential for human contact, impact to water supply, impact to shellfish beds or other economic resources, impact to animal or aquatic habitat, etc. This strategy will be completed in the short-term. (Cross-reference this strategy to the I/I Task Force Report recommendation 5.3 Strategy C-1)

Work by MWRA under this Strategy is complete. As previously stated, MWRA does not have SSOs related to dry weather sewer system capacity issues. MWRA also does not have SSOs related to wet weather sewer capacity issues for rainfall events at or below the MassDEP recommended standard design storm for inflow having a one year recurrence interval and a duration of six hours (see MassDEP’s Guidelines for Performing I/I Analyses and Sewer System Evaluation Surveys – Revised May 2017). Since prior SSOs have been eliminated for sewer capacity issues at or below the collection system design standard for inflow, additional work under this strategy is not necessary.

Strategy E: Utilizing the priority ranking to be completed in Strategy D above, as well as system hydraulic analyses, MWRA (for the MWRA-owned interceptor system) - in conjunction with DEP and EPA - will evaluate the potential to eliminate each overflow. Appropriate I/I reduction and/or relief sewer projects that may eliminate (or minimize) SSOs from MWRA-owned interceptors will be evaluated. This strategy will be initiated in the short to mid-term; however, implementation of projects developed from the evaluation may span beyond the long-term time frame as defined within the Regional I/I Reduction Plan. (Cross-reference this strategy to the I/I Task Force Report recommendation 5.3 Strategy C-2)

Work by MWRA under this Strategy is complete as noted below. Some ongoing work that is associated with this Strategy is also noted.

As previously stated, MWRA does not have SSOs related to dry weather sewer system capacity issues. MWRA also does not have SSOs related to wet weather sewer capacity issues for rainfall events at or below the MassDEP recommended standard design storm for inflow having a one year recurrence interval and a duration of six hours (see MassDEP’s Guidelines for Performing I/I Analyses and Sewer System Evaluation Surveys – Revised May 2017). Since prior SSOs have been eliminated for sewer capacity issues at or below the collection system design standard for inflow, additional work under this strategy is not necessary.

During FY14 (as of April 25, 2014), MassDEP revised its Regulation 314 CMR 12.00 *Operation, Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Dischargers*. The revisions include a requirement for all public entities that

own a sewer system to complete an I/I analysis by December 31, 2017. The analysis also must specifically include an assessment of the risk of sewer system overflows.

As part of its ongoing program to support member community I/I reduction and sewer system rehabilitation programs, MWRA offers technical assistance to communities to review local I/I reduction plans and regional SSO problems. MWRA also offers member communities financial assistance for I/I reduction projects. During FY18, at the request of member communities, MWRA will continue to provide technical and financial assistance on local sewer system projects. MWRA will also continue to work on projects in the MWRA Capital Improvement Program, as summarized in Attachment 3.

Strategy F: For those overflows that are unlikely to be eliminated in the short to mid-term (based on the evaluation from Strategy E, above), MWRA (for the MWRA-owned interceptor system) will consider developing interim measures to relocate or otherwise mitigate the impact of existing overflows on human and natural resources. The priority ranking (from Strategy D, above) will be utilized in development of interim mitigation measures. This strategy has an ongoing schedule that should be initiated in the short-term. (Cross-reference this strategy to the I/I Task Force Report recommendation 5.3 Strategy C-3)

Work by MWRA under this Strategy is ongoing.

As previously stated, MWRA does not have SSOs related to dry weather sewer system capacity issues. MWRA also does not have SSOs related to wet weather sewer capacity issues for rainfall events at or below the MassDEP recommended standard design storm for inflow having a one year recurrence interval and a duration of six hours (see MassDEP's Guidelines for Performing I/I Analyses and Sewer System Evaluation Surveys – Revised May 2017). The one-year, six-hour storm produces approximately 1.72 inches of rainfall in the Boston area.

During FY17, MWRA continued its ongoing priority program to clean and inspect all inverted siphons in the MWRA-owned collection system. This program is intended to minimize potential SSOs upstream of siphons and reduce the risk of hydraulic limitations and/or blockage from debris buildup in siphon barrels. The cleaning and inspection program will continue in FY18.

During extreme storm events that exceed the MassDEP recommended standard design storm for inflow, I/I entering the upstream community-owned collection systems may cause an occasional SSO in the MWRA regional interceptor system. Continued coordination with member communities to reduce I/I from local collection systems will help to minimize SSOs that may occur during extreme storm events. Most recently (beginning in FY15), an additional \$160 million in 75% grants and 25% interest-free loans was added as Phases 9 and 10 (\$80 million for each Phase) of the I/I Local Financial Assistance Program to help fund community I/I reduction projects. Note that MWRA has enhanced the Phase 9 and 10 Phases of its grant/loan community funding program by increasing the grant portion from 45% to 75%. MWRA's commitment to fund local sewer rehabilitation projects under the I/I Local Financial Assistance Program totals \$460.75 million. Through FY17, \$332 million in grants and interest-free loans has been distributed to member sewer communities.

Strategy G: MWRA will assist DEP, member communities, and other regional stakeholders to inform local plumbing inspectors of the regional priority of eliminating sewer system backups. Plumbing inspectors will be requested to work more closely with local DPW staff to identify sewer system backup problem areas and locations where backflow prevention devices may be required. MWRA expects to meet this strategy by distributing a letter to the plumbing inspector in each member community that discusses sewer backups, potential public health impacts, backflow prevention, and coordination with the local DPW to identify problem areas. This strategy will be completed in the short-term. (Cross-reference this strategy to the I/I Task Force Report recommendation 4.2 Strategy B-4)

Work by MWRA under this Strategy is complete as noted below.

On September 26, 2005, MWRA distributed an informational package on Sewer Backups and Sanitary Sewer Overflows to all service area community plumbing inspectors, Health Departments (Boards of Health), DPW Directors, Engineering Departments, and collection system operators. The package included information from fourteen separate sources and provided many web links for additional information. On September 29, 2005, MWRA sent a copy of the informational package to EPA, MassDEP, all MWRA water-only member communities, and local watershed associations. Currently this type of information is widely available via the internet.

Goal 3 under MWRA's Regional I/I Reduction Plan is:

MWRA will work cooperatively with member communities, DEP, and EPA to reduce I/I in the regional collection system with emphasis on the following: (1) inflow reduction in areas tributary to sewer backups and SSOs, (2) private source inflow reduction, (3) infiltration that may impact groundwater or surface water resources, and (4) excessive infiltration as defined in DEP regulations or guidance documents.

Strategy A: MWRA will continue to analyze available MWRA wastewater metering data to estimate community infiltration and inflow rates. MWRA will provide this information along with technical assistance to help interpret the information to member communities. This strategy has an ongoing schedule that has been initiated. (Cross-reference this strategy to the I/I Task Force Report recommendations 6.1 Strategy A-1, and 7.1 Strategy A-1).

Work by MWRA under this Strategy is ongoing.

During FY17, MWRA continued to estimate community infiltration and inflow rates on a bimonthly basis. Community wastewater flow data for CY16 is included as Attachment 6. These flow data tables are available to all users on MWRA's web site. Community wastewater flow rate basis data is distributed to member communities throughout the year on a bimonthly basis. \$23.3 million in funds for the next phases of the wastewater meter replacement/upgrade project are programmed in MWRA's Capital Improvement Program during FY18-28.

During FY18, MWRA will continue to estimate community infiltration and inflow rates on a bimonthly basis and make this information available to MWRA member communities. MWRA will provide the information to EPA and MassDEP as part of the annual summary report on actions taken to reduce I/I (submitted annually by September 1 per the NPDES Permit).

Strategy B: MWRA, in cooperation with member communities, will evaluate the feasibility of developing and operating an expanded emergency notification system (ENS). Currently, the MWRA remotely monitors wastewater flow at key locations within the regional collection system before and during wet weather events. Interested communities are notified when sewer system depths reach critical levels. The Authority and member communities use this information to forecast problem areas, predict potential sewer system overflows and deploy work crews. The MWRA's wastewater metering system will be upgraded over the next few years. This upgrade may impact the ENS. MWRA is also investigating, over the next three to five years, the benefits of adding SCADA-type meters at some key locations in the collection system. After completion of the two ongoing projects, MWRA will evaluate whether an ENS system can be used efficiently to provide information at the local level. This strategy will be completed in the long-term or more extended time frame subject to the schedule of the ongoing projects noted above. (Cross-reference this strategy to the I/I Task Force Report recommendation 5.4 Strategy D-1)

Work by MWRA under this Strategy is complete as noted below.

MWRA's Wastewater Meter Replacement project was completed in FY06. The system continues to be used to monitor wastewater flow at key locations within the regional collection system before and during wet weather events. Interested communities are notified when sewer system depths reach critical levels.

During FY18, MWRA will begin the next Wastewater Metering System upgrade project with a complete review of metering equipment and software technologies, review of MWRA's community metering methodologies, and subsequent design and construction of upgrades. This project is planned for FY18-22 with a budget of over \$14.0 million.

Strategy C: MWRA will provide technical assistance to member communities to establish written infiltration and inflow identification and removal programs as outlined in the I/I Task Force Report. This strategy has an ongoing schedule that will be initiated in the short to mid-term. (Cross-reference this strategy to the I/I Task Force Report recommendations 6.1 Strategy A-1, and 7.1 Strategy A-1)

Work by MWRA under this Strategy is ongoing.

During FY14 (as of April 25, 2014), MassDEP revised its Regulation 314 CMR 12.00 Operation, Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Dischargers. The revisions include a requirement for all public entities that own a sewer system to complete an I/I analysis by December 31, 2017. The analysis also must specifically include an assessment of the risk of sewer system overflows.

During FY17, MWRA staff continued to meet with community representatives to provide technical assistance and discuss local programs. Communities are often interested in utilizing MWRA wastewater meter data and flow component analyses for local I/I and SSES studies. Communities also discuss what sewer system rehabilitation actions other communities are pursuing. MWRA's Advisory Board Operation Committee meetings are used as a platform for member communities to share information on projects and lessons learned. All member sewer communities are actively participating in MWRA's \$460.75 million I/I Local Financial Assistance Program (see Attachment 4). Community I/I reduction programs are generally being conducted by local engineering consultants under contract to the communities. These projects generally utilize standards established in MassDEP's May 2017 I/I Guidelines. This work will continue in FY18.

Strategy D: MWRA will provide technical assistance to member communities that seek to emphasize infiltration removal that may impact groundwater and surface water resource areas. MWRA will provide GIS mapping information to member communities that identifies water resource areas, provides an overlay of local and regional sewers, and delineates watersheds. The I/I Task Force Report recommends communities target areas where infiltration reduction will provide the most meaningful benefit for aquifer recharge, stream flow, wetlands and water levels in lakes and ponds. The Task Force also recommends communities coordinate their infiltration reduction efforts with appropriate EOEAs Watershed Teams, local watershed groups and the local conservation commission. Distribution of MWRA mapping information is intended to assist member communities in fulfilling this I/I Task Force recommendation. This strategy has an ongoing schedule that will be initiated in the short to mid-term. (Cross-reference this strategy to the I/I Task Force Report recommendation 7.1 Strategy A-5)

Work by MWRA under this Strategy is complete as noted below. Some ongoing work performed by MWRA that is associated with this Strategy is also noted. Additional community technical assistance is provided upon request as noted under Strategy C, above.

During FY05, MWRA completed a major upgrade to its electronic sewer database and GIS mapping system. Also during FY05, MWRA completed coordination with local communities to more accurately map connection points of local sewers to the MWRA interceptor system and GPS located all wastewater meter sites located in community-owned sewers. Significant GIS mapping upgrades were rolled-out in FY06. In July 2006, MWRA provided GIS maps with detailed water resource information overlaid with the local sewer system to each MWRA member sewer community. In addition, land use mapping was also distributed to the communities. The distribution of this GIS mapping information fulfilled MWRA's work under Strategy D.

During FY14 and continuing through FY17, MWRA updated prior (or developed new) GIS mapping information partnership agreements with most MWRA member water and sewer communities to share MWRA/community GIS mapping data. Under the partnership agreements, MWRA and member communities have signed nondisclosure agreements that detail security protocols necessary to safeguard water and sewer system data. MWRA continues to coordinate with member communities to add GIS partners and update existing data. This work will continue in FY18.

Strategy E: MWRA, in coordination with the MWRA Advisory Board, will continue to fund the I/I Local Financial Assistance Program to provide grants and loans to member sewer communities to fund local I/I reduction projects. Through September 2002, MWRA has authorized a total budget of \$140.75 million to fund this program. Financial assistance is provided through 45 percent grants and 55 percent interest-free loans for eligible projects. The MWRA Board of Directors has approved the program through FY2010. The I/I Local Financial Assistance Program is fully detailed in the "Program Guidelines" document available from the MWRA Community Support Program. This strategy has an ongoing schedule that has been initiated. (Cross-reference this strategy to the I/I Task Force Report recommendation 10.2 Strategy B-1)

Work by MWRA under this Strategy is ongoing.

In June 2004, the MWRA Board of Directors approved an additional \$40 million (\$18 million in grants and \$22 million in interest-free loans) to increase the total I/I Local Financial Assistance Program budget to \$180.75 million and extended program distribution through FY13. The additional \$40 million (Phase 5) in financial assistance funds became available to the communities in FY05.

In June 2006, the MWRA Board of Directors approved an additional \$40 million (\$18 million in grants and \$22 million in interest-free loans) to increase the total I/I Local Financial Assistance Program budget to \$220.75 million and extended program distributions through FY15. The additional \$40 million (Phase 6) in financial assistance funds became available to the communities in FY07.

In June 2009, the MWRA Board of Directors approved an additional \$40 million (\$18 million in grants and \$22 million in interest-free loans) to increase the total I/I Local

Financial Assistance Program budget to \$260.75 million and extended program distributions through FY18. The additional \$40 million (Phase 7) in financial assistance funds became available to the communities in FY10.

In June 2012, the MWRA Board of Directors approved an additional \$40 million (\$18 million in grants and \$22 million in interest-free loans) to increase the total I/I Local Financial Assistance Program budget to \$300.75 million and extended program distributions through FY21. The additional \$40 million (Phase 8) in financial assistance funds became available to the communities in FY13.

In June 2014, the MWRA Board of Directors approved an additional \$160 million (\$120 million in 75% grants and \$40 million in 25% interest-free 10-year loans) to increase the total I/I Local Financial Assistance Program budget to \$460.75 million and extended program distributions through FY25. The additional \$160 million (\$80 million each for Phases 9 and 10) in financial assistance funds became available to the communities in FY15. Note that MWRA has enhanced the Phase 9 and 10 Phases of its grant/loan community funding program by increasing the grant portion from 45% to 75%. Also, the loan portion repayment period has been extended from 5 to 10 years. As of FY15, MWRA's commitment to fund local sewer rehabilitation projects under the I/I Local Financial Assistance Program totals \$460.75 million.

During FY17, MWRA continued to provide grants and loans to member sewer communities to fund local I/I reduction and sewer system rehabilitation projects. A total of \$22.2 million was distributed during FY17. Since program inception in May 1993, \$332 million has been distributed to fund 528 local projects. The program Guidelines, Financial Assistance Application, and summary of available funds by community are posted on the MWRA Community Support Program web page at <http://www.mwra.com/comsupport/communitysupportmain.html>. A status update on MWRA's I/I Local Financial Assistance Program is included as Attachment 4.

During FY18, MWRA will continue to distribute funds and assist communities in the management of projects under the I/I Local Financial Assistance Program. MWRA's remaining financial assistance funds are authorized for distribution through FY25.

Strategy F: MWRA, in coordination with the MWRA Advisory Board, will continue to provide emergency assistance to member communities for sewer services on local collection systems that are routinely performed by MWRA staff for the MWRA-owned interceptor system. Examples of past community assistance provided by MWRA staff include: emergency response assistance, bypass pumping, internal TV inspection, sewer cleaning, flow metering, engineering technical assistance, etc. This strategy has an ongoing schedule that has been initiated. (Cross-reference this strategy to the I/I Task Force Report recommendations 9.6 Strategy F-2, and 10.2 Strategy B-2)

Work by MWRA under this Strategy is ongoing.

During FY17, MWRA continued to provide emergency assistance to member communities, as requested. These efforts typically included internal TV inspection of local sewers and associated sewer cleaning, as well as, other emergency assistance. During FY18, MWRA will continue to provide emergency assistance to member communities.

Goal 4 under MWRA's Regional I/I Reduction Plan is:

MWRA will work cooperatively with member communities, DEP, and EPA to expand existing efforts to educate and involve the public regarding regional sewer backup, SSO, and I/I reduction issues.

Strategy A: MWRA will act as a "clearinghouse" to collect and distribute information on I/I and SSO issues. Other groups, agencies, associations, community representatives, and local citizens wishing to disseminate information on I/I and SSO issues within the region can provide a copy to MWRA that will be copied and distributed. MWRA staff will maintain a database of contacts with Federal, State and community officials, as well as, local associations and individuals that wish to stay informed on I/I and SSO issues. Summary mailings will be made periodically. MWRA, in coordination with the MWRA Advisory Board, will also act as a clearinghouse to inform regional stakeholders about the progress of efforts to increase state and federal funding for I/I reduction and SSO projects. Regional stakeholders will be advised on the most appropriate time to provide input and lobbying efforts. This strategy has an ongoing schedule that will be initiated in the short-term. (Cross-reference this strategy to the I/I Task Force Report recommendations 8.1 Strategy A-1, 10.4 Strategy C-5, and 10.4 Strategy D-2)

Work by MWRA under this Strategy is ongoing.

During FY17, MWRA distributed technical information to member community Public Works Directors, local wastewater/water system operators, and local watershed groups, including:

- **MWRA continued to estimate community infiltration and inflow rates on a bimonthly basis. Community wastewater flow data for CY16 is included as Attachment 6. These flow data tables are available to all users on MWRA's web site. Community wastewater flow rate basis data is distributed to member communities throughout the year on a bimonthly basis. \$23.3 million in funds for the next phase of wastewater meter replacement/upgrade project are programmed in MWRA's Capital Improvement Program during FY18-28.**
- **July 5, 2016, MWRA staff distributed letters to the three sewer communities that had not yet applied for their Phase 6 I/I Local Financial Assistance Program grant/loan funds. The letters notified the communities that the grant portion of the financial assistance "sunsets" at the end of FY18.**
- **March 3, 2017, MWRA staff distributed letters to the three sewer communities that had not yet applied for their Phase 6 I/I Local Financial Assistance Program grant/loan funds. The letters notified the communities that the grant portion of the financial assistance "sunsets" at the end of FY18.**
- **March 6, 2017, MWRA staff distributed correspondence to all sewer communities with an update on funds available under the I/I Local Financial Assistance Program (grant/loan funds) and requested information on the community's projected three year spending plan.**

- **March 15, 2017, MWRA staff provided an update presentation on the I/I Local Financial Assistance Program to the MWRA Board of Directors. The Board approved staff recommended modifications to the Program Guidelines to increase eligibility for more holistic community infrastructure planning. The modifications were based on discussions with community representatives at via MWRA Advisory Board meetings. All Staff Summaries to the MWRA Board of Directors are posted on MWRA web site at www.mwra.com.**
- **March 15, 2017, MWRA staff provided an update presentation on the Local Water System Assistance Program to the MWRA Board of Directors. All Staff Summaries to the MWRA Board of Directors are posted on MWRA web site at www.mwra.com.**
- **March 16, 2017, MWRA staff distributed an announcement letter on water conservation educational materials and low-flow device retrofit kits available from MWRA at no cost to member communities, local customers, watershed associations, environmental groups, housing authorities, condo associations, etc.**
- **March 20, 2017, Local Water System Assistance Program funding (interest-free 10-year loans) update e-mails were distributed to each member community.**
- **April 20, 2017, MWRA staff provided an update presentation on the Local Water System Assistance Program to the MWRA Advisory Board and community representatives.**
- **May 18, 2017, correspondence were distributed to each member community with a link to MassDEP's May 2017 update Guidelines for Performing Infiltration/Inflow Analyses and Sewer System Evaluation Surveys. This update included a link to MassDEP's Regulations 314 CMR 12.00.**
- **Mid-June 2017, annual community I/I questionnaire were distributed to member communities to acquire information on FY17 local I/I reduction programs for development of MWRA's Annual I/I Reduction Report (see Attachment 5).**
- **June 29, 2017, MWRA staff distributed letters to the three sewer communities that had not yet applied for their Phase 6 I/I Local Financial Assistance Program grant/loan funds. The letters notified the communities that the grant portion of the financial assistance "sunset" at the end of FY18.**
- **July 19, 2017, MWRA staff distributed correspondence to all water communities announcing the MWRA's \$292 million Phase 3 Local Water System Assistance (Loan) Program with a link to the MWRA Community Support Web page for more information.**

During FY18, MWRA will continue to distribute information on I/I and SSO issues, as appropriate.

Strategy B: MWRA will develop and distribute a summary of previous information/technology distributions regarding I/I reduction and SSOs. The summary will be organized by topic and distributed to all regional stakeholders in MWRA's database of contacts. This summary can be used as a tool to help reference previously distributed information. This strategy will be completed in the short-term. (Cross-reference this strategy to the I/I Task Force Report recommendation 8.1 Strategy A-2)

Work by MWRA under this Strategy is complete as noted below.

On August 8, 2007, MWRA distributed a Technical Transfer Summary package that included lists of previously distributed information under five separate topic headings: (1) Reports, Handbooks, and Guidelines; (2) Sewer Back-ups, SSOs, and Flooding; (3) Public Source I/I Reduction; (4) Private Source I/I Reduction; and (5) Brochures and Bill Stuffers. Additional information/technology distributions will continue under Strategy A, above.

Strategy C: MWRA, jointly with DEP (and possibly other regional organizations), will organize periodic demonstration projects and/or workshops to bring together regulators, community representatives, vendors, environmental groups, consultants, contractors, etc. Workshops may cover topics such as: new or revised regulations, I/I reduction technologies, updates/progress on Task Force Report recommendations, etc. MWRA and DEP conducted a joint workshop on private source inflow reduction during November 2001. Lessons learned from this workshop will help shape future efforts under this strategy. Completion of this strategy requires a significant resource commitment by DEP. This strategy has an ongoing schedule that will be initiated in the short-term. (Cross-reference this strategy to the I/I Task Force Report recommendations 8.1 Strategy A-3 and 8.2 Strategy B-6)

Work by MWRA under this Strategy is ongoing. Following-up on the joint workshop in 2001, additional joint workshops were held in 2002 and 2004.

On April 27, 2011, representatives from MassDEP, EPA, and MWRA met to discuss I/I reduction in the region. The potential for future workshops was noted, but no specific plans have been developed for organizing additional joint workshops.

During FY14 (as of April 25, 2014), MassDEP revised its Regulation 314 CMR 12.00 *Operation, Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Dischargers*. The revisions included a requirement for all public entities that own a sewer system to complete an I/I analysis by December 31, 2017. The analysis also must specifically include an assessment of the risk of sewer system overflows.

During FY17 (as of May 2017), MassDEP revised its *Guidelines for Performing Infiltration/Inflow Analyses and Sewer System Evaluation Surveys*.

On an annual basis, MWRA staff provided an update presentation to the MWRA Board of Directors on both I/I Local Financial Assistance and Local Water System Assistance Programs.

Periodically, MWRA staff provided update presentations to the MWRA Advisory Board and member community representatives, as well as the Wastewater Advisory Committee and Water Supply Citizens Advisory Committee, on a variety of related

topics including: I/I Local Financial Assistance Program, Local Water System Assistance Program, Lead Service Line Replacement Loan Program, water and wastewater metering, water and wastewater flow data, rate assessment methodologies, water and wastewater permitting and regulations, etc. See the list of technical information noted in Strategy A, above.

During FY18, MWRA will continue to work cooperatively with MassDEP on this strategy.

Strategy D: MWRA will develop a summary of available public education material such as local/regional billing inserts, Water Environment Federation (WEF) brochures, “How-To” pamphlets, etc. The summary will provide information on where to obtain the material. A listing of available public education materials will be posted on the MWRA Internet site. MWRA will also make copies of public education material available to communities and local associations. MWRA will pilot this strategy by distributing to member communities sample copies of the “Fat-Free Sewers” brochure developed cooperatively by the Water Environment Federation (WEF) and EPA. MWRA will recommend use of the brochures for public education. This strategy has an ongoing schedule that will be initiated in the short-term. (Cross-reference this strategy to the I/I Task Force Report recommendations 8.2 Strategy B-1, and 8.2 Strategy B-4)

Work by MWRA under this Strategy is complete as noted below.

MWRA distributed the Fat-Free Sewers brochure to wastewater system operators in July 2003. In conjunction with the Technical Transfer Summary package distributed on August 8, 2007 (see Strategy B, above), MWRA included a separate topic heading for “Brochures and Bill Stuffers” that can be used by local communities as educational materials. Links to educational materials are provided on www.mwra.com.

Strategy E: Depending on the outcome of the summary of available information being developed under Strategy D, MWRA (jointly with DEP and possibly other regional organizations) may develop informational materials that will educate the public on I/I and SSO issues. This effort may include “how-to” pamphlets that detail a step-by-step process for disconnecting private inflow sources or similar information. The development of new materials under this strategy will be targeted to fill gaps that are not covered by existing/available public education material. This strategy will be completed in the mid-term. (Cross-reference this strategy to the I/I Task Force Report recommendation 8.2 Strategy B-2)

Work by MWRA under this Strategy is complete as noted below.

As part of the Technical Transfer Summary package distributed on August 8, 2007 (see Strategy B, above), MWRA included a separate topic heading specifically for “Brochures and Bill Stuffers” that can be used by local communities as educational materials. There are sufficient example brochures available so that no additional work is needed under this strategy. Communities actively involved with private inflow removal programs have generally been using available sample brochures and other public education materials to develop public education information related to their specific project. Information already available via local engineering consultants is also utilized.

Strategy F: Upon request from member communities, MWRA will assist member communities in providing a link from the local DPW or community Internet site to the MWRA Internet site. The possibility of a link or reference to other regional bodies that are involved in sewer system issues (such as DEP, EPA, New England Water Environment Association, New England Interstate Water Pollution Control Commission, watershed associations, etc) will also be investigated. This strategy will be completed in the mid-term. (Cross-reference this strategy to the I/I Task Force Report recommendation 8.2 Strategy B-3)

Work by MWRA under this Strategy is complete as noted below.

Local communities, state agencies, regional associations, etc. all maintain their own web pages with numerous information links. MWRA's web site contains links to the communities' web sites and links to other organizations. Based on current broad use of the web, additional work under this strategy is not needed. MWRA continues to revise and upgraded its web site www.mwra.com and the Community Support Program page: <http://www.mwra.com/comsupport/communitysupportmain.html>.

Strategy G: MWRA will integrate information on I/I and SSO issues into existing MWRA school education materials. MWRA's School Education staff will identify what types of materials are appropriate for their programs. This strategy has an ongoing schedule that will be initiated in the mid-term. (Cross-reference this strategy to the I/I Task Force Report recommendation 8.3 Strategy C-1)

Work by MWRA under this Strategy is ongoing. The focus of MWRA's School Education Program is to provide a general understanding of water and wastewater transport and treatment systems with emphasis on water conservation and environmental awareness issues. Educational materials are designed for students from elementary to high school levels.

Strategy H: Upon request from DEP, MWRA will provide technical assistance to DEP to develop and issue DEP press releases prior to and during extreme wet weather events to notify the public of possible sewer system backups and overflow problems. The I/I Task Force Report recommends DEP develop a standardized format that includes a request that system users minimize non-essential water consumption activities and includes a standardized high sewer flow warning. Completion of this strategy is dependent on DEP actions. This strategy has an ongoing schedule that should be initiated in the short to mid-term. (Cross-reference this strategy to the I/I Task Force Report recommendation 5.4 Strategy D-2)

Work by MWRA under this Strategy is ongoing. During FY17, no assistance from MWRA was requested by MassDEP. Any future action under this strategy will be initiated jointly with MassDEP.

Strategy I: Upon request from member communities, MWRA will provide technical assistance to communities to provide residents with information on I/I reduction, SSOs and backups using local cable stations or other media outlets. This strategy has an ongoing schedule that will be initiated in the mid to long-term. (Cross-reference this strategy to the I/I Task Force Report recommendation 8.2 Strategy B-7)

Work by MWRA under this Strategy is ongoing. During FY17, no assistance from MWRA was requested under this strategy.

Goal 5 under MWRA's Regional I/I Reduction Plan is:

MWRA will provide technical assistance and work cooperatively with member communities, DEP, and EPA regarding guidance on local operation and maintenance and capital improvement programs intended to provide a reasonable level of sewer service to local sewer users/ratepayers.

Strategy A: MWRA will provide all member communities a copy of the I/I Task Force Report (which includes recommendations for sewer system operation and maintenance). MWRA will maintain a supply of I/I Task Force Reports and will provide additional copies to MWRA member communities and regional stakeholders, as requested. This strategy has an ongoing schedule that has been initiated.

Work by MWRA under this Strategy is complete as noted below.

MWRA provided all member communities and all interested parties copies of the I/I Task Force Report in April 2001, shortly after the Report was completed. MWRA continues to maintain a supply of I/I Task Force Reports and provides additional copies to MWRA member communities and regional stakeholders, as requested. In July 2003, all member communities were provided a copy of the MWRA Regional I/I Reduction Plan. Both the I/I Task Force Report and MWRA Regional I/I Reduction plan are posted on MWRA's Community Support Program web page at: <http://www.mwra.com/comsupport/communitysupportmain.html>.

Strategy B: MWRA will request member communities provide a copy of their existing local Sewer Use Regulations to MWRA, will review those local Regulations that are submitted, and will make recommendations for improvements. MWRA may utilize a committee representing a cross-section of sewer system stakeholders to assist in accomplishing this strategy. This strategy will be completed in the mid-term. (Cross-reference this strategy to the I/I Task Force Report recommendation 9.1 Strategy A-2)

Work by MWRA under this Strategy is complete as noted below.

MWRA did not proceed with work under this strategy pending issuance of EPA's SSO Rule, including CMOM Regulations, that were likely to impact local sewer use regulations. EPA's draft SSO Rule was not promulgated. During FY04, MassDEP distributed a new guideline document – "Optimizing Operation, Maintenance and Rehabilitation of Sanitary Sewer Collection Systems" dated August 2003. This manual was developed by New England Interstate Water Pollution Control Commission (NEIWPCC) under a grant from EPA. The Guideline Document was written by a committee consisting of NEIWPCC member state environmental agencies, EPA, and wastewater consultants. The manual is available at www.neiwpcc.org. Chapter 4 of the manual "Optimizing Legal Authority" includes sections on Sewer Use Ordinances; therefore, additional work by MWRA under this strategy is not necessary. Web links to information provided by MassDEP, USEPA, and NEIWPCC are posted on MWRA's Community Support Program web page at: <http://www.mwra.com/comsupport/communitysupportmain.html>.

Strategy C: MWRA will develop a Member Community Collection System Operation and Maintenance Manual Guidance Document and Overflow Response Plan. This guidance document will be provided to all member communities. This strategy will be completed in the short-term.

Work by MWRA under this Strategy is complete as noted below.

A Member Community Collection System Operation and Maintenance Manual Guidance Document and Overflow Response Plan was developed and submitted to EPA and MassDEP for review in June 2001. This guidance document was made available to member communities. During FY04, MassDEP distributed a new guideline document – “*Optimizing Operation, Maintenance and Rehabilitation of Sanitary Sewer Collection Systems*” dated August 2003. This manual was developed by New England Interstate Water Pollution Control Commission (NEIWPCC) under a grant from EPA. It was written by a committee consisting of NEIWPCC member state environmental agencies, EPA, and wastewater consultants. The manual is available at www.neiwpcc.org. MWRA provided its collection system O&M manual and the community collection system guidance document to the NEIWPCC committee for review. With the publication of the NEIWPCC manual, further efforts on the Member Community Collection System Operation and Maintenance Manual Guidance Document are not required.

During FY14 (as of April 25, 2014), MassDEP revised its Regulation 314 CMR 12.00 *Operation, Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Dischargers*.

ATTACHMENT 3
TO
MWRA ANNUAL I/I REDUCTION REPORT FOR FY17
Reporting Period – July 2016 Through June 2017

MWRA ACTIONS TAKEN TO REDUCE I/I DURING FY17

The MWRA Field Operations Department's Technical Inspection program staff have internally inspected approximately 33 miles of Authority-owned interceptors and 400 feet of community-owned sewers, internally inspected 48 inverted siphon barrels with sonar inspection equipment, and physically inspected 719 sewer manholes and other structures (diversion chambers, siphon headhouses, tide gates, etc.) during FY17. During the internal inspection process, problems such as physical defects, manhole frame and cover defects, infiltration/inflow, sediment, grease deposits, etc. are noted and stored in MWRA's electronic maintenance (MAXIMO) database. Maintenance work is then scheduled based on the identified problems.

During FY17, MWRA's maintenance work included hydraulic/mechanical cleaning of 36 miles of Authority-owned sewers, 1400 feet of community-owned sewers, cleaning of 70 siphon barrels, and replacement of 115 manhole frames and covers. In addition, 43 sewer manholes were rehabilitated via cement mortar lining under MWRA's annual manhole rehabilitation contract. Potential structural problems and infiltration sources identified during the inspection process are referred to engineering staff for follow-up review and analysis of cost-effective repairs.

The MWRA is undertaking a number of significant capital projects to provide additional hydraulic capacity and rehabilitate portions of Authority-owned interceptors. Updates on these projects are included below:

1. During FY17, MWRA continued rehabilitation of sewer interceptors under the Interceptor Renewal/Asset Protection Program. Evaluation and design of interceptor rehabilitation began in FY09. The program includes a series of twelve interceptor renewal projects to be phased over multiple years at a cost of over \$100 million. Each of these projects will provide structural repairs for existing pipelines and reduce I/I entering the MWRA interceptor system. MWRA's Interceptor Renewal/Asset Protection Projects #1 through #7 for rehabilitation construction of a variety of Sewer Sections are programmed in the FY18 CIP at a cost of \$88 million in FY16-27. Interceptor Renewal/Asset Protection Projects #1 through #7 include:
 - Interceptor Renewal/Asset Protection Project #1: Rehabilitation design and construction of 12,300 linear feet of the Reading Extension Sewer Sections 75, 74, 73, primarily in Stoneham, with short reaches in Wakefield and Woburn. Approximately 1,400 linear feet of Reading Extension Sewer Section 74 were CIPP lined in the mid 1990's. Also, included is rehabilitation of 2,280 linear feet of Metropolitan Sewer Section 46 in Stoneham. Design for this project is complete and construction began in FY17. Total design, construction, and construction services costs will be approximately \$3.2 million.

- Interceptor Renewal/Asset Protection Project #2: Rehabilitation design and construction of Section 4, 5, 6 and 186 on the North Metropolitan Sewer in Winthrop and just upstream of the Deer Island Treatment Plant will include rehabilitation of about 5,300 feet of 108-inch brick sewer; some of this sewer was previously rehabilitated using a shotcrete process in the 1990s. A preliminary design study for this project began in FY17 with an overall design and construction cost estimate of over \$20.0 million.
- Interceptor Renewal/Asset Protection Project #3: Rehabilitation design and construction of the Dorchester Interceptor Sewer Sections 240, 241, and 242. Design for this project will begin in FY18 with an overall design and construction cost estimate of \$7.5 million.
- Interceptor Renewal/Asset Protection Project #4A: Rehabilitation design and construction of the Cambridge Branch Sewer Sections 27 and 26 in Charlestown, Somerville, and Cambridge. A preliminary design study for Cambridge Branch Sewer Sections 23 – 24 and 26 – 27 began in FY17.
- Interceptor Renewal/Asset Protection Project #4B: Rehabilitation design and construction of the Cambridge Branch Sewer Sections 23 and 24 in Everett and Charlestown. A preliminary design study for Cambridge Branch Sewer Sections 23 – 24 and 26 – 27 began in FY17.
- Interceptor Renewal/Asset Protection Project #5: Rehabilitation design and construction of portions of Sections 607, 609, and 610 in Milton.
- Interceptor Renewal/Asset Protection Project #6: Rehabilitation design and construction of portions of Sections 12, 14, 15, and 62 in Chelsea.
- Interceptor Renewal/Asset Protection Project #7: Rehabilitation design and construction of portions of Sections 41, 42, 49, 54 and 65 in Melrose and Malden.

ATTACHMENT 4
TO
MWRA ANNUAL I/I REDUCTION REPORT FOR FY17
Reporting Period: July 2016 Through June 2017

**STATUS UPDATE ON MWRA's
I/I LOCAL FINANCIAL ASSISTANCE PROGRAM**

Financial Assistance Update

All 43 member sewer communities are participating in MWRA's \$460.75 million Infiltration/Inflow (I/I) Local Financial Assistance (grant/loan) Program. The program began in May 1993 and, through FY17, \$332 million has been distributed to fund 528 local I/I reduction and sewer system rehabilitation projects. The program budget of \$460.75 million includes the most recent addition of \$160 million in Phase 9 (\$80 million) and Phase 10 (\$80 million) funds approved by the MWRA Board of Directors for distribution beginning in FY15. In addition, the grant component and loan repayment terms have been enhanced for the additional Phase 9 and 10 funds. The table on page 2 provides a summary of funding allocations, distributions, and funds remaining for each MWRA sewer community. Distribution of grant and loan financial assistance to member communities has been approved through FY25. The table on page 3 provides a summary of funding distributions by fiscal quarter since Program inception.

Program Background

MWRA's I/I Local Financial Assistance Program was initiated to provide funding to member sewer communities to perform I/I reduction and sewer system rehabilitation projects within their locally-owned collection systems. Following recommendations from the MWRA Advisory Board, the MWRA Board of Directors has approved a total program budget of \$460.75 million. The funds have been allocated among the 43 MWRA sewer communities based on respective share of MWRA's wholesale sewer charge. Financial assistance for Phases 1 and 2 (total of \$63.75 million) was distributed for approved projects as a 25 percent grant and a 75 percent interest-free loan. The grant/loan split was revised for distribution of the Phase 3 through 8 funds (total of \$237 million) to a 45 percent grant and a 55 percent interest-free loan. The interest-free loan portion for Program Phases 1 through 8 has been repaid to MWRA over a five year period beginning one year after the date the funds are distributed. The grant/loan split was again enhanced for distribution of Phases 9 and 10 funds (total of \$160 million) to a 75 percent grant and a 25 percent interest-free loan. The interest-free loan repayment period for Program Phases 9 and 10 has been extended to ten years from the previous five (again beginning one year after the date the funds are distributed).

MWRA funding is provided to a community following execution of a standard agreement that stipulates the project scope, schedule, and loan repayment requirements. Communities are required to provide periodic schedule and expenditure progress reports to MWRA. For planning and design projects, the work products (reports, plans, specifications, and bidding documents) are reviewed and approved by MWRA. During construction, MWRA staff perform site visits to document progress.

**MWRA // LOCAL FINANCIAL ASSISTANCE PROGRAM
FUNDING SUMMARY AS OF JULY 2017**

Community	Total Allocations (Phases 1 - 10)	Total Distributions (Phases 1 - 10)	Percent Distributed	Funds Remaining
Arlington	\$8,423,000	\$8,213,000	98%	\$210,000
Ashland	\$2,168,500	\$1,742,450	80%	\$426,050
Bedford	\$3,404,600	\$1,999,600	59%	\$1,405,000
Belmont	\$5,135,100	\$2,992,100	58%	\$2,143,000
Boston	\$132,171,200	\$92,678,406	70%	\$39,492,794
Braintree	\$8,359,000	\$6,575,800	79%	\$1,783,200
Brookline	\$13,165,200	\$7,666,200	58%	\$5,499,000
Burlington	\$5,102,800	\$5,102,800	100%	\$0
Cambridge	\$23,620,100	\$11,077,055	47%	\$12,543,045
Canton	\$3,965,900	\$2,675,900	67%	\$1,290,000
Chelsea	\$6,870,100	\$5,551,100	81%	\$1,319,000
Dedham	\$5,740,000	\$5,740,000	100%	\$0
Everett	\$8,071,500	\$6,650,500	82%	\$1,421,000
Framingham	\$12,125,000	\$7,255,910	60%	\$4,869,090
Hingham	\$1,632,500	\$1,632,500	100%	\$0
Holbrook	\$1,639,600	\$896,562	55%	\$743,038
Lexington	\$7,445,300	\$7,445,300	100%	\$0
Malden	\$12,283,900	\$4,593,900	37%	\$7,690,000
Medford	\$11,987,600	\$6,914,600	58%	\$5,073,000
Melrose	\$6,076,300	\$4,995,300	82%	\$1,081,000
Milton	\$5,564,500	\$3,736,500	67%	\$1,828,000
Natick	\$5,582,600	\$4,613,600	83%	\$969,000
Needham	\$6,257,600	\$2,892,150	46%	\$3,365,450
Newton	\$21,197,400	\$21,197,400	100%	\$0
Norwood	\$6,879,400	\$4,519,399	66%	\$2,360,001
Quincy	\$19,790,000	\$16,336,000	83%	\$3,454,000
Randolph	\$6,050,800	\$3,894,800	64%	\$2,156,000
Reading	\$4,629,100	\$3,785,100	82%	\$844,000
Revere	\$10,130,900	\$5,502,900	54%	\$4,628,000
Somerville	\$15,515,800	\$10,117,800	65%	\$5,398,000
Stoneham	\$4,919,900	\$4,919,900	100%	\$0
Stoughton	\$4,722,900	\$4,629,100	98%	\$93,800
Wakefield	\$5,966,900	\$5,966,900	100%	\$0
Walpole	\$3,680,000	\$3,042,000	83%	\$638,000
Waltham	\$13,732,400	\$11,377,400	83%	\$2,355,000
Watertown	\$6,285,800	\$3,661,800	58%	\$2,624,000
Wellesley	\$5,709,700	\$3,256,224	57%	\$2,453,476
Westwood	\$2,532,300	\$2,091,300	83%	\$441,000
Weymouth	\$11,480,900	\$7,785,900	68%	\$3,695,000
Wilmington	\$2,462,000	\$1,606,000	65%	\$856,000
Winchester	\$4,183,000	\$3,535,100	85%	\$647,900
Winthrop	\$3,393,400	\$2,807,400	83%	\$586,000
Woburn	\$10,695,500	\$8,962,500	84%	\$1,733,000
Totals	\$460,750,000	\$332,636,156	72%	\$128,113,844

MWRA I/I Local Financial Assistance Program - Fiscal Year Breakdown

FY	Distribution Cycle	Distribution Amount	Distribution Cycle	Distribution Amount	Distribution Cycle	Distribution Amount	Distribution Cycle	Distribution Amount	FY Total
FY93	Aug 1992	\$0	Nov 1992	\$0	Feb 1993	\$0	May 1993	\$2,714,883	\$2,714,883
FY94	Aug 1993	\$3,096,468	Nov 1993	\$4,096,133	Feb 1994	\$3,191,032	May 1994	\$251,494	\$10,635,127
FY95	Aug 1994	\$354,126	Nov 1994	\$976,700	Feb 1995	\$1,894,030	May 1995	\$6,489,891	\$9,714,747
FY96	Aug 1995	\$0	Nov 1995	\$504,100	Feb 1996	\$2,921,600	May 1996	\$3,902,426	\$7,328,126
FY97	Aug 1996	\$1,682,061	Nov 1996	\$1,581,266	Feb 1997	\$395,100	May 1997	\$3,530,758	\$7,189,185
FY98	Aug 1997	\$1,066,300	Nov 1997	\$1,157,260	Feb 1998	\$909,350	May 1998	\$2,001,608	\$5,134,518
FY99	Aug 1998	\$1,521,100	Nov 1998	\$2,464,263	Feb 1999	\$1,481,700	May 1999	\$5,758,077	\$11,225,140
FY00	Aug 1999	\$1,315,767	Nov 1999	\$1,847,900	Feb 2000	\$1,679,000	May 2000	\$1,070,100	\$5,912,767
FY01	Aug 2000	\$1,148,400	Nov 2000	\$388,000	Feb 2001	\$1,640,931	May 2001	\$804,800	\$3,982,131
FY02	Aug 2001	\$4,480,735	Nov 2001	\$704,040	Feb 2002	\$1,804,200	May 2002	\$5,002,691	\$11,991,666
FY03	Aug 2002	\$1,962,600	Nov 2002	\$4,461,768	Feb 2003	\$7,955,752	May 2003	\$1,836,600	\$16,216,720
FY04	Aug 2003	\$2,021,940	Nov 2003	\$1,306,200	Feb 2004	\$1,770,760	May 2004	\$3,295,400	\$8,394,300
FY05	Aug 2004	\$2,756,659	Nov 2004	\$6,013,436	Feb 2005	\$4,054,060	May 2005	\$2,636,700	\$15,460,855
FY06	Aug 2005	\$5,377,487	Nov 2005	\$4,589,600	Feb 2006	\$1,519,463	May 2006	\$6,489,676	\$17,976,226
FY07	Aug 2006	\$0	Nov 2006	\$4,947,414	Feb 2007	\$8,789,300	May 2007	\$8,121,023	\$21,857,737
FY08	Aug 2007	\$3,915,500	Nov 2007	\$4,355,750	Feb 2008	\$1,392,400	May 2008	\$4,436,600	\$14,100,250
FY09	Aug 2008	\$4,196,399	Nov 2008	\$352,000	Feb 2009	\$1,990,300	May 2009	\$4,872,400	\$11,411,099
FY10	Aug 2009	\$5,462,736	Nov 2009	\$616,600	Feb 2010	\$2,679,600	May 2010	\$4,845,000	\$13,603,936
FY11	Aug 2010	\$723,700	Nov 2010	\$3,183,250	Feb 2011	\$4,123,100	May 2011	\$4,258,900	\$12,288,950
FY12	Aug 2011	\$3,695,100	Nov 2011	\$2,417,378	Feb 2012	\$848,300	May 2012	\$7,010,324	\$13,971,102
FY13	Aug 2012	\$21,299,965	Nov 2012	\$1,004,610	Feb 2013	\$2,460,000	May 2013	\$2,675,000	\$27,439,575
FY14	Aug 2013	\$7,550,310	Nov 2013	\$0	Feb 2014	\$2,929,700	May 2014	\$2,271,852	\$12,751,862
FY15	Aug 2014	\$4,053,000	Nov 2014	\$7,647,400	Feb 2015	\$10,128,648	May 2015	\$4,803,450	\$26,632,498
FY16	Aug 2015	\$3,983,100	Nov 2015	\$5,783,000	Feb 2016	\$7,195,116	May 2016	\$5,483,000	\$22,444,216
FY17	Aug 2016	\$2,352,100	Nov 2016	\$6,553,210	Feb 2017	\$2,918,900	May 2017	\$10,434,030	\$22,258,240
Total		\$84,015,553		\$66,951,278		\$76,672,342		\$104,996,983	\$332,636,156

Program Goals

The I/I Local Financial Assistance Program is a critical component of MWRA's Regional I/I Reduction Plan. Specifically, local sewer system rehabilitation projects are intended to at least offset ongoing collection system deterioration to prevent a net increase in regional I/I. In the long-term, system rehabilitation should result in lower I/I, which will allow for future increases in sanitary (residential, commercial, industrial, and institutional) flow without a net increase in total wastewater flow to the Deer Island Treatment Plant.

A second goal of the program is to assist member communities in implementing effective annual local collection system maintenance programs to assure efficient operation and ongoing collection system repair/replacement.

Type of Local Projects Receiving Funding

Funding has been provided to local communities for eligible I/I reduction projects including planning, design, construction, and engineering services during construction. These projects generally take one to three years to complete. Seventy-six percent of funds distributed to date have financed local construction projects. The table below details funds distributed by project phase for both completed and ongoing projects.

<u>PROJECT PHASE</u>	<u>COMPLETE PROJECTS (\$ millions)</u>	<u>ONGOING PROJECTS (\$ millions)</u>	<u>TOTAL (\$ millions)</u>
Planning/Study:	\$ 38.6	\$ 7.7	\$ 46.3 (14%)
Design:	12.3	2.7	15.0 (5%)
Construction:	189.2	64.6	253.8 (76%)
Eng. Services During Const.:	13.0	4.5	17.5 (5%)
TOTAL	\$ 253.1 (76%)	\$ 79.5 (24%)	\$ 332.6 (100%)

Program Results

The I/I Local Financial Assistance Program began in May 1993. Through FY17, a total of 528 local I/I reduction and sewer system rehabilitation projects have been funded through the MWRA's grant/loan program. Cumulative results for the program are summarized below.

Results for all projects (FY93 through FY17) for planning/inspection include the following:

- 1,902 miles of sewer TV inspected
- 1,341 miles of sewer flow isolated
- 1,308 miles of sewer smoke tested
- 55,180 sewer manholes inspected
- 77,894 buildings inspected

Results for all projects (FY93 through FY17) targeting infiltration reduction include the following:

- 60 miles sewer replaced
- 165 miles sewer CIP lined
- 149 miles sewer tested/chemically sealed
- 2,398 sewer spot repairs
- 11,891 service connection repairs
- 4.8 miles underdrains sealed

Results for all projects (FY93 through FY17) targeting inflow reduction include the following:

- 1,031 catch basins disconnected
- 44 miles of new or replaced storm drains
- 16,118 manholes rehabilitated/sealed
- 2,921 manhole covers replaced or inflow seals installed
- 433 sump pumps redirected
- 5,292 downspouts/area drains disconnected

Stormwater and Infiltration/Inflow Impacts to the Collection System

Wastewater discharged by member sewer communities to MWRA is influenced by seasonal and wet-weather conditions related to stormwater in combined sewer systems, groundwater infiltration, and stormwater and tidal inflow. Infiltration/Inflow (I/I) is extraneous water that enters all wastewater collection systems through a variety of sources.

Infiltration is groundwater that enters the collection system through physical defects such as cracked pipes/manholes or deteriorated joints. Typically, many sewer pipes and sewer service laterals are below the surrounding groundwater table. Therefore, leakage into the sewer (infiltration) is a broad problem that is difficult and expensive to identify and reduce.



Infiltration in a Sanitary Sewer

Inflow is extraneous flow entering the collection system through point sources and may be directly related to storm water run-off from sources such as roof leaders, yard and area drains, basement sump pumps, manhole covers, cross connections from storm drains or catch basins, leaking tide gates, etc. Inflow causes a rapid increase in wastewater flow that occurs during and after storms. The volume of inflow entering a collection system typically depends on the magnitude and duration of a storm event, as well as related impacts such as snowmelt and storm tides.



Inflow into a Manhole

Stormwater in Combined Sewers is, by design, collected in the combined sewer system to be transported to a downstream treatment facility. Additional system capacity is available via combined sewer overflow (CSO) storage facilities and outfalls that may be active during rainfall events.

Regional Wastewater Flow Trends

Wastewater Flow Graph 1 (page 8) provides long-term regional flow data for the Deer Island Treatment Plant collection system and annual rainfall. The long-term average daily flow for the total system is about 355 mgd (last 28 years) and the average annual rainfall is 42.5 inches (Boston Logan Airport Data). Total system minimum dry-weather flows drop to 220 mgd; peak wet-weather flow during significant rainfall exceeds the 1,270 mgd plant capacity (more than 3.5 times the average flow), and significant additional system capacity is available at combined sewer overflow (CSO) storage facilities and outfalls. Few problems exist within local and

regional sewer systems during dry weather or as a result of small and medium storm events. However, I/I and stormwater from combined sewers reduce pipeline capacity in the collection system that would otherwise be available to transport sanitary flow. The result, during extreme storm events that occur during periods of high groundwater, may be sewer system surcharging and sanitary sewer overflows (SSOs). I/I also results in the transport of groundwater and surface water out of the natural watershed.

Over the last five years (2012-2016), MWRA's average daily flow of 295 mgd has been well below the long-term average (60 mgd or 17% below average); while the five-year average rainfall has been 11% below average at 38 inches. During the recent drought, annual rainfall recorded at Boston-Logan has been only 35 inches (2015) and 33 inches (2016). As a result, wastewater flows to Deer Island have been historically low at about 290 mgd (2015 average daily flow) and 275 mgd (2016 average daily flow).

Wastewater Flow Graph 2 (page 9) shows the five-year running averages (flow and rainfall) as a means of smoothing the annual variability in the long-term data displayed in Wastewater Flow Graph 1. The five-year running average daily flow has declined from approximately 390 mgd to approximately 300 mgd, a reduction of 90 mgd or 23% of wastewater flow tributary to the Deer Island Treatment Plant.

The estimated average daily flow reduction associated with completed local I/I reduction projects that have received MWRA financial assistance is about 89 million gallons per day (mgd). This flow reduction "ballpark" figure is based on the communities' (or their consultants') peak I/I reduction estimates, which have been prorated by MWRA staff to estimate an annual average I/I reduction. The estimated I/I reduction represents groundwater and stormwater that no longer enter the collection system at the point of sewer repair. Regional wastewater flow reductions resulting from specific local I/I reduction projects are difficult to substantiate through end-of-the-collection-system meter data, due to factors noted below:

- Wastewater flows within the collection system vary dramatically due to changes in precipitation. For example, annual average daily flow for MWRA's system varies up to 100 mgd from year to year (from a low of less than 300 mgd to a high of more than 400 mgd). Small flow reductions for individual projects (typically much less than one mgd) are dwarfed by regional flow fluctuations;
- Sewer capacity gained by elimination of I/I in one subsystem may, in some cases, allow for other I/I to enter the collection system at a different location, resulting in less net flow reduction at the end of the collection system;
- MWRA's numerous pumping and interceptor upgrades, as well as combined sewer overflow and system optimization projects, result in an increase in the capture and treatment of wastewater flow and the reduction of raw sewage discharges. When reviewing end-of-the-collection system meter data, these increased flows to the Deer Island Treatment Plant offset upstream I/I reductions; and,
- In the MWRA service area, the increase in wastewater flow from an increase in sewered population is likely offset by the decline in per capita indoor water use. Over the last 20 years, sewered population in the service area has increased by about 270,000 people leading to an increase in sanitary sewage of about 17.5 mgd (based on 65 gpcd water use returned to the sewer system). During the same 20 year period, per capita indoor water

use returned to the sewer system has decreased due to conservation measures such as installation of low-flow plumbing fixtures and appliances. Reduced indoor water use produces a decrease in sanitary sewage. A 20 mgd decrease in sanitary sewage would be produced by an across-the-region 10 gpcd reduction in water use from all of the approximately 2 million customers. The estimates noted above are generally offsetting.

Taking these factors into account, long-term metering records will continue to be analyzed to monitor regional wastewater flow trends.

Community Projects Funded During FY17

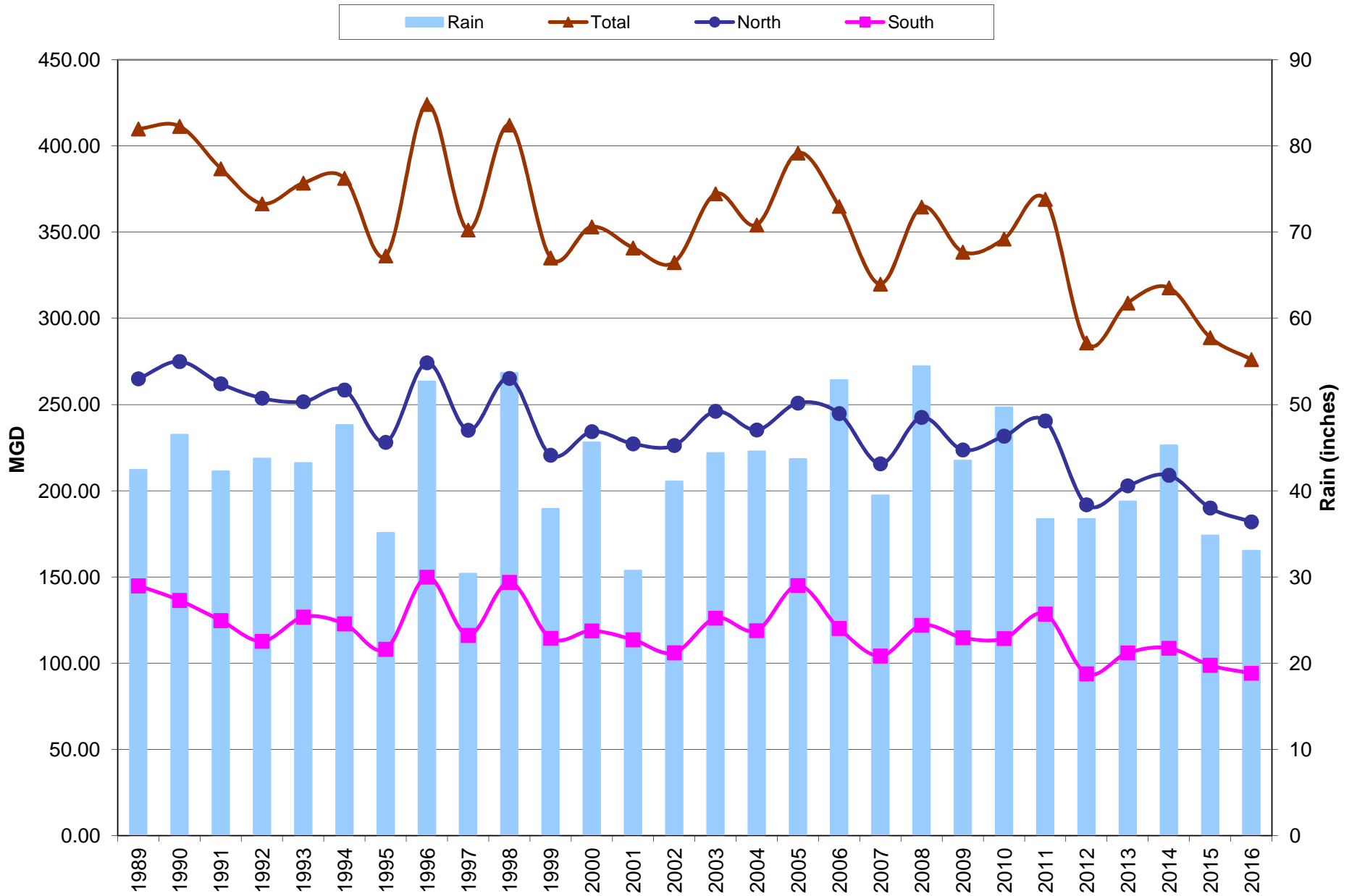
During FY17, MWRA distributed \$22.2 million in grants and loans to member communities to help fund local I/I reduction projects. Local community projects are funded quarterly under the MWRA I/I Local Financial Assistance Program. Attached (after page 9) are funding summaries for the four quarterly funding distributions during FY17:

- August 2016 (\$2,352,100 distributed) with three communities funded: Everett, Reading, and Winchester;
- November 2016 (\$6,553,210 distributed) with seven communities funded: Ashland, Burlington, Framingham, Melrose, Quincy, Watertown, and Wilmington;
- February 2017 (\$2,918,900 distributed) with six communities funded: Arlington, Braintree, Norwood, Quincy, Stoughton, and Weymouth; and,
- May 2017 (\$10,434,030 distributed) with three communities funded: Boston, Natick, and Wakefield.

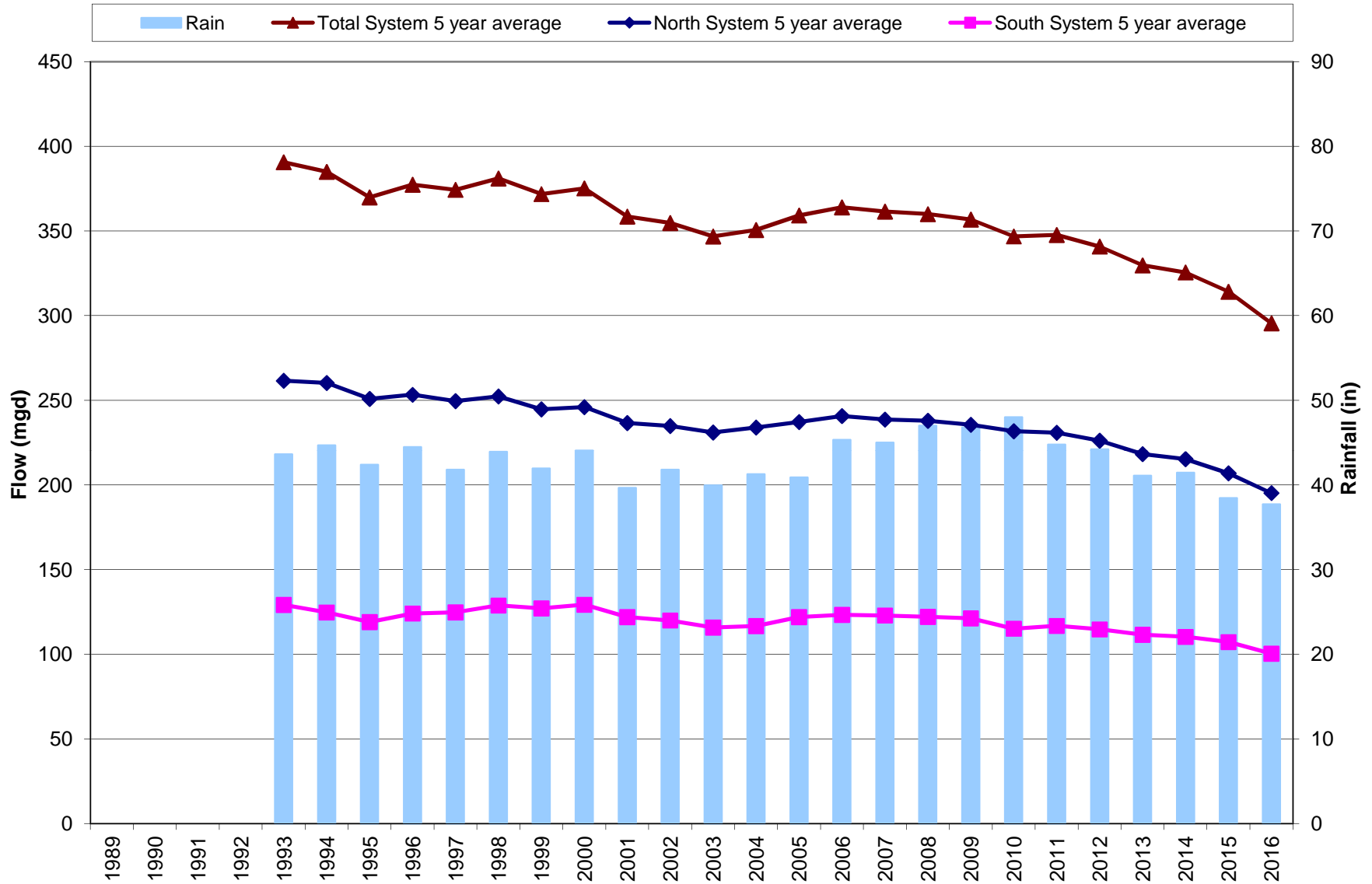
Wastewater Flow Graph 1

MWRA Long-Term Regional Flow Data

NOAA Annual Rainfall at Logan Airport



Wastewater Flow Graph 2
MWRA Long-Term Regional Flow Data
5-year Running Averages
5 year running average NOAA Rainfall at Logan Airport



MWRA I/I Local Financial Assistance Program Funding Summary

August 2016 Funding Cycle

<u>Community</u>	<u>Funding Allocation</u>
Everett	\$ 1,421,000
Reading	\$ 844,000
Winchester	\$ 87,100
	<hr/>
Total	\$ 2,352,100

**MWRA I/ LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

PROJECT NO. WRA-P9-13-3-952

CITY OF EVERETT

DESIGN & CONSTRUCTION OF CATCH BASIN REDIRECTION PROJECT

SCOPE OF SERVICES

The Scope of Services for this project is the same as for the MWRA funded Project #WRA-P9-13-3-939. The estimated cost of this project which includes design, bid & award, construction and construction services is \$3,646,500. Under MWRA Project #WRA-P9-13-3-939, the City's funding allotment of \$1,388,000 from Phases 7 & 8 was distributed for this project.

SUMMARY OF PROJECT COSTS

<u>Description of Work</u>	<u>Estimated Cost</u>	<u>Eligible Cost</u>
Catch Basin Redirection Project		
Design & Bid/Award Services	\$ 346,500	\$ 346,500
Construction	\$ 3,000,000	\$ 2,162,500
Engineering Construction Services	\$ 300,000	\$ 300,000
	-----	-----
TOTAL ESTIMATED PROJECT COST	\$ 3,646,500	\$ 2,809,000

The funding sources for the Eligible Cost is as follows:

Total Eligible Project Cost:	\$ 2,809,000
Phase 7 & 8 Funding Allotment:	\$ 1,388,000 (WRA-P9-13-3-939)
Phase 9 Funding Allotment:	\$ 1,421,000 (WRA-P9-13-3-952)

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT

PROJECT NO. WRA-P9-13-3-952

CITY OF EVERETT

DESIGN & CONSTRUCTION OF CATCH BASIN REDIRECTION PROJECT

PROJECT SCHEDULE

<u>Description of Work</u>	<u>Start Date</u>	<u>Completion Date</u>
Design of Catch Basin Redirection Project	April 2016	September 2016
Bid & Award of Catch Basin Redirection Project	October 2016	November 2016
Construction of Catch Basin Redirection Project	December 2016	October 2017

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT
PROJECT NO. WRA-P9-28-3-950
TOWN OF READING**

**CONSTRUCTION OF RECOMMENDED SEWER & MANHOLE REHABILITATIONS AND
INFLOW ELIMINATION AT VARIOUS LOCATIONS**

SCOPE OF SERVICES

The recommended sewer & manhole rehabilitations were as indicated in Table 3 of the April 2, 2015 Memorandum from CDM Smith to the Town and Tables 6-3 & 6-4 of the November 2012 Report. The Inflow elimination were as indicated in the August 2010 Report (Table 5-4) and November 2012 Report (Table 6-2). The recommended rehabilitation contract is to be bid in 2 separate packages to take advantage of the Town's funding under MWRA I/I Local Financial Assistance Program Phases 9 & 10.

The first Bid Package, which will be funded with the Town's Phase 9 Funding Allotment, will include a Base Bid with 3 Alternates. The Base Bid is expected to include: cleaning & inspection of 1,750 linear feet (lf) of 6" to 15" sewer; heavy cleaning of 778 lf of sewer; cured-in-place lining of 9,700 lf of 6" to 12" sewer; removing & replacing 220 lf of 8" sewer; open cut point repair at 4 locations; cutting of 4 protruding service laterals; testing & grouting 3 service laterals in Alden Circle, Gleason Rd, Grand St, Harriman Ave, Lowell St, Pine Ridge Circle & Road, South St and Woburn St. The Base Bid also includes sewer manhole rehabilitations throughout the Town consisting of: cementitious lining of 17 manholes; repairing 7 brick corbels; constructing 4 new benches & inverts; installing 5 HDPE grading rings; replace 1 frame & cover; repair 10 frames & covers. Also, a catch basin will be redirected from the sewer to storm drain and dye testing will be performed at 10 other potential Inflow sites.

The Alternate 1 Bid is expected to include: cleaning & inspection of 1,470 lf of 6" to 15" sewer; heavy cleaning of 200 lf of sewer; cured-in-place lining of 2,575 lf of 8" and 300 lf of 10" sewer in Avalon Rd, Haystack Rd, Heather Drive, South St & Walnut St.

The Alternate 2 Bid is expected to include: cleaning & inspection of 1,185 lf of 6" to 15" sewer; cured-in-place lining of 2,510 lf of 6" to 12" sewer; cutting of 1 protruding service lateral; testing & grouting 2 service laterals in Curtis St, Haystack St, Milepost Rd, New Crossing Rd, Shackford Rd & Woburn St. This Bid also includes sewer manhole rehabilitations throughout the Town consisting of: cementitious lining of 4 manholes; constructing 1 new bench & invert; repairing 2 brick corbels; installing 1 HDPE grading rings.

The Alternate 3 Bid is expected to include: cleaning & inspection of 200 lf of 6" to 15" sewer; cured-in-place lining of 1,950 lf of 6" sewer in Avon St, Main St, South St & Whitehall Lane. This Bid also includes sewer manhole rehabilitations throughout the Town consisting of: cementitious lining of 2 manholes; removing or repairing 4 brick corbels.

Also included under this funding distribution will be the engineering services to be provided during the construction.

PROJECT COST SUMMARY

Description of Task	Estimated Cost
Construction of Sewer Rehabilitations	\$ 844,000
Engineering During Construction	\$ 100,000
Total Project Cost	<u>\$ 944,000</u>

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT

PROJECT NO. WRA-P9-28-3-950

TOWN OF READING

CONSTRUCTION OF RECOMMENDED SEWER & MANHOLE REHABILITATIONS AND
INFLOW ELIMINATION AT VARIOUS LOCATIONS

PROJECT SCHEDULE

<u>Description of Work</u>	<u>Start Date</u>	<u>Completion Date</u>
Bid & Award	August 2016	September 2016
Construction	September 2016	December 2017

**MWRA I/ LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASES 9 & 10
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

PROJECT NO. WRA-P9-41-2-951

TOWN OF WINCHESTER

**DESIGN & BID/AWARD OF RECOMMENDED SEWER REHABILITATIONS
PER
PHASE II SANITARY SEWER EVALUATION SURVEY REPORT OF JUNE 2016**

SCOPE OF SERVICES

This project consists of the engineering services to be provided during the design and bid/award associated with the sewer rehabilitations as recommended by the "Phase II Sanitary Sewer Evaluation Survey Report" of June 2016. The recommended sewer rehabilitations will be performed in the West Side and Leslie Road/Lawson Road Areas.

The recommended sewer rehabilitations will include but is not necessarily limited to: clean & TV inspection of approximately 5,600 l.f. of 5-inch to 16-inch diameter sewers; root treatment of approximately 9,900 l.f. of 6-inch to 12-inch diameter sewers and 7 manholes; clean, inspect, testing & sealing approximately 9,800 l.f. of 6-inch to 12-inch diameter sewers; installation of approximately 122 l.f. of short liners and approximately 60 l.f. of structural shot liners in 6-inch to 12-inch diameter sewers; installation of approximately 8,900 l.f. of cured-in-place pipe liners and approximately 7,900 l.f. of cured-in-place structural pipeliners in 6-inch to 12-inch diameter sewers; installation of 9 lateral liners; testing & grouting of approximately 13 sewer services; cutting 2 protruding service connections; open cut repair of sewer at 11 locations; replacing the services connection wye at 3 locations; cementitious lining of approximately 64 manholes; replacement of 17 manhole frames & covers; building 28 manhole benches & inverts; repairing 6 manhole benches & inverts; sealing combined manhole (#SB-493); furnishing & installing 29 manhole inflow dishes; installing 3 bolted & gasketed manhole frames & covers; and all other related tasks and appurtenances including permanent and temporary pavement, police details and mobilization.

PROJECT COST SUMMARY

<u>Description of Task</u>	<u>Estimated Cost</u>
Design & Bid/Award	\$ 87,100
Total Project Cost	<u>\$ 87,100</u>

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASES 9 & 10
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT**

PROJECT NO. WRA-P9-41-2-951

TOWN OF WINCHESTER

**DESIGN & BID/AWARD OF RECOMMENDED SEWER REHABILITATIONS
PER
PHASE II SANITARY SEWER EVALUATION SURVEY REPORT OF JUNE 2016**

PROJECT SCHEDULE

<u>Description of Work</u>	<u>Start Date</u>	<u>Completion Date</u>
Design and Bid & Award	July 2016	April 2017

MWRA I/I Local Financial Assistance Program Funding Summary

November 2016 Funding Cycle

<u>Community</u>	<u>Funding Allocation</u>
Ashland	\$ 413,950
Burlington	\$ 899,000
Framingham	\$ 1,381,260
Melrose	\$ 1,081,000
Quincy	\$ 2,010,000
Watertown	\$ 550,000
Wilmington	\$ 218,000
Total	\$ 6,553,210

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

TOWN OF ASHLAND, MASSACHUSETTS

**WASTEWATER FLOW METERING AND I/I IDENTIFICATION
IN ASHLAND SUB-BASINS 1 / 2 / 3 / 4**

MWRA PROJECT NO. WRA-P9-02-1-957

SCOPE OF SERVICES

The purpose of this project is to identify, quantify and rehabilitate community sub-basins that contribute excessive I/I, evaluate rehabilitation options and rehabilitate the sewer system. Project work will include, but not be limited to, the following:

1. Wastewater Flow Metering will be conducted in accordance with the current draft MassDEP I/I Analysis and SSES Guidelines. Metering will take place across the entire Ashland sanitary sewer system (Ashland Sub-Basins 1 / 2 / 3 / 4) and provide overall I/I quantification and designated storm event data. The Metering Program will utilize 18 wastewater flow meters over a 10 week period during Spring 2017. Data generated will capture base and I/I related flows. This data will be continually evaluated to assist the identification of sub-basins showing elevated I/I levels, which will facilitate the CCTV investigation and quantification of I/I sources.
2. I/I Identification work will include CCTV inspection in main line (as much as 120,000 LF) and service line (as many as 75 services) sewers, sewer manhole inspection (as many as 500), nighttime weir readings and smoke testing. Nighttime weir readings will be directed towards basins where the above flow metering data indicated elevated I/I levels. CCTV inspection work will be directed toward areas identified to have I/I based upon the nighttime weir readings.

The above work will be performed pursuant to the terms and conditions detailed within the approved MWRA Phase 9 I/I Local Financial Assistance Project Application (received October 26, 2016).

Total project cost is estimated at \$413,950. Eligible MWRA I/I Local Financial Assistance is \$413,950.

PROJECT SCHEDULE

<u>Item</u>	<u>Start Date</u>	<u>Completion Date</u>
Wastewater Flow Metering	March 2017	May 2017
I/I Identification	May 2017	July 2017

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 10
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

PROJECT NO. WRA-P9-08-3-956

TOWN OF BURLINGTON

CONSTRUCTION FOR THE PROJECT 6 & 7 SEWER REHABILITATIONS PROJECT

SCOPE OF SERVICES

The objective of this project is to construct sanitary sewer rehabilitations in the Project 6 & 7 Areas as recommended by the "2012 Sanitary Sewer Evaluation Survey" Report (Project 6) dated November 2012 and the "Project 7 Sewer System Evaluation Survey" dated March 2014.

The scope of work includes: open cut repair of 10 lf of sewer; cleaning, inspection, testing and sealing of 6,109 lf of sewer; chemical root treatment of 2,394 lf of sewer; chemical root treatment of 15 manholes; installation of 30 lf of cured-in-place short liners; installation of 4,689 lf of cured-in-place pipe and reinstatement of 29 service connections; installation of 481 lf of structural cured-in-place pipe and reinstatement of 6 service connections; inspecting, testing, and grouting of 22 service connections; cementitious lining of 4,932 vf of manholes; installation of 11 manhole frames and covers; installation of 379 manhole inflow dishes; grouting to stop leaks at one (1) manhole; and all associated appurtenances.

SUMMARY OF ESTIMATED PROJECT COST

<u>Description of Task</u>	<u>Total Cost</u>	<u>Eligible Cost</u>
Construction Administration Services/Inspection	\$ 229,900	\$ 127,430
Construction of Sewer Rehabilitations	\$ 1,392,000	\$ 771,570
TOTAL ESTIMATED PROJECT COST	<u>\$ 1,621,900</u>	<u>\$ 899,000</u>

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 10
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT

PROJECT NO. WRA-P9-08-3-956

TOWN OF BURLINGTON

CONSTRUCTION FOR THE PROJECT 6 & 7 SEWER REHABILITATIONS PROJECT

PROJECT SCHEDULE

<u>Description of Task</u>	<u>Start Date</u>	<u>Completion Date</u>
Bid & Award	October 2016	November 2016
Construction of Rehabilitations	December 2016	May 2017
Re-test & Warranty Inspection	March 2018	March 2018

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

**TOWN OF FRAMINGHAM CONTRACT NO. PW 320
UNION AVENUE AREA SEWER IMPROVEMENTS
MWRA PROJECT NO. WRA-P9-14-3-953**

SCOPE OF SERVICES

The proposed project includes contracted sewer main rehabilitation / replacement in the Union Avenue area of the Town of Framingham. Much of the existing infrastructure has been in service well beyond its expected design life (sewers in this area were installed in approximately 1917) and require above average maintenance attention.

Work to be performed under this project includes, but is not necessarily limited to: replacement of approximately 950 linear feet (LF) of 8-inch sewer main; replacement of approximately 1520 LF of sewer service laterals; cured-in-place lining of approximately 1700 LF of 8-inch sewer main; cured-in-place lining of approximately 120 LF of 15-inch sewer main; replacement of approximately 24 sewer manholes; and the performance of all other work pursuant to the terms and conditions detailed within the plans and specifications of Framingham Contract No. PW 320 (Union Avenue Area Utility Improvements) and the approved MWRA Phase 9 I/I Local Financial Assistance Project Application received October 12, 2016.

The project's work area includes: Union Avenue / Walnut Street / Neville Road.

Total project cost is estimated at \$6,165,450. Eligible MWRA I/I Local Financial Assistance is \$1,381,260 (Rehabilitation Construction = \$1,107,660 / Construction Administration = \$273,600). As a result of the above work, an estimated 0.05 mgd of peak infiltration will be removed from the collection system upon contract completion.

PROJECT SCHEDULE

<u>Item</u>	<u>Start Date</u>	<u>Completion Date</u>
Design	December 2015	February 2016
Bid/Award	March 2016	June 2016
Construction	July 2016	May 2018
Project Closeout	June 2018	July 2018

ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT

PROJECT NO. WRA-P9-20-3-959
CITY OF MELROSE

**SEWER SYSTEM INVESTIGATION & EVALUATION; DESIGN & BID AWARD;
CONSTRUCTION OF RECOMMENDED SEWER REHABILITATIONS IN YEAR 1
AREA OF ANNUAL I/I AND OPERATION AND MAINTENANCE PROGRAM**

SCOPE OF SERVICES

This Project will identify sources of infiltration and inflow (I/I) in portions of Sewer Subareas 3/3A, 7/7A, 15, 18 & 20A. The field work associated with this project will include, but not be limited to: conducting top side physical survey of approximately 500 sewer manholes for sources of I/I; conducting flow isolation in as much as 90,500 l.f. of sewer; cleaning and internal TV inspection of approximately 90,500 l.f. of sewer; updating of sewer mapping & GIS database; preparing draft and final report on the results of the field work which will include preliminary design recommendations; design cost and preliminary construction cost estimates and schedule; cost-effectiveness analysis and recommendations for sewer rehabilitation.

The project will continue with the design of the sewer rehabilitations as recommended by the investigations and evaluation work previously mentioned. This design of manhole and pipeline rehabilitations will include "Excavate and Replace" and "Trenchless" rehabilitation techniques such as root treatment, service connection testing & sealing, service connection lining, short liners, spot repairs, cured-in-place pipelining (CIPP), manhole grouting & sealing. The preparation of Contract Documents and assistance during bidding will also be included.

The project will then proceed to the construction phase. The scope of work for this phase will include but not limited to: various manhole repairs; cementitious lining of manholes; installing manhole inflow dishes; chemical root treatment of sewers & manholes; installing of cured-in-place pipeliners; installing cured-in-place short liners; cleaning, inspection, testing and sealing of sewers; open cut point repairs; cutting protruding service connections; testing & grouting service connections; and other related tasks and appurtenances. This project will also include the engineering services during construction which will include office engineering and resident field engineering services.

This funding distribution will also include a cost of \$40,000 for City Force Account which is associated with a Project Engineer in the City Engineering Department to oversee the Project and to coordinate it with other ongoing projects in the City. Police Details estimated at \$80,000 is also included under this funding.

PROJECT COST SUMMARY

<u>DESCRIPTION OF WORK</u>	<u>TOTAL COST</u>
Sewer System Investigation & Evaluation	\$ 422,000
Design and Prepare Bid Documents	\$ 152,500
Bid & Award	\$ 17,500
Engineering Services During Construction of Sewer Rehabilitations	\$ 50,000
Construction of Sewer Rehabilitations	\$ 400,728
Force Account (City Project Engineer)	\$ 40,000
Police Details	\$ 80,000

Estimated Total Project Cost	<u>\$1,162,728</u>

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT

PROJECT NO. WRA-P9-20-3-959
CITY OF MELROSE

SEWER SYSTEM INVESTIGATION & EVALUATION; DESIGN & BID AWARD;
CONSTRUCTION OF RECOMMENDED SEWER REHABILITATIONS IN YEAR 1
AREA OF ANNUAL I/I AND OPERATION AND MAINTENANCE PROGRAM

PROJECT SCHEDULE

<u>Description of Work</u>	<u>Start Date</u>	<u>Completion Date</u>
Sewer System Investigations & Evaluation	December 2016	May 2017
Design of Sewer Rehabilitations	May 2017	July 2017
Bid & Award	July 2017	August 2017
Construction of Sewer Rehabilitations	September 2017	December 2017
Re-testing & Warranty Inspection	March 2018	March 2018

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A-1
FINANCIAL ASSISTANCE AGREEMENT**

**CITY OF QUINCY, MASSACHUSETTS
I/I IDENTIFICATION & REHABILITATION PROJECTS
MWRA PROJECT NO. WRA-P9-26-3-954**

SCOPE OF SERVICES

The purpose of these projects is to identify and rehabilitate community subareas that contribute excessive I/I, evaluate rehabilitation options and rehabilitate the sewer system. Project work will include, but not be limited to, the following:

Wollaston Beach Area Sewer System Evaluation Survey (SSES): (Est. Cost = \$990,500)

1. Flow isolate as much as 184,000 LF of 8 to 30-inch sewer main to quantify infiltration amounts within manhole-to-manhole sewer segments. The inspection will be conducted between the hours of 12AM and 6AM when groundwater levels are typically at their highest and sanitary flows at a minimum. Light clean, TV inspect, videotape and record as much as 184,000 LF of sewer main. The TV inspection will be performed to locate problem areas and I/I sources within manhole-to-manhole sewer segments. The inspection will be conducted in Spring 2017 when groundwater levels are typically at their highest.
2. Conduct topside physical survey of as many as 975 sewer manholes for defects and I/I sources. A written log will be furnished for each manhole inspected.
3. Smoke test as much as 184,000 LF of 8 to 30-inch sewer main; Dye water test as many as 50 suspected inflow sources identified during smoke testing; Perform dye water flooding at as many as 25 locations in conjunction with TV inspection identified during smoke testing.
4. Update GIS mapping and information from above results. Prepare a letter report that details areas in which work was performed, summarizes work completed to date and includes recommendations, a cost-effectiveness analysis and prioritization analysis for rehabilitation of pipeline/manhole defects and I/I sources identified during the investigation. This is the first phase of a two phase SSES of the Wollaston Beach Area.

Wollaston Beach Area SSES Rehabilitation (Design): (Est. Cost = \$69,500)

The Wollaston Beach Area SSES Rehabilitation Design includes rehabilitation of sewer mains/manholes investigated and identified as needing repair under the Wollaston Beach Water Quality Phase 3 Investigation and the Northwest Quincy Sewer Interceptor Evaluation Project. The design project will include: (1) design of open cut repairs, CIPP lining, CIP short liners and manhole rehabilitation; (2) preparation of contract documents for public bidding, and (3) preparation of a final rehabilitation cost estimate. This area has been identified as an area of critical importance by EPA in the City's Consent Decree.

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A-2
FINANCIAL ASSISTANCE AGREEMENT**

**CITY OF QUINCY, MASSACHUSETTS
I/I IDENTIFICATION & REHABILITATION PROJECTS
MWRA PROJECT NO. WRA-P9-26-3-954**

SCOPE OF SERVICES

**Furnace Brook Parkway Sewer Main/Manhole Rehabilitation: (Est. Cost = \$350,000)
(Design & Construction)**

The project is located within tidal wetlands adjacent to Furnace Brook Parkway (between Lafayette Street and Quincy Shore Drive) and a section of cross-country sewer main located in a wooded area (owned by DCR). CCTV assessment was undertaken in September 2016 and revealed serious sewer main/manhole deficiencies. The rehabilitation project will include: (1) design and construction associated with the repair of two collapsed VC sewer segments. Approximately 141 LF of 15-inch VC pipe will be replaced via open cut replacement; (2) design and construction associated with the rehabilitation of 20 structurally deficient manholes via the curtain (injection) grout process with a cementitious liner; and (3) design and construction associated with the replacement of one existing brick manhole with a new 5-foot diameter precast sewer manhole. The estimated amount of I/I to be removed as a result of this project is 0.12 mgd.

**Bayside Road Area Sewer Main Rehabilitation (CIPP): (Est. Cost = \$500,000)
(Design & Construction)**

The project is located along a public beach at Bayside Road (from Border Street to Brunswick Street) in the Squantum area. The rehabilitation project will include: (1) CCTV inspection of approximately 4700 LF of 8 and 12-inch sewer main; and (2) design and construction associated with CIPP lining of approximately 4700 LF of 8 and 12-inch sewer main. The estimated amount of I/I to be removed as a result of this project is 0.13 mgd.

**John Street Sewer Service Lateral Repair: (Est. Cost = \$100,000)
(Design & Construction)**

The project is located at the lower end of John Street (adjacent to Sagamore Creek). CCTV inspection of the sewer service laterals in this area revealed numerous offset and separated joints. The rehabilitation project will include: design and construction associated with open cut replacement of nine defective sewer service laterals within the roadway curb lines between MH 4+50 and MH 7+91 (House No. 11 to House No. 40). The estimated amount of I/I to be removed as a result of this project is 0.08 mgd.

The above projects will be performed pursuant to the terms and conditions detailed within the approved MWRA Phase 9 I/I Local Financial Assistance Project Application received October 13, 2016. Total project cost is estimated at \$2,010,000. Eligible MWRA I/I Local Financial Assistance is \$2,010,000. As a result of the above work, the peak rate of I/I to be removed from the collection system by these projects is estimated at 0.33 mgd.

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT B-1
FINANCIAL ASSISTANCE AGREEMENT**

**CITY OF QUINCY, MASSACHUSETTS
I/I IDENTIFICATION & REHABILITATION PROJECTS
MWRA PROJECT NO. WRA-P9-26-3-954**

PROJECT SCHEDULE

<u>Item</u>	<u>Start Date</u>	<u>Completion Date</u>
Wollaston Beach Area Sewer System Evaluation Survey (SSES):		
Flow Isolation	Spring 2017	Summer 2017
Manhole Inspection	Spring 2017	Summer 2017
TV Inspection	Spring 2017	Summer 2017
Smoke Testing	Summer 2017	Summer 2017
Dye Testing / Dye Flooding	Summer 2017	Summer 2017
SSES Summary Report	Fall 2017	Winter 2017
Wollaston Beach Area SSES Rehabilitation (Design):		
Design	December 2016	February 2017
Advertise/Open Bids/Award	April 2017	June 2017
Construction	July 2017	December 2017
Furnace Brook Parkway Sewer Main/Manhole Rehabilitation (Design & Construction):		
Design	September 2016	October 2016
Construction	October 2016	December 2016

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT B-2
FINANCIAL ASSISTANCE AGREEMENT

CITY OF QUINCY, MASSACHUSETTS
I/I IDENTIFICATION & REHABILITATION PROJECTS
MWRA PROJECT NO. WRA-P9-26-3-954

PROJECT SCHEDULE

<u>Item</u>	<u>Start Date</u>	<u>Completion Date</u>
Bayside Road Area Sewer Main Rehabilitation (CIPP) (Design & Construction):		
Design	September 2016	October 2016
Construction	November 2016	December 2016
John Street Sewer Service Lateral Repair (Design & Construction):		
Design	September 2016	October 2016
Construction	November 2016	December 2016

MWRA I/ LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9

ATTACHMENT A

FINANCIAL ASSISTANCE AGREEMENT

PROJECT NO. WRA-P9-36-3-955

TOWN OF WATERTOWN

TV INSPECTION, DESIGN & CONSTRUCTION OF SEWER REHABILITATIONS IN CIP
PROJECT AREA 6 SEWER SUBAREAS (2017 SEWER REHABILITATIONS PROJECT)

SCOPE OF SERVICES

The inspection, design & construction of sewer rehabilitations in CIP Project Area #6 (2017 Sewer rehabilitations Project) involves the topside inspection of approximately 79 manholes and TV inspection in the project area as indicated in the map included with the Financial Assistance Application. The specific locations and approximate sewer lengths are:

- Acton St (Rutland St to Pleasant St) - 637 l.f. of 12-inch diameter & 2,012 l.f. of 15-inch diameter
- Bridge St – 185 l.f. of 8-inch diameter
- Bromfield St – 728 l.f. of 6-inch & 500 l.f. of 8-inch diameter
- Buick St – 294 l.f. of 8-inch diameter
- Edward Rd. – 1,083 l.f. of 8-inch diameter
- Essex St – 237 l.f. of 6-inch diameter
- Evans St. – 424 l.f. of 8-inch diameter
- Gilbert St. – 240 l.f. of 8-inch diameter
- Jensen St – 1,664 l.f. of 8-inch diameter
- Nash St – 337 l.f. of 6-inch & 155 l.f. of 8-inch diameter
- Pine St – 1,244 l.f. of 8-inch diameter
- Prescott St. – 746 l.f. of 8-inch diameter
- Rutland St. – 774 l.f. of 8-inch diameter & 252 l.f. of 10-inch diameter

For Main St (Olcott St to Prescott St) only the sewer manholes will be investigated and rehabilitated.

Following these investigations & evaluation, design & construction of the recommended cost-effective rehabilitations will be completed. The rehabilitations will include techniques such as root treatment, services connection testing & sealing or lining, short liners, cured-in-place pipe liners and manhole grouting and sealing.

This funding distribution will also include engineering services for the construction phase including bid & award, field and office services.

PROJECT COST SUMMARY

<u>DESCRIPTION OF WORK</u>	<u>TOTAL COST</u>	<u>ELIGIBLE COST</u>
Manhole & internal TV Inspection & evaluation	\$ 67,670	\$ 29,130
Design, Prepare Bid Documents & Bidding	\$ 53,900	\$ 22,200
Engineering Services During Construction	\$ 192,700	\$ 82,945
Construction of Recommended Sewer rehabilitations	\$ 963,500	\$414,725
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Estimated Project Cost	<u>\$1,277,770</u>	<u>\$550,000</u>

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT

PROJECT NO. WRA-P9-36-3-955
TOWN OF WATERTOWN

TV INSPECTION, DESIGN & CONSTRUCTION OF SEWER REHABILITATIONS IN CIP
PROJECT AREA 6 SEWER SUBAREAS (2017 SEWER REHABILITATIONS PROJECT)

PROJECT SCHEDULE

<u>Description of Work</u>	<u>Start Date</u>	<u>Completion Date</u>
Manhole & TV Inspection of Sewers	November 2016	February 2017
Design of Sewer Rehabilitations	March 2017	May 2017
Bid & Award	June 2017	July 2017
Construction of Sewer Rehabilitations	July 2017	December 2017

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

PROJECT NO. WRA-P9-40-1-958

TOWN OF WILMINGTON

TOWNWIDE INFILTRATION/INFLOW (I/I) ANALYSIS

SCOPE OF SERVICES

This project consists of the following tasks:

- 1) Flow monitoring at eight (8) locations throughout Town for a six week period
- 2) Rainfall gauging and groundwater monitoring throughout the flow monitoring period
- 3) Engineering evaluation of the flow monitoring results to estimate average daily flows and I/I rates in each of the eight tributary areas
- 4) Prioritization of high I/I areas for follow-up sanitary sewer evaluation study (SSES) activities and assess the risk of sanitary sewer overflows (SSOs) based on a five year 24 hour storm event
- 5) Conduct 30,000 LF of closed-circuit television (CCTV) inspection in selected high I/I priority areas
- 6) Perform 180 manhole inspections in selected high I/I priority areas
- 7) Provide updates to the Town's sewer GIS

A Draft and Final Report will be developed which will present the data collected from the flow monitoring, rainfall gauging, groundwater monitoring, TV inspection and manhole inspection. An analysis of the findings and results will be presented along with an evaluation and condition assessment of the CCTV and manhole inspections and development of sewer rehabilitation recommendations.

SUMMARY OF ESTIMATED PROJECT COST

<u>Description of Task</u>	<u>Total Cost</u>	<u>Eligible Cost</u>
Townwide Infiltration/ Inflow Analysis	\$ 218,000	\$ 218,000

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM – PHASE 9
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT

PROJECT NO. WRA-P9-40-1-958

TOWN OF WILMINGTON

TOWNWIDE INFILTRATION/INFLOW (I/I) ANALYSIS

PROJECT SCHEDULE

<u>Description of Work</u>	<u>Start Date</u>	<u>Completion Date</u>
Infiltration/Inflow Analysis	September 2016	December 2017

MWRA I/I Local Financial Assistance Program Funding Summary

February 2017 Funding Cycle

<u>Community</u>	<u>Funding Allocation</u>
Arlington	\$ 800,000
Braintree	\$ 660,000
Norwood	\$ 285,900
Quincy	\$ 689,000
Stoughton	\$ 189,000
Weymouth	\$ 295,000
	<hr/>
Total	\$ 2,918,900

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 10
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT

PROJECT NO. WRA-P9-01-3-960

TOWN OF ARLINGTON

TASK 1 – SEWER SYSTEM INVESTIGATION PLANNING PROGRAM (SSIPP) IN AREA #11
TASK 2 - CONSTRUCTION OF PHASE #9 SANITARY SEWER REHABILITATIONS
TASK 3 – POST CONSTRUCTION FLOW EVALUATION IN PHASE 7 AREA

SCOPE OF SERVICES

Task 1 – Sewer System Investigation in Area #11. This Study will identify sources of Infiltration and Inflow (I/I) in Sewer Subareas 16, 47, 51, O, P, U, X, AB, AC, AP, AQ, AR, OS & OT. The expected field work associated with this project will include, but not be limited to: conducting top side physical survey of approximately 250 sewer manholes for sources of I/I; conducting flow isolation of approximately 35,000 l.f. of sewer; cleaning and internal TV inspection of approximately 35,000 l.f. of sewer; spot flow readings of as many as 7 locations; updating of sewer mapping/GIS database; preparing a draft and final report on the results of the field work which will include a cost-effectiveness analysis and recommendations for sewer rehabilitation.

Task 2 – Construction of Phase #9 Sanitary Sewer Rehabilitations. The sewer rehabilitation work is located in Sewer Subareas 02, 19, 32, 49, AD, AJ and at manholes with high Infiltration identified in Sewer System Investigation Planning Program Areas #1 through #10. The sewer rehabilitation contract to be awarded will include the Base Bid and Alternates Bid No. 1 & 2. The Base Bid includes approximately: furnishing & installing 23 lf of 8-inch sewer & 4 manholes; installing 5,000 l.f. of CIPP; root treatment of 1,406 l.f. of sewer; cementitious lining of 210 vertical feet of manholes; reinstating & grouting 146 service connections in cured-in-place pipe; installing 2 manhole inflow dishes; removing & replacing 28 vf of internal drop connections; cut 5 protruding service connections; conducting 5,000 lf of post construction flow isolation; and other related tasks. Alternate Bid No. 1 includes approximately: installing 240 l.f. of CIPP; root treatment of 240 l.f. of sewer; cementitious lining of 78 vertical feet of manholes; reinstating & grouting 7 service connections in cured-in-place pipe; installing 1 manhole inflow dish; grouting & patching 5 manholes; conducting 240 lf of post construction flow isolation; and other related tasks. Alternate Bid No. 2 includes approximately: installing 207 l.f. of CIPP; root treatment of 207 l.f. of sewer; cementitious lining of 6 vertical feet of manhole; furnishing & installing 1 manhole; conducting 207 lf of post construction flow isolation; and other related tasks.

Task 3 – Post Construction Flow Evaluation in Phase 7 Area. Flow isolation data collected as part of the sewer rehabilitation in the Phase #7 Area will be compiled and reviewed. A line segment comparison of the flow isolation before and after rehabilitation will be compared. Available groundwater and rain data will be used to evaluate the similarity of conditions during the different collection periods. A draft & Final Report will be prepared evaluating the pre and post construction flows.

SUMMARY OF PROJECT COSTS

Sewer System Investigation Planning Program (SSIPP) in Area #11	\$ 170,000
Construction of Phase #9 Sanitary Sewer Rehabilitations	\$ 500,000
Engineering Services During Construction of Phase #9 Sewer Rehabilitations	\$ 120,000
Post Construction Flow Evaluation in Phase 7 Area	\$ 15,000

TOTAL ESTIMATED PROJECT COST	\$ 805,000

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 10
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT**

PROJECT NO. WRA-P9-01-3-960

TOWN OF ARLINGTON

TASK 1 – SEWER SYSTEM INVESTIGATION PLANNING PROGRAM (SSIPP) IN AREA #11

TASK 2 - CONSTRUCTION OF PHASE #9 SANITARY SEWER REHABILITATIONS

TASK 3 – POST CONSTRUCTION FLOW EVALUATION IN PHASE #7 AREA

PROJECT SCHEDULE

<u>Description of Work</u>	<u>Start Date</u>	<u>Completion Date</u>
Sewer System Investigation in Area #11	March 2017	December 2017
Phase #9 Sanitary Sewer Rehabilitations	March 2017	August 2017
Re-testing & Warranty Inspection	March 2018	May 2018
Phase #7 Post Construction Flow Evaluation	May 2017	May 2018

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

**TOWN OF BRAINTREE, MASSACHUSETTS
I/I INVESTIGATION AND REHABILITATION PROGRAM - YEAR 6
MWRA PROJECT NO. WRA-P9-06-3-961**

SCOPE OF SERVICES

The purpose of this project is to identify and rehabilitate community sewer subareas that contribute excessive I/I, evaluate rehabilitation options and rehabilitate the sewer system on a continuous set schedule. Project work will include, but not be limited to, the following:

Year 6 I/I Investigation - Study / Design / Bid & Award (Est. Cost = \$ 210,000)

1. Flow isolate as much as 46,000 LF of sewer in Braintree Sewer Subareas L5 / L6 / L7 / HC4 to quantify infiltration amounts within manhole-to-manhole segments of sewer. The inspection will be conducted between the hours of 12AM and 6AM when groundwater levels are typically at their highest and sanitary flows are at a minimum.
2. Clean, TV inspect, videotape and record as much as 46,000 LF of sewer in Braintree Sewer Subareas L5 / L6 / L7 / HC4 . The TV inspection will be performed to locate problem areas and I/I sources within manhole-to-manhole segments of sewer. The inspection will be conducted in Spring 2017 when groundwater levels are typically at their highest.
3. Conduct a topside physical survey of as many as 230 sewer manholes in Braintree Sewer Subareas L5 / L6 / L7 / HC4 to identify defects and I/I sources. A written log will be furnished for each manhole inspected.
4. Prepare a letter report that details areas in which work was performed, summarizes work completed to date and includes recommendations, a cost-effectiveness analysis and prioritization analysis for rehabilitation of pipeline/manhole defects and I/I sources identified during this investigation. [Study = \$150,000 / Design (with Bid & Award) = \$60,000]

Year 6 I/I Investigation - Construction / Construction Services (Est. Cost = \$ 450,000)

Construction plans and specifications (to remove excessive I/I identified during the above Year 6 I/I Investigation) will be developed and submitted, followed by rehabilitation construction. [Construction = \$350,000 / Construction Services = \$100,000]

Total project cost is estimated at \$660,000. Eligible MWRA I/I Local Financial Assistance is \$660,000. As a result of the above work, an estimated 0.40 mgd of peak I/I will be removed from the collection system upon contract completion.

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT

TOWN OF BRAINTREE, MASSACHUSETTS
I/I INVESTIGATION AND REHABILITATION PROGRAM - YEAR 6
MWRA PROJECT NO. WRA-P9-06-3-961

PROJECT SCHEDULE

<u>Item</u>	<u>Start Date</u>	<u>Completion Date</u>
Year 6 I/I Investigation / Rehabilitation:		
I/I Investigation and Reporting	March 2017	November 2017
Design	February 2018	April 2018
Bid and Award	May 2018	June 2018
Construction	July 2018	November 2018
Warranty Retesting	March 2019	March 2019

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

**TOWN OF NORWOOD, MASSACHUSETTS
MEADOWBROOK PRIORITY AREA 5 REHABILITATION DESIGN /
MISCELLANEOUS I/I REHABILITATION MEASURES
MWRA PROJECT NO. WRA-P9-25-3-964**

SCOPE OF SERVICES

The Town of Norwood is continuing its efforts to reduce I/I and identify/eliminate sources of sewage contamination in its collection system and improve conveyance of wastewater. Prior investigations in the Meadowbrook area have identified both infiltration and inflow sources and deficiencies in the collection system affecting capacity. Coli sampling in the brook can be traced to the underdrain system that was constructed beneath the sanitary sewer in much of the downtown area of Norwood. Comprehensive rehabilitation of the sewers, manholes and service connections has been successful in eliminating this problem and groundwater infiltration into the sanitary system.

This project includes two distinct elements: (1) Design of Rehabilitation Measures in Meadowbrook Priority Area 5 and (2) Construction of Miscellaneous Sewer Rehabilitation Measures.

Design of Rehabilitation Measures in Meadowbrook Priority Area 5

Project work includes sewer main/manhole rehabilitation design in Priority Area 5 covering CIPP lining of 9500 LF of sewer main, lining 38 sewer manholes and lining 160 house service connections. The design documents will include one or more bid alternates to allow the Town to maximize the amount of construction that can be performed relative to the amount of anticipated SRF Loan Program funding. Total estimated construction value of the rehabilitation measures is approximately \$2,100,000. Project costs include design services to prepare plans, specifications and contract documents for the proposed rehabilitation measures. Bidding and construction of the proposed work will be completed using SRF Loan Program funding. Estimated design services cost = \$50,000.

Construction of Miscellaneous Sewer Rehabilitation Measures

Sewer rehabilitation work will include CIPP lining of 1500 LF of sewer main on Springvale Road, Alpine Road and the Monroe Street area. Work will also include the lining of service laterals and manhole rehabilitation. Construction will be performed by a negotiated change order under an on-going rehabilitation contract. Estimated rehabilitation cost = \$235,900 (Construction = \$205,900 / Construction Services = \$30,000).

The above work will be performed pursuant to the terms and conditions detailed within the Agreement For Professional Services By and Between the Town of Norwood and CDM Smith, Inc. and the approved MWRA Phase 9 I/I Local Financial Assistance Project Application received January 27, 2017. Total project cost is estimated at \$285,900. Eligible MWRA I/I Local Financial Assistance is \$285,900. As a result of the above work, an estimated 0.10 mgd of peak I/I will be removed from the collection system upon contract completion.

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT**

**TOWN OF NORWOOD, MASSACHUSETTS
MEADOWBROOK PRIORITY AREA 5 REHABILITATION DESIGN /
MISCELLANEOUS I/I REHABILITATION MEASURES
MWRA PROJECT NO. WRA-P9-25-3-964**

PROJECT SCHEDULE

<u>Item</u>	<u>Start Date</u>	<u>Completion Date</u>
Design of Rehabilitation Measures in Meadowbrook Priority Area 5		
Design	March 2017	June 2017
Construction of Miscellaneous Sewer Rehabilitation Measures		
Construction	April 2017	June 2017

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

**CITY OF QUINCY, MASSACHUSETTS
WOLLASTON BEACH AREA SSES I/I REHABILITATION PROJECT
MWRA PROJECT NO. WRA-P9-26-3-962**

SCOPE OF SERVICES

The purpose of this project is to identify and rehabilitate community subareas that contribute excessive I/I, evaluate rehabilitation options and rehabilitate the sewer system on a continuous set schedule. The project area covers sewer subareas along Wollaston Beach and Northwest Quincy. Project work will include, but not be limited to, the following:

I/I Rehabilitation Construction: Construction of cost-effective and value-effective sewer rehabilitations in sewer subareas along Wollaston Beach and Northwest Quincy and the performance of construction public bid/award/resident project representative services. Sewer rehabilitation work includes approximately: 4800 LF of cleaning, inspection, testing and sealing of joints; open cut point repair within 80 LF of sewer main; CIP lining 20,000 LF of sewer main; installing CIP structural short liners in 60 LF of sewer main; cutting one (1) protruding service connection; grouting 35 service connections at the sewer main; and rehabilitating (via interior sealing and exterior grouting) 175 manholes. Design of the above project work was performed under MWRA Project No. WRA-P9-26-3-954.

The above work will be performed pursuant to the terms and conditions detailed within the Agreement For Engineering Services Agreement By and Between the City of Quincy and Weston & Sampson Engineers, Inc. and the approved MWRA Phase 9 I/I Local Financial Assistance Project Application received January 20, 2017.

Total project cost is estimated at \$3,212,000 (Construction = \$2,767,000 / Construction Services = \$445,000). Eligible MWRA I/I Local Financial Assistance is \$689,000 (Phase 9 Allocation Limit). As a result of the above work, an estimated 0.24 mgd of peak I/I will be removed from the collection system upon contract completion.

PROJECT SCHEDULE

<u>Item</u>	<u>Start Date</u>	<u>Completion Date</u>
Wollaston Beach Area SSES I/I Rehabilitation:		
Design	December 2016	March 2017
Advertise/Open Bids/Award	April 2017	June 2017
Construction	July 2017	December 2017

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

**TOWN OF STOUGHTON
REPRIORITIZED YEAR 5 SPRING 2017 I/I INVESTIGATION AND REPORTING**

MWRA PROJECT NO. WRA-P9-32-1-963

SCOPE OF SERVICES

The purpose of this project is to identify and rehabilitate community sewer subareas that contribute excessive I/I, evaluate rehabilitation options and rehabilitate the sewer system on a continuous set schedule. Project work will include, but not be limited to, the following:

Reprioritized Year 5 Spring 2017 I/I Investigation - Study (Est. Cost = \$ 189,000)

1. Flow isolate as much as 54,000 LF of sewer to quantify infiltration amounts within manhole-to-manhole segments of sewer. The inspection will be conducted between the hours of 12AM and 6AM when groundwater levels are typically at their highest and sanitary flows are at a minimum. Work will be performed within sewers that are (1) on the Town paving list that have not been inspected within five years (approximately 3000 LF) and (2) within 200 feet of a flood zone that have not been inspected within five years (approximately 51,000 LF).
2. Clean, TV inspect, videotape and record as much as 54,000 LF of sewer. The TV inspection will be performed to locate I/I sources within manhole-to-manhole segments of sewer in the areas detailed above. The inspection will be conducted in Spring 2017 when groundwater levels are typically at their highest.
3. Conduct a topside physical survey of as many as 300 sewer manholes to identify defects and I/I sources within the areas detailed above. A written survey log will be furnished for each manhole inspected.
4. Prepare a letter report that details areas in which work was performed, summarizes work completed to date and includes recommendations, a cost-effectiveness analysis and prioritization analysis for rehabilitation of pipeline/manhole defects and I/I sources identified during this investigation.

The above work will be performed pursuant to the terms and conditions detailed within Task Order No. FY17 #2 under the August 24, 2016 General Engineering Services Agreement By and Between the Town of Stoughton and Weston & Sampson Engineers, Inc. and the approved MWRA Phase 9 I/I Local Financial Assistance Project Application received January 20, 2017.

Total project cost is estimated at \$189,000. Eligible MWRA I/I Local Financial Assistance is \$189,000.

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT**

**TOWN OF STOUGHTON
REPRIORITIZED YEAR 5 SPRING 2017 I/I INVESTIGATION AND REPORTING**

MWRA PROJECT NO. WRA-P9-32-1-963

PROJECT SCHEDULE

<u>Item</u>	<u>Start Date</u>	<u>Completion Date</u>
Reprioritized Year 5 Spring 2017 I/I Investigation and Reporting		
Flow Isolation	March 2017	May 2017
TV Inspection	March 2017	May 2017
Manhole Inspection	March 2017	May 2017
Data Review / Letter Report	June 2017	December 2017

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

**TOWN OF WEYMOUTH, MASSACHUSETTS
TOWN-WIDE I/I INVESTIGATION & REHABILITATION PROGRAM
YEAR 6 INVESTIGATION
MWRA PROJECT NO. WRA-P9-39-2-965**

SCOPE OF SERVICES

The purpose of this project is to identify and rehabilitate community subareas that contribute excessive I/I, evaluate rehabilitation options and rehabilitate the sewer system on a continuous set schedule. Project work will include, but not be limited to, the following:

Town-Wide Sewer Investigation & Rehabilitation Program - Year 6 Investigation

1. Flow isolate as much as 43,000 LF of 6 to 15-inch sewer in Subarea C-8 to quantify infiltration amounts within manhole-to-manhole segments of sewer. The inspection will be conducted between the hours of 12AM and 6AM when groundwater levels are typically at their highest and sanitary flows are at a minimum.
2. Light clean, TV inspect, videotape and record as much as 53,300 LF of 6 to 30-inch sewer in Subarea C-8. The TV inspection will be performed to locate problem areas and I/I sources within manhole-to-manhole segments of sewer. The inspection will be conducted in Spring 2017 when groundwater levels are typically at their highest.
3. Conduct topside physical survey of as many as 305 sewer manholes in Subarea C-8 for defects and I/I sources. A written log will be furnished for each manhole inspected.
4. Prepare a letter report that details areas in which work was performed, summarizes work completed to date and includes recommendations, a cost-effectiveness analysis and prioritization analysis for rehabilitation of pipeline/manhole defects and I/I sources identified during this investigation.
5. For those I/I sources that have been located and quantified, the above report will include a plan and cost estimate for the design phase that will include the preparation of bid documents for I/I rehabilitation. An opinion of probable construction cost will also be provided.

Total project cost is estimated at \$295,000 (Year 6 Investigation = \$170,000 / 2017 Sewer System I/I Rehabilitation Design = \$60,000 / 2017 Sewer System I/I Rehabilitation Construction Services = \$65,000. Eligible MWRA I/I Local Financial Assistance is \$295,000. Project work will be performed pursuant to the terms and conditions detailed within the approved MWRA Phase 9 I/I Local Financial Assistance Project Application (received January 27, 2017) and the Agreements For Engineering Services By And Between The Town of Weymouth, MA And Weston & Sampson Engineers, Inc.

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT**

**TOWN OF WEYMOUTH, MASSACHUSETTS
TOWN-WIDE I/I INVESTIGATION & REHABILITATION PROGRAM
YEAR 6 INVESTIGATION
MWRA PROJECT NO. WRA-P9-39-2-965**

PROJECT SCHEDULE

<u>Item</u>	<u>Start Date</u>	<u>Completion Date</u>
Town-Wide Sewer Investigation & Rehabilitation Program - Year 6 Investigation		
Flow Isolation	March 2017	May 2017
TV Inspection	March 2017	May 2017
Manhole Inspection	March 2017	May 2017
Data Review / Letter Report	June 2017	November 2017
2017 Sewer System Infiltration Rehabilitation:		
Design	February 2017	April 2017
Bid and Award	May 2017	May 2017
Construction	July 2017	October 2017
Warranty Retesting	May 2018	May 2018

MWRA I/I Local Financial Assistance Program Funding Summary

May 2017 Funding Cycle

<u>Community</u>	<u>Funding Allocation</u>
Boston	\$ 8,966,130
Natick	\$ 160,800
Wakefield	\$ 1,307,100
Total	<hr/> \$ 10,434,030

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A-1
MWRA PROJECT NO. WRA-P9-05-3-968**

**BWSC SEWER AND WATER WORKS IMPROVEMENTS IN BOSTON PROPER
FAIRFIELD STREET SEWER REHABILITATION**

BWSC CONTRACT NO. 16-308-007

SCOPE OF SERVICES

Sewer rehabilitation project work is located on Fairfield Street within Boston's Back Bay area. Work to be performed under this project includes, but is not necessarily limited to, contracted internal rehabilitation of approximately 430 linear feet (LF) of 72 by 78-inch brick sewer using a trenchless lining system; rehabilitating two (2) existing sewer manholes; and the performance of all other work pursuant to the terms and conditions detailed within the plans and specifications of BWSC Contract No. 16-308-007 [Sewer and Water Works Improvements in Boston Proper (Fairfield Street Sewer Rehabilitation)] and the approved MWRA Phase 9 I/I Local Financial Assistance Project Application received May 25, 2017.

The peak infiltration reduction is estimated to be 0.03 mgd. Total project cost is estimated at \$4,285,766. Eligible MWRA I/I Local Financial Assistance for the Fairfield Street Sewer Rehabilitation is \$1,102,328.

PROJECT SCHEDULE

<u>Item</u>	<u>Start Date</u>	<u>Completion Date</u>
Construction	August 2017	October 2017

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A-2
MWRA PROJECT NO. WRA-P9-05-3-969**

BWSC SEWER AND WATER WORKS IMPROVEMENTS IN ROXBURY

UPPER ROXBURY SEWER SEPARATION - PHASE 2

BWSC CONTRACT NO. 16-309-011

SCOPE OF SERVICES

This project will separate sewer flows within Roxbury. The project work area includes the following streets: Aspen Street / Blue Hill Avenue / Cleveland Street / Copeland Street / Dunreath Street / Fairland Street / La Grange Street / Langford Park / Montrose Street / Moreland Street / Perrin Street / Whiting Street / Winthrop Street. The separation of sewers and drains achieved by this project will result in a decrease of combined sewer overflows that currently discharge to the Fort Point Channel (BOS 072). Separation of this area was not included in the MWRA's CSO Plan.

Work to be performed under this project includes, but is not necessarily limited to, contracted installation of approximately 12,415 linear feet (LF) of 8 to 42-inch sewer/drain pipe and 1435 LF of minor drain; structurally lining 2745 LF of 10 to 15-inch sewer/drain pipe; installation of 67 manholes and 11 catch basins/drop inlets; disconnecting 83 downspouts; cleaning and TV inspecting 3950 LF of sewer pipe; and the performance of all other work pursuant to the terms and conditions detailed within the plans and specifications of BWSC Contract No. 16-309-011 [Sewer and Water Works Improvements in Roxbury (Upper Roxbury Sewer Separation - Phase 2)] and the approved MWRA Phase 9 I/I Local Financial Assistance Project Application received May 25, 2017.

The area being separated by this project is approximately 52 acres. The peak and average annual inflow reductions are estimated to be 23 mgd and 0.14 mgd, respectively. Total project cost is estimated at \$8,228,227. Eligible MWRA I/I Local Financial Assistance is \$7,863,802 (Separation Construction = \$7,863,802).

PROJECT SCHEDULE

<u>Item</u>	<u>Start Date</u>	<u>Completion Date</u>
Construction	August 2017	June 2019

**MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT**

**TOWN OF NATICK, MASSACHUSETTS
CCTV INSPECTION VEHICLE / EQUIPMENT PURCHASE
MWRA PROJECT NO. WRA-P9-22-1-966**

SCOPE OF SERVICES

The objective of this CCTV inspection vehicle/equipment (and associated training) purchase is to provide the Town with a more cost-effective method of performing pipeline condition assessments and identifying/quantifying infiltration within the sewer system. Having the in-house capabilities to perform these types of investigations will provide much more flexibility to complete them in a timely manner, and not leave the Town subject to the availability of outside consultants.

This project will not result in any direct I/I removal, but in the long-term should provide more cost-efficient means to complete sewer investigation, leaving additional money available for sewer rehabilitation.

CCTV Inspection Vehicle / Software & Operating System / Camera Equipment / NASSCO Pipeline Assessment Certification Program (PACP) Training Costs (\$195,600) are detailed below:

1. CCTV Inspection Vehicle: \$ 43,460
2. Software & Operating System / Camera Equipment: \$143,540
3. NASSCO PACP Training: \$ 3,000
4. Engineering Assistance During Field Training Phase: \$ 5,600

The above activities will be performed pursuant to the terms and conditions detailed within the approved MWRA Phase 9 I/I Local Financial Assistance Project Application received April 10, 2017.

Total project cost is estimated at \$195,600. Eligible MWRA I/I Local Financial Assistance is \$160,800 (The Town requested that \$34,800 in unspent project funds from MWRA Project No. WRA-P9-22-3-912 be applied to this purchase).

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM - PHASE 9
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT

TOWN OF NATICK, MASSACHUSETTS
CCTV INSPECTION VEHICLE / EQUIPMENT PURCHASE
MWRA PROJECT NO. WRA-P9-22-1-966

PROJECT SCHEDULE

<u>Task</u>	<u>Start Date</u>	<u>Completion Date</u>
Obtain Quotes From Suppliers	April 2017	April 2017
Issue Purchase Orders to Suppliers	April 2017	May 2017
NASSCO PACP Training	August 2017	August 2017
CCTV Inspection Vehicle Delivery	September 2017	October 2017
Field Training	October 2017	October 2017
CCTV Inspection Vehicle In Full Service	November 2017	November 2017

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM – PHASES 9 & 10
ATTACHMENT A
FINANCIAL ASSISTANCE AGREEMENT
PROJECT NO. WRA-P9-33-3-967
TOWN OF WAKEFIELD

**CONDUCT A YEAR 2 SEWER SYSTEM EVALUATION SURVEY STUDY;
CONSTRUCTION OF RECOMMENDED SEWER REHABILITATIONS FROM
YEAR 1 SEWER SYSTEM EVALUATION SURVEY STUDY**

SCOPE OF SERVICES

Conduct a Year 2 Sewer System Evaluation Survey Study This project includes cleaning & internally inspecting approximately 65,000 lf of sewer and manhole inspections of up to 350 manholes. A Letter Report will be prepared which will present the results of the field work; identify those sewer segments and manholes which appear to contribute excessive I/I; present specific conclusions and recommendations for sewer rehabilitations and associated cost that includes a cost-effectiveness analysis. The location of this work is throughout the Town as listed in the Table in Attachment 1 of the Financial Assistance Application dated 04/14/17.

Construction of Recommended Sewer Rehabilitations from Year 1 Sewer System Evaluation Survey Study

This project consists of only the construction cost which will consist of a Base Bid and 2 Alternate Bids. The Base Bid will consist of: open cut point repair of 24 linear feet (lf) of 6” & 8” sewer; 1,711 lf of cleaning, inspection, testing, and sealing of 6” to 10” sewer; root treatment of 3,451 lf of 6” & 8” sewer; 14 lf of 8” cured-in-place short liner; 25 lf of 6” & 8” cured-in-place structural short liner; 5,860 lf of 6” & 8” cured-in-place pipe; 3,181 lf of 6” & 8” structural cured-in-place pipe; testing and sealing of 9 service connections; cutting of 33 protruding service connections; clean, inspection & cured-in-place lining 1 sewer lateral; 48 vertical feet of cementitious manhole lining; root treatment of 1 manhole; replace 2 sewer manhole frames & covers; and other related tasks and appurtenances.

Alternate Bid #1 will consist of: 2,219 lf of cleaning, inspection, testing, and sealing of 6” to 10” sewer; root treatment of 1,947 lf of 6” & 8” sewer; 24 lf of 6” & 8” cured-in-place short liner; 28 lf of 8” & 10” cured-in-place structural short liner; 2,723 lf of 8” to 18” cured-in-place pipe; 1,828 lf of 6” to 10” structural cured-in-place pipe; testing and sealing of 6 service connections; cutting of 21 protruding service connections; 107 vertical feet of cementitious manhole lining; replace 2 sewer manhole frames & covers; and other related tasks and appurtenances.

Alternate Bid #2 will consist of: 1,617 lf of cleaning, inspection, testing, and sealing of 6” to 15” sewer; root treatment of 1,181 lf of 8” to 12” sewer; 20 lf of 8” cured-in-place short liner; 29 lf of 6” & 8” cured-in-place structural short liner; 2,259 lf of 8” to 15” cured-in-place pipe; 641 lf of 8” & 10” structural cured-in-place pipe; testing and sealing of 4 service connections; cutting of 5 protruding service connections; clean, inspection & cured-in-place lining 1 sewer lateral; 34 vertical feet of cementitious manhole lining; replace 6 sewer manhole frames & covers; and other related tasks and appurtenances.

ESTIMATED PROJECT COST SUMMARY

Description of Task	Total Cost	Eligible Cost
Year 1 Sewer Investigation	\$ 175,000	\$ 175,000
Construction of Recommended Sewer Rehabilitations	\$1,212,600	\$1,212,600
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Total Estimated Project Cost	\$1,387,600	\$1,387,600

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM – PHASES 9 & 10
ATTACHMENT B
FINANCIAL ASSISTANCE AGREEMENT

PROJECT NO. WRA-P9-33-3-967

TOWN OF WAKEFIELD

CONDUCT A YEAR 2 SEWER SYSTEM EVALUATION SURVEY STUDY;
CONSTRUCTION OF RECOMMENDED SEWER REHABILITATIONS FROM
YEAR 1 SEWER SYSTEM EVALUATION SURVEY STUDY

PROJECT SCHEDULE

<u>General Description of Work Performed</u>	<u>Start Date</u>	<u>Completion Date</u>
Year 2 Sewer System Evaluation Survey	April 2017	September 2017
Year 1 SSES Recommended Sewer Rehabilitations	June 2017	September 2017
Retesting & Warranty Inspection	March 2018	June 2018

ATTACHMENT 5
TO
MWRA ANNUAL I/I REDUCTION REPORT FOR FY16
Reporting Period: July 2016 Through June 2017

**I/I REDUCTION STATUS UPDATE
FOR MEMBER COMMUNITIES**

The MWRA is working cooperatively with member communities to develop phased I/I reduction programs throughout the service area. The Authority will encourage continuing community efforts in I/I reduction as detailed in the MWRA Regional I/I Reduction Plan. Many community I/I projects are funded through MWRA's I/I Local Financial Assistance Program. This \$460.75 million grant/loan program was established to provide funding to member sewer communities to perform I/I reduction and sewer system rehabilitation projects within their locally-owned collection systems. Through FY17, MWRA has distributed \$332 million to fund local projects. A detailed update on MWRA's I/I Local Financial Assistance Program is included as Attachment 4 to this report.

The Authority has instituted a computer-based questionnaire format for communities to submit annual status reports on their I/I reduction programs. All 43 member sewer communities have submitted information to MWRA for FY17. Community information is summarized below:

1. ARLINGTON: North System

Background Information:

- Miles of Sewer: 106
- Sewered Population: 43,993
- Three Year (CY14 - CY16) Annual Average I/I: 1.69 mgd
- MassDEP Administrative Actions: ACOP-NE-10-1N006 (August, 2010)
 NON-NE-09-1N003 (July 2009)
 NON-NE-07-1N004 (June 2007)

Latest I/I or SSES Reports:

- “Sewer System Investigation Area #6” Final Report (November 2011)
- “Kimball Road/MWRA Millbrook Valley Relief Sewer Evaluation” Final Report (November 2011)
- “Area #6 Smoke Testing, Dye Testing and Dye Flooding” Final Report (December 2011)
- “Town-wide I/I Analysis” Final Report (April 2012)
- “Additional Inspection of Sewer on Pond Lane, Academy St & Mystic Lake Drive” Letter Report (May 2012)
- “Area #6 (Kimball Road) Building Inspections” Report (January 2013)
- “Sewer system Investigation Area #7” Report (August 2013)
- “Area #4, 5 & 7 Smoke Testing” Report (December 2013)
- “Area #8 Sewer System Investigation” Report (August 2014)
- “Area #9 Sewer System Investigation” Report (August 2015)
- “Area #10 Sewer System Investigation” Report (August 2016)
- “Phase #7 Sanitary Sewer Rehabilitation – Post Rehabilitation Flow Evaluation (July 2017)
- “Area #11 Sewer System Investigation” Report (expected August 2017)

Private Source Inflow Removal Program: The Arlington Department of Public Works is currently implementing a water meter replacement program. At the time of the water meter replacement, a building inspection is performed by the town employee while they are still in the home. The building inspections are ongoing and anticipated to be completed town-wide by June 2019.

I/I Rehabilitation Projects in Design or Construction:

The Construction of the Phase #7 Sanitary Sewer Rehabilitations – Bid No. 15-25 was substantially completed in April 2016. The following work was completed: performed 7,044 LF of chemical root treatment; CIPP lining of 13,737 LF of 8” to 12” sewer; structural CIPP lining of 8” & 12” sewer; cementitious lining of 695 vf of manholes; grouting & patching of 8 manholes; building 4 manhole benches & inverts; replacing 3 manhole frames & covers; raising 2 manhole frames & covers; installing 6 Inflow dishes; installing 33 vf of internal drop connections; sealing a manhole Access Port; grouting of 206 services; cutting 14 protruding service connections. The Warranty inspection for this project was completed in April 2017.

The Phase #8 Sanitary Sewer Rehabilitations – Bid No. 16-26 was substantially completed in November 2016. The work completed consisted of: root treatment of 2,711 LF of sewer; cleaned & inspected 844 LF of sewer; installed 8,584 LF of CIPP lining; installed 116 LF of structural CIPP lining; reinstated & grouted 1 lateral liner; installed 8 LF of structural short liners; cementitious lining of 364 VF of manholes; grouted & patched 5 manholes; separated 5 shared manholes; installed 5 internal drop connections; installed an inflow dish; replaced 2 manhole frames and covers; open cut point repair at 4 locations; installed 3 precast sewer manholes. The Warranty inspection for this project was completed in April 2017.

The bids for Phase #9 Sanitary Sewer Rehabilitations – Bid No. 17-15 were opened on April 6, 2017. The Town awarded the Contract to the low bidder, Rapid Flow, Inc. The Town awarded the Base Bid, Alternate #1 and Alternate #2 of the Contract. Work began in June 2017. The project is expected to be substantially complete by September 2017 with warranty inspections expected by July 2018.

Reporting Period Activity:

The Town is continuing with the 12-year Sewer System Investigation and Planning Program which was initiated in September 2006.

The Area #10 Sewer System Investigation Report, which includes sewer investigations in mini-systems C, D, E, Q, R, Z, 14, 16, 18, 19, 32, 36, 37, 38, 44, AA, AF, AG, AH, AI, AL, AM, AX & AY, was completed in August 2016.

The Area #11 Sewer System Investigation Report, which includes sewer investigations in mini-systems 16, 47, 51,), P, U, X, AB, AC, AP, AQ, AR, OS 7 OT is expected to be completed in July 2018.

In March 2017, funds were distributed to fund the following projects: Task 1 – Sewer System Investigation in Area #11 will identify sources of Infiltration and Inflow (I/I) in Sewer Subareas 16, 47, 51, O, P, U, X, AB, AC, AP, AQ, AR, OS & OT. The expected field work associated with this project will include, but not be limited to: conducting top side physical survey of approximately 250 sewer manholes for sources of I/I; conducting flow isolation of approximately 35,000 l.f. of sewer; cleaning and internal TV inspection of approximately 35,000 l.f. of sewer; spot flow readings of as many as 7 locations; updating of sewer mapping/GIS database; preparing a draft and final report on the results of the field work which will include a cost-effectiveness analysis and recommendations for sewer rehabilitation. Task 2 – Construction of Phase #9 Sanitary Sewer Rehabilitations is located in Sewer Subareas 02, 19, 32, 49, AD, AJ and at manholes with high Infiltration identified in Sewer System Investigation Planning Program Areas #1 through #10. The sewer rehabilitation contract to be awarded will include the Base Bid and Alternates Bid No. 1 & 2. The Base Bid includes approximately: furnishing & installing 23 lf of 8-inch sewer & 4 manholes; installing 5,000 l.f. of CIPP; root treatment of 1,406 l.f. of sewer; cementitious lining of 210 vertical feet of manholes; reinstating & grouting 146 service connections in cured-in-place pipe; installing 2 manhole inflow dishes; removing & replacing 28 vf of internal drop connections; cut 5 protruding service connections; conducting 5,000 lf of post construction flow isolation; and other related tasks. Alternate Bid No. 1 includes approximately: installing 240 l.f. of CIPP; root treatment of 240 l.f. of sewer; cementitious lining of 78 vertical feet of manholes; reinstating & grouting 7 service connections in cured-in-place pipe; installing 1 manhole inflow dish; grouting & patching 5 manholes; conducting 240 lf of post construction flow isolation; and other related tasks. Alternate Bid No. 2 includes approximately: installing 207 l.f. of CIPP; root treatment of 207 l.f. of sewer; cementitious lining of 6 vertical feet of manhole; furnishing & installing 1 manhole; conducting 207 lf of post construction flow isolation; and other related tasks. Task 3 – Post Construction Flow Evaluation in Phase 7 Area. Flow isolation data collected as part of the sewer rehabilitation in the Phase #7 Area will be compiled and reviewed. A line segment comparison of the flow isolation before and after rehabilitation will be compared. Available groundwater and rain data will be used to evaluate the similarity of conditions during the different collection periods. A draft & Final Report will be prepared evaluating the pre- and post-construction flows. The estimated Peak Infiltration removal for Task 2 is 0.085 mgd (MWRA Project No. WRA-P9-01-3-960).

MWRA I/I Local Financial Assistance Program: The community has financed twenty-two (22) I/I reduction projects through the Authority's funding assistance program. Of the \$8,423,000 allotted through the Program's Phases 1 - 10, the community has \$210,000 remaining in funding assistance.

2. ASHLAND: South System

Background Information:

- Miles of Sewer: 66
- Sewered Population: 13,549
- Three Year (CY14 - CY16) Annual Average I/I: 0.36 mgd
- MassDEP Administrative Actions: No. 594 (November 1985)

Latest I/I or SSES Report: I/I Investigation: TV Inspection (2014 Summary Report): April 2015
I/I Investigation: TV Inspection (2017 Summary Report): On-Going

Private Source Inflow Removal Program: Sump pump/roof leader investigations (via DPW personnel) by Sub-Basin during FY16/17:

Sub-Basin 1: 162 inspections	Sub-Basin 2: 320 inspections
Sub-Basin 3: 34 inspections	Sub-Basin 4: 245 inspections

I/I Rehabilitation Projects in Design or Construction: The Town has contracted Truax Corp. to perform internal TV inspection of 199,500 LF of sewer main in Ashland Sewer System Sub-Basins 1 / 2 (MWRA Project No. WRA-P8-02-1-827). The majority of the sewer main investigation work has been completed. A 2017 Investigations Summary Report is currently being prepared. The Report will address sewer main rehabilitation options. A sewer rehabilitation contract will be awarded in CY17/18, with repair work scheduled over the next three years as funding becomes available.

Reporting Period Activity: A Town-wide wastewater flow metering (MWRA Project No. WRA-P9-02-1-957) began in March 2017 (covering an 11 week metering period). Data analysis and report preparation is on-going.

MWRA I/I Local Financial Assistance Program: The community has financed seven (8) I/I reduction projects through the Authority's funding assistance program. Of the \$2,168,500 allotted through the Program's Phases 1 - 10, the community has \$426,050 remaining in funding assistance.

3. BEDFORD: North System

Background Information:

- Miles of Sewer: 78
- Sewered Population: 13,394
- Three Year (CY14 - CY16) Annual Average I/I: 1.12 mgd
- MassDEP Administrative Actions: None

Latest I/I or SSES Report: Entegris Sewer Evaluation Final Report (January 2012)
Phase #3 Sewer System Investigation (October 2016)
Phase #4 Sewer System Investigation (October 2016)

Private Source Inflow Removal Program: No additional inspections were reported this period. Smoke testing which was conducted as part of the Sewer System Investigation Project #3 identified several private Inflow sources. These sources are expected to be removed in an upcoming sewer rehabilitation project.

In March 2010, Town Meeting voted to amend the Town's General Bylaws for Article 52 – Sewer System. This amendment includes a new Section 52.19 which allows authorized Town personnel to enter private properties to inspect internal plumbing. Under this bylaw amendment, the Town's Sewer System Bylaw now includes a 4:1 Inflow/Infiltration removal requirement for new developments that will generate greater than 50,000 gpd of new sanitary flows.

I/I Rehabilitation Projects in Design or Construction: The Construction of the Phase #3 Sewer Rehabilitations, which began in April 2016 (bid opening) has been completed. The warranty inspection which was conducted in March 2017, found some rehabilitation work which needed to be corrected. A second warranty inspection will be performed in spring 2018.

Reporting Period Activity: The Phase #3 Sewer System Investigation and Flow Evaluation Report was complete in October 2016. An estimated 131,184 gpd of infiltration was identified during manholes inspections. An estimated 44,963 gpd of inflow was identified during smoke testing.

The Phase #4 Sewer System Evaluation and Survey Report was complete in October 2016. An estimated 43,920 gpd of infiltration was identified.

The Phase #5 Sewer System Evaluation and Survey is ongoing. A summary report will be complete in fall 2017.

The town-wide Force Main Evaluation and Prioritization is ongoing.

MWRA I/I Local Financial Assistance Program: The community has financed seven (7) I/I reduction projects through the Authority's funding assistance program. Of the \$3,404,600 allotted through the Program's Phases 1 - 10, the community has \$1,405,000 remaining in funding assistance.

4. BELMONT: North System

Background Information:

- Miles of Sewer: 78
- Sewered Population: 24,927
- Three Year (CY14 - CY16) Annual Average I/I: 1.08 mgd
- MassDEP Administrative Actions: None

Latest I/I or SSES Report:

I/I and Comprehensive Flow Monitoring Project Final Report (July 2009)
Sewer System Evaluation Survey Final Report (October 2009)
Preliminary Design Report – Investigations of Sewers to Identify I/I Report (January 2013)

Private Source Inflow Removal Program: The Town continues to work with potential developers in implementing a program that either removes I/I at rate of 5 to 1 or makes a one time payment to the Town to fund community I/I removal work.

No building inspections were performed during the past year.

I/I Rehabilitation Projects in Design or Construction: The Town has inspected approximately 20,000 LF of sewer and storm drain associated with the Town's Pavement Management Program (PMP). Point repairs, service replacements and full length replacements were conducted on structural defects within the PMP limits and additional future trenchless repairs will be conducted to complete the recommended repairs.

Reporting Period Activity: The Town has begun a comprehensive storm water sampling program in accordance with the upcoming MS4 permit requirements as well as an Order on Consent that was issued by the EPA. Investigations will include storm water sampling, building inspections, dyed-water testing and CCTV inspection of both the sewer and storm drain systems.

MWRA I/I Local Financial Assistance Program: The community has financed five (5) I/I reduction projects through the Authority's funding assistance program. Of the \$5,135,100 allotted through the Program's Phases 1 - 10, the community has \$2,143,000 remaining in funding assistance.

5. BOSTON: North and South Systems

Background Information:

- Miles of Sewer: 858
- Sewered Population: 645,320
- Three Year (CY14 - CY16) Annual Average I/I: 25.82 mgd
- MassDEP Administrative Actions: None (Cooperative Agreement Exists)

Boston North is one of MWRA's five combined sewer service communities (Boston North, Brookline, Cambridge, Chelsea, Somerville). Portions of Boston North are impacted by projects under MWRA's CSO Control Plan.

Latest I/I or SSES Reports: City-Wide I/I Analysis; West Roxbury Low Level Sewer I/I Study; Roxbury Canal Sewer Separation Study; Upper Neponset Valley Sewer Inflow Survey; Granite Avenue I/I Survey; Dorchester High Level Sewer I/I Survey; Lower Dorchester Brook Sewer Study; and Longwood Medical Area I/I Survey.

Private Source Inflow Removal Program: Since 1994, the Downspout Disconnection Program has conducted approximately 38,000 building surveys and 10,500 dye water tests. Approximately 25,150 downspouts have been disconnected. During CY05 - CY17, a total of seventy-five (75) large impervious areas were surveyed to identify inflow sources. All seventy-five (75) areas have been dye tested.

I/I Rehabilitation Projects in Design or Construction: BWSC has both completed and is currently working on a wide variety of separation and I/I identification/rehabilitation projects. To date, eighty-one (81) projects have received funding through the MWRA I/I Local Financial Assistance Program. During FY07-FY17, BWSC completed the following rehabilitation projects: Rehabilitation of Sewers in the Fenway (Audubon Circle / St. Mary's Street Area); A Street Area Sewer Separation (South Boston Gillette Headquarters); Mass Ave - Dorchester Separation (New Market Square Area); East Boston (Border/Meridian Street Area) Sewer Separation; Sewer Rehabilitation in Back Bay/Kenmore/Hyde Park/Mattapan; Albany Street Sewer Separation; Sewer Rehabilitation in Dorchester/Mattapan/West Roxbury/Brighton; Talbot Avenue High Level Sewer Area Sewer Replacement/Manhole Rehabilitation; South End Sewer Rehabilitation; Marginal Street Sewer Separation; St. Botolph Street Sewer Separation; Maverick Street Sewer Separation; West Side Interceptor and Public Garden Lining; Back Street Sewer Separation and Chester Park Area Sewer Separation.

On-going rehabilitation projects include: Fairfield Street Sewer Rehabilitation; Upper Roxbury Sewer Separation; Mass Ave - Roxbury Separation (New Market Square); Dudley Square Sewer Separation; Hampden Street Area Separation and Upper Roxbury Area Sewer Separation (Phase I).

BWSC is also working with the Boston University Medical Center Facilities Management Group on I/I mitigation projects to offset sanitary discharges from Boston University's National Emerging Infectious Diseases BioSquare Phase II Project (620 Albany Street).

BWSC also works cooperatively with Massport to identify impacts from the sewer system to the Logan Airport area stormwater drainage system. Between 2006 and 2008, Massport conducted inspections of the sanitary sewer and stormwater drainage systems to locate sanitary system leaks/breaks and direct/illegal cross-connections to the drainage system. As a result of these surveys, BWSC completed sanitary sewer section replacement during 2009/10. The sanitary sewer inspections also identified deficiencies in the sewer maintained by Massport at several locations throughout the Airport property. In 2012, sewer cleaning and internal TV inspection identified additional sewer sections requiring repair. Rehabilitation design was completed in July 2013. Rehabilitation construction was completed in November 2013. Work included CIP pipe lining of 1525 LF of sewer main and replacing 240 LF of sewer main. In 2012/3, Massport Facilities Department conducted inspections and cleaning of manholes/catch basins at locations throughout the Airport property. A total of 371 structures were inspected.

BWSC entered into an I/I reduction agreement with the Massachusetts DEP in January 1986. As provided in the agreement, BWSC has performed a Phase II SSES on separated sewer areas within the City. BWSC also has an ongoing tide gate/regulator inspection and repair program and performs separation projects on pockets of combined sewers tributary to separated sewer areas.

Reporting Period Activity: BWSC is required to report to the EPA on I/I reduction measures under their NPDES permit. This reporting requirement coincides with the MWRA's required submittal dates; therefore, please refer to the BWSC NPDES report for a summary of activities during this period.

MWRA I/I Local Financial Assistance Program: The Commission has financed eighty-one (81) I/I identification/ reduction projects through the Authority's funding assistance program. Of the \$132,171,200 allotted through the Program's Phases 1 - 10, the Commission has \$39,492,794 remaining in funding assistance.

6. BRAINTREE: South System

Background Information:

- Miles of Sewer: 140
- Sewered Population: 36,573
- Three Year (CY14 - CY16) Annual Average I/I: 3.34 mgd
- MassDEP Administrative Actions:
 - ACO-NE-01-1001 (April 2001)
 - ACO-NE-99-1001 (March 1999)
 - NON (May 1997)
 - NON (October 1986)
 - Amended AO Docket No. 546 (February 1985)

Latest I/I or SSES Report: Annual Town-Wide Sewer Investigation & Rehabilitation Program –
Prioritization Evaluation Report (July 2011)
Annual Town-Wide Sewer Program – Yr 1 Investigation (July 2012)
Annual Town-Wide Sewer Program – Yr 2 Investigation (January 2014)
Annual Flow Monitoring Project – Phase I (January 2015)
Annual Town-Wide Sewer Program – Yr 3 Investigation (March 2015)
Annual Town-Wide Sewer Program – Yr 4 Investigation (February 2016)
Annual Town-Wide Sewer Program – Yr 5 Investigation (January 2017)
Annual Town-Wide Sewer Program – Yr 6 Investigation (Ongoing)

Private Source Inflow Removal Program: Sump pump removal program is ongoing. Ten (10) private source sump pump removal contracts have redirected 295 sump pumps to date. Developer Flow Reduction Program is now 6 to 1 per DEP ACO. During CY13/14, a sump pump amnesty letter was sent out with the Town's annual water report to all users. The letter resulted in 31 customer calls to have their connections checked. To date, 27 inspections have taken place, and nine (9) sump pumps have been identified for removal. Actual removal/rerouting of the sump pumps has not yet taken place.

I/I Rehabilitation Projects in Design or Construction:

Annual I/I Removal Program (Year 5) design (MWRA Project No. WRA-P9-06-3-941) was completed June 2017. Year 5 Rehabilitation Construction (Braintree Contract S17-1) was bid July 2017 with construction estimated to begin Fall 2017. The Year 5 project is estimated to remove 32,040 gpd of infiltration from the Town's sewer system.

Annual I/I Removal Program (Year 4) design (MWRA Project No. WRA-P9-06-3-915) was completed June 2016. Year 4 Rehabilitation Construction (Braintree Contract S16-1) was bid August 2016 with Warranty Retesting scheduled for Fall 2017. The Year 4 project is estimated to remove 27,929 gpd of infiltration from the Town's sewer system.

Annual I/I Removal Program (Year 3) design (MWRA Project No. WRA-P9-06-3-915) was completed June 2014. Year 3 Rehabilitation Construction (Braintree Contract S15-1) was bid July 2015 with Warranty Retesting completed Spring 2017. The Year 3 project is estimated to have removed 55,765 gpd of infiltration from the Town's sewer system.

Annual I/I Removal Program (Year 2) design (MWRA Project No. WRA-P8-06-3-812) was completed May 2014. Year 2 Rehabilitation Construction (Braintree Contract S14-1) was bid July 2014 with Warranty Retesting completed Spring 2016. The Year 2 project is estimated to have removed 32,947 gpd of infiltration from the Town's sewer system.

Annual I/I Removal Program (Year 1) design (MWRA Project No. WRA-P7-06-3-748) was completed May 2013. Year 1 Rehabilitation Construction (Braintree Contract S13-1) was bid June 2013 with Warranty Retesting completed Summer 2014.

Reporting Period Activity:

The Surrey Lane Pump Station was eliminated in December 2016. The gravity sewer has been rerouted to connect to the existing sanitary sewer on Pearl Street.

Town-Wide Annual Wastewater Flow Monitoring began September 2015 and was completed December 2016. Summary Letter Report completed July 2017.

Annual I/I Removal Program (Year 6) Investigation (MWRA Project No. WRA-P9-06-3-961) was completed Spring 2017. Data review/report preparation is ongoing.

Annual I/I Removal Program (Year 5) Investigation in Subareas FR1 / MA1 / T2 (MWRA Project No. WRA-P9-06-3-941) was completed Spring 2016. Data review/report preparation completed January 2017. Flow isolation and television inspection revealed an estimated 57,024 gpd of peak infiltration. Topside manhole inspection of 202 manholes revealed an estimated 20,091 gpd of peak I/I.

Annual I/I Removal Program (Year 4) Investigation in Subareas PS1 / T3 / T4 / T5 (MWRA Project No. WRA-P9-06-3-915) was completed Spring 2015. Data review/report preparation completed February 2016. Flow isolation and television inspection revealed an estimated 66,384 gpd of peak infiltration. Topside manhole inspection of 257 manholes revealed an estimated 8,441 gpd of peak infiltration.

Annual I/I Removal Program (Year 3) Investigation consisted of flow isolation, TV inspection and topside manhole inspections during Spring 2014 (MWRA Project No. WRA-P9-06-3-915). Data review/report preparation completed March 2015. Flow isolation and TV inspection of 43,489 lf of sewers in Subareas U1 / W5 / W6 revealed an estimated 94,176 gpd of peak infiltration. Topside manhole inspection of 236 manholes in Subareas U1 / W5 / W6 revealed an estimated 31,104 gpd of peak infiltration and 1969 gpd of peak inflow.

Annual I/I Removal Program (Year 2) Investigation (MWRA Project No. WRA-P8-06-3-812) consisted of flow isolation, TV inspection and topside manhole inspection during Spring 2013. Data review/report preparation completed January 2014.

Annual I/I Removal Program (Year 1) Investigation (MWRA Project No. WRA-P7-06-3-748) consisted of TV inspection of 49,538 LF of sewer pipe in Subareas S1 / W2 / HC2 / M2 and revealed an estimated 43,632 gpd of peak infiltration. Topside manhole inspection of 230 manholes in Subareas S1 / W2 revealed an estimated 35,795 gpd of peak infiltration.

MWRA I/I Local Financial Assistance Program: The community has financed ten (10) I/I reduction projects through the Authority's funding assistance program. Of the \$8,359,000 allotted through the Program's Phases 1 - 10, the community has \$1,783,200 remaining in funding assistance.

7. BROOKLINE: North and South Systems

Background Information:

- Miles of Sewer: 111
- Sewered Population: 59,069
- Three Year (CY14 - CY16) Annual Average I/I: 3.53 mgd
- Mass DEP Administrative Actions: None

Brookline is one of MWRA's five combined sewer service communities (Boston North, Brookline, Cambridge, Chelsea, Somerville). Portions of Brookline are impacted by projects under MWRA's CSO Control Plan.

Latest I/I or SSES Report:

Sewer Evaluation Survey in Subareas NI-7, 8 & 12 Final Report (May 2012)
Results for Condition Survey – Subareas NI-7, NI-8 & NI-12 Technical Memo (August 2012)
Eliot Street Smoke Testing Technical Memo (January 2013)
Englewood Ave/Kilsyth Rd Sewer Alternative Evaluation Technical Memo (February 2013)
Wastewater Master Plan Update (December 2013)
Results for Sewer Condition Survey in Subareas NI-9, NI-10 & NI-11 Technical Memo (September 2014)

Private Source Inflow Removal Program: Town is in the process of developing a Private Flow Source Identification and Removal Program. A 4:1 Flow Reduction is enforced for large residential and commercial projects. The community is continuing its public outreach for private inflow identification/removal. Engineering Division personnel are on the lookout for illicit sump pumps during inspections.

The Town is currently reviewing pre and post CCTV files of project PW/15-10 for clear water flow from services and locating the sources using GIS. Town sewer crews have CCTV entire sewer basin NI-5, and are currently working on CCTV NI-7. Clear water flow has been observed from sewer laterals in NI-5 (especially around Sargent Pond) and NI-7. The Town's next sewer rehabilitation project will be concentrated in these areas. Removal of these clear water sources will be addressed in the next sewer rehabilitation contract.

I/I Rehabilitation Projects in Design or Construction: Construction of Contract #PW/15-10 Recommended Sewer Rehabilitation in Subareas NI-8, NI-9, NI-10 & NI-11, which was awarded to D'Allessandro Corp. on September 17, 2015, is substantially completed (99%). Only punch list items remain, approval of final balancing change order is expected in August 2017. Final inspection of punch list items and contract close-out is expected by end of August 2017.

Reporting Period Activity: See Above information in Private Inflow Removal Program and I/I Rehabilitation Projects in Design or Construction paragraphs.

MWRA I/I Local Financial Assistance Program: The community has financed eight (8) I/I reduction projects through the Authority's funding assistance program. Of the \$13,165,200 allotted through the Program's Phases 1 - 10, the community has \$5,499,000 remaining in funding assistance.

8. BURLINGTON: North System

Background Information:

- Miles of Sewer: 115
- Sewered Population: 24,826
- Three Year (CY14 - CY16) Annual Average I/I: 1.12 mgd
- MassDEP Administrative Actions: ACO-NE-06-1N001 (March 2006)
ACO-NE-01-1004 (July 2001)
Amended AO Docket No. 618 (October 1986)

Latest I/I or SSES Reports:

Easement Manhole Inspections & Flood Plain Manhole Inflow Investigations Final Report (August 2011)
Phase 5 Smoke Testing, Dye Testing & Dye Flooding Final Report (January 2012)
Phase 5 Sanitary Sewer Flow Evaluation and Recommendations Final Report (January 2012)
Phase 6 Sewer System Evaluation Survey Final Report (January 2012)
Building Inspections in the Phase 6 Area Final Report (June 2012)
Project 7 – Evaluate Sewer Flows Based on Water Use & SCADA Pump Station Data Report (Fall 2013)
Project 7 – Evaluation of Localized Flooding Areas Final Report (February 2014)
Project 7 – Building Inspections Final Report (March 2014)
Project 7 – Sewer System Evaluation Survey Final Report (March 2014)
Evaluation of Sewer Flows Based Upon SCADA Pump Station Data & Water Use Data – Project 7 (December 2014)

Private Source Inflow Removal Program: In the past year, no house-to-house inspections investigations were conducted. No private inflow sources were removed though several are under construction.

The Town's sewer connection fund balance (5 for 1 sewer connection fee) is \$397,875.00. The Town has also appropriated \$300,000.00 of sewer enterprise funds for I/I mitigation and structural improvements.

I/I Rehabilitation Projects in Design or Construction:

The Design of the "Sewer Rehabilitations Downstream of Terrace Hall Force Main Discharge – Contract No. 17C-411-0028" was completed in April 2017. The construction contract has been bid and awarded. The Notice to Proceed was given on June 26, 2017.

The Design of the “Project 6 & 7 Sewer Rehabilitations – Contract No. 17C-411-0017” was completed in October 2016. The construction contract has been bid and awarded. Completion is expected by the end of summer 2017. The project will remove an estimated 176,361 gallons per day of infiltration and 431,244 gallons per day of inflow.

The “Lucaya Circle Pump Station and Force Main Rehabilitation” project was awarded to D&C Construction Company, Inc in August 2016. Substantial Completion was reached in April 2017.

Reporting Period Activity: In November 2016, funds were distributed for the construction of sanitary sewer rehabilitations in the Project 6 & 7 Areas as recommended by the “2012 Sanitary Sewer Evaluation Survey” Report (Project 6) dated November 2012 and the “Project 7 Sewer System Evaluation Survey” dated March 2014. The scope of work includes: open cut repair of 10 lf of sewer; cleaning, inspection, testing and sealing of 6,109 lf of sewer; chemical root treatment of 2,394 lf of sewer; chemical root treatment of 15 manholes; installation of 30 lf of cured-in-place short liners; installation of 4,689 lf of cured-in-place pipe and reinstatement of 29 service connections; installation of 481 lf of structural cured-in-place pipe and reinstatement of 6 service connections; inspecting, testing, and grouting of 22 service connections; cementitious lining of 4,932 vf of manholes; installation of 11 manhole frames and covers; installation of 379 manhole inflow dishes; grouting to stop leaks at one (1) manhole; and all associated appurtenances. The estimated annual Infiltration to be removed is 0.50 mgd. (MWRA Project No. WRA-P9-08-3-956).

MWRA I/I Local Financial Assistance Program: The community has financed twelve (12) I/I reduction projects through the Authority’s funding assistance program. The community has used its entire Phase 1 - 10 allocation of the \$5,102,800.

9. CAMBRIDGE: North System

Background Information:

- Miles of Sewer: 148
- Sewered Population: 107,278
- Three Year (CY14 - CY16) Annual Average I/I: 5.812 mgd
- Mass DEP Administrative Actions: NON-NE-00-1012 (May 2000)
 NON-NE-00-1004 (January 2000)
 ACOP-NE-96-1004

Cambridge is one of MWRA’s five combined sewer service communities (Boston North, Brookline, Cambridge, Chelsea, Somerville). Portions of Cambridge are impacted by projects under MWRA’s CSO Control Plan.

Latest I/I or SSES Reports:

Phase II: Analysis and Fast Track Design of I/I Rehabilitation Projects (December 2007)
East Cambridge Sewer Capacity Program (January 2013)
Area 4 Infrastructure Improvements and Kendall Square Sewer Assessment (July 2015)

Private Source Inflow Removal Program: The City has completed house to house inspections in the Willard Street catchment area. This work was done as part of the design of a new stormwater outfall to the Charles River. Construction of the stormwater outfall is expected in 2018.

The City will also be performing house to house inspections in a portion of the Cambridgeport catchment area in advance of the construction of a new stormwater outfall at Talbot Street. These inspections will start in 2018.

The City continues to work with developers on I/I removal projects triggered by increased sewer flows greater than 15,000 gpd on new development projects. I/I removal projects are currently in progress for developments at 399 Binney Street, 145 Broadway, 88 Ames Street, 88 Cambridgepark Drive, the North Point development, 1 Broadway and the MIT SoMa project.

I/I Rehabilitation Projects in Design or Construction: For the Western Avenue Reconstruction Project, the new Storm Water Quality Sampling Station (SWQSS) has been installed. Remaining work includes programming and startup which is expected to be completed by the end of September 2016. All other work for Western Ave Reconstruction Project is complete.

Reporting Period Activity: Remedial Sewer Repair: In the past year, the City's Remedial Repair Contractor has made various repairs to the City's sewer and drain system at 140 locations. These repairs consist primarily of spot repairs on mainline pipes and catch basin replacement.

MWRA I/I Local Financial Assistance Program: The community has financed nine (9) I/I reduction projects through the Authority's funding assistance program. Of the \$23,620,100 allotted through the Program's Phases 1 - 10, the community has \$12,543,045 remaining in funding assistance.

10. CANTON: South System

Background Information:

- Miles of Sewer: 62
- Sewered Population: 15,088
- Three Year (CY14 - CY16) Annual Average I/I: 1.31 mgd
- MassDEP Administrative Actions: AO Docket No. 537 (April 1984)

Latest I/I or SSES Report: Comprehensive Water Resources Management Plan (February 2009)
I/I Five Year Management Plan (November 2011)
I/I Five Year Management Plan Update (On-going)

Private Source Inflow Removal Program: No additional inspections were reported during this period. Town has established an I/I Mitigation Fee for all new connections. Fee is paid based upon DEP flow rates at a 4 to 1 ratio.

I/I Rehabilitation Projects in Design or Construction: Sewer System Rehabilitation (Canton Contract No. 12-01S / MWRA Project No. WRA-P8-10-3-817) was performed within Sewer Subsections 1-12 / 17 and included sewer manhole sealing/restoration, sewer pipe testing and sealing, CIPP lining and joint testing/sealing. Project work is complete.

Reporting Period Activity: The Town performed sewer main cleaning and TV inspection in Sewer Subsections 14 / 19. The Town also sealed 25 manholes in various locations (ten cross country manholes were sealed along Route 138). Estimated average I/I removal is 44,000 gpd. The Town conducted a 12 week flow metering program within Subsystems 7/9/12/14/16/18/19/24 to identify areas with extraneous flows.

MWRA I/I Local Financial Assistance Program: The community has financed six (6) I/I reduction projects through the Authority's funding assistance program. Of the \$3,965,900 allotted through the Program's Phases 1 - 10, the community has \$1,290,000 remaining in funding assistance.

11. CHELSEA: North System

Background Information:

- Miles of Sewer: 41
- Sewered Population: 37,670
- Three Year (CY14 - CY16) Annual Average I/I: 1.91 mgd
- MassDEP Administrative Actions: None
- EPA Clean Water Act Administrative Order: EPA Docket No. 09-008 (March 2009)

Chelsea is one of MWRA's five combined sewer service communities (Boston North, Brookline, Cambridge, Chelsea, Somerville). Portions of Chelsea are impacted by projects under MWRA's CSO Control Plan.

Latest I/I or SSES Report: Investigation into Excessive Infiltration/Inflow & Exfiltration (November 2009)
Everett, Spruce & Second St Sewer & Drain Evaluation (October 2012)

Private Source Inflow Removal Program: The City began collecting Sewer Bank fees for redevelopment projects in CY13. The City has also begun a move toward the implementation of Green vs. Gray infrastructure to reduce the amount of stormwater discharged to combined sewers. Efforts to date have included requiring all redevelopment projects to utilize Low Impact Development and retain/infiltrate stormwater onsite, and incorporating green infrastructure into municipal projects (e.g., rain garden at Mace Housing Complex).

I/I Rehabilitation Projects in Design or Construction:

The Shurtleff Street Utility Improvement Project was bid and awarded. Construction is ongoing and will continue until December 2017.

Construction of the Phase IV Gateway Center Infrastructure Improvements Project is complete.

Construction of the Gardner Street and Forsyth Street Utility and Roadway Improvements Project is complete.

Construction of the 2015 Pump Station Upgrades is ongoing and will continue into fall 2017.

Construction of the Clark Avenue, Crescent Avenue, Tudor Street, and Lawrence Street Utility and Roadway Improvements Project is substantially complete on the utility side. Roadway reconstruction is scheduled to begin in August 2017 and proceed into fall 2017.

Design of the Phase V Gateway Center Infrastructure Improvements Project is complete and the bid process is underway. The City expects to award the Contract in the coming months and construction is anticipated to begin in early Fall 2017.

Reporting Period Activity: Construction of the Carter Street Drainage Pump Station Force Main Relocation Project is scheduled to begin in the next few weeks and extend into early winter 2017. The Contractor is already under contract with the City.

MWRA I/I Local Financial Assistance Program: The community has financed thirteen (13) I/I reduction projects through the Authority's funding assistance program. Of the \$6,870,100 allotted through the Program's Phases 1 - 10, the community has \$1,319,000 remaining in funding assistance.

12. DEDHAM: South System

Background Information:

- Miles of Sewer: 95
- Sewered Population: 23,098
- Three Year (CY14 - CY16) Annual Average I/I: 1.48 mgd
- MassDEP Administrative Actions: AO Docket No. 547 (October 1985)

Latest I/I or SSES Report: 2013 Year One Inflow Investigation (March 2014)
2014 Smoke Testing Program (March 2015)
Town-Wide Flow Monitoring (November 2016)
Sewer System Hydraulic Flow Model Update (On-going)

Private Source Inflow Removal Program: The Town adopted a sewer system enterprise fund at the May 2009 Town Meeting. A Municipal Buildings Inspection Program was undertaken to identify inflow sources. Inspections identified approximately 78,231 GPD of peak inflow. The Town removed the 78,231 GPD of peak inflow during CY15-17. The Town is also in the early stages of developing a private inflow removal policy.

Smoke testing was conducted within approximately 140,000 LF of sewer to identify potential inflow sources. Testing results indicated 27 inflow sources contributing approximately 78,231 GPD of peak design storm inflow. Of the 27 defects identified, six were located within the Town's ROW. These six defects were rehabilitated by the Town's DPW during CY14-CY17.

Additional smoke testing was conducted within approximately 195,000 LF of sewer to identify potential inflow sources. This round of smoke testing finished the remainder of the Town's sewer system. Testing results indicated 33 inflow sources contributing approximately 66,111 gpd of peak design storm inflow. Of the 33 defects identified, 12 were located within the Town's ROW. These 12 defects were rehabilitated during Summer/Fall 2016.

A Private Building Inspection was conducted within three of the Town's seven precincts. This program was promoted throughout the community as voluntary. The Town provided penalty amnesty to all residents/commercial property owners who participated. There were 3581 locations within the three precincts. Only 1510 property owners (42%) permitted

inspections. Of the 1510 inspections performed, fifty-seven (57) direct and one (1) indirect inflow sources were observed (contributing 418,951 gpd of estimated peak inflow). These sources consisted of thirty-seven (37) sump pumps, one (1) floor drain, nine (9) interior open cleanouts, four (4) exterior open cleanouts, five (5) direct driveway drains, one (1) indirect driveway drain and one (1) roof leader. Due to low program participation, the Town is not going to perform private building inspections within the remaining four (4) precincts at this time. The Town is currently working on how best to revamp the program for better participation and reviewing the collected data for removal alternatives for the sources indentified.

I/I Rehabilitation Projects in Design or Construction: The Town, as part of the 2015 Sewer Rehabilitation On-Call Services Project (MWRA Project Nos. WRA-P9-12-3-908 / 943), completed the installation of 13,464 LF of CIPP lining, 211 LF of short liners, 1823 VF of cementitious manhole lining and 104 lateral liners. The project removed an estimated 0.80 mgd of peak infiltration.

The community also continued its annual sewer system inspection program. In March 2017, the Town began cleaning and TV inspecting 130,000 LF of sewer main. The Town plans to utilize this data, along with previous year's backlog work, to perform CY17/18 rehabilitation on the most cost-effective sewer lines/manholes utilizing an on-call rehabilitation contract.

Reporting Period Activity: Approximately 100 LF of sewer main extensions were installed throughout the Town by private developers. Upon completion of the extension projects, the Town took over ownership of the sewer mains.

MWRA I/I Local Financial Assistance Program: The community has financed sixteen (16) I/I reduction projects through the Authority's funding assistance program. The community has used its entire Phase 1 - 10 allocation of \$5,740,000.

13. EVERETT: North System

Background Information:

- Miles of Sewer: 57
- Sewered Population: 42,935
- Three Year (CY14 - CY16) Annual Average I/I: 1.89 mgd
- MassDEP Administrative Actions: ACOP-NE-08-1N006 (July 2008)
- EPA Clean Water Act Administrative Order: EPA Docket No. 09-026 (August 2009)

Latest I/I or SSES Report:

Sanitary Sewer Overflow Abatement Plan – Behan & Beacham Street Area Final Report (December 2009)
I/I Investigation (July 2010)
Sanitary Sewer/Drain Investigation on Beacham Street (August 2012)
I/I Investigation (August-September 2013)
IDDE Citywide Report (February 2015)
Sewer Flow Monitoring Report (October 2016)
EPA Administrative Order Compliance Report (January 2017)

Private Source Inflow Removal Program: No additional inspections were reported during this period.

I/I Rehabilitation Projects in Design or Construction:

The Otis, Henderson & Bow St. Sewer Replacement Project has been re-bid and awarded in October 2016. Construction is ongoing.

The Draft Report for the Sewer System Metering Project has been completed.

The design of the Catch Basin Redirection Project has been awarded to CDM Smith, who is currently performing investigations for the design phase.

Reporting Period Activity: In August 2016, funds were distributed for the remaining eligible cost of the Catch Basin Redirection Project that was partially funded under MWRA Project No. WRA-P9-13-3-939.

MWRA I/I Local Financial Assistance Program: The community has financed nine (9) I/I reduction projects through the Authority's funding assistance program. Of the \$8,071,500 allotted through the Program's Phases 1 - 10, the community has \$1,421,000 remaining in funding assistance.

14. FRAMINGHAM: South System

Background Information:

- Miles of Sewer: 275
- Sewered Population: 67,680
- Three Year (CY14 - CY16) Annual Average I/I: 2.61 mgd
- MassDEP Administrative Actions: ACO-NE-07-1N001 (March 2007)
AO Docket No. 592 (January 1986)

Latest I/I or SSES Report: Town-Wide I/I Study / SSES Phase 1 / CWMP (Complete)
SSES Phase 2 (Complete); SSES Phase 3 (Complete)
SSES Phase 4/5 (Complete); Blackberry Lane SSES (Complete)

Private Source Inflow Removal Program: The Town's ten year capital plan now includes three phases of inflow removal projects. The first phase is scheduled for funding in the FY17 budget cycle. The Town is currently developing capital projects that will incorporate the removal of the illicit connections identified during the field reconnaissance efforts of the SSES programs. The capital project program will include the redirection of illicit flows as well as the extension of storm drain systems to remove flow from the sewer system. During this year's capital project development cycle, the Town will determine the proposed rehabilitation areas and improvements required in order to further refine the costs and timing of the actual inflow removal projects. The Town has begun drafting the scope of work for this first phase of projects.

The Town conducted dye testing of roof leaders on three condominium buildings located at 1321-1325 Worcester Road and found them to be directly connected into the sanitary system. The roof's overall surface area is 43,125 sf. Inflow volume generated from these sources (from a one year, six hour design storm) is approximately 42,000 gpd. Removal of these inflow sources will be performed as part of the New England Center for Children expansion process.

I/I Rehabilitation Projects in Design or Construction:

The Union Avenue Area Sewer Improvements Project (Contract PW 320 / MWRA Project No. WRA-P9-14-3-953) is scheduled for completion Spring 2018. Project work includes the replacement of approximately 950 LF of 8-inch sewer main; replacement of approximately 1520 LF of sewer service laterals; CIP lining of approximately 1700 LF of 8-inch sewer main; CIP lining of approximately 120 LF of 15-inch sewer main and the replacement of approximately 24 sewer manholes. The project's work area includes: Union Avenue / Walnut Street / Neville Road.

The Main Street Area Sewer Improvements Project (Contract PW 291 / MWRA Project No. WRA-P9-14-3-920) was completed June 2016. Project work included the replacement of approximately 1460 LF of 8-inch sewer main; replacement of approximately 450 LF of sewer service laterals; CIPP lining of approximately 2750 LF of 8-inch sewer main and the replacement of approximately 24 sewer manholes. The project's work area included: Main Street / Granite Street / Moulton Park Road / Maple Street.

The Central Street Siphon / Sudbury River Interceptor Project consisted of CIPP lining 4000 LF of 18-inch sewer in a wetland area of the Sudbury River and the replacement of 4000 LF of 8-inch sewer with an 18-inch interceptor. The new configuration eliminated two siphons under the Sudbury River and a bottleneck that had generated a seasonal sanitary sewer overflow. Project work is complete.

Reporting Period Activity: The existing 10-inch VC sewer (circa 1913) on Campbell Road was replaced with 500 LF of 10-inch PVC. The existing 6-inch VC sewer (circa 1896) on Avon Street was replaced with 210 LF of 8-inch PVC. The existing 8-inch VC sewer (circa 1928) on Hampshire Road was replaced with 400 LF of 8-inch PVC. The Town also completed sewer realignment projects on Salem End Road (89 LF of sewer replaced) and Elmfield Road (1712 LF of sewer replaced and 2815 CIP lined). Town forces / on-call service providers performed 10 open trench repairs (approximately 90 LF), installed 24 short liners (approximately 1469 LF) and rehabilitated 111 sewer manholes.

MWRA I/I Local Financial Assistance Program: The community has financed thirteen (13) I/I reduction projects through the Authority's funding assistance program. Of the \$12,125,000 allotted through the Program's Phases 1 - 10, the community has \$4,869,090 remaining in funding assistance.

15. HINGHAM: South System

Background Information:

- Miles of Sewer: 33
- Sewered Population: 6,809
- Three Year (CY14 - CY16) Annual Average I/I: 0.81 mgd
- MassDEP Administrative Actions: AO Docket No. 536 (November 1985)

Latest I/I or SSES Report: Comprehensive Wastewater Management Study (August 2010)

I/I Investigations Letter Report (June 2012)

FY14 I/I Evaluation (January 2014)

FY15 I/I Evaluation (April 2104)

FY15 Evaluation Amendment 1 (November 2014)

2015 Town-Wide Flow Metering (February 2015)

FY16 Evaluation (February 2016)

FY17 Evaluation (Ongoing)

Private Source Inflow Removal Program: The house-to-house sump pump inspection and roof leader disconnection programs are ongoing. In CY16/17, approximately 100 homes were inspected for sump pumps. Three sump pumps were identified as being connected to the sanitary system. All three sump pumps have been removed/rerouted.

I/I Rehabilitation Projects in Design or Construction:

FY16 Annual Sewer Program: Review TV inspection videos of approximately 27,000 LF of sewer main. Conduct topside physical survey of 174 sewer manholes. Identify sewer main/manhole defects to be repaired as part of On-Call I/I Rehabilitation Services Contract. FY16 Sewer System I/I Investigation (MWRA Project No. WRA-P9-15-3-913) completed December 2015. FY16 Smoke Testing (140,000 LF) and Rehabilitation Construction (MWRA Project No. WRA-P9-15-3-934) work on-going.

FY15 Annual Sewer Program: Review TV inspection videos of approximately 11,500 LF of sewer main. Conduct topside physical survey of 65 sewer manholes. Identified sewer main/manhole defects to be repaired as part of On-Call I/I Rehabilitation Services Contract. FY15 Sewer System I/I Investigation (MWRA Project No. WRA-P8-15-3-828) completed Spring 2014. FY15 Rehabilitation Construction (MWRA Project No. WRA-P9-15-3-913) completed August 2015.

Reporting Period Activity: A 6 to 1 [@\$2.67/gallon] fee for new system flow has recently been implemented. The funds are earmarked for I/I identification and repair. Ship Street and Street Sewer Extensions are ongoing (total length of extension is approximately 1800 LF of PVC sewer pipe).

MWRA I/I Local Financial Assistance Program: The community has financed seven (7) I/I reduction projects through the Authority's funding assistance program. The community has used its entire Phase 1 - 10 allocation of \$1,632,500.

16. HOLBROOK: South System

Background Information:

- Miles of Sewer: 31
- Sewered Population: 9,671
- Three Year (CY14 - CY16) Annual Average I/I: 0.35 mgd
- MassDEP Administrative Actions: ACOP-NE-04-1001
(Signed January 2005; Amended July 2007)
(Amended ACO No. 2 May 2008)

Latest I/I or SSES Report: I/I Inspections Report (July 2006); DEP ACO Progress Report (June 2008);
CWSRF No. 2919 Contract No. 1 (October 2009)

Private Source Inflow Removal Program: House-to-House inspections continue. All new home construction is inspected by the DPW and Town Plumbing Inspector. The State has approved the Town's Sewer Bank Policy.

I/I Rehabilitation Projects in Design or Construction: TV inspection was conducted on 10,500 LF of sewer in Sub-areas H(7) and H(8). Manholes inspections (300 total) were conducted primarily in Sub-areas A/F/G/H(8).

Reporting Period Activity: The Town has completed its yearly check of all cross-country sewer manholes. Plymouth Street System Extension has been completed. Abington Avenue sewer work has also been completed. Phase 3/4 properties associated with collection system expansion are now being connected at owner's request. Phase 5 System Extension (Spring Street Area) and Spring Street Pump Station work is complete.

MWRA I/I Local Financial Assistance Program: The community has financed two (2) I/I reduction projects through the Authority's funding assistance program. Of the \$1,639,600 allotted through the Program's Phases 1 - 10, the community has \$743,038 remaining in funding assistance.

17. LEXINGTON: North System

Background Information:

- Miles of Sewer: 170
- Sewered Population: 33,030
- Three Year (CY14 - CY16) Annual Average I/I: 2.29 mgd
- MassDEP Administrative Actions: ACO-NE-11-015 (July 2011)

Latest I/I or SSES Reports:

Annual Town-wide Sewer Investigation & Implementation Program Final Report (October 2011)
Sewer Basins 3, 9 & 10 Smoke Testing, Dye Testing & Dye Flooding Program Final Report (January 2012)
Sewer Use Code Review Final Report (February 2012)
Private Inflow Removal Program Final Letter Report (February 2012)
Sewer System Evaluation Survey – Phase III Final Report (April 2012)
Surcharged Areas Evaluation Final Report (April 2012)
Sewer System Evaluation Survey Phase 4: Sewer Basins 3 & 9 (May 2013)
Sewer System Evaluation Survey – Manhole Inspections in Sewer Basin 14 (August 2013)
Sewer System Evaluation Survey – Phase 5: Sewer Basins 4, 5 & 14 (May 2015)
Sewer System Evaluation Survey – Phase 6: Sewer Basins 2, 11 & 13 (March 2016)
Sewer System Evaluation Survey – Phase 7: Sewer Basins 8 & 12 (July 2017)

Private Source Inflow Removal Program: The Town is using the February 2012 *Lexington Sewer Use Code Review* to update their current regulations to incorporate a sewer bank or other funding options that may be adopted by the town.

A private inflow program based on the February 2012 Private Inflow Removal Program Letter Report is currently on hold.

I/I Rehabilitation Projects in Design or Construction: The Warranty Inspection for "Phase 5 Sewer System Improvements for Sewer Basins 4, 5 & 14 (Contract #16-35)" is substantially complete. The only remaining items are final paving at three open cut point repairs on Massachusetts Ave. Final pay estimate will follow shortly in August 2017.

The Dunback Meadow and Mill Brook Sewer Improvements project is scheduled to be put out to bid in July 2017. This project goal is remove I/I associated with multiple structural defects identified in the Dunback Meadow, Mill Brook and Valley Rd areas.

Reporting Period Activity: The Sewer System Evaluation Survey for Sewer Basins 2, 11 & 13 (Phase 6) Final Report was completed in October 2016. The design for the recommended rehabilitations will be drafted in the fall of 2017. This

project identified approximately 670,000 gpd of removable peak I/I that is associated with the approximately 195,000 LF of sewer in these three sewer basins.

The Infiltration/Inflow Investigation for Sewer Basins 8 & 12 (Phase 7) is complete and a draft report will be sent to the MWRA in July 2017. This project identified approximately 200,000 gpd of removable peak I/I in the 157,500 linear feet in these two sewer basins.

MWRA I/I Local Financial Assistance Program: The community has financed eleven (11) I/I reduction projects through the Authority's funding assistance program. The community has used its entire Phase 1 - 10 allocation of \$7,445,300.

18. MALDEN: North System

Background Information:

- Miles of Sewer: 100
- Sewered Population: 60,206
- Three Year (CY14 - CY16) Annual Average I/I: 3.39 mgd
- MassDEP Administrative Actions: None
- EPA Clean Water Act Administrative Order: EPA Docket No. 09-002 (January 2009)

Latest I/I or SSES Report:

Malden Sewer System Evaluation Survey (Phase III) Final Report (December 2011)
Hydraulic Model and Capacity Assessment Draft Report (June 2012)
Hydraulic Model and Capacity Assessment Final Report (December 2012)

Private Source Inflow Removal Program: No additional inspections were reported. The City continues to monitor potential private Inflow sources.

I/I Rehabilitation Projects in Design or Construction: During the work conducted on 2014-S-1 two locations with extensive cracks and partial collapse were identified. The conditions did not allow for lining to be installed in the sewer main so spot repairs were necessary. Contract Documents were prepared by Malden and CDM Smith with the work being completed under Contract No. 2016-S-1. The two locations are: Mountain Ave. in the area of #107 replacing approx. 200 LF of 8" PVC sewer main, and Broadway @ Bayrd St replacing approx. 50 LF of 10" PVC sewer main.

Reporting Period Activity: No other activities.

MWRA I/I Local Financial Assistance Program: The community has financed five (5) I/I reduction projects through the Authority's funding assistance program. Of the \$12,283,900 allotted through the Program's Phases 1 - 10, the community has \$7,690,000 remaining in funding assistance.

19. MEDFORD: North System

Background Information:

- Miles of Sewer: 113
- Sewered Population: 57,113
- Three Year (CY14 - CY16) Annual Average I/I: 2.89 mgd
- MassDEP Administrative Actions: NON-NE-00-1005
- EPA Clean Water Act Administrative Order: EPA Docket No. 09-027 (August 2009)

Latest I/I or SSES Report:

Limited Sewer System Evaluation Survey of North Medford/Heights Area Final Report (July 2012)
Mini-System "P" Sewer System Evaluation Survey Study Final Report (June 2014)
Continuation of Sewer System Evaluation Survey of North Medford/Heights Area (ongoing)
Continuation of Mini-System "P" SSES (ongoing)

Private Source Inflow Removal Program: The City is continuing to work with a property owner in mini-system D to remove inflow sources from their property into the sewer system.

I/I Rehabilitation Projects in Design or Construction: D'Allessandro Corp. is currently in Year 3 of a three year sewer rehabilitation contract. To date in Year 3 over 800 linear feet of defective sewer line has been replaced and 5 more manholes rehabilitated. Finishing out the contract will be the replacement of another 330 feet of sewer line and the CIPP lining of 1200 linear feet of 8" & 12" sewer main.

The Design for the removal of catch basins in North Medford began in December 2016. The Design is complete and the project was bid in June 2017. A contractor has been selected and the contract is being prepared. Anticipated start date is July/August 2017.

The Design of the Sewer Rehabilitations recommended by the SSES – Phase 1 Study in Mini-system P began in December 2016 and is 99% complete. Bidding is expected later this summer (2017). An estimate is complete and an MWRA Financial Assistance Application is being prepared.

Reporting Period Activity: The SSES – Phase 2 Study in North Medford began in December 2016 and is on-going. It is anticipated that the field work will end in the early fall and the report of the findings should be available in November 2017.

The SSES – Phase 2 Study in Mini-system P began in December 2016 and is on-going. It is anticipated that the field work will end in the early fall and the report of the findings should be available in November 2017.

MWRA I/I Local Financial Assistance Program: The community has financed eight (8) I/I reduction projects through the Authority's funding assistance program. Of the \$11,987,600 allotted through the Program's Phases 1 - 10, the community has \$5,073,000 remaining in funding assistance.

20. MELROSE: North System

Background Information:

- Miles of Sewer: 74
- Sewered Population: 27,662
- Three Year (CY14 - CY16) Annual Average I/I: 2.18 mgd
- MassDEP Administrative Actions: None

Latest I/I or SSES Report:

I/I Rehabilitation Project Recommendations (November 2001)
Summary Letter Report for Sewer System Investigations - Subareas 21 & 22 (May 2014)
Summary Letter Report for Sewer System Investigations & Mapping (August 2014)
City-wide I/I Flow Metering (December 2016)
Sewer System Investigation and Evaluation (Spring 2017)

Private Source Inflow Removal Program: No inspections were reported during this period. Smoke testing for private Inflow investigations will start in September 2017 in five of the City's sewer subareas.

In June 2016, the Board of Aldermen voted in favor of an ordinance to increase the City's infiltration and inflow mitigation fee from \$2.14 per gallon per day (gpd) to \$6.89/gpd. This revised cost reflects the actual cost of the Subarea 21 and 22 project per gpd of I/I removal, accounting for design, construction, and construction administration costs. This fee is now being routinely charged to all projects for which a Title 5 flow increase is apparent from the building permit application. In 2017, the City instituted a process with the Inspectional Services Department to ensure that I/I fee reviews are occurring for all applicable projects.

I/I Rehabilitation Projects in Design or Construction: As part of the "Sewer System Investigation & Evaluation Project", Inland Waters, Inc. applied cementitious lining to 14 sewer manholes in June 2017. These 14 manholes had an estimated Infiltration of 18,000 gpd.

According to the data reviewed thus far from the “Sewer System Investigation & Evaluation Project”, the next step will be to start a project to install cured-in-place pipe (CIPP) liners from manhole to manhole in various sewer pipes throughout the five subareas targeting those segments with the most infiltration and that are most cost-effective to repair. Design of this project, which will include preparation of plans and specifications suitable for public bidding, will be completed simultaneously with the completion of the SSES Summary Report. The following is the estimated schedule for the work:

- *Design - Completed by mid-August 2017*
- *Bidding - Starting by late-August to early-September 2017*
- *Award - Completed by late-September 2017*
- *Construction - Completed between October and December 2017*

Reporting Period Activity: In spring 2016, the City retained the services of Raftelis/Woodcock and Associates to review the water and sewer rate structure and recommend improvements. The City’s Board of Aldermen voted to modify the tiered rate structure to have only two tiers (rather than three) and to increase both water and sewer base fees for FY17. In spring 2017, the City was able to hold water and sewer rates steady from FY17 into FY18 with the exception of a minimal increase in sewer base fees. Furthermore, in FY17, the City achieved its multi-year target of establishing 10% reserves in both the water and sewer enterprise funds.

In spring 2016, sewer flow metering was performed Citywide, with 29 meters operating for 10 weeks, reporting data in 15-minute intervals. Groundwater and rainfall monitoring were also performed during this period. The flow metering report was completed in December 2016 by Weston and Sampson Engineers.

In November 2016, funds were distributed for Sewer System Investigation & Evaluation; Design and Bid/Award; and Construction of Recommended Sewer Rehabilitations in Year 1 Area of the Annual I/I and Operation and Maintenance Program. This project is identifying sources of infiltration and inflow (I/I) in portions of Sewer Subareas 3/3A, 7/7A, 15, 18 & 20A. The field work associated with this project includes, but is not be limited to: conducting top side physical survey of approximately 500 sewer manholes for sources of I/I; conducting flow isolation in as much as 90,500 l.f. of sewer; cleaning and internal TV inspection of approximately 90,500 l.f. of sewer; cementitious lining of manholes where deemed most cost effective, smoke testing of up to 90,500 l.f. of sewer mains, updating of sewer mapping & GIS database; preparing draft and final reports on the results of the field work which will include preliminary design recommendations; design cost and preliminary construction cost estimates and schedule; cost-effectiveness analysis and recommendations for sewer rehabilitation. The project will continue with the design of sewer rehabilitation as recommended by the investigations and evaluation work previously mentioned. This design of manhole and pipeline rehabilitations will include “Excavate and Replace” and “Trenchless” rehabilitation techniques such as root treatment, service connection testing & sealing, service connection lining, short liners, spot repairs, cured-in-place pipelining (CIPP), manhole grouting & sealing, and manhole lining. The preparation of Contract Documents and assistance during bidding will also be included. The project will then proceed to the construction phase. The scope of work for this phase will include, but not be limited to: various manhole repairs; cementitious lining of manholes; installing manhole inflow dishes; chemical root treatment of sewers and manholes; installing of cured-in-place pipe liners; installing of cured-in-place short liners; cleaning, inspection, testing and sealing of sewers; open cut point repairs; cutting protruding service connections; testing and grouting service connections; and other related tasks and appurtenances. This project will also include the engineering services during construction which will include office engineering and resident field engineering services. (MWRA Project No. WRA-P9-20-3-959).

The “Sewer System Investigation & Evaluation Project”, which began in March 2017 in the top 5 sewer subareas based on the results of the 2016 Flow Metering Program, included approximately 93,000lf of flow isolation and CCTV inspection and approximately 590 manholes inspections. During the manhole inspections, approximately 50,000 gpd of Infiltration was observed. Currently a review is being conducted of all the collected field data and a cost-effectiveness analysis is being conducted for recommended improvements to the sewer system.

MWRA I/I Local Financial Assistance Program: The community has financed seven (7) I/I reduction projects through the Authority’s funding assistance program. Of the \$6,076,300 allotted through the Program’s Phases 1 - 10, the community has \$1,081,000 remaining in funding assistance.

21. MILTON: South System (Small Portion Tributary to the North System)

Background Information:

- Miles of Sewer: 83
- Sewered Population: 26,534
- Three Year (CY14 - CY16) Annual Average I/I: 1.50 mgd
- MassDEP Administrative Actions: Amended AO Docket No. 580 (March 1986)

Latest I/I or SSES Report: I/I Town-Wide Sewer Evaluation – Year 10 (February 2015)

I/I Town-Wide Sewer Evaluation – Year 11 (February 2016)

I/I Town-Wide Sewer Evaluation – Year 12 (January 2017)

I/I Town-Wide Sewer Evaluation – Year 13 (On-going)

Private Source Inflow Removal Program: The Town is continuing to pursue the removal of sump pumps and other private inflow sources identified through a previously completed building inspection program. All new connections to the municipal sanitary sewer system will be charged a one-time I/I mitigation fee. Connection applicants must remove four gallons of I/I from the sewer system for each one gallon of new wastewater flow requested in the connection permit. If there are not sources of I/I that, at the discretion of the DPW Director, are appropriate for removal at the time of the permit, a monetary fee may be required (at a cost of \$3.00 per gallon of flow per day to be removed). Also, a building inspection is performed during the final water meter reading when a house is being sold. If the building inspection identifies an illegally connected sump pump, a fine is issued and the house cannot be sold until the sump pump has been rerouted and inspected.

A pilot inflow investigation program was conducted during Fall/Winter 2015 which included smoke testing and internal building inspections. Building inspections were performed at 354 properties and identified 13 positive sources and 9 suspect sources.

I/I Rehabilitation Projects in Design or Construction:

Year 12 Sewer System Infiltration Rehabilitation [MWRA Project No. WRA-P9-21-3-972 / Milton Contract S17-1] was bid June 2017 with construction to begin Summer 2017. Work will be performed in Subareas G-02A / G-03B / G-03D / G-09 / G-10A / G-16 / G-17 / G-19 / G-20 / S-01 / S-01A and includes approximately 4370 LF of cleaning and TV inspection; 17,000 LF of testing and sealing of joints; performing 1075 LF of chemical root treatment; installing 5080 LF of CIP pipe; installing 230 LF of CIP short liners; cutting one protruding service connection; testing and grouting 110 service connections; rehabilitating 71 manholes; installing 12 manhole inflow dishes; replacing 4 manhole frames and covers; TV inspection of 4270 LF of sewer and topside inspection of 30 sewer manholes; and performing 22,000 LF of post-construction flow isolation. The Year 12 project is estimated to remove 56,376 gpd of infiltration from the Town's sewer system.

Year 11 Sewer System Infiltration Rehabilitation [MWRA Project No. WRA-P9-21-3-948 / Milton Contract S16-1] has reached substantial completion with Warranty Retesting scheduled for Spring 2018. The Year 11 project is estimated to have removed 36,504 gpd of infiltration from the Town's sewer system.

Year 10 Sewer System Infiltration Rehabilitation was completed Spring 2016. The Year 10 project is estimated to have removed 73,296 gpd of infiltration from the Town's sewer system.

Reporting Period Activity:

Year 13 I/I Rehabilitation Investigation (MWRA Project No. WRA-P9-21-3-972) was completed Spring 2017 (Subareas G-03A / G-03C / S-07B / S-07D / S-08). Data review/report preparation is on-going.

Year 12 I/I Rehabilitation Investigation (MWRA Project No. WRA-P9-21-3-948) began March 2016 and was completed June 2016. Summary Report completed January 2017. Flow isolation and TV inspection of 51,760 LF of sewers in Subareas G-02A, G-03B, G-03D, G-09, G-16, G-17, G-19, G-20, S-01 and S-01A revealed an estimated 105,552 gpd of peak infiltration. Topside inspection of 329 manholes revealed an estimated 22,176 gpd of peak infiltration and 88,408 gpd of peak inflow.

Year 11 I/I Rehabilitation Investigation completed Spring 2015. Data review/report preparation completed February 2016. TV inspection of 42,737 LF of sewer in Subareas G-08C, G-08D, G-10B, G-11D, G-13B and S-14 revealed an estimated

66,960 gpd of peak infiltration. Topside manhole inspection of 259 manholes revealed an estimated 22,032 gpd of peak infiltration.

Year 10 I/I Rehabilitation Investigation Report completed February 2015. TV inspection of 41,449 LF of sewer in Subareas G-08B, G-13 and G-25 revealed an estimated 130,320 gpd of peak infiltration. Topside manhole inspection of 205 manholes in revealed an estimated 37,152 gpd of peak infiltration.

Approximately 1385 LF of 8-inch sewers were added to Milton's system in CY16/17. The additional sewer pipelines will service the newly constructed Woodmere at Brush Hill development at 865 Brush Hill Road.

MWRA I/I Local Financial Assistance Program: The community has financed nineteen (19) I/I reduction projects through the Authority's funding assistance program. Of the \$5,564,500 allotted through the Program's Phases 1 - 10, the community has \$914,000 remaining in funding assistance.

22. NATICK: South System

Background Information:

- Miles of Sewer: 135
- Sewered Population: 31,351
- Three Year (CY14 - CY16) Annual Average I/I: 1.16 mgd
- MassDEP Administrative Actions: AO Docket No. 593 (November 1985)

Latest I/I or SSES Report: Town-Wide SSES (Ongoing)

Private Source Inflow Removal Program: The SSES (MWRA Project No. WRA-P5-22-1-523) included a house-to-house inspection component. Home inspections are also conducted in conjunction with a water meter replacement program. The Town has prepared an informational handout on eliminating sump pump connections to the wastewater system, which is distributed to targeted/suspect areas of the community.

I/I Rehabilitation Projects in Design or Construction: The Three Year Sewer Rehabilitation Project (Natick Contract No. S-127 / MWRA Project Nos. WRA-P7-22-3-761/825) was bid June 2013. Rehabilitation Construction began October 2013 with completion of identified rehabilitation work scheduled for Fall 2017. The peak infiltration removed by this project is approximately 0.61 MGD.

Additional sewer rehabilitation work includes CCTV and chimney inspection program (MWRA Project No. WRA-P9-22-3-912). To date, 137,608 LF of CCTV inspection has been completed. The chimney inspection program evaluates pre-1980 chimneys. Approximately 335 services meeting this criterion have been identified and inspected. The data obtained from these investigations is currently being reviewed to identify rehabilitation needs.

Reporting Period Activity: The Town is in the process of purchasing a CCTV inspection vehicle (MWRA Project No. WRA-P9-22-1-966). Town anticipates vehicle delivery in Fall 2017.

Primrose School Development (296 North Main Street): In CY17, 109 LF of 6-inch PVC gravity sewer, 300 LF of 1¼-inch force main, two sewer manholes and a pump chamber was installed as part of this service. Cider Mill Estates: A sewer extension of 1462 LF of 8-inch PVC gravity sewer has been constructed. Five new homes and two existing homes been connected. Six stubs were left for existing homes on Rockland Street. Only two Rockland Street homes have connected to date; Heavey Estates (4 homes: 2 homes have tied in); Mill Creek Development (82 North Main Street): In CY16, 700 LF of 8-inch PVC gravity sewer was installed for seven building connections, consisting of three apartment buildings, three townhouse buildings (12 townhomes total) and the Clubhouse. There are approximately 150 units within these structures. All seven buildings have connected to the sewer, but only two building connections, equivalent to seven townhomes, are live and in use.

MWRA I/I Local Financial Assistance Program: The community has financed nine (9) I/I reduction projects through the Authority's funding assistance program. Of the \$5,582,600 allotted through the Program's Phases 1 - 10, the community has \$969,000 remaining in funding assistance.

23. NEEDHAM: South System

Background Information:

- Miles of Sewer: 132
- Sewered Population: 28,089
- Three Year (CY14 - CY16) Annual Average I/I: 1.31 mgd
- MassDEP Administrative Actions: AO Docket No. 549 (November 1984)

Latest I/I or SSES Report: Town-Wide Infiltration/Inflow Report (October 2013)
Phase I I/I Investigation Report (June 2015)
Reservoir B Tributary Investigation (July 2015)
Phase II I/I Investigation Report (August 2016)
CCTV Inspection: Beech / Webster Street Area (April 2017)

Private Source Inflow Removal Program: A private source identification program, using Town-owned CCTV equipment, is ongoing.

I/I Rehabilitation Projects in Design or Construction: 2017 I/I Removal Contract - Various Areas (General Dynamics): Sewer rehabilitation work is substantially complete. Project work eliminated an estimated 85,032 gpd of peak infiltration.

2016 I/I Removal Contract - Various Areas: Sewer rehabilitation work complete. Project work eliminated an estimated 49,620 gpd of peak infiltration.

The Infiltration Rehabilitation (Subareas 16 / Lower 22 and Others) Project (MWRA Project Nos. WRA-P7-23-3-751 / Needham Contract No. FY 12-14-01) included design and construction of sanitary sewer infiltration reduction measures. Project work is complete. An estimated 0.04 mgd of peak infiltration was removed from the collection system.

Reporting Period Activity: Reservoir A Pump Station replacement is substantially complete.

Twelve meters (ten permanent and two portable area velocity flow module) have been installed for continued I/I monitoring. Town-wide TV inspection of 178,000 LF of sewer main was completed as part of the Phase II I/I Investigation Report (over 680,000 gpd of peak infiltration observed).

Sewer Extensions: 209 LF of sewer pipe on Country Way installed by private developer; 145 LF of sewer pipe on High Street installed by private developer; 627 LF of sewer pipe on South/Chestnut Street installed by private developer; 105 LF of sewer pipe at Greendale installed by private developer; 1514 LF of sewer pipe on Farley Pond Lane installed by private developer; 620 LF of sewer pipe on Second Avenue installed by private developer; 323 LF of sewer pipe on Greendale Avenue installed by private developer; 262 LF of sewer pipe on Armen Way installed by private developer; 371 LF of sewer pipe on Putnam Road installed by private developer.

MWRA I/I Local Financial Assistance Program: The community has financed nine (9) I/I reduction projects through the Authority's funding assistance program. Of the \$6,257,600 allotted through the Program's Phases 1 - 10, the community has \$3,365,450 remaining in funding assistance.

24. NEWTON: North and South Systems

Background Information:

- Miles of Sewer: 271
- Sewered Population: 87,003
- Three Year (CY14 - CY16) Annual Average I/I: 6.83 mgd
- MassDEP Administrative Actions: ACO-NE-00-1001
ACOP-NE-96-1005 (March 1997)

Latest I/I or SSES Reports:

Commonwealth Ave Sewer/Underdrain Investigation Final Report (May 2011)
Newton Commonwealth Golf Course Sewer & Drain Evaluation Report (November 2012)
CIP – Project 1 Inspection & Assessment Final Report (November 2012)

CIP – Project 1, 2 & 3 Smoke Testing Final Report (November 2012)
CIP – Project 2 Inspection & Assessment Final Report (January 2014)
CIP – Project 4, 5, 6 & 7 Smoke Testing Report (February 2014)
Smoke Testing in Subareas B016, B022 & B029 Final Report (February 2014)
CIP – Project 3 Inspection & Assessment Report (January 6, 2015)
CIP – Project 4 Inspection & Assessment Report (February 19, 2015)
CIP – Project 5 Inspection and Assessment Report (November 2015)
Smoke Testing in Subareas B066 & B071 (March 2016)
CIP Project 1 Post Construction Flow Evaluation (April 2016)
CIP – Project 6 Inspection and Assessment Report (June 2017)
CIP – Project 7 Inspection and Assessment Report (ongoing)

Private Source Inflow Removal Program: Private Inflow Source Removal post 8/16 includes: 5 sump pumps, 6 roof leaders and 4 area drains.

I/I Rehabilitation Projects in Design or Construction:

The CIP Project #2 Sewer Rehabilitation Project is substantially complete with only a few punch list items to be completed which is expected by the end of summer 2017.

Construction of the “CIP Project 3 & 4 Rehabilitations (Invitation for Bid #16-14) is ongoing with substantial completion expected by late summer 2017. Final Warranty inspection is expected in spring 2018. The estimated I/I removal is 362,025 gpd of Peak Infiltration, 109,940 gpd of Peak Rain-induced Infiltration and 123,384 gpd of Peak Inflow.

Completed design of CIP Project #5 Sewer Rehabilitations. The project will be bid late summer 2017. The estimated I/I removal is 126,881 gpd of Peak Infiltration, 2,160 gpd of Peak Rain-induced Infiltration and 141,738 gpd of Peak Inflow.

Reporting Period Activity: Completed CIP Project 6 Inspection & Assessment which included cleaning and inspection of 118,435 LF of sewer and inspection of 682 manholes.

Started CIP Project 7 Inspection and Assessment which includes 145,031 LF of sewer and 883 manholes.

MWRA I/I Local Financial Assistance Program: The community has financed twenty-seven (27) I/I reduction projects through the Authority’s funding assistance program. The community has used its entire Phase 1 - 10 allocation of \$21,197,400.

25. NORWOOD: South System

Background Information:

- Miles of Sewer: 83
- Sewered Population: 28,795
- Three Year (CY14 - CY16) Annual Average I/I: 2.58 mgd
- MassDEP Administrative Actions: AO Docket No. 534 (July 1983)

Latest I/I or SSES Report: Hawes Brook Sewer Evaluation (July 2009)
Washington Street Sewer Evaluation (September 2009)

Private Source Inflow Removal Program: As part of the Meadowbrook Area Sewer Inspection, ten buildings were inspected for illicit connections. Eleven illegal connections removed to date. Within the Hawes Brook sewer tributary area, eight property owners have been notified to redirect sump pumps.

I/I Rehabilitation Projects in Design or Construction:

Meadowbrook Priority Area 5 Rehabilitation Design (MWRA Project No. WRA-P9-25-3-964) is substantially complete.

Meadowbrook Priority Area 5 Rehabilitation Construction (MWRA Project No. WRA-P9-25-3-974) to be bid Fall 2017. Rehabilitation work includes CIPP lining of 9500 LF of sewer main, lining 38 sewer manholes and lining 160 house service connections.

Area 3 and Area 4 Sewer Rehabilitation Project is on-going. Rehabilitation work includes CIPP lining 8245 LF of sewer main, CIPP lining of 217 service connections, manhole rehabilitation and installation of 605 LF of 8-inch PVC sewer main.

Hoyle Street Area (Hospital Area @ Meadowbrook) Sewer System Rehabilitation Project (MWRA Project No. WRA-P8-25-3-814) completed Fall 2016. Rehabilitation work included CIPP lining 2100 LF of sewer main, lining 10 sewer manholes and CIPP lining 45 house service connections.

Underdrain Manhole Rehabilitation Project (MWRA Project No. WRA-P9-25-3-917) is complete. Hawes Brook-Westover Parkway Area Sewer Rehabilitation Construction is complete.

Meadowbrook Area Sewer Rehabilitation Project is complete. Rehabilitation work included CIPP lining 8190 LF of sewer main, manhole rehabilitation and the CIPP lining of 299 service connections.

Hospital and Florence Avenue Areas Sewer Rehabilitation (SRF Project) is complete. Project work included CIPP lining 7500 LF of 6 to 12-inch sewer main, manhole rehabilitation and CIPP lining 100 house service connections.

Reporting Period Activity: I/I Assessment and GIS Tracking Program (MWRA Project No. WRA-P9-25-1-919) work is on-going.

MWRA I/I Local Financial Assistance Program: The community has financed twenty-one (21) I/I reduction projects through the Authority's funding assistance program. The community has used its entire Phase 1 - 10 allocation of \$6,879,400.

26. QUINCY: South System

Background Information:

- Miles of Sewer: 202
- Sewered Population: 93,494
- Three Year (CY14 - CY16) Annual Average I/I: 4.45 mgd
- MassDEP Administrative Actions: AO Docket No. 644 (October 1986)

Latest I/I or SSES Report: Coastal Structures I/I Evaluation (On-going)
Coastal I/I Evaluation: Salinity (August 2014)
Quincy Point Force Main Evaluation (October 2014)
Wollaston Beach Water Quality (September 2015)
Sea Street CCTV Assessment (January 2016)
NW Quincy Sewer Interceptor TV Inspection (February 2016)
SSES & I/I Identification Plan (July 2016)

Private Source Inflow Removal Program: The City has partnered with the Plumbing Inspector on its FOG Program. As part of this program, the inspector visits CV License Holders for Grease Trap Inspections. While inspecting for grease traps, the inspector also observes the property for illegal inflow connections. Although this program directly addresses FOG discharges, it has been successful in identifying direct private inflow sources for removal.

Storm Water Discharge Ordinance has been approved. The ordinance forbids non-sanitary connections. A new fee structure was made effective July 1, 2013 and outlines penalties for illegal connections/discharges to the sanitary sewer system (<http://www.quincyma.gov/government/pwd/watersewerfees.cfm>). The fee structure mentioned remains in effect and has resulted in improvements to the system.

Developers contribute one percent of total project value to the Sewer Rehabilitation Fund. Additionally, the City has begun to implement 310 CMR 12.04 and require those new connections whose flow exceeds 15,000 GPD to continue to the 4:1 removal required under the regulations. This regulation is enforced during the site plan review process.

The City owns a CCTV sewer inspection vehicle. The vehicle provided significant input towards the development of the Coastal Structures I/I Evaluation/Identification Study. Also, many of the open cut and rehabilitation repairs on the Phase IIB Coastal Structures I/I Reduction Project were identified via the City's CCTV vehicle during I/I investigative efforts in the Houghs Neck area.

I/I Rehabilitation Projects in Design or Construction: It is anticipated that the City will be completing a significant amount of I/I reduction work over the coming years based upon the results of the July 2009 Coastal Structures I/I Evaluation/Identification Study.

Coastal manhole inspections were completed Summer 2009 with rehabilitation design completed Winter 2010. In March 2010, the City awarded a construction contract to conduct sewer manhole rehabilitation in coastal areas. The Coastal Manhole Rehabilitation Construction Contract I was completed during Summer 2011. Work included the rehabilitation of 139 manholes and is estimated to have removed approximately 0.50 mgd of I/I. This work was partially funded through the MWRA I/I Local Financial Assistance Program.

Additional manhole inspections and sewer CCTV inspections were conducted during 2010/2011. Recommendations from this work resulted in the Phase IIA Coastal Structures I/I Reduction Project (MWRA Project No. WRA-P7-26-3-737). This project was bid in August 2011. Rehabilitation construction is complete. Warranty retesting work was performed in Summer 2013. Phase IIA work is estimated to have removed 0.85 mgd of peak I/I.

The Phase IIB Coastal Structures I/I Reduction Project (MWRA Project No. WRA-P9-26-3-903) was bid in June 2015. Construction commenced in Spring 2016 and was completed Fall 2016. Work under this phase included cleaning & TV inspection of 13,710 LF of sewer main and 103 service laterals and CIPP lining of 6870 LF of sewer main and 66 service laterals in the Houghs Neck / Sea Street / Black's Creek / Furnace Brook Parkway areas. Phase IIB work is estimated to have removed 0.65 mgd of peak I/I. The project also included the cleaning, CCTV inspection and condition assessment of 4600 LF of sewer main within areas of suspected high groundwater or coastal impact (Black's Creek and St. Moritz Pond).

Underground Technologies Downtown CCTV: MassDOT worked on a traffic redesign/streetscape project at the Historic Adams Green area in Downtown Quincy. As part of this areas' work, the City investigated their sewer and drain infrastructure and found some collapsed pipes and many in need of repair within the next 5-10 years. To protect the investment in the Downtown area, the City designed and awarded a sewer infrastructure contract for this area. Rehabilitation Construction is substantially complete.

Downtown Redevelopment I/I Mitigation: Also part of the Downtown redevelopment, the City and developer reached an agreement where I/I would be removed from the City's system at a 4:1 ratio to the new proposed sewer flows. In order to satisfy this requirement, both metering and CCTV inspections were completed in the Hospital Hill and Block 4 (Merchants Row) areas to quantify I/I.

Block 4 Infrastructure Upgrades: As part of the Downtown redevelopment, the initial Block 4 phase included upgrades of the sewer/storm drain system around the Hancock Street, Chestnut Street and Cottage Avenue triangle. This project is currently under construction with an anticipated completion of Spring 2018.

Reporting Period Activity: Salinity samples were collected from strategically selected coastal manholes at 15 minute intervals for 24 hours. From this data the City was able to estimate the peak/average percentage of saltwater flow and the volume of saltwater and harbor stage when infiltration begins to occur. Project work was completed in FY16.

A Sanitary Sewer Evaluation Survey (SSES) is on-going (MWRA Project No. WRA-P9-26-13-944). Project work includes: (1) Smoke Testing 40,000 LF of sewer to identify segments of pipe with direct/indirect inflow sources. Smoke Testing will be conducted during periods of low groundwater and after sufficient time has elapsed from previous rainfall events; (2) Flow isolating 70,000 LF of sewer to quantify infiltration amounts within manhole-to-manhole segments of sewer. The inspection will be conducted between the hours of 12AM and 6AM when groundwater levels are typically at their highest and sanitary flows are at a minimum; (3) Cleaning, TV inspecting, videotaping and recording 75,000 LF of sewer. The TV inspection will be performed to locate problem areas and I/I sources within manhole-to-manhole segments of sewer; (4) Conducting topside physical survey of 500 sewer manholes for defects and I/I sources. A written log will be furnished for each manhole inspected; and (5) Preparing a SSES Summary Report that details areas in which the above work was performed, summarizing work completed to date and including recommendations, a cost-effectiveness analysis and prioritization analysis for rehabilitation of pipeline/manhole defects and I/I sources identified during this investigation.

Estimated rehabilitation costs will also be provided. Also, develop a City-wide sewer system hydraulic model for critical lateral and interceptor sewers. This project work is scheduled to be complete Fall 2017.

The Wollaston Beach Area SSES Phase 1 (MWRA Project No. WRA-P9-26-3-954) revealed 186,000 GPD of I/I to the sanitary sewer system. Phase 1 rehabilitation design (MWRA Project No. WRA-P9-26-3-954) is complete with bidding performed in May 2017. Wollaston Beach Area SSES Rehabilitation Phase 1 (MWRA Project No. WRA-P9-26-3-962 / Quincy Contract No. 17-329) substantially complete. Sewer rehabilitation work included 4800 LF of cleaning, inspection, testing and sealing of joints; open cut point repair within 80 LF of sewer main; CIP lining 20,000 LF of sewer main; installing CIP structural short liners in 60 LF of sewer main; cutting one (1) protruding service connection; grouting 35 service connections at the sewer main; and rehabilitating (via interior sealing and exterior grouting) 175 manholes.

Bayside Road Sewer Rehabilitation (MWRA Project No. WRA-P9-26-3-954): This particular area of sewer is highly susceptible to tidal I/I (Bayside Beach area). During initial CCTV, no infiltration was observed, however, staining along the sewer mains was observed indicating some evidence of infiltration. Rehabilitation involved lining approximately 3048 LF of 8 and 12-inch sewer main and 11 manholes.

John Street Lateral Repair (MWRA Project No. WRA-P9-26-3-954): Review of CCTV tapes along the John Street sewer main revealed multiple deficiencies in the service lateral connections. John Street is located adjunct to the Neponset River in an area of high groundwater. The sewer main is very shallow with little slope. I/I was not observed during the CCTV inspection, however, significant exfiltration from the sewer to the MS4 was confirmed through sampling and dye testing suggesting the potential for infiltration is quite high during rain events and high tides. Work on this project was completed in June 2017.

Furnace Brook Emergency Manhole and Open Cut Repairs (MWRA Project No. WRA-P9-26-3-954): Inspection of the easement along Furnace Brook revealed multiple deficiencies in the manholes and sewer mains. Project work included 125 LF of pipe burst repairs and a 15 foot point repair.

Large Diameter Sewer Survey (MWRA Project No. WRA-P9-26-3-954): This project included the heavy cleaning and CCTV inspection of 14,500 LF of 10, 15, 24 x 36 and 30 x 45-inch sewer interceptors. During the process of this project, the City experienced a sewer emergency on an interceptor in Quincy Center. With approval from the MWRA, funds from this project were expended to remedy that sewer main emergency in the Granite Street area. This emergency cleaning and CCTV work helped locate a direct source of inflow from the drainage system into the sewer system through a 12-inch main. The City undertook temporary repairs to eliminate the condition. Permanent repairs will be conducted as part of the Wollaston Beach Area SSES Rehabilitation Phase II Project (MWRA Project No. WRA-P9-26-3-971).

Wollaston Beach Area SSES Rehabilitation Phase II Project (MWRA Project No. WRA-P9-26-3-971): Sewer rehabilitation work includes approximately: 2670 LF of cleaning, inspection, testing and sealing of joints; heavy cleaning and inspecting 514 LF of sewer; exterior sealing and cementitious lining of 1526 VF of sewer manholes; chemical root treatment of 9411 LF of sewer; installing 16 LF of short liner; installing CIP pipe from manhole-to-manhole in 21,129 LF of sewer; television inspecting, testing and sealing 57 service connections and cutting three (3) protruding service connections.

Avalon Beach & Bay Pointe Marina Easement Sewer Rehabilitation Project (MWRA Project No. WRA-P9-26-3-971): Sewer rehabilitation work includes approximately: replacing 260 LF of 15-inch pipe; installing 750 LF of 20-inch CIP pipe and rehabilitating six (6) manholes.

The City also completed its evaluation of the Quincy Point Pump Station and associated force main. A preliminary update design package was completed Spring 2015. The project has a design capacity of seven million gallons per day. The objective of the project was to prevent a potential sanitary sewer overflow due to equipment or force main failure. Project work included replacing the pumps and installing variable speed drives; upgrading the sluice gates; replacing the odor control unit; improving power distribution; removing the underground storage tank; replacing the standby generator, improved lighting and wiring; replacing the HVAC and plumbing system; structural and architectural improvements to the roof, ceiling, walls, and wetwell; and miscellaneous site work. The force main rehabilitation included replacing the air release valves and applying corrosion protection to the force main within the air release structure. The project also included heavy cleaning and TV inspection of 546 LF of 18-inch sewer and 485 LF of 27-inch sewer located upstream of the pump station. The Quincy Point Pump Station Renovation Project is substantially complete.

MWRA I/I Local Financial Assistance Program: The community has financed fourteen (14) I/I reduction projects through the Authority's funding assistance program. Of the \$19,790,000 allotted through the Program's Phases 1 - 10, the community has \$134,000 remaining in funding assistance.

27. RANDOLPH: South System

Background Information:

- Miles of Sewer: 101
- Sewered Population: 33,423
- Three Year (CY14 - CY16) Annual Average I/I: 1.30 mgd
- MassDEP Administrative Actions: AO Docket No. 548 (July 1985)

Latest I/I or SSES Report: Amelian Road SSES (January 2003)
Internal TV Inspection Report (August 2010)
I/I Investigation – March 2010 Storm Events (July 2013)
Wastewater System Metering Program (June 2017)

Private Source Inflow Removal Program: The Town developed a sump pump inspection and amnesty program. As a result of the program, the Town was contacted by 202 homeowners having sump pumps. Internal inspections were completed to determine sump pump locations. One hundred twenty-one homes (121) were determined to have sump pumps connected to the sewer system. Ninety-four (94) of these homes have drainage directly adjacent to the homes. Each of the 94 homes was inspected. Design was completed to redirect these sump pumps to the drainage system. Sump pump redirection construction is complete (Randolph Contract Nos. 08-SP1/2/3 / MWRA Project No. WRA-P6-27-3-655). Total peak flow inflow removed is estimated to be 0.61 mgd.

I/I Rehabilitation Projects in Design or Construction: An I/I Investigation Report (July 2013) was drafted for the community areas affected by the March 2010 storm events. As a result of that report, a rehabilitation contract (Randolph Contract 15-S1 / MWRA Project No. WRA-P8-27-3-820) was designed (March 2015) and bid (April 2015). Rehabilitation construction is complete and included lining of the Vine Street Pump Station wet well, CIPP lining 1600 LF of sewer main, installing seven short liners, grouting of 24 service connections, installing nine manhole liners, digging and replacing two sewer mains, testing and sealing of 5500 LF of sewer main and root removal within 500 LF of sewer main.

Reporting Period Activity: A Town-wide wastewater flow metering program was performed during Spring 2017. Data review/report preparation scheduled for completion December 2017.

The Pond Street Pump Station is currently being rehabilitated. The Michelle Lane Pump Station was upgraded to increase capacity to allow for the expansion of the Avalon Bay development.

MWRA I/I Local Financial Assistance Program: The community has financed ten (10) I/I reduction projects through the Authority's funding assistance program. Of the \$6,050,800 allotted through the Program's Phases 1 - 10, the community has \$2,156,000 remaining in funding assistance.

28. READING: North System

Background Information:

- Miles of Sewer: 96
- Sewered Population: 24,719
- Three Year (CY14 - CY16) Annual Average I/I: 1.24 mgd
- MassDEP Administrative Actions: None

Latest I/I or SSES Report:

Infiltration/Inflow Investigations – Spot Gauging & Flow Isolation Final Report (August 2010)
Infiltration and Inflow (I/I) Investigations Final Report (November 2012)
I/I Investigations Report – Section 2 Supplement (November 2014)

Private Source Inflow Removal Program: No additional sump pumps were removed during this period. The Town is continuing to work with property owners where illicit connections were found during the Building Inspection Program. The Town will be working to set up a program over the next year to utilize some of the collected funds.

I/I Rehabilitation Projects in Design or Construction: During the last year, the Town cleaned and TV inspected an additional 2,310 LF of sewer main.

Design of the sewer rehabilitations under “Collection Systems Improvements – Contract #17-14” was completed in April 2017. The contract was executed on July 5, 2017. The Notice to Proceed had a start date of July 15, 2017. The anticipated contract completion date is October 13, 2017.

Reporting Period Activity: The internal investigation of 5,000 LF of sewer is ongoing.

In August 2016, funds were distributed for construction of the recommended sewer & manhole rehabilitations were as indicated in Table 3 of the April 2, 2015 Memorandum from CDM Smith to the Town and Tables 6-3 & 6-4 of the November 2012 Report. The Inflow elimination were as indicated in the August 2010 Report (Table 5-4) and November 2012 Report (Table 6-2). The recommended rehabilitation contract is to be bid in 2 separate packages to take advantage of the Town’s funding under MWRA I/I Local Financial Assistance Program Phases 9 & 10. The first Bid Package, which will be funded with the Town’s Phase 9 Funding Allotment, will include a Base Bid with 3 Alternates. The Base Bid is expected to include: cleaning & inspection of 1,750 linear feet (lf) of 6” to 15” sewer; heavy cleaning of 778 lf of sewer; cured-in-place lining of 9,700 lf of 6” to 12” sewer; removing & replacing 220 lf of 8” sewer; open cut point repair at 4 locations; cutting of 4 protruding service laterals; testing & grouting 3 service laterals in Alden Circle, Gleason Rd, Grand St, Harriman Ave, Lowell St, Pine Ridge Circle & Road, South St and Woburn St. The Base Bid also includes sewer manhole rehabilitations throughout the Town consisting of: cementitious lining of 17 manholes; repairing 7 brick corbels; constructing 4 new benches & inverts; installing 5 HDPE grading rings; replace 1 frame & cover; repair 10 frames & covers. Also, a catch basin will be redirected from the sewer to storm drain and dye testing will be performed at 10 other potential Inflow sites. The Alternate 1 Bid is expected to include: cleaning & inspection of 1,470 lf of 6” to 15” sewer; heavy cleaning of 200 lf of sewer; cured-in-place lining of 2,575 lf of 8” and 300 lf of 10” sewer in Avalon Rd, Haystack Rd, Heather Drive, South St & Walnut St. The Alternate 2 Bid is expected to include: cleaning & inspection of 1,185 lf of 6” to 15” sewer; cured-in-place lining of 2,510 lf of 6” to 12” sewer; cutting of 1 protruding service lateral; testing & grouting 2 service laterals in Curtis St, Haystack St, Milepost Rd, New Crossing Rd, Shackford Rd & Woburn St. This Bid also includes sewer manhole rehabilitations throughout the Town consisting of: cementitious lining of 4 manholes; constructing 1 new bench & invert; repairing 2 brick corbels; installing 1 HDPE grading rings. The Alternate 3 Bid is expected to include: cleaning & inspection of 200 lf of 6” to 15” sewer; cured-in-place lining of 1,950 lf of 6” sewer in Avon St, Main St, South St & Whitehall Lane. This Bid also includes sewer manhole rehabilitations throughout the Town consisting of: cementitious lining of 2 manholes; removing or repairing 4 brick corbels. The estimated Average annual I/I removal is 0.09 mgd. (MWRA Project No. WRA-P9-28-3-950).

MWRA I/I Local Financial Assistance Program: The community has financed eight (8) I/I reduction projects through the Authority’s funding assistance program. Of the \$4,629,100 allotted through the Program’s Phases 1 - 10, the community has \$844,000 remaining in funding assistance.

29. REVERE: North System

Background Information:

- Miles of Sewer: 98
- Sewered Population: 53,702
- Three Year (CY14 - CY16) Annual Average I/I: 2.72 mgd
- MassDEP Administrative Actions: No. 837 (April 1991)
- EPA Clean Water Act Administrative Order: CD 1:10-cv-11460 (November 16, 2010)

Latest I/I or SSES Reports:

Sewer System Evaluation Survey (SSES) Phase I Study Areas – CWSRF No. 3233 Final Report (July 2010)
Internal CCTV Inspection of Revere Trunk Sewer Technical Memorandum Report (October 2011)
Sewer System Evaluation Survey (SSES) – Phase II (CWSRF 3411) Final Report (July 2011)
Sewer System Evaluation Survey (SSES) – Phase III (CWSRF 3513) Final Report (July 2012)
Comprehensive Stormwater and Wastewater Management Plan (CWSRF 3513) Final Report (December 2013)
Sewer System Evaluation Survey (SSES) – Phase IV (CWSRF 3655) Final Report (December 2013)
SSES Phase V and Supplemental Field Investigations (CWSRF 3831) (December 31, 2014)

CMOM Program Development (CWSRF 3817) (March 2015)
SSES – Phase VI and IDDE Planning Investigations (CWSRF 3908) (December 31, 2015)
SSES – Phase VII Field Investigations (CWSRF 3956) (December 31, 2016)
Illicit Connection Detection (CWSRF 3957) (December 31, 2016)

Private Source Inflow Removal Program:

During Contract 1B (CWSRF-3852), 2 more sump pump discharges to the sewer have been plugged and rerouted bringing the total to date to 98.

During Contract 2 (CWSRF-3910), 68 more sump pump discharges to the sewer have been plugged and rerouted bring the total to 126. Another 21 roof leaders were also rerouted from the sewer.

The City awarded Contract 3B (CWSRF-4052, WW-002) to Moriarty & Sons, Inc in April. To date, 18 sump pump discharges have been plugged and rerouted from the sewer.

The City is in the process of awarding Contract 3A (CWSRF-4052, WW-001) to Moriarty & Sons, Inc.

The City continues to maintain a (10:1) I/I removal ratio for new commercial and multi-family construction

I/I Rehabilitation Projects in Design or Construction:

The following sewer rehabilitations were completed during the current period:

- Cured-in-place lining of 17,144 LF of 8" sewer
- Cured-in-place lining of 2,645 LF of 10" sewer
- Cured-in-place lining of 804 LF of 12" sewer
- Cured-in-place lining of 2,403 LF of 15" sewer
- Cured-in-place lining of 142 LF of 18" sewer
- Cured-in-place lining of 766 LF of 36" x 40" sewer
- Performed 1 dig-in-place spot repair
- Installed lateral service connection lining at 948 locations
- Installed full length later service lining at 1 location
- Cleaned and CCTV'd 23,904 LF of main line pipe
- Grouted 65 lateral service connections
- Installed 746 vf of cement/epoxy manhole lining
- Sealed 69 manhole corbels
- Direct connection of a catch basin to the sewer on Winthrop Ave was removed

The City awarded a contract (CWSRF 3958, WW-002) to R&D Site Development, Inc. in April 2016 for sanitary sewer line replacement and sanitary sewer pump station rehabilitation on Atwood Street and the decommissioning of the sanitary sewer pump station on Roosevelt Street. This work has been completed.

The City awarded a contract (CWSRF 3958, WW-003) to PG Construction in April 2016 for inflow removal at all Revere Housing Authority properties. This contract, which removed 94 inflow sources, has been completed.

Reporting Period Activity: Besides the previously mentioned work, the rehabilitation of the sanitary sewer pump station at Sherman St was completed.

MWRA I/I Local Financial Assistance Program: The community has financed six (6) I/I reduction projects through the Authority's funding assistance program. Of the \$10,130,900 allotted through the Program's Phases 1 - 10, the community has \$4,628,000 remaining in funding assistance.

30. SOMERVILLE: North System

Background Information:

- Miles of Sewer: 128
- Sewered Population: 78,804
- Three Year (CY14 - CY16) Annual Average I/I: 4.65 mgd
- MassDEP Administrative Actions: Unilateral Order (September 2010)
NON-NE-00-1006 (January 2000)

Somerville is one of MWRA's five combined sewer service communities (Boston North, Brookline, Cambridge, Chelsea, Somerville). Portions of Somerville are impacted by projects under MWRA's CSO Control Plan.

Latest I/I or SSES Report: City-Wide Sewer Assessment Report (February 2009)
Sewer and Combined Sewer CIP (September 2016)
CIP Project 1 – Manhole Inspection, Assessment and Design (ongoing)

Private Source Inflow Removal Program: City continues to enforce a 4 to 1 I/I Reduction policy with potential developers if the proposed project increases sanitary flows by more than 2000 gpd. The design engineer is required to show that the sewer system downstream of proposed project is capable of handling increased flow. City is anticipating the acceptance of a new policy sometime this year that eliminates the 2000 gpd requirement to more fairly apply to the I/I Policy.

City is enforcing City Ordinance Chapter 11 (Public Works), Article VII (Sewers), Section 11-165 (roof water, surface water and other drainage). This ordinance gives the City authority to disconnect and prevent roof, surface and other water from entering the collection system in various sections of the city.

I/I Rehabilitation Projects in Design or Construction: The 15 year CIP for the sewer system has been completed. The design for the first year of the implementation of the CIP will commence this month. The value of the design and construction is expected to approach 2 million dollars annually and is expected focus on I&I removal.

The Cedar Street Sewer Separation Project began in June 2016 and construction is ongoing. To date, P. Gioioso & Sons has installed 1,924 LF of 48-inch RC drain; 901 LF of 12-inch PVC sewer; 1,066 LF of 12-inch DI water main; 12 manholes; and installed 30 sewer service connections (698 LF) and 42 water service connections (690 LF). The utility construction is estimated to be completed in spring 2018, with final road construction to follow in Summer/Fall 2018.

For the Bike Path Sewer/Drain Repair, design for the repair of the 24" combined sewer pipe is at 75% completion stage. City is developing community outreach program to explain the purpose of the project and how residents will be impacted during construction. Anticipate bidding in mid/late fall 2017 with construction beginning mid-winter 2017.

For the Medford St/Pearl St Sewer Repair, which involved the removal and replacement of 80 LF of 42" brick sewer with PVC sewer pipe, construction was substantially completed in January 2017.

Small sewer and/or drain repairs have been completed throughout the year, however no other modifications have been made that would reduce or change volumes of I/I to the sewer system.

Reporting Period Activity: The field work associated with the CIP Project 1 Manhole inspection & Assessment Project began in February 2017 and was completed on June 30, 2017. Weston & Sampson inspected 4,478 manholes. The manhole inspection assessment will be completed in fall 2017 with design of manhole rehabilitations following in Fall/Winter 2017. During the inspection, 255,024 gpd of infiltration was identified.

MWRA I/I Local Financial Assistance Program: The community has financed nine (9) I/I reduction projects through the Authority's funding assistance program. Of the \$15,515,800 allotted through the Program's Phases 1 - 10, the community has \$5,398,000 remaining in funding assistance.

31. STONEHAM: North System

Background Information:

- Miles of Sewer: 63
- Sewered Population: 21,401
- Three Year (CY14 - CY16) Annual Average I/I: 1.18 mgd
- MassDEP Administrative Actions: None
- EPA Clean Water Act Administrative Order: EPA Docket No. 09-028 (August 2009)

Latest I/I or SSES Report: Manhole / CCTV Inspection in Marble / Main Streets Area Final Report (September 2007)

Private Source Inflow Removal Program: The Town is continuing to investigate and eliminate illicit cross-connections between the sanitary sewer and storm water systems as part of the Illicit Discharge Detection and Elimination Program (IDDE). Within the past couple of years the Town has eliminated several illegal sump pumps and illegal driveway & roof leader connections from the sewer systems.

The Town has also established a sewer connection fee.

I/I Rehabilitation Projects in Design or Construction: The construction of the Phase 5 Sanitary Sewer System Rehabilitation Project was completed. Warranty inspection was completed in spring 2017.

Phase 6 Sanitary Sewer Rehabilitation is in design with potential contract bid in Fall of 2017.

Reporting Period Activity: The Town is continuing to investigate and eliminate illicit cross-connections between the sanitary sewer and storm water systems as part of the Illicit Discharge Detection and Elimination Program (IDDE). Three (3) SMHs on a dead end street were discovered to still be part of a combined system (sewer & storm drain). This situation is scheduled to be corrected in October 2017.

MWRA I/I Local Financial Assistance Program: The community has financed ten (10) I/I reduction projects through the Authority's funding assistance program. The community has used its entire Phase 1 - 10 allocation of \$4,919,900.

32. STOUGHTON: South System

Background Information:

- Miles of Sewer: 89
- Sewered Population: 19,112
- Three Year (CY14 - CY16) Annual Average I/I: 1.40 mgd
- MassDEP Administrative Actions: AO Docket No. 538 (June 1984)

Latest I/I or SSES Report: Year 8 Rehabilitation Evaluation (May 2013)
Years 9 & 10 Rehabilitation Evaluation (February 2014)
Years 1 & 2 (Round 2) Sewer System I/I Investigation (November 2015)
Years 3 & 4 (Round 2) Evaluation (July 2016)
Reprioritized Year 5 Spring 2017 I/I Investigation (On-going)

Private Source Inflow Removal Program: The Town has adopted new sewer use regulations which address private inflow removal. TV inspection of service connections / house-to-house inspections is on-going.

I/I Rehabilitation Projects in Design or Construction: Years 1 & 2 Infiltration Rehabilitation Construction (Stoughton Contract 16-1 / MWRA Project No. WRA-P9-32-3-935) is substantially complete with Warranty Retesting scheduled for Spring 2018.

Years 8/9/10 Infiltration Rehabilitation Construction (Stoughton Contract 15-1 / MWRA Project No. WRA-P9-32-3-902) completed Winter 2017 (estimated 0.19 mgd of peak I/I to be removed). Years 8/9/10 Infiltration Rehabilitation Design completed August 2014.

Reporting Period Activity: Reprioritized Year 5 Spring 2017 I/I Investigation (MWRA Project No. WRA-P9-32-1-963) completed Spring 2017. Data review/report preparation on-going.

Years 3 & 4 (Round 2 of a Ten Year Annual I/I Identification Program) Sewer System I/I Investigation completed July 2016 (MWRA Project No. WRA-P9-32-3-935). Estimated 0.038 mgd of removable infiltration and 0.073 mgd of removable inflow identified. Years 1 & 2 (Round 2 of a Ten Year Annual I/I Identification Program) Sewer System I/I Investigation completed November 2015. Estimated 0.035 mgd of removable infiltration and 0.061 mgd of removable inflow identified.

Sewer extension of approximately 3000 LF at Forest Green by private developer is on-going. Sewer extension of approximately 9000 LF off Daly Drive by private developer is on-going.

MWRA I/I Local Financial Assistance Program: The community has financed twelve (12) I/I reduction projects through the Authority's funding assistance program. Of the \$4,722,900 allotted through the Program's Phases 1 - 10, the community has \$93,800 remaining in funding assistance.

33. WAKEFIELD: North System

Background Information:

- Miles of Sewer: 93
- Sewered Population: 26,007
- Three Year (CY14 - CY16) Annual Average I/I: 2.29 mgd
- MassDEP Administrative Actions: None

Latest I/I or SSES Report:

Sanitary Sewer Investigation Assistance – Subarea 3 Smoke Testing, Dye Testing & Dye Flooding Program Final Report (November 2011)

Sanitary Sewer Investigation Assistance – Municipal Building Inspections Final Report (November 2011)

Sanitary Sewer Investigation Assistance – Subarea 3 Television Inspection of Sewers and Manhole Investigations in Subarea 3 & Subarea 6 Low-lying Areas Final Report (April 2012)

2013 Infiltration & inflow Investigation – Gauging Areas 6 & 7 Final Report (January 2014)

2014 Smoke Testing Program – Gauging Areas 6 & 7 of Subarea 6 (January 2015)

2015 Smoke Testing Program – Sewer Subarea 2 (June 2016)

TV Inspection & Cleaning of areas to be paved (August 2016)

Sewer System Evaluation Survey – Year 1 (February 2017)

Private Source Inflow Removal Program: The Town continues to require a 4 to 1 removal of flow from completed subdivisions/ developments.

The Town is developing a plan to notify residents in the Paon Blvd area of a potential pilot building inspection program as this area is being investigated for potential Inflow sources.

I/I Rehabilitation Projects in Design or Construction: The construction contract for the Lakeview Ave, Plaza Rd & Spaulding St pump station replacements was executed on February 4, 2016. Construction is complete with only punch list items remaining. Expected annual average infiltration removal will be 0.10 gpd annually by replacing station chambers or lining existing wet wells.

In November 2016, excavated and replaced approximately 12 LF of collapsing 8-inch VC sewer main (including repairing a wye connection) on Valley Street between Cottage Street and Hart Street which removed an estimated 1,728 gpd of infiltration.

On approximately 15 roadways, replaced 9 sewer frames and covers (including repair/replacement of brick and mortar corbels) and removed and reset approximately 80 sewer frames and covers (including repair/replacement of brick and mortar corbels). The approximate Inflow reduction is potentially up to 0.10 mgd due to a number of the covers previously being lower than the surrounding pavement.

Reporting Period Activity: The Final Report for television inspection and manhole inspection that was performed in approximately 60,000 LF (May 2016) where paving will be performed in 2016/2017 (Sewer System Evaluation Survey – Year 1 Project) was completed in February 2017.

Television inspection and manhole inspections for approximately 50,000 LF of sewer under the Sewer System Evaluation Survey – Year 2 Project is currently ongoing. The project goal is to identify I/I and structural defects in select areas that are scheduled to be paved within the next calendar year.

In May 2017, funds were distributed for the following 2 projects: Conduct a Year 2 Sewer System Evaluation Survey Study This project includes cleaning & internally inspecting approximately 65,000 lf of sewer and manhole inspections of up to 350 manholes. A Letter Report will be prepared which will present the results of the field work; identify those sewer segments and manholes which appear to contribute excessive I/I; present specific conclusions and recommendations for sewer rehabilitations and associated cost that includes a cost-effectiveness analysis. The location of this work is throughout the Town as listed in the Table in Attachment 1 of the Financial Assistance Application dated 04/14/17; Construction of Recommended Sewer Rehabilitations from Year 1 Sewer System Evaluation Survey Study. This project consists of only the construction cost which will consist of a Base Bid and 2 Alternate Bids. The Base Bid will consist of: open cut point repair of 24 linear feet (lf) of 6” & 8” sewer; 1,711 lf of cleaning, inspection, testing, and sealing of 6” to 10” sewer; root treatment of 3,451 lf of 6” & 8” sewer; 14 lf of 8” cured-in-place short liner; 25 lf of 6” & 8” cured-in-place structural short liner; 5,860 lf of 6” & 8” cured-in-place pipe; 3,181 lf of 6” & 8” structural cured-in-place pipe; testing and sealing of 9 service connections; cutting of 33 protruding service connections; clean, inspection & cured-in-place lining 1 sewer lateral; 48 vertical feet of cementitious manhole lining; root treatment of 1 manhole; replace 2 sewer manhole frames & covers; and other related tasks and appurtenances. Alternate Bid #1 will consist of: 2,219 lf of cleaning, inspection, testing, and sealing of 6” to 10” sewer; root treatment of 1,947 lf of 6” & 8” sewer; 24 lf of 6” & 8” cured-in-place short liner; 28 lf of 8” & 10” cured-in-place structural short liner; 2,723 lf of 8” to 18” cured-in-place pipe; 1,828 lf of 6” to 10” structural cured-in-place pipe; testing and sealing of 6 service connections; cutting of 21 protruding service connections; 107 vertical feet of cementitious manhole lining; replace 2 sewer manhole frames & covers; and other related tasks and appurtenances. Alternate Bid #2 will consist of: 1,617 lf of cleaning, inspection, testing, and sealing of 6” to 15” sewer; root treatment of 1,181 lf of 8” to 12” sewer; 20 lf of 8” cured-in-place short liner; 29 lf of 6” & 8” cured-in-place structural short liner; 2,259 lf of 8” to 15” cured-in-place pipe; 641 lf of 8” & 10” structural cured-in-place pipe; testing and sealing of 4 service connections; cutting of 5 protruding service connections; clean, inspection & cured-in-place lining 1 sewer lateral; 34 vertical feet of cementitious manhole lining; replace 6 sewer manhole frames & covers; and other related tasks and appurtenances. The estimated I/I removal by this project is 0.03 mgd annually. (MWRA Project No. WRA-P9-33-3-967).

MWRA I/I Local Financial Assistance Program: The community has financed twenty-five (25) I/I reduction projects through the Authority’s funding assistance program. The community has used its entire Phase 1 - 10 allocation of \$5,966,900.

34. WALPOLE: South System

Background Information:

- Miles of Sewer: 59
- Sewered Population: 17,993
- Three Year (CY14 - CY16) Annual Average I/I: 0.59 mgd
- MassDEP Administrative Actions: None

Latest I/I or SSES Report: I/I Investigation Program: Year 7 (January 2014)
I/I Investigation Program: Year 8 (February 2016)
I/I Investigation Program (Round 2): Year 1 (January 2017)
I/I Investigation Program (Round 2): Year 2 (On-going)

Private Source Inflow Removal Program: The Town includes house-to-house private inflow inspection program as part of its water meter replacement program. For new connections greater than 15,000 gpd, a 4 to 1 reduction as per 314 CMR 12.04 is required. For new connections less than 15,000 gpd, developers are required to remove I/I at a ratio of 2.3 to 1. (developers may pay the town \$13.60 per gallon should they so choose). In November 2016, a roof leader was determined to be directly connected to the sewer system. The property owner was contacted and instructed to disconnect this roof leader.

I/I Rehabilitation Projects in Design or Construction: Years 4-7 I/I Rehabilitation Project (Walpole Contract 2015-30 / MWRA Project No. WRA-P9-34-3-914) bid May 2015. Construction began July 2015 and was completed March 2016. It is estimated that the Years 4-7 project removed 0.08 mgd of peak infiltration from the Town's sewer system. Years 4-7 Infiltration Rehabilitation Design complete April 2015. Year 7 I/I Investigation was completed January 2014. Project work was undertaken in Subareas 10 / 11 and included TV inspection of 73,614 LF of sewer main and 349 topside manholes inspections.

Reporting Period Activity: Year 2 I/I Investigation (Round 2) work completed Spring 2017. Data review/report preparation on-going.

Year 1 I/I Investigation (Round 2) (MWRA Project No. WRA-P9-34-3-914) work completed Spring 2016. Summary Report completed January 2017. Television inspection revealed an estimated 24,624 gpd of peak infiltration. Topside manhole inspection revealed an estimated 6,048 gpd of peak infiltration.

Year 8 I/I Investigation (MWRA Project No. WRA-P9-34-3-914) work, targeting Walpole Sewer Subareas 4 / 6, completed Spring 2015. Summary Report completed February 2016. TV inspection revealed an estimated 17,136 gpd of peak infiltration. Topside manhole inspection revealed an estimated 15,696 gpd of peak infiltration.

There were a total of 40 new connections made to the sewer system over the past year.

MWRA I/I Local Financial Assistance Program: The community has financed seven (7) I/I reduction projects through the Authority's funding assistance program. Of the \$3,680,000 allotted through the Program's Phases 1 - 10, the community has \$638,000 remaining in funding assistance.

35. WALTHAM: North System

Background Information:

- Miles of Sewer: 138
- Sewered Population: 61,318
- Three Year (CY14 - CY16) Annual Average I/I: 2.66 mgd
- MassDEP Administrative Actions: ACOP-NE-10-1N001 (February 2010)
ACOP-NE-04-1N004 (January 2005)
ACOP-NE-02-1003 (May 2003)
NON-NE-01-1066 (April 2001)

Latest I/I or SSES Report:

Updated Wastewater Facilities Plan (including Operations and Maintenance Plan) (April 2011)
Rangley Acres – I/I Removal Project Report (Spring 2012)
Polaroid Redevelopment Project Report (Summer 2013)
Inflow & Infiltration Improvements Section 5C (Lexington St - Trapelo Rd to Town Line) (March 2014)
Inflow & Infiltration Analysis Sewer System Section 12A-2 Lakeview Area (July 2014)
Inflow & Infiltration Improvements Phase 5.1, Section 6B6 - Pond End Lane Area (August 2014)
Post Flow Metering Report – Area 13/14-A SSO Mitigation Project (June 2016)
Post Flow Metering Report - Area 12-A -2-3 Lakeview (June 2016)
Post Flow Metering Report - Area 6B6 - Pond End Lane (July 2016)
Post Flow Metering Report - Alderwood Road Area (July 2006)

Private Source Inflow Removal Program: The City is planning the removal of 2 sump pumps within the next six months that were recently found connected to the sewer.

City Engineering Department is also planning to prepare an RFP for the design of the removal of the remaining 152 illicit sump pumps.

I/I Rehabilitation Projects in Design or Construction: The design of the sewer rehabilitations in the Beaver St Area (Area 5A) recommended by the SSES Study was completed. The project has been bid and the construction contract was awarded to Aqua Line Corp. The construction is expected to start 8/15/17. This sewer rehabilitation work consists of: replacement of

sewer and manholes; lining of sewer and manholes; point repairs of sewer; manhole point repairs; replacement of manhole frames& covers and all associated appurtenances. This rehabilitation work will be in area of: Azalea Rd Beaver St, Forest St, Ledge Rd, Lyman St, Rogers Way, Valley View Rd & Woodcliff Drive. The estimated I/I to be removed by this project is 121,000 gpd.

The City's consultant is currently working on the design of sewer rehabilitations (\$500,000) for the Area 13/14-B (Bear Hill Valley/ West End) SSO Mitigation Project. The Contract Documents are expected to be completed by December 2017. The City estimates the construction budget to be \$4.5 million.

A total of 36 sewer services were repaired between August 2016 and July 2017. An estimated 157 gpd of I/I was removed.

Reporting Period Activity: In the Beaver St. Area (Area 5A), a Sewer System Evaluation Survey Study (SSES) project was completed.

MWRA I/I Local Financial Assistance Program: The community has financed eight (8) I/I investigation projects through the Authority's funding assistance program. Of the \$13,732,400 allotted through the Program's Phases 1 - 10, the community has \$2,355,000 remaining in funding assistance.

36. WATERTOWN: North System

Background Information:

- Miles of Sewer: 75
- Sewered Population: 32,996
- Three Year (CY14 - CY16) Annual Average I/I: 0.92 mgd
- MassDEP Administrative Actions: ACOP-NE-97-5004

Latest I/I or SSES Report:

TV Inspection Report - Nichols Avenue & Boylston Street Sewers (June 2009)
TV Inspection - Lexington Street Sewer (December 2011)
TV Inspection Subsystem 7 (ongoing)
Additional TV Inspection Subsystem 7 (initiated)

Private Source Inflow Removal Program: During the past year, 125 buildings were inspected and dye tested by the Town's consultants. No direct illicit connections were located but 6 indirect illicit connections were identified; 4 of these connections were removed. The estimated amount of flow removed was 89 gpd.

I/I Rehabilitation Projects in Design or Construction: The design of the recommended sewer rehabilitations from the Boylston St/Nichols Ave CCTV inspection project was completed in February 2017. This project (Construction of Infiltration/Inflow Removal Project – Contract #17-01S) was bid in March 2017 and awarded in April 2017. Construction started in June 2017. This sewer rehabilitation project includes sewers located in Nichols Ave, Boylston St, Dartmouth St, Edward Rd, Rutland St, Evans St, Gilbert St, Main St & Porter St. The project involves sewer rehabilitations consist of 8-inch full length sewer replacement, point repair replacements, service replacements, installation of approximately 290 linear feet (lf) of 6-inch diameter, 3,225 lf of 8-inch diameter, 1,090 lf of 10-inch diameter, 765 lf of 12-inch diameter & 1,190 lf of 15-inch cured-in-place pipe (CIPP) liner, mainline sewer heavy cleaning and chemical root control.

Replacement of 1,300 LF of 8-inch sewer, 60 LF of 6-inch sewer, 33 sewer service connections, five (5) sewer manholes, and 30 vertical feet of sewer manhole cementitious lining on Arden Road near Oakley Road and Maplewood Road between School Street and Commonwealth Road is currently ongoing.

Awarded a lining and spot repair contract to Institutorm Technologies in the amount of \$386,500 for work to begin in FY 18.

Lined 1,330 LF of 8" Sanitary Sewer on Edenfield Ave from Bancroft St. to Main Street.

Lined 242 LF of 8" Sanitary Sewer on Warren Street

Lined 80 LF of Sanitary Sewer on Morrison Road

Replaced the Sanitary Sewer Main and associated laterals on Harden Ave from the first manhole to Lexington Street.

Replaced 120 LF. of 15" Sanitary Sewer and installed an additional sewer manhole in the easement between Acton Street and Pleasant Street.

Replaced 400 LF of Sanitary Sewer on Chauncy St.

Replaced 140 LF of Sanitary Sewer on Priest Road.

Reporting Period Activity: The 2017 Sewer Rehabilitations project is in review and evaluation phase. Inspections of 69 manholes were completed in March 2017. Light cleaning and television inspection of 9,942 LF of sewer was performed between February and March 2017. Heavy cleaning of approximately 1,137 LF of sewer was performed in June 2017.

Two separate sewer flow evaluations took place by private developers:

Athena Health Care through their consultant, Stantec, cleaned and TV inspected 4,200 LF of sanitary sewer on North Beacon Street and Greenough Boulevard as part of their sanitary sewer mitigation.

Cappola Development through their consultant, V.T.P associates, has committed to investigate methods to clean the sanitary sewer siphon in Watertown Square.

In November 2016, funds were distributed for the inspection, design & construction of sewer rehabilitations in CIP Project Area #6 (2017 Sewer rehabilitations Project) involves the topside inspection of approximately 79 manholes and TV inspection in the project area as indicated in the map included with the Financial Assistance Application. The specific locations and approximate sewer lengths are:

Acton St (Rutland St to Pleasant St) - 637 l.f. of 12-inch diameter & 2,012 l.f. of 15-inch diameter

Bridge St – 185 l.f. of 8-inch diameter

Bromfield St – 728 l.f. of 6-inch & 500 l.f. of 8-inch diameter

Buick St – 294 l.f. of 8-inch diameter

Edward Rd. – 1,083 l.f. of 8-inch diameter

Essex St – 237 l.f. of 6-inch diameter

Evans St. – 424 l.f. of 8-inch diameter

Gilbert St. – 240 l.f. of 8-inch diameter

Jensen St – 1,664 l.f. of 8-inch diameter

Nash St – 337 l.f. of 6-inch & 155 l.f. of 8-inch diameter

Pine St – 1,244 l.f. of 8-inch diameter

Prescott St. – 746 l.f. of 8-inch diameter

Rutland St. – 774 l.f. of 8-inch diameter & 252 l.f. of 10-inch diameter

For Main St (Olcott St to Prescott St) only the sewer manholes will be investigated and rehabilitated.

Following these investigations & evaluation, design & construction of the recommended cost-effective rehabilitations will be completed. The rehabilitations will include techniques such as root treatment, services connection testing & sealing or lining, short liners, cured-in-place pipe liners and manhole grouting and sealing. The annual Infiltration to be removed is estimated to be 0.066 mgd. (MWRA Project #WRA-P9-36-3-955).

MWRA I/I Local Financial Assistance Program: The community has financed seven (7) I/I investigation projects through the Authority's funding assistance program. Of the \$6,285,800 allotted through the Program's Phases 1 - 10, the community has \$2,624,000 remaining in funding assistance.

37. WELLESLEY: South System

Background Information:

- Miles of Sewer: 134
- Sewered Population: 28,334
- Three Year (CY14 - CY16) Annual Average I/I: 1.26 mgd
- MassDEP Administrative Actions: AO Docket No. 579 (May 1985)

Latest I/I or SSES Report: Phase 2 SSES (November 1994)

Private Source Inflow Removal Program: Based upon previous private source inflow studies, DPW is contacting the owners of identified illegal sump pumps. To date, 18 sump pumps have been removed from the sanitary system. Also, the Town continues to pursue illegal sump pump connections identified through the water meter ERT Battery Changeout Transaction Program.

I/I Rehabilitation Projects in Design or Construction:

Sewer System Inspection and Rehabilitation (Wellesley Contract No. 13C-460-1482) work completed in CY17. Work consisted of cleaning and TV inspection of 35,418 LF of sewer; testing 6995 joints and sealing/retesting 2371 joints; and sealing 388 VF of manholes. The Town also flushed 264,270 LF of sewer main and rodded 326 sewer laterals.

Sewer System Inspection and Rehabilitation (Wellesley Contract No. 13C-460-1482 / MWRA Project No. WRA-P9-37-3-942) work completed in August 2015. Work consisted of cleaning and TV inspection of 33,975 LF of sewer; chemical root treatment of 18,132 LF of 8 to 12-inch sewer; testing 6775 joints and sealing/retesting 2655 joints; installing 50 LF of CIP short liners; and sealing 1002 VF of manholes.

Reporting Period Activity: In FY17, the Town contracted for replacement design of the Lake Road Sewer Lift Station. Pump station replacement construction to be performed in FY18. A 200 foot section of 10-inch VC sewer main within Mclean Street was replaced by pipe bursting.

MWRA I/I Local Financial Assistance Program: The community has financed twelve (12) I/I reduction projects through the Authority's funding assistance program. Of the \$5,709,700 allotted through the Program's Phases 1 - 10, the community has \$2,453,476 remaining in funding assistance.

38. WESTWOOD: South System

Background Information:

- Miles of Sewer: 77
- Sewered Population: 14,564
- Three Year (CY14 - CY16) Annual Average I/I: 0.62 mgd
- MassDEP Administrative Actions: AO Docket No. 578 (May 1985)

Latest I/I or SSES Report: SSES Phases 1 and 2 (January 1991)
Town-Wide I/I Study (June 2009)
I/I Investigation Program (On-going)

Private Source Inflow Removal Program: A house-to-house inspection survey has been completed. The survey included inspection of 1880 residences and identified 135 suspect sump pumps. Sump pump removal notification letters forthcoming.

I/I Rehabilitation Projects in Design or Construction:

Phase 2 - I/I Investigation (MWRA Project No. WRA-P9-38-3-949): Cleaning, TV inspection, videotaping and recording 15,000 LF of sewer main and performing topside manhole inspections of 75 sewer manholes. Project work will be performed in the following areas: School Street Area / Hartford Street Fill-in Area / Lake Shore Drive to High Street / Lake

Shore Drive to Arcadia Road / Sycamore Drive to Arcadia Road. Phase 2 work began March 2017 and is scheduled for completion Summer 2017.

Phase 1 - I/I Rehabilitation Design/Construction (MWRA Project No. WRA-P9-38-3-949): Design cost-effective and value-effective sewer rehabilitations; prepare construction rehabilitation drawings and specifications for public bidding; and prepare a final cost estimate for the designed rehabilitations. Construct cost-effective and value-effective sewer rehabilitations and perform construction public bid/award/resident project representative services. Sewer rehabilitation work includes approximately: Cleaning and TV inspection of 20,000 LF of sewer main; installing 5020 LF of CIP pipe; performing 112 lateral connection repairs; raising 17 manhole frames & covers to grade; replacing 3 manhole frames & covers and rehabilitating 19 sewer manholes (via cementitious and epoxy lining). Project work will be performed in the following areas: Pond Plain Road to Oak Street / Pond Street Fill-in Area / High Street to Oriole Road / Stanford Road to Sunrise Road. Phase 1 work began June 2016 and is scheduled for completion Summer 2017.

Reporting Period Activity: Construction of large retail/residential development on University Avenue is on-going. Project involves installation of new 6 and 8-inch PVC sewer mains throughout the development. Extension of an 8-inch PVC sewer line on Summer Street and Grove Street for approximately 1600 LF completed (will add five additional services to the sanitary system).

MWRA I/I Local Financial Assistance Program: The community has financed seven (7) I/I reduction projects through the Authority's funding assistance program. Of the \$2,532,300 allotted through the Program's Phases 1 - 10, the community has \$441,000 remaining in funding assistance.

39. WEYMOUTH: South System

Background Information:

- Miles of Sewer: 238
- Sewered Population: 53,646
- Three Year (CY14 - CY16) Annual Average I/I: 3.56 mgd
- MassDEP Administrative Actions: ACO-NE-04-1N002 (September 2004)
NON-NE-00-1025 (August 2000)
AO Docket No. 543 (November 1984)

Latest I/I or SSES Report: Town-Wide Sewer Investigation - Year 3 (December 2014)
Town-Wide Sewer Investigation - Year 4 (December 2015)
Town-Wide Sewer Investigation - Year 5 (December 2016)
Town-Wide Sewer Investigation - Year 6 (On-going)

Private Source Inflow Removal Program: The Town has completed the redirection of 330 sump pumps (for an estimated 165,000 gpd of inflow removal). Six (6) sump pumps were redirected during FY13-17.

I/I Rehabilitation Projects in Design or Construction:

The Year 5 Sewer System Infiltration Rehabilitation Design Project (MWRA Project No. WRA-P9-39-2-965) was completed in July 2017. Rehabilitation Construction bidding is scheduled for Fall 2017. Project work will be performed in Subareas B-1 / B-4. Approximately 0.04 mgd of infiltration and 0.10 mgd of peak design storm inflow will be removed through this project.

The Year 4 Sewer System Infiltration Rehabilitation Design Project (Weymouth Contract PW-16-001-S / MWRA Project No. WRA-P9-39-3-940) was completed in July 2016 and bid in August 2016. Rehabilitation Construction was completed in March 2017. Project work was performed in Subareas C-3 / D-1-1. Work included cleaning/inspecting/testing and sealing 21,200 LF of sewer; performing 2900 LF of heavy cleaning; performing 5200 LF of root treatment; installing short liners at 61 locations; installing 3300 LF of CIP pipe; rehabilitating 61 manholes; grouting 60 service connections; installing two lateral liners; installing four manhole inflow dishes; and TV inspecting 2300 LF of sewer. Approximately 0.18 mgd of peak I/I was removed through the project.

The Year 3 Sewer System Infiltration Rehabilitation Design Project (Weymouth Contract PW-15-002-S / MWRA Project No. WRA-P9-39-3-909) was completed in June 2015 and bid in July 2015. Rehabilitation Construction was completed in Summer 2016. Work included CIP lining of 3377 LF of 8 to 15-inch sewer main and 796 VF of cementitious interior manhole lining. Approximately 0.19 mgd of peak I/I was removed through the project.

Reporting Period Activity:

The Year 6 Town-Wide Investigation Program (MWRA Project No. WRA-P9-39-2-965) began March 2017 (Subarea C-8) and was completed May 2017. Data review/report preparation is on-going.

The Year 5 Town-Wide Investigation Program (MWRA Project No. WRA-P9-39-3-940) began March 2016 (Subareas B-1 / B-4) and was completed May 2016. Project Summary report completed December 2016. The investigation identified approximately 0.06 mgd of infiltration and 0.10 of peak inflow.

The Year 4 Town-Wide Investigation Program (MWRA Project No. WRA-P9-39-3-909) began March 2015 (Subareas C-3 / D-1-1 / N-1 / N-7) and was completed May 2015. Project Summary report completed December 2015. The investigation identified approximately 0.24 mgd of infiltration and 0.002 of peak inflow.

MWRA I/I Local Financial Assistance Program: The community has financed sixteen (16) I/I reduction projects through the Authority's funding assistance program. Of the \$11,480,900 allotted through the Program's Phases 1 - 10, the community has \$3,695,000 remaining in funding assistance.

40. WILMINGTON: North System

Background Information:

- Miles of Sewer: 20
- Sewered Population: 4,833
- Three Year (CY14 - CY16) Annual Average I/I: 0.49 mgd
- MassDEP Administrative Actions: None

Latest I/I or SSES Report: Sewer System Inspection Report (June 2003)

Infrastructure Maintenance & Management Program (IMMP) Phase 1 Rpt (June 2003)

Infrastructure Maintenance & Management Program (IMMP) Phase 2 Rpt (March 2005)

Private Source Inflow Removal Program: Town continuing inspections on an as needed basis.

I/I Rehabilitation Projects in Design or Construction: No I/I Rehabilitation work was conducted over the past year.

Reporting Period Activity: The Townwide Infiltration/Inflow (I/I) Analysis Study began in August 2016.

In November 2016, funds were distributed for a Townwide Infiltration/Inflow Analysis Study. This project consists of the following tasks: 1) Flow monitoring at eight (8) locations throughout Town for a six week period; 2) Rainfall gauging and groundwater monitoring throughout the flow monitoring period; 3) Engineering evaluation of the flow monitoring results to estimate average daily flows and I/I rates in each of the eight tributary areas; 4) Prioritization of high I/I areas for follow-up sanitary sewer evaluation study (SSES) activities and assess the risk of sanitary sewer overflows (SSOs) based on a five year 24 hour storm event; 5) Conduct 30,000 LF of closed-circuit television (CCTV) inspection in selected high I/I priority areas; 6) Perform 180 manhole inspections in selected high I/I priority areas; 7) Provide updates to the Town's sewer GIS. A Draft and Final Report will be developed which will present the data collected from the flow monitoring, rainfall gauging, groundwater monitoring, TV inspection and manhole inspection. An analysis of the findings and results will be presented along with an evaluation and condition assessment of the CCTV and manhole inspections and development of sewer rehabilitation recommendations. (MWRA Project No. WRA-P9-40-1-958).

MWRA I/I Local Financial Assistance Program: The community has financed six (6) I/I reduction projects through the Authority's funding assistance program. Of the \$2,462,000 allotted through the Program's Phases 1 - 10, the community has \$856,000 remaining in funding assistance.

41. WINCHESTER: North System

Background Information:

- Miles of Sewer: 83
- Sewered Population: 22,064
- Three Year (CY14 - CY16) Annual Average I/I: 0.94 mgd
- MassDEP Administrative Actions: None (Draft ACO in 2001 was not finalized).

Latest I/I or SSES Report:

West Side Building Inspection Report (May 2009)
Squire Road & Meter #4 Area Sewer System Evaluation Survey Final Report (June 2013)
Stowell & Marshall Road Sewer System Evaluation (January 2014)
Sewer System Evaluation Survey (SSES) Phase II (November 2016)

Private Source Inflow Removal Program: The Town's Private Inflow Source Removal Program is ongoing. No additional sump pumps were removed from the sewer system during this period.

I/I Rehabilitation Projects in Design or Construction: The Design of the recommended sewer rehabilitations per the "Phase II SSES in Meter Areas #1, 2, 6 & Leslie/ Lawson Subareas" Report is ongoing.

Reporting Period Activity: The Final Report entitled of the "Phase II SSES in Meter Areas #1, 2, 6 & Leslie/ Lawson Subareas" Report was completed in November 2016.

In August 2016, funds were distributed for the cost of the engineering services to be provided during the design and bid/award associated with the sewer rehabilitations as recommended by the "Phase II SSES in Meter Areas #1, 2, 6 & Leslie/ Lawson Subareas" Report. The recommended sewer rehabilitations will include but is not necessarily limited to: clean & TV inspection of approximately 5,600 l.f. of 5-inch to 16-inch diameter sewers; root treatment of approximately 9,900 l.f. of 6-inch to 12-inch diameter sewers and 7 manholes; clean, inspect, testing & sealing approximately 9,800 l.f. of 6-inch to 12-inch diameter sewers; installation of approximately 122 l.f. of short liners and approximately 60 l.f. of structural shot liners in 6-inch to 12-inch diameter sewers; installation of approximately 8,900 l.f. of cured-in-place pipe liners and approximately 7,900 l.f. of cured-in-place structural pipeliners in 6-inch to 12-inch diameter sewers; installation of 9 lateral liners; testing & grouting of approximately 13 sewer services; cutting 2 protruding service connections; open cut repair of sewer at 11 locations; replacing the services connection wye at 3 locations; cementitious lining of approximately 64 manholes; replacement of 17 manhole frames & covers; building 28 manhole benches & inverts; repairing 6 manhole benches & inverts; sealing combined manhole (#SB-493); furnishing & installing 29 manhole inflow dishes; installing 3 bolted & gasketed manhole frames & covers; and all other related tasks and appurtenances including permanent and temporary pavement, police details and mobilization.

MWRA I/I Local Financial Assistance Program: The community has financed seven (7) I/I reduction projects through the Authority's funding assistance program. Of the \$4,183,000 allotted through the Program's Phases 1 - 10, the community has \$735,000 remaining in funding assistance.

42. WINTHROP: North System

Background Information:

- Miles of Sewer: 36
- Sewered Population: 18,111
- Three Year (CY14 - CY16) Annual Average I/I: 0.77 mgd
- MassDEP Administrative Actions: None

Latest I/I or SSES Report: Sanitary Sewer Evaluation Report (April 2007)
Sewer System I/I Assessment (April 2014)

Private Source Inflow Removal Program: The DPW, in partnership with the Building & Plumbing Inspectors, continues to actively seek out illegal sump pump connections to the Town's sewer system.

I/I Rehabilitation Projects in Design or Construction: Design of Town Center Improvements:

Design of improvements to upgrade sewer mains on Woodside Avenue, Somerset Avenue, Bartlett Road, Adam Street, Williams Street, and Cottage Park Avenue is on-going. The Town anticipates completing design of these improvements in September 2017. This design work includes improvements to the sewer system as recommended from the video inspections conducted as part of the Sanitary Sewer Evaluation Report of April 2007. The design work involves conducting survey, boring, flow monitoring, permitting & preparing Contract Documents for the replacement of approximately 2400 LF of sewer, manholes and service laterals (to the property line). Construction of this sewer improvement is being planned within the next two years and will be coordinated with the Town Center Redevelopment Project which is currently being finalized. The estimated annual I/I reduction is 0.02 mgd (MWRA Project No. WRA-P9-42-3-946).

Reporting Period Activity: See description of work under "I/I Rehabilitation Projects in Design or Construction"

MWRA I/I Local Financial Assistance Program: The community has financed ten (10) I/I reduction projects through the Authority's funding assistance program. Of the \$3,393,400 allotted through the Program's Phases 1 - 10, the community has \$586,000 remaining in funding assistance.

43. WOBURN: North System

Background Information:

- Miles of Sewer: 141
- Sewered Population: 38,262
- Three Year (CY14 - CY16) Annual Average I/I: 2.27 mgd
- MassDEP Administrative Actions: ACO 2005 (September 2005)
ACO-NE-01-1005 (August 2001)
Revised AO Docket No. 619 (November 1984)

Latest I/I or SSES Report:

Area #3 Sanitary Sewer Rehabilitation – Post Rehabilitation Flow Evaluation Report (May 2011)
Arlington Road Area Sanitary Sewer Rehabilitation – Post Rehabilitation Flow Evaluation Report (May 2011)
East Woburn Sewer Collection System Capital Improvement Plan (October 2011)
CIP Smoke Testing – Project 1 Final Report (February 2014)
CIP Project 1 – Sewer Investigation and Evaluation Final Report (March 2014)
CIP Project 2 - Sewer Investigation and Evaluation Final Report (February 2015)
CIP Project 3 - Sewer Investigation and Evaluation Final Report (April 2016)
CIP Project 4 - Sewer Investigation and Evaluation Final Report (March 2017)

Private Source Inflow Removal Program: Under the current ACO, a 10:1 flow reduction is required. No activity occurred during this period.

I/I Rehabilitation Projects in Design or Construction: Construction of the CIP Project 1 Rehabilitations (Contract No. 16-IFB-010) has been substantially completed with the Warranty & Final Inspection being completed in May 2017. This sewer

rehabilitation included: installation of 7469 LF of cured-in-place manhole-to-manhole pipe liners; lining of 326 vf (50 manholes) of manholes; and sealing of underdrain access ports at four (4) locations. The estimated I/I removal is 96,397 gpd of peak infiltration, 28,800 of peak rain-induced infiltration, and 5270 gpd of peak inflow.

CIP Project 2 Rehabilitations are currently being designed with completion now expected by December 2017.

As part of the “Horn Pond Sanitary Sewer Interceptor” project; 2,027 linear feet of cured-in-place manhole-to-manhole pipe was installed in 36-inch and 30-inch diameter sewers, 47 linear feet of cementitious lining of sewer manholes was performed, and one (1) manhole frame and cover was reset.

Six properties were upgraded/repared to mitigate infiltration.

Reporting Period Activity:

Sewer blockages were repaired/cleared at 46 separate locations.

The Report on the “Sewer Investigations and Evaluation for CIP Project 4” was completed in March 2017. One of the major components of this project was the cleaning & TV inspection of 47,887 LF of sewer & topside inspection of 223 manholes.

MWRA I/I Local Financial Assistance Program: The community has financed eleven (11) I/I reduction projects through the Authority’s funding assistance program. Of the \$10,695,500 allotted through the Program’s Phases 1 - 10, the community has \$1,733,000 remaining in funding assistance.

ATTACHMENT 6
TO
MWRA ANNUAL I/I REDUCTION REPORT FOR FY17
Reporting Period – July 2016 Through June 2017

CY16 COMMUNITY WASTEWATER FLOW DATA

This attachment contains calendar year 2016 wastewater flow data for the 43 MWRA member sewer communities. There are four separate data tables as detailed below.

TABLE 1 (one page - page number 2) presents the CY16 MWRA Wastewater Metering System Community Flow Estimates. This data is monthly total wastewater flow estimates for each of the 43 member sewer communities derived from MWRA's wastewater metering system. Each community's percent share average daily flow and percent share maximum month flow are used as components of MWRA's annual wholesale sewer charge.

TABLE 2 (one page - page number 3) presents the CY16 MWRA Community Wastewater Flow Component Estimates. This data is developed through an engineering analysis by MWRA staff to estimate wastewater flow components, including: dry day average daily flow, average daily infiltration, average daily sanitary flow, and average daily inflow. The data in TABLE 2 is annual data. The percent share for each estimated flow component is also presented. The data presented in TABLE 2 is a summary of the more detailed monthly flow component analysis presented in TABLE 4. The estimated average daily sanitary flow (non-I/I flows) includes: residential, commercial, industrial, and institutional flows.

TABLE 3 (one page - page 4) presents the CY16 Community Wastewater Flow Component Estimates with additional information based on estimated community inch-diameter-miles of sewer.

TABLE 4 (13 pages - page numbers 5 through 17) presents the Estimated Community Wastewater Flow Components for CY16. This data is developed through an engineering analysis by MWRA staff of each community's monthly wastewater flow (derived from MWRA's wastewater metering system) to estimate flow components, including: dry day average daily flow, average daily infiltration, average daily sanitary flow, and average daily inflow. The data listed as MWRA Estimated Infiltration is a calculated estimate of the infiltration entering MWRA-owned sewers that are upstream of wastewater flow meters within a community. The calculation is a weighted allocation of the Raw Estimated Infiltration to the portion of the sewer system that is MWRA-owned versus community-owned. The weighted allocation is based on inch-diameter-miles of MWRA-owned and community-owned sewer. The data presented in TABLE 4 is also presented in TABLE 2 as an annual summary.

TABLE 1 - CY16 MWRA WASTEWATER METERING SYSTEM COMMUNITY FLOW ESTIMATES

Community	Total Population	Sewered Population	CY16 Average Daily Flow (ADF) By Calendar Month (MGD)												12 Month Average Daily Flow (MGD)	Percent Average Daily Flow	Max. Month ADF (MGD)	Percent Max. Month ADF
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Arlington	44,028	43,993	5.38	5.28	5.61	5.73	3.87	3.11	2.60	2.45	2.48	3.23	3.33	4.24	3.94	1.5%	5.73	1.6%
Ashland	17,150	13,549	1.26	1.34	1.29	1.31	1.13	1.07	0.97	0.99	1.03	1.21	1.20	1.31	1.18	0.4%	1.34	0.4%
Bedford	13,975	13,394	2.62	2.85	3.26	3.19	2.45	1.97	1.70	1.72	1.67	1.84	1.89	2.15	2.27	0.8%	3.26	0.9%
Belmont	25,332	24,927	3.03	3.04	3.18	3.58	2.20	1.81	1.44	1.41	1.40	1.79	1.83	2.28	2.25	0.8%	3.58	1.0%
BWSC	645,966	645,320	84.90	95.74	90.29	94.30	79.70	75.56	71.08	71.59	72.15	86.63	77.79	79.65	81.56	30.3%	95.74	26.9%
Braintree	36,727	36,573	8.42	9.82	8.51	8.81	6.52	5.18	4.37	4.17	3.62	4.24	4.47	5.19	6.10	2.3%	9.82	2.8%
Brookline	59,128	59,069	8.60	9.57	9.26	9.88	6.76	5.98	4.69	4.54	4.53	6.04	5.87	6.60	6.85	2.5%	9.88	2.8%
Burlington	25,463	24,826	3.49	3.57	4.03	4.04	3.19	2.61	2.22	2.19	2.13	2.39	2.58	3.03	2.95	1.1%	4.04	1.1%
Cambridge	107,289	107,278	17.05	17.43	17.83	17.91	16.32	15.44	14.54	15.43	15.45	18.16	15.73	16.43	16.48	6.1%	18.16	5.1%
Canton	22,221	15,088	3.01	3.47	3.13	3.27	2.51	2.19	1.98	2.06	2.01	2.26	2.31	2.48	2.55	0.9%	3.47	1.0%
Chelsea	37,670	37,670	4.67	4.85	4.74	4.83	4.29	3.88	3.61	3.52	3.49	4.59	3.88	4.49	4.24	1.6%	4.85	1.4%
Dedham	25,299	23,098	3.63	4.45	4.22	4.48	3.19	2.56	2.02	1.76	1.73	2.07	2.29	2.58	2.91	1.1%	4.48	1.3%
Everett	42,935	42,935	5.24	5.51	5.46	5.30	4.29	3.74	3.39	3.32	3.30	4.14	4.47	4.97	4.42	1.6%	5.51	1.6%
Framingham	70,441	67,680	8.39	8.76	8.76	8.69	6.99	5.88	5.25	5.32	5.20	5.76	5.71	6.04	6.72	2.5%	8.76	2.5%
Hingham	7,350	6,809	1.65	1.94	1.63	1.64	1.14	0.90	0.72	0.66	0.65	0.78	0.81	0.95	1.12	0.4%	1.94	0.5%
Holbrook	10,952	9,671	0.97	1.12	1.00	1.03	0.83	0.71	0.65	0.64	0.65	0.69	0.71	0.76	0.81	0.3%	1.12	0.3%
Lexington	32,650	32,030	5.03	5.21	5.98	6.00	4.42	3.52	2.57	2.22	2.16	2.57	3.01	3.82	3.87	1.4%	6.00	1.7%
Malden	60,509	60,206	9.77	9.88	9.98	10.15	8.17	6.98	6.00	5.74	5.66	6.85	7.02	8.21	7.86	2.9%	10.15	2.9%
Medford	57,170	57,113	8.21	7.93	8.34	8.67	6.15	5.18	4.47	4.03	4.01	4.98	5.02	6.58	6.13	2.3%	8.67	2.4%
Melrose	27,690	27,662	4.77	4.85	5.18	5.14	3.64	2.98	2.44	2.27	2.18	2.76	3.09	3.88	3.59	1.3%	5.18	1.5%
Milton	27,270	26,534	3.28	4.15	3.82	4.02	2.45	1.90	1.47	1.35	1.36	1.75	1.90	2.33	2.47	0.9%	4.15	1.2%
Natick	35,214	31,351	3.29	3.60	3.49	3.62	2.76	2.38	2.17	2.06	2.00	2.14	2.25	2.51	2.69	1.0%	3.62	1.0%
Needham	29,736	28,089	3.89	4.19	4.14	4.54	3.09	2.47	1.92	1.92	2.02	2.36	2.59	3.02	3.01	1.1%	4.54	1.3%
Newton	87,971	87,003	17.67	18.31	18.93	21.25	14.86	11.73	9.42	8.71	8.62	10.70	11.16	12.80	13.66	5.1%	21.25	6.0%
Norwood	28,951	28,795	5.55	7.16	5.71	6.96	5.00	4.03	3.67	3.57	3.43	3.80	4.33	4.69	4.81	1.8%	7.16	2.0%
Quincy	93,494	93,494	13.50	15.56	14.66	15.38	12.33	11.17	9.68	9.11	8.80	10.39	10.14	10.83	11.78	4.4%	15.56	4.4%
Randolph	33,456	33,423	3.26	4.16	3.79	4.00	2.75	2.12	1.75	1.64	2.07	2.34	2.40	2.77	2.75	1.0%	4.16	1.2%
Reading	25,327	24,719	3.08	3.21	3.60	3.47	2.59	2.00	1.67	1.56	1.54	1.80	2.09	2.63	2.43	0.9%	3.60	1.0%
Revere	53,756	53,702	6.92	7.32	7.47	7.15	5.37	5.06	4.54	4.53	4.35	5.59	5.04	6.07	5.78	2.1%	7.47	2.1%
Somerville	78,804	78,804	11.80	12.20	11.97	12.58	8.78	7.46	6.71	7.06	6.57	10.02	9.22	9.89	9.51	3.5%	12.58	3.5%
Stoneham	21,734	21,401	3.17	3.15	3.39	3.32	2.23	1.82	1.42	1.40	1.43	1.69	1.85	2.24	2.26	0.8%	3.39	1.0%
Stoughton	28,106	19,112	2.99	3.69	3.48	3.76	2.81	2.25	1.80	1.63	1.60	1.84	1.96	2.28	2.50	0.9%	3.76	1.1%
Wakefield	26,080	26,007	4.79	4.88	5.40	5.38	3.79	2.85	2.24	2.08	1.99	2.45	2.86	3.72	3.53	1.3%	5.40	1.5%
Walpole	24,818	17,993	1.95	2.21	2.15	2.24	1.72	1.52	1.31	1.28	1.33	1.41	1.47	1.74	1.69	0.6%	2.24	0.6%
Waltham	62,227	61,318	9.85	9.59	9.87	10.40	7.68	6.50	5.65	5.48	5.47	6.62	7.02	7.69	7.64	2.8%	10.40	2.9%
Watertown	32,996	32,996	3.68	3.80	3.99	4.09	2.86	2.47	2.27	2.14	2.16	2.42	2.48	2.99	2.94	1.1%	4.09	1.2%
Wellesley	29,090	28,334	3.46	3.71	3.69	3.99	2.83	2.30	1.85	1.75	1.84	2.24	2.36	2.70	2.72	1.0%	3.99	1.1%
Westwood	14,876	14,564	1.78	1.99	1.93	2.23	1.60	1.39	1.18	1.18	1.18	1.25	1.34	1.50	1.54	0.6%	2.23	0.6%
Weymouth	55,419	53,646	8.97	9.94	8.57	9.65	7.56	5.94	4.92	4.66	4.49	5.42	5.66	6.65	6.86	2.5%	9.94	2.8%
Wilmington	23,147	4,833	1.38	1.44	1.48	1.46	1.30	1.26	1.06	1.15	1.12	1.21	1.25	1.27	1.28	0.5%	1.48	0.4%
Winchester	22,079	22,064	2.55	2.54	2.91	2.92	1.97	1.58	1.22	1.08	1.05	1.25	1.40	1.83	1.86	0.7%	2.92	0.8%
Winthrop	18,111	18,111	2.09	2.21	2.14	2.06	1.81	1.75	1.62	1.51	1.46	1.83	1.77	2.07	1.86	0.7%	2.21	0.6%
Woburn	39,083	38,262	6.59	6.88	7.61	7.44	5.65	5.17	4.90	4.75	4.57	5.11	5.66	6.94	5.94	2.2%	7.61	2.1%
Total/Average	2,261,690	2,193,444	315.58	342.50	335.87	349.86	271.55	238.37	211.15	207.63	205.95	248.61	241.21	266.80	269.31	100%	355.43	100%
Logan Airport Monthly Rainfall (in)			3.27	4.17	3.16	2.91	2.83	1.33	0.87	1.72	1.38	5.46	2.70	3.25				

TABLE 2 - 2016 MWRA COMMUNITY WASTEWATER FLOW COMPONENT ESTIMATES (CY16-12 MONTHS)

COMMUNITY	2016 Averages (1)					Components of Average Daily Flow (Estimated) (2)						Peak Month ADF (MGD)	Percent Peak Month ADF			
	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
	Total Population	Sewered Population														
Arlington	44,028	43,993	327	106	7	3.94	1.46%	3.65	1.25	31.7%	2.40	60.9%	0.29	7.4%	5.73	1.61%
Ashland	17,150	13,549	2	66	2	1.18	0.44%	1.13	0.33	28.0%	0.80	67.8%	0.04	3.4%	1.34	0.38%
Bedford	13,975	13,394	1	78	4	2.27	0.84%	2.17	0.87	38.3%	1.30	57.3%	0.10	4.4%	3.26	0.92%
Belmont	25,332	24,927	2	78	2	2.25	0.84%	1.99	0.69	30.7%	1.30	57.8%	0.25	11.1%	3.58	1.01%
BWSC (5)	645,966	645,320	255	858	33	81.56	30.28%	72.45	13.95	17.1%	58.50	71.7%	9.11	11.2%	95.74	26.94%
Braintree	36,727	36,573	21	140	8	6.10	2.27%	5.62	2.42	39.7%	3.20	52.5%	0.48	7.9%	9.82	2.76%
Brookline (5)	59,128	59,069	10	111	14	6.85	2.54%	6.10	1.90	27.7%	4.20	61.3%	0.75	10.9%	9.88	2.78%
Burlington	25,463	24,826	1	115	1	2.95	1.10%	2.83	0.83	28.1%	2.00	67.8%	0.13	4.4%	4.04	1.14%
Cambridge (5)	107,289	107,278	127	148	9	16.48	6.12%	14.37	2.87	17.4%	11.50	69.8%	2.11	12.8%	18.16	5.11%
Canton	22,221	15,088	65	62	6	2.55	0.95%	2.41	1.01	39.6%	1.40	54.9%	0.14	5.5%	3.47	0.98%
Chelsea (5)	37,670	37,670	47	41	8	4.24	1.57%	3.52	0.52	12.3%	3.00	70.8%	0.72	17.0%	4.85	1.36%
Dedham	25,299	23,098	30	95	8	2.91	1.08%	2.71	0.93	32.0%	1.78	61.2%	0.20	6.9%	4.48	1.26%
Everett	42,935	42,935	21	57	6	4.42	1.64%	4.06	0.86	19.5%	3.20	72.4%	0.36	8.1%	5.51	1.55%
Framingham	70,441	67,680	2	275	4	6.72	2.50%	6.48	1.68	25.0%	4.80	71.4%	0.24	3.6%	8.76	2.46%
Hingham	7,350	6,809	1	33	1	1.12	0.42%	1.02	0.52	46.4%	0.50	44.6%	0.10	8.9%	1.94	0.55%
Holbrook	10,952	9,671	2	31	2	0.81	0.30%	0.77	0.27	33.3%	0.50	61.7%	0.04	4.9%	1.12	0.32%
Lexington	32,650	32,030	17	170	6	3.87	1.44%	3.64	1.54	39.8%	2.10	54.3%	0.23	5.9%	6.00	1.69%
Malden	60,509	60,206	242	100	6	7.86	2.92%	7.35	2.45	31.2%	4.90	62.3%	0.51	6.5%	10.15	2.86%
Medford	57,170	57,113	74	113	6	6.13	2.28%	5.51	1.54	25.1%	3.97	64.8%	0.62	10.1%	8.67	2.44%
Melrose	27,690	27,662	188	74	5	3.59	1.33%	3.24	1.44	40.1%	1.80	50.1%	0.35	9.7%	5.18	1.46%
Milton	27,270	26,534	56	83	13	2.47	0.92%	2.23	0.98	39.7%	1.25	50.6%	0.24	9.7%	4.15	1.17%
Natick	35,214	31,351	30	135	4	2.69	1.00%	2.56	0.76	28.3%	1.80	66.9%	0.13	4.8%	3.62	1.02%
Needham	29,736	28,089	21	132	2	3.01	1.12%	2.80	1.00	33.2%	1.80	59.8%	0.21	7.0%	4.54	1.28%
Newton	87,971	87,003	52	271	7	13.66	5.07%	12.79	4.99	36.5%	7.80	57.1%	0.87	6.4%	21.25	5.98%
Norwood	28,951	28,795	31	108	6	4.81	1.79%	4.48	2.08	43.2%	2.40	49.9%	0.33	6.9%	7.16	2.01%
Quincy	93,494	93,494	56	202	6	11.78	4.37%	11.05	2.85	24.2%	8.20	69.6%	0.73	6.2%	15.56	4.38%
Randolph	33,456	33,423	2	101	2	2.75	1.02%	2.57	0.88	32.0%	1.69	61.5%	0.17	6.2%	4.16	1.17%
Reading	25,327	24,719	2	96	2	2.43	0.90%	2.28	0.98	40.3%	1.30	53.5%	0.15	6.2%	3.60	1.01%
Revere	53,756	53,702	3	98	2	5.78	2.15%	5.13	1.63	28.2%	3.50	60.6%	0.65	11.2%	7.47	2.10%
Somerville (5)	78,804	78,804	43	128	8	9.51	3.53%	7.48	1.98	20.8%	5.50	57.8%	2.03	21.3%	12.58	3.54%
Stoneham	21,734	21,401	27	63	7	2.26	0.84%	2.02	0.72	31.9%	1.30	57.5%	0.23	10.2%	3.39	0.95%
Stoughton	28,106	19,112	1	88	2	2.50	0.93%	2.38	0.98	39.2%	1.40	56.0%	0.12	4.8%	3.76	1.06%
Wakefield	26,080	26,007	11	93	2	3.53	1.31%	3.29	1.79	50.7%	1.50	42.5%	0.24	6.8%	5.40	1.52%
Walpole	24,818	17,993	1	59	2	1.69	0.63%	1.60	0.40	23.7%	1.20	71.0%	0.09	5.3%	2.24	0.63%
Waltham	62,227	61,318	5	138	4	7.64	2.84%	7.23	1.83	24.0%	5.40	70.7%	0.42	5.5%	10.40	2.93%
Watertown	32,996	32,996	14	75	3	2.94	1.09%	2.75	0.65	22.1%	2.10	71.4%	0.19	6.5%	4.09	1.15%
Wellesley	29,090	28,334	2	134	3	2.72	1.01%	2.56	0.86	31.6%	1.70	62.5%	0.17	6.3%	3.99	1.12%
Westwood	14,876	14,564	3	77	3	1.54	0.57%	1.46	0.56	36.4%	0.90	58.4%	0.08	5.2%	2.23	0.63%
Weymouth	55,419	53,646	19	238	4	6.86	2.55%	6.35	2.65	38.6%	3.70	53.9%	0.51	7.4%	9.94	2.80%
Wilmington	23,147	4,833	2	20	1	1.28	0.48%	1.23	0.43	33.6%	0.80	62.5%	0.05	3.9%	1.48	0.42%
Winchester	22,079	22,064	102	83	7	1.86	0.69%	1.73	0.64	34.4%	1.08	58.1%	0.13	7.0%	2.92	0.82%
Winthrop	18,111	18,111	22	36	4	1.86	0.69%	1.68	0.58	31.2%	1.10	59.1%	0.18	9.7%	2.21	0.62%
Woburn	39,083	38,262	18	141	13	5.94	2.21%	5.62	1.92	32.3%	3.70	62.3%	0.31	5.2%	7.61	2.14%
Totals/Averages	2,261,690	2,193,444	1,958	5,350		269.31	100.00%	244.29	70.01	26.0%	174.27	64.7%	25.00	9.3%	355.43	100.00%

FOOTNOTES:

- (1) Figures tabulated using data from the MWRA Wastewater Metering System for Calendar Year 2016.
- (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 2016 divided by 366 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

TABLE 3 - 2016 Final Community Wastewater Flow Component Estimates

Community	Sewered Population	Miles of Local Sewers	IDM of Local Sewers	Average Daily Flow ADF (MGD)	Average Annual Infiltration (MGD)	Average Annual Inflow (MGD)	Average Sanitary Flow (MGD)	ADF (GPD Per IDM)	VI (GPD Per IDM)	Infiltration (GPD Per IDM)	Inflow (GPD Per IDM)	Inflow (GPD Per Sewer Mile)	Average Sanitary (GPD Per Sew. Pop.)
Arlington	43,993	106	954	3.94	1.25	0.29	2.40	4,130	1,614	1,310	304	2,736	55
Ashland	13,549	66	594	1.18	0.33	0.04	0.80	1,987	623	556	67	606	59
Bedford	13,394	78	738	2.27	0.87	0.10	1.30	3,076	1,314	1,179	136	1,282	97
Belmont	24,927	78	708	2.25	0.69	0.25	1.30	3,178	1,328	975	353	3,205	52
BWSC	645,320	858	14,024	81.56	13.95	9.11	58.50	5,816	1,644	995	650	10,618	91
Braintree	36,573	140	1,300	6.10	2.42	0.48	3.20	4,692	2,231	1,862	369	3,429	87
Brookline	59,069	111	1,332	6.85	1.90	0.75	4.20	5,143	1,989	1,426	563	6,757	71
Burlington	24,826	115	1,150	2.95	0.83	0.13	2.00	2,565	835	722	113	1,130	81
Cambridge	107,278	148	2,368	16.48	2.87	2.11	11.50	6,959	2,103	1,212	891	14,257	107
Canton	15,088	62	567	2.55	1.01	0.14	1.40	4,497	2,028	1,781	247	2,258	93
Chelsea	37,670	41	618	4.24	0.52	0.72	3.00	6,861	2,006	841	1,165	17,561	80
Dedham	23,098	95	832	2.91	0.93	0.20	1.78	3,498	1,358	1,118	240	2,105	77
Everett	42,935	57	686	4.42	0.86	0.36	3.20	6,443	1,778	1,254	525	6,316	75
Frammingham	67,680	275	2,750	6.72	1.68	0.24	4.80	2,444	698	611	87	873	71
Hingham	6,809	33	297	1.12	0.52	0.10	0.50	3,771	2,088	1,751	337	3,030	73
Holbrook	9,671	31	312	0.81	0.27	0.04	0.50	2,596	994	865	128	1,290	52
Lexington	32,030	170	1,763	3.87	1.54	0.23	2.10	2,195	1,004	874	130	1,353	66
Malden	60,206	100	1,000	7.86	2.45	0.51	4.90	7,860	2,960	2,450	510	5,100	81
Medford	57,113	113	1,130	6.13	1.54	0.62	3.97	5,425	1,912	1,363	549	5,487	70
Melrose	27,662	74	641	3.59	1.44	0.35	1.80	5,601	2,793	2,246	546	4,759	65
Milton	26,534	83	747	2.47	0.98	0.24	1.25	3,307	1,633	1,312	321	2,892	47
Natick	31,351	135	1,180	2.69	0.76	0.13	1.80	2,280	754	644	110	963	57
Needham	28,089	132	1,232	3.01	1.00	0.21	1.80	2,443	982	812	170	1,591	64
Newton	87,003	271	2,710	13.66	4.99	0.87	7.80	5,041	2,162	1,841	321	3,210	90
Norwood	28,795	108	1,091	4.81	2.08	0.33	2.40	4,409	2,209	1,907	302	3,056	83
Quincy	93,494	202	2,020	11.78	2.85	0.73	8.20	5,832	1,772	1,411	361	3,614	88
Randolph	33,423	101	1,138	2.75	0.88	0.17	1.69	2,417	923	773	149	1,683	51
Reading	24,719	96	864	2.43	0.98	0.15	1.30	2,813	1,308	1,134	174	1,563	53
Revere	53,702	98	1,434	5.78	1.63	0.65	3.50	4,031	1,590	1,137	453	6,633	65
Somerville	78,804	128	1,920	9.51	1.98	2.03	5.50	4,953	2,089	1,031	1,057	15,859	70
Stoneham	21,401	63	567	2.26	0.72	0.23	1.30	3,986	1,675	1,270	406	3,651	61
Stoughton	19,112	88	888	2.50	0.98	0.12	1.40	2,815	1,239	1,104	135	1,364	73
Wakefield	26,007	93	888	3.53	1.79	0.24	1.50	3,975	2,286	2,016	270	2,581	58
Walpole	17,993	59	577	1.69	0.40	0.09	1.20	2,929	849	693	156	1,525	67
Waltham	61,318	138	1,380	7.64	1.83	0.42	5.40	5,536	1,630	1,326	304	3,043	88
Watertown	32,996	75	675	2.94	0.65	0.19	2.10	4,356	1,244	963	281	2,533	64
Wellesley	28,334	134	1,340	2.72	0.86	0.17	1.70	2,030	769	642	127	1,269	60
Westwood	14,564	77	693	1.54	0.56	0.08	0.90	2,222	924	808	115	1,039	62
Weymouth	53,646	238	2,380	6.86	2.65	0.51	3.70	2,882	1,328	1,113	214	2,143	69
Wilmington	4,833	20	280	1.28	0.43	0.05	0.80	4,571	1,714	1,536	179	2,500	166
Winchester	22,064	83	747	1.86	0.64	0.13	1.08	2,490	1,031	857	174	1,566	49
Winthrop	18,111	36	324	1.86	0.58	0.18	1.10	5,741	2,346	1,790	556	5,000	61
Woburn	38,262	141	1,410	5.94	1.92	0.31	3.70	4,213	1,582	1,362	220	2,199	97
Total	2,193,444	5,350	60,249	269.3	70.0	25.0	174.3						
Average	51,010	124	1,401	6.3	1.6	0.6	4.1	4,047	1,566	1,230	336	3,852	73

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average (MGD)
Ashland	Average Daily Flow	1.26	1.34	1.29	1.31	1.13	1.07	0.97	0.99	1.03	1.21	1.20	1.31	1.18
	Dry Day Average Daily Flow	1.21	1.24	1.26	1.21	1.10	1.04	0.96	0.97	0.98	1.18	1.18	1.26	1.13
	Estimated Infiltration	0.41	0.44	0.46	0.41	0.30	0.24	0.16	0.17	0.18	0.38	0.38	0.46	0.33
	Estimated Sanitary Flow	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Estimated Inflow	0.05	0.10	0.03	0.10	0.03	0.03	0.01	0.02	0.05	0.03	0.02	0.05	0.04
Boston (South Only)	Raw Average Daily Flow	20.16	24.75	23.37	21.41	17.85	14.49	13.86	13.70	13.26	15.27	14.53	15.50	17.32
	Raw Dry Day Average Daily Flow	17.49	20.53	21.30	15.44	16.75	14.12	13.61	13.44	12.99	13.23	13.75	14.21	15.56
	Raw Estimated Infiltration	9.19	12.23	13.00	7.14	8.45	5.82	5.31	5.14	4.69	4.93	5.45	5.91	7.26
	MWRA Estimated Infiltration	3.58	4.76	5.06	2.78	3.29	2.27	2.07	2.00	1.83	1.92	2.12	2.30	2.83
	Final Average Daily Flow	16.58	19.99	18.31	18.63	14.56	12.22	11.79	11.70	11.43	13.35	12.41	13.20	14.49
	Final Dry Day Average Daily Flow	13.91	15.77	16.24	12.66	13.46	11.85	11.54	11.44	11.16	11.31	11.63	11.91	12.73
	Final Estimated Infiltration	5.61	7.47	7.94	4.36	5.16	3.55	3.24	3.14	2.86	3.01	3.33	3.61	4.43
	Estimated Sanitary Flow	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30
	Estimated Inflow	2.67	4.22	2.07	5.97	1.10	0.37	0.25	0.26	0.27	2.04	0.78	1.29	1.76
Braintree	Raw Average Daily Flow	9.17	10.68	9.28	9.65	7.03	5.49	4.55	4.31	3.69	4.35	4.68	5.50	6.52
	Raw Dry Day Average Daily Flow	8.30	9.02	8.43	8.89	6.66	5.29	4.42	4.12	3.67	3.92	4.60	5.30	6.04
	Raw Estimated Infiltration	5.10	5.82	5.23	5.69	3.46	2.09	1.22	0.92	0.47	0.72	1.40	2.10	2.84
	MWRA Estimated Infiltration	0.75	0.86	0.77	0.84	0.51	0.31	0.18	0.14	0.07	0.11	0.21	0.31	0.42
	Final Average Daily Flow	8.42	9.82	8.51	8.81	6.52	5.18	4.37	4.17	3.62	4.24	4.47	5.19	6.10
	Final Dry Day Average Daily Flow	7.55	8.16	7.66	8.05	6.15	4.98	4.24	3.98	3.60	3.81	4.39	4.99	5.62
	Final Estimated Infiltration	4.35	4.96	4.46	4.85	2.95	1.78	1.04	0.78	0.40	0.61	1.19	1.79	2.42
	Estimated Sanitary Flow	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
	Estimated Inflow	0.87	1.66	0.85	0.76	0.37	0.20	0.13	0.19	0.02	0.43	0.08	0.20	0.48
Brookline (South Only)	Raw Average Daily Flow	5.74	6.47	6.33	6.91	4.10	3.45	2.43	2.23	2.22	3.40	3.52	4.19	4.24
	Raw Dry Day Average Daily Flow	4.52	5.23	5.34	5.86	3.71	3.20	2.38	2.16	2.15	2.62	3.22	3.60	3.66
	Raw Estimated Infiltration	2.42	3.13	3.24	3.76	1.61	1.10	0.28	0.06	0.05	0.52	1.12	1.50	1.56
	MWRA Estimated Infiltration	0.02	0.02	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	Final Average Daily Flow	5.72	6.45	6.31	6.88	4.09	3.44	2.43	2.23	2.22	3.40	3.51	4.18	4.23
	Final Dry Day Average Daily Flow	4.50	5.21	5.32	5.83	3.70	3.19	2.38	2.16	2.15	2.62	3.21	3.59	3.65
	Final Estimated Infiltration	2.40	3.11	3.22	3.73	1.60	1.09	0.28	0.06	0.05	0.52	1.11	1.49	1.55
	Estimated Sanitary Flow	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
	Estimated Inflow	1.22	1.24	0.99	1.05	0.39	0.25	0.05	0.07	0.07	0.78	0.30	0.59	0.58
Canton	Raw Average Daily Flow	3.22	3.71	3.37	3.52	2.66	2.31	2.06	2.15	2.10	2.37	2.44	2.64	2.71
	Raw Dry Day Average Daily Flow	2.97	3.18	3.17	3.31	2.55	2.28	2.01	2.06	2.06	2.23	2.40	2.58	2.56
	Raw Estimated Infiltration	1.57	1.78	1.77	1.91	1.15	0.88	0.61	0.66	0.66	0.83	1.00	1.18	1.16
	MWRA Estimated Infiltration	0.21	0.24	0.24	0.25	0.15	0.12	0.08	0.09	0.09	0.11	0.13	0.16	0.16
	Final Average Daily Flow	3.01	3.47	3.13	3.27	2.51	2.19	1.98	2.06	2.01	2.26	2.31	2.48	2.55
	Final Dry Day Average Daily Flow	2.76	2.94	2.93	3.06	2.40	2.16	1.93	1.97	1.97	2.12	2.27	2.42	2.41
	Final Estimated Infiltration	1.36	1.54	1.53	1.66	1.00	0.76	0.53	0.57	0.57	0.72	0.87	1.02	1.01
	Estimated Sanitary Flow	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
	Estimated Inflow	0.25	0.53	0.20	0.21	0.11	0.03	0.05	0.09	0.04	0.14	0.04	0.06	0.14
Dedham	Average Daily Flow	3.63	4.45	4.22	4.48	3.19	2.56	2.02	1.76	1.73	2.07	2.29	2.58	2.91
	Dry Day Average Daily Flow	3.26	3.88	3.94	4.11	3.03	2.44	1.94	1.72	1.71	1.88	2.23	2.46	2.71
	Estimated Infiltration	1.46	2.08	2.14	2.31	1.23	0.64	0.14	0.02	0.01	0.08	0.43	0.66	0.93
	Estimated Sanitary Flow	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.70	1.70	1.80	1.80	1.80	1.78
	Estimated Inflow	0.37	0.57	0.28	0.37	0.16	0.12	0.08	0.04	0.02	0.19	0.06	0.12	0.20

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average (MGD)
Framingham	Average Daily Flow	8.39	8.76	8.76	8.69	6.99	5.88	5.25	5.32	5.20	5.76	5.71	6.04	6.72
	Dry Day Average Daily Flow	7.94	8.23	8.50	8.42	6.71	5.66	5.23	5.24	5.06	5.41	5.62	5.84	6.48
	Estimated Infiltration	3.14	3.43	3.70	3.62	1.91	0.86	0.43	0.44	0.26	0.61	0.82	1.04	1.68
	Estimated Sanitary Flow	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80
	Estimated Inflow	0.45	0.53	0.26	0.27	0.28	0.22	0.02	0.08	0.14	0.35	0.09	0.20	0.24
Hingham	Average Daily Flow	1.65	1.94	1.63	1.64	1.14	0.90	0.72	0.66	0.65	0.78	0.81	0.95	1.12
	Dry Day Average Daily Flow	1.40	1.62	1.46	1.45	1.07	0.86	0.69	0.66	0.64	0.69	0.78	0.91	1.02
	Estimated Infiltration	0.90	1.12	0.96	0.95	0.57	0.36	0.19	0.16	0.14	0.19	0.28	0.41	0.52
	Estimated Sanitary Flow	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Estimated Inflow	0.25	0.32	0.17	0.19	0.07	0.04	0.03	0.00	0.01	0.09	0.03	0.04	0.10
Holbrook	Average Daily Flow	0.97	1.12	1.00	1.03	0.83	0.71	0.65	0.64	0.65	0.69	0.71	0.76	0.81
	Dry Day Average Daily Flow	0.90	0.96	0.92	0.95	0.78	0.69	0.65	0.64	0.64	0.66	0.70	0.74	0.77
	Estimated Infiltration	0.40	0.46	0.42	0.45	0.28	0.19	0.15	0.14	0.14	0.16	0.20	0.24	0.27
	Estimated Sanitary Flow	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Estimated Inflow	0.07	0.16	0.08	0.08	0.05	0.02	0.00	0.00	0.01	0.03	0.01	0.02	0.04
Milton (South Only)	Average Daily Flow	3.09	3.90	3.58	3.73	2.27	1.74	1.31	1.17	1.18	1.57	1.72	2.12	2.27
	Dry Day Average Daily Flow	2.65	3.19	3.14	3.12	2.12	1.68	1.29	1.14	1.14	1.51	1.62	2.01	2.05
	Estimated Infiltration	1.55	2.09	2.04	2.02	1.02	0.58	0.19	0.04	0.04	0.41	0.52	0.91	0.95
	Estimated Sanitary Flow	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
	Estimated Inflow	0.44	0.71	0.44	0.61	0.15	0.06	0.02	0.03	0.04	0.06	0.10	0.11	0.23
Natick	Average Daily Flow	3.29	3.60	3.49	3.62	2.76	2.38	2.17	2.06	2.00	2.14	2.25	2.51	2.69
	Dry Day Average Daily Flow	3.06	3.25	3.36	3.36	2.63	2.31	2.09	2.04	1.94	2.02	2.21	2.43	2.56
	Estimated Infiltration	1.26	1.45	1.56	1.56	0.83	0.51	0.29	0.24	0.14	0.22	0.41	0.63	0.76
	Estimated Sanitary Flow	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
	Estimated Inflow	0.23	0.35	0.13	0.26	0.13	0.07	0.08	0.02	0.06	0.12	0.04	0.08	0.13
Needham	Average Daily Flow	3.89	4.19	4.14	4.54	3.09	2.47	1.92	1.92	2.02	2.36	2.59	3.02	3.01
	Dry Day Average Daily Flow	3.47	3.73	3.86	4.15	2.91	2.34	1.85	1.83	1.94	2.16	2.53	2.88	2.80
	Estimated Infiltration	1.67	1.93	2.06	2.35	1.11	0.54	0.05	0.03	0.14	0.36	0.73	1.08	1.00
	Estimated Sanitary Flow	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
	Estimated Inflow	0.42	0.46	0.28	0.39	0.18	0.13	0.07	0.09	0.08	0.20	0.06	0.14	0.21
Newton (South Only)	Raw Average Daily Flow	10.52	10.89	10.97	12.54	8.57	6.06	4.68	4.50	4.67	6.21	6.48	7.51	7.79
	Raw Dry Day Average Daily Flow	9.19	10.01	9.76	11.84	8.20	5.71	4.58	4.36	4.52	5.40	5.98	7.16	7.21
	Raw Estimated Infiltration	5.19	6.01	5.76	7.84	4.20	1.71	0.58	0.36	0.52	1.40	1.98	3.16	3.21
	MWRA Estimated Infiltration	0.01	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	Final Average Daily Flow	10.51	10.87	10.95	12.52	8.56	6.06	4.68	4.50	4.67	6.21	6.47	7.50	7.78
	Final Dry Day Average Daily Flow	9.18	9.99	9.74	11.82	8.19	5.71	4.58	4.36	4.52	5.40	5.97	7.15	7.20
	Final Estimated Infiltration	5.18	5.99	5.74	7.82	4.19	1.71	0.58	0.36	0.52	1.40	1.97	3.15	3.20
	Estimated Sanitary Flow	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
	Estimated Inflow	1.33	0.88	1.21	0.70	0.37	0.35	0.10	0.14	0.15	0.81	0.50	0.35	0.57

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average (MGD)	
Norwood	Raw Average Daily Flow	5.85	7.58	6.06	7.38	5.27	4.19	3.79	3.69	3.54	3.95	4.55	4.93	5.05	
	Raw Dry Day Average Daily Flow	5.28	6.50	5.77	6.49	5.04	3.94	3.59	3.60	3.44	3.89	4.48	4.74	4.72	
	Raw Estimated Infiltration	2.88	4.10	3.37	4.09	2.64	1.54	1.19	1.20	1.04	1.49	2.08	2.34	2.32	
	MWRA Estimated Infiltration	0.30	0.42	0.35	0.42	0.27	0.16	0.12	0.12	0.11	0.15	0.22	0.24	0.24	
	Final Average Daily Flow	5.55	7.16	5.71	6.96	5.00	4.03	3.67	3.57	3.43	3.80	4.33	4.69	4.81	
	Final Dry Day Average Daily Flow	4.98	6.08	5.42	6.07	4.77	3.78	3.47	3.48	3.33	3.74	4.26	4.50	4.48	
	Final Estimated Infiltration	2.58	3.68	3.02	3.67	2.37	1.38	1.07	1.08	0.93	1.34	1.86	2.10	2.08	
	Estimated Sanitary Flow	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
	Estimated Inflow	0.57	1.08	0.29	0.89	0.23	0.25	0.20	0.09	0.10	0.06	0.07	0.19	0.33	
Quincy	Average Daily Flow	13.50	15.56	14.66	15.38	12.33	11.17	9.68	9.11	8.80	10.39	10.14	10.83	11.78	
	Dry Day Average Daily Flow	12.11	13.62	13.49	14.22	11.74	10.91	9.42	8.97	8.74	9.39	9.83	10.29	11.05	
	Estimated Infiltration	3.91	5.42	5.29	6.02	3.54	2.71	1.22	0.77	0.54	1.19	1.63	2.09	2.85	
	Estimated Sanitary Flow	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	
	Estimated Inflow	1.39	1.94	1.17	1.16	0.59	0.26	0.26	0.14	0.06	1.00	0.31	0.54	0.73	
Randolph	Average Daily Flow	3.26	4.16	3.79	4.00	2.75	2.12	1.75	1.64	2.07	2.34	2.40	2.77	2.75	
	Dry Day Average Daily Flow	2.93	3.52	3.49	3.73	2.60	2.03	1.71	1.62	2.05	2.19	2.36	2.72	2.57	
	Estimated Infiltration	1.23	1.82	1.79	2.03	0.90	0.33	0.01	0.02	0.35	0.49	0.66	1.02	0.88	
	Estimated Sanitary Flow	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.60	1.70	1.70	1.70	1.70	1.69	
	Estimated Inflow	0.33	0.64	0.30	0.27	0.15	0.09	0.04	0.02	0.02	0.15	0.04	0.05	0.17	
Stoughton	Average Daily Flow	2.99	3.69	3.48	3.76	2.81	2.25	1.80	1.63	1.60	1.84	1.96	2.28	2.50	
	Dry Day Average Daily Flow	2.80	3.29	3.27	3.56	2.71	2.18	1.76	1.57	1.58	1.75	1.90	2.22	2.38	
	Estimated Infiltration	1.40	1.89	1.87	2.16	1.31	0.78	0.36	0.17	0.18	0.35	0.50	0.82	0.98	
	Estimated Sanitary Flow	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	
	Estimated Inflow	0.19	0.40	0.21	0.20	0.10	0.07	0.04	0.06	0.02	0.09	0.06	0.06	0.12	
Walpole	Average Daily Flow	1.95	2.21	2.15	2.24	1.72	1.52	1.31	1.28	1.33	1.41	1.47	1.74	1.69	
	Dry Day Average Daily Flow	1.78	2.07	2.02	2.13	1.64	1.47	1.24	1.25	1.26	1.30	1.43	1.68	1.60	
	Estimated Infiltration	0.58	0.87	0.82	0.93	0.44	0.27	0.04	0.05	0.06	0.10	0.23	0.48	0.40	
	Estimated Sanitary Flow	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	
	Estimated Inflow	0.17	0.14	0.13	0.11	0.08	0.05	0.07	0.03	0.07	0.11	0.04	0.06	0.09	
Wellesley	Average Daily Flow	3.46	3.71	3.69	3.99	2.83	2.30	1.85	1.75	1.84	2.24	2.36	2.70	2.72	
	Dry Day Average Daily Flow	3.09	3.30	3.54	3.67	2.69	2.21	1.79	1.71	1.77	2.05	2.33	2.57	2.56	
	Estimated Infiltration	1.39	1.60	1.84	1.97	0.99	0.51	0.09	0.01	0.07	0.35	0.63	0.87	0.86	
	Estimated Sanitary Flow	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	
	Estimated Inflow	0.37	0.41	0.15	0.32	0.14	0.09	0.06	0.04	0.07	0.19	0.03	0.13	0.17	
Westwood	Average Daily Flow	1.78	1.99	1.93	2.23	1.60	1.39	1.18	1.18	1.18	1.25	1.34	1.50	1.54	
	Dry Day Average Daily Flow	1.61	1.79	1.85	2.08	1.53	1.33	1.14	1.15	1.15	1.16	1.31	1.47	1.46	
	Estimated Infiltration	0.71	0.89	0.95	1.18	0.63	0.43	0.24	0.25	0.25	0.26	0.41	0.57	0.56	
	Estimated Sanitary Flow	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
	Estimated Inflow	0.17	0.20	0.08	0.15	0.07	0.06	0.04	0.03	0.03	0.09	0.03	0.03	0.08	

Table 4 - Estimated Community Wastewater Flow Components for 2016

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PAGE 4

Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average (MGD)
Weymouth	Average Daily Flow	8.97	9.94	8.57	9.65	7.56	5.94	4.92	4.66	4.49	5.42	5.66	6.65	6.86
	Dry Day Average Daily Flow	7.97	8.07	7.62	8.85	7.17	5.73	4.88	4.66	4.42	4.97	5.50	6.46	6.35
	Estimated Infiltration	4.27	4.37	3.92	5.15	3.47	2.03	1.18	0.96	0.72	1.27	1.80	2.76	2.65
	Estimated Sanitary Flow	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70
	Estimated Inflow	1.00	1.87	0.95	0.80	0.39	0.21	0.04	0.00	0.07	0.45	0.16	0.19	0.51
Subtotal (Southern System)	Raw Average Daily Flow	116.74	134.64	125.76	131.70	98.48	80.39	68.87	66.35	65.25	77.02	78.81	88.03	94.17
	Raw Dry Day Average Daily Flow	103.93	116.23	115.49	116.84	93.34	77.42	67.23	64.91	63.85	69.61	75.96	83.53	87.25
	Raw Estimated Infiltration	50.63	62.93	62.19	63.54	40.04	24.12	13.93	11.81	10.65	16.31	22.66	30.23	33.97
	MWRA Estimated Infiltration	4.87	6.32	6.46	4.34	4.24	2.87	2.45	2.35	2.10	2.29	2.70	3.03	3.66
	Final Average Daily Flow	111.87	128.32	119.30	127.36	94.24	77.52	66.42	64.00	63.15	74.73	76.11	85.00	90.51
	Final Dry Day Average Daily Flow	99.06	109.91	109.03	112.50	89.10	74.55	64.78	62.56	61.75	67.32	73.26	80.50	83.58
	Final Estimated Infiltration	45.76	56.61	55.73	59.20	35.80	21.25	11.48	9.46	8.55	14.02	19.96	27.20	30.31
	Estimated Sanitary Flow	53.30	53.30	53.30	53.30	53.30	53.30	53.30	53.10	53.20	53.30	53.30	53.30	53.27
Estimated Inflow	12.81	18.41	10.27	14.86	5.14	2.97	1.64	1.44	1.40	7.41	2.85	4.50	6.93	
South System Pump Station as Reported by NPDES	Average Daily Flow	117.70	134.70	127.20	135.50	96.50	80.00	66.60	63.00	62.30	76.70	80.10	90.50	94.06

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Annual
Average
(MGD)

Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average (MGD)
Arlington	Raw Average Daily Flow	5.48	5.38	5.73	5.85	3.92	3.14	2.61	2.45	2.48	3.25	3.36	4.31	3.99
	Raw Dry Day Average Daily Flow	4.79	4.79	5.28	5.34	3.68	3.04	2.54	2.42	2.44	2.95	3.19	3.99	3.70
	Raw Estimated Infiltration	2.39	2.39	2.88	2.94	1.28	0.64	0.14	0.02	0.04	0.55	0.79	1.59	1.30
	MWRA Estimated Infiltration	0.10	0.10	0.12	0.12	0.05	0.03	0.01	0.00	0.00	0.02	0.03	0.07	0.05
	Final Average Daily Flow	5.38	5.28	5.61	5.73	3.87	3.11	2.60	2.45	2.48	3.23	3.33	4.24	3.94
	Final Dry Day Average Daily Flow	4.69	4.69	5.16	5.22	3.63	3.01	2.53	2.42	2.44	2.93	3.16	3.92	3.65
	Final Estimated Infiltration	2.29	2.29	2.76	2.82	1.23	0.61	0.13	0.02	0.04	0.53	0.76	1.52	1.25
	Estimated Sanitary Flow	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40	2.40
Estimated Inflow	0.69	0.59	0.45	0.51	0.24	0.10	0.07	0.03	0.04	0.30	0.17	0.32	0.29	
Bedford	Average Daily Flow	2.62	2.85	3.26	3.19	2.45	1.97	1.70	1.72	1.67	1.84	1.89	2.15	2.27
	Dry Day Average Daily Flow	2.47	2.64	3.03	3.06	2.40	1.92	1.67	1.68	1.57	1.78	1.82	2.05	2.17
	Estimated Infiltration	1.17	1.34	1.73	1.76	1.10	0.62	0.37	0.38	0.27	0.48	0.52	0.75	0.87
	Estimated Sanitary Flow	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
	Estimated Inflow	0.15	0.21	0.23	0.13	0.05	0.05	0.03	0.04	0.10	0.06	0.07	0.10	0.10
Belmont	Average Daily Flow	3.03	3.04	3.18	3.58	2.20	1.81	1.44	1.41	1.40	1.79	1.83	2.28	2.25
	Dry Day Average Daily Flow	2.42	2.48	2.84	3.03	2.01	1.75	1.41	1.38	1.30	1.53	1.73	2.05	1.99
	Estimated Infiltration	1.12	1.18	1.54	1.73	0.71	0.45	0.11	0.08	0.00	0.23	0.43	0.75	0.69
	Estimated Sanitary Flow	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
	Estimated Inflow	0.61	0.56	0.34	0.55	0.19	0.06	0.03	0.03	0.10	0.26	0.10	0.23	0.25
Boston (North Only)														
Boston Charlestown	Raw Average Daily Flow	3.09	3.24	3.49	2.90	2.78	2.67	2.60	2.85	2.69	3.64	3.14	3.42	3.04
	Raw Dry Day Average Daily Flow	2.28	2.43	2.43	2.18	2.13	2.23	2.59	2.66	2.50	2.63	2.69	2.57	2.44
	Raw Estimated Infiltration	0.58	0.73	0.73	0.48	0.43	0.53	0.89	0.96	0.80	0.93	0.99	0.87	0.74
	MWRA Estimated Infiltration	0.08	0.10	0.10	0.06	0.06	0.07	0.12	0.13	0.11	0.12	0.13	0.12	0.10
	Final Average Daily Flow	3.01	3.14	3.39	2.84	2.72	2.60	2.48	2.72	2.58	3.52	3.01	3.30	2.94
	Final Dry Day Average Daily Flow	2.20	2.33	2.33	2.12	2.07	2.16	2.47	2.53	2.39	2.51	2.56	2.45	2.34
	Final Estimated Infiltration	0.50	0.63	0.63	0.42	0.37	0.46	0.77	0.83	0.69	0.81	0.86	0.75	0.64
	Estimated Sanitary Flow	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Estimated Inflow	0.81	0.81	1.06	0.72	0.65	0.44	0.01	0.19	0.19	1.01	0.45	0.85	0.60	
Boston Columbus Park	Raw Average Daily Flow	31.22	34.57	32.37	33.93	29.06	27.79	24.36	25.29	24.87	32.61	27.93	28.57	29.36
	Raw Dry Day Average Daily Flow	26.88	28.42	26.63	28.87	25.81	25.26	23.93	22.39	23.31	24.44	25.26	26.07	25.59
	Raw Estimated Infiltration	6.38	7.92	6.13	8.37	5.31	4.76	3.43	1.89	2.81	3.94	4.76	5.57	5.09
	MWRA Estimated Infiltration	0.18	0.22	0.17	0.23	0.15	0.13	0.10	0.05	0.08	0.11	0.13	0.16	0.14
	Final Average Daily Flow	31.04	34.35	32.20	33.70	28.91	27.66	24.26	25.24	24.79	32.50	27.80	28.41	29.22
	Final Dry Day Average Daily Flow	26.70	28.20	26.46	28.64	25.66	25.13	23.83	22.34	23.23	24.33	25.13	25.91	25.45
	Final Estimated Infiltration	6.20	7.70	5.96	8.14	5.16	4.63	3.33	1.84	2.73	3.83	4.63	5.41	4.95
	Estimated Sanitary Flow	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50
Estimated Inflow	4.34	6.15	5.74	5.06	3.25	2.53	0.43	2.90	1.56	8.17	2.67	2.50	3.77	
Boston East Boston	Raw Average Daily Flow	5.17	6.15	5.73	6.09	4.15	5.14	4.85	4.66	4.18	5.77	5.13	5.74	5.23
	Raw Dry Day Average Daily Flow	4.17	4.86	4.90	4.96	3.68	5.07	4.68	4.49	4.01	4.53	4.81	4.85	4.58
	Raw Estimated Infiltration	0.67	1.36	1.40	1.46	0.18	1.57	1.18	0.99	0.51	1.03	1.31	1.35	1.08
	MWRA Estimated Infiltration	0.10	0.21	0.21	0.22	0.03	0.24	0.18	0.15	0.08	0.16	0.20	0.20	0.16
	Final Average Daily Flow	5.07	5.94	5.52	5.87	4.12	4.90	4.67	4.51	4.10	5.61	4.93	5.54	5.06
	Final Dry Day Average Daily Flow	4.07	4.65	4.69	4.74	3.65	4.83	4.50	4.34	3.93	4.37	4.61	4.65	4.42
	Final Estimated Infiltration	0.57	1.15	1.19	1.24	0.15	1.33	1.00	0.84	0.43	0.87	1.11	1.15	0.92
	Estimated Sanitary Flow	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
Estimated Inflow	1.00	1.29	0.83	1.13	0.47	0.07	0.17	0.17	0.17	1.24	0.32	0.89	0.64	

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average (MGD)
Boston Ward Street	Raw Average Daily Flow	29.44	33.12	31.61	34.50	29.89	28.71	28.36	27.67	29.85	32.34	30.54	29.70	30.46
	Raw Dry Day Average Daily Flow	25.91	29.20	28.85	31.75	27.43	27.58	27.28	25.98	28.02	28.55	29.79	27.41	28.13
	Raw Estimated Infiltration	1.41	4.70	4.35	7.25	2.93	3.08	2.78	1.48	3.52	4.05	5.29	2.91	3.63
	MWRA Estimated Infiltration	0.24	0.80	0.74	1.24	0.50	0.53	0.48	0.25	0.60	0.69	0.90	0.50	0.62
	Final Average Daily Flow	29.20	32.32	30.87	33.26	29.39	28.18	27.88	27.42	29.25	31.65	29.64	29.20	29.84
	Final Dry Day Average Daily Flow	25.67	28.40	28.11	30.51	26.93	27.05	26.80	25.73	27.42	27.86	28.89	26.91	27.51
	Final Estimated Infiltration	1.17	3.90	3.61	6.01	2.43	2.55	2.30	1.23	2.92	3.36	4.39	2.41	3.01
	Estimated Sanitary Flow	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50
Estimated Inflow	3.53	3.92	2.76	2.75	2.46	1.13	1.08	1.69	1.83	3.79	0.75	2.29	2.33	
Boston (North Total)	Raw Average Daily Flow	68.92	77.08	73.20	77.42	65.88	64.31	60.17	60.47	61.59	74.36	66.74	67.43	68.09
	Raw Dry Day Average Daily Flow	59.24	64.91	62.81	67.76	59.05	60.14	58.48	55.52	57.84	60.15	62.55	60.90	60.74
	Raw Estimated Infiltration	9.04	14.71	12.61	17.56	8.85	9.94	8.28	5.32	7.64	9.95	12.35	10.70	10.54
	MWRA Estimated Infiltration	0.60	1.33	1.22	1.75	0.74	0.97	0.88	0.58	0.87	1.08	1.36	0.98	1.03
	Final Average Daily Flow	68.32	75.75	71.98	75.67	65.14	63.34	59.29	59.89	60.72	73.28	65.38	66.45	67.06
	Final Dry Day Average Daily Flow	58.64	63.58	61.59	66.01	58.31	59.17	57.60	54.94	56.97	59.07	61.19	59.92	59.72
	Final Estimated Infiltration	8.44	13.38	11.39	15.81	8.11	8.97	7.40	4.74	6.77	8.87	10.99	9.72	9.52
	Estimated Sanitary Flow	50.20	50.20	50.20	50.20	50.20	50.20	50.20	50.20	50.20	50.20	50.20	50.20	50.20
Estimated Inflow	9.68	12.17	10.39	9.66	6.83	4.17	1.69	4.95	3.75	14.21	4.19	6.53	7.35	
Brookline (North Only)	Average Daily Flow	2.88	3.12	2.95	3.00	2.67	2.54	2.26	2.31	2.31	2.64	2.36	2.42	2.62
	Dry Day Average Daily Flow	2.76	2.87	2.76	2.65	2.58	2.40	2.22	2.26	2.17	2.27	2.28	2.24	2.45
	Estimated Infiltration	0.66	0.77	0.66	0.55	0.48	0.30	0.12	0.16	0.07	0.17	0.18	0.14	0.35
	Estimated Sanitary Flow	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
	Estimated Inflow	0.12	0.25	0.19	0.35	0.09	0.14	0.04	0.05	0.14	0.37	0.08	0.18	0.17
Burlington	Average Daily Flow	3.49	3.57	4.03	4.04	3.19	2.61	2.22	2.19	2.13	2.39	2.58	3.03	2.95
	Dry Day Average Daily Flow	3.27	3.34	3.75	3.87	3.05	2.51	2.20	2.12	2.05	2.30	2.53	2.94	2.83
	Estimated Infiltration	1.27	1.34	1.75	1.87	1.05	0.51	0.20	0.12	0.05	0.30	0.53	0.94	0.83
	Estimated Sanitary Flow	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	Estimated Inflow	0.22	0.23	0.28	0.17	0.14	0.10	0.02	0.07	0.08	0.09	0.05	0.09	0.13
Cambridge	Raw Average Daily Flow	17.57	17.89	18.40	18.55	16.83	15.89	14.98	15.87	15.88	18.66	16.09	16.74	16.94
	Raw Dry Day Average Daily Flow	15.17	14.79	15.57	16.09	15.11	14.73	14.60	14.65	14.56	15.04	14.04	13.68	14.84
	Raw Estimated Infiltration	3.67	3.29	4.07	4.59	3.61	3.23	3.10	3.15	3.06	3.54	2.54	2.18	3.34
	MWRA Estimated Infiltration	0.52	0.46	0.57	0.64	0.51	0.45	0.44	0.44	0.43	0.50	0.36	0.31	0.47
	Final Average Daily Flow	17.05	17.43	17.83	17.91	16.32	15.44	14.54	15.43	15.45	18.16	15.73	16.43	16.48
	Final Dry Day Average Daily Flow	14.65	14.33	15.00	15.45	14.60	14.28	14.16	14.21	14.13	14.54	13.68	13.37	14.37
	Final Estimated Infiltration	3.15	2.83	3.50	3.95	3.10	2.78	2.66	2.71	2.63	3.04	2.18	1.87	2.87
	Estimated Sanitary Flow	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50
Estimated Inflow	2.40	3.10	2.83	2.46	1.72	1.16	0.38	1.22	1.32	3.62	2.05	3.06	2.11	
Chelsea	Raw Average Daily Flow	4.78	4.94	4.85	4.94	4.37	3.96	3.66	3.55	3.51	4.64	3.92	4.58	4.31
	Raw Dry Day Average Daily Flow	3.93	3.72	3.94	3.93	3.65	3.62	3.43	3.27	3.14	3.40	3.29	3.75	3.59
	Raw Estimated Infiltration	0.93	0.72	0.94	0.93	0.65	0.62	0.43	0.27	0.14	0.40	0.29	0.75	0.59
	MWRA Estimated Infiltration	0.11	0.09	0.11	0.11	0.08	0.08	0.05	0.03	0.02	0.05	0.04	0.09	0.07
	Final Average Daily Flow	4.67	4.85	4.74	4.83	4.29	3.88	3.61	3.52	3.49	4.59	3.88	4.49	4.24
	Final Dry Day Average Daily Flow	3.82	3.63	3.83	3.82	3.57	3.54	3.38	3.24	3.12	3.35	3.25	3.66	3.52
	Final Estimated Infiltration	0.82	0.63	0.83	0.82	0.57	0.54	0.38	0.24	0.12	0.35	0.25	0.66	0.52
	Estimated Sanitary Flow	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	Estimated Inflow	0.85	1.22	0.91	1.01	0.72	0.34	0.23	0.28	0.37	1.24	0.63	0.83	0.72

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average (MGD)	
Everett	Raw Average Daily Flow	5.25	5.52	5.47	5.31	4.29	3.74	3.39	3.32	3.30	4.14	4.48	4.98	4.43	
	Raw Dry Day Average Daily Flow	4.60	5.02	4.95	4.78	3.96	3.56	3.30	3.23	3.21	3.47	4.25	4.50	4.07	
	Raw Estimated Infiltration	1.40	1.82	1.75	1.58	0.76	0.36	0.10	0.03	0.01	0.27	1.05	1.30	0.87	
	MWRA Estimated Infiltration	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	
	Final Average Daily Flow	5.24	5.51	5.46	5.30	4.29	3.74	3.39	3.32	3.30	4.14	4.47	4.97	4.42	
	Final Dry Day Average Daily Flow	4.59	5.01	4.94	4.77	3.96	3.56	3.30	3.23	3.21	3.47	4.24	4.49	4.06	
	Final Estimated Infiltration	1.39	1.81	1.74	1.57	0.76	0.36	0.10	0.03	0.01	0.27	1.04	1.29	0.86	
	Estimated Sanitary Flow	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
	Estimated Inflow	0.65	0.50	0.52	0.53	0.33	0.18	0.09	0.09	0.09	0.09	0.67	0.23	0.48	0.36
Lexington	Raw Average Daily Flow	5.29	5.49	6.35	6.38	4.64	3.64	2.61	2.23	2.16	2.59	3.09	3.98	4.03	
	Raw Dry Day Average Daily Flow	4.85	5.05	6.00	6.09	4.38	3.38	2.54	2.18	2.14	2.35	2.99	3.75	3.80	
	Raw Estimated Infiltration	2.75	2.95	3.90	3.99	2.28	1.28	0.44	0.08	0.04	0.25	0.89	1.65	1.70	
	MWRA Estimated Infiltration	0.26	0.28	0.37	0.38	0.22	0.12	0.04	0.01	0.00	0.02	0.08	0.16	0.16	
	Final Average Daily Flow	5.03	5.21	5.98	6.00	4.42	3.52	2.57	2.22	2.16	2.57	3.01	3.82	3.87	
	Final Dry Day Average Daily Flow	4.59	4.77	5.63	5.71	4.16	3.26	2.50	2.17	2.14	2.33	2.91	3.59	3.64	
	Final Estimated Infiltration	2.49	2.67	3.53	3.61	2.06	1.16	0.40	0.07	0.04	0.23	0.81	1.49	1.54	
	Estimated Sanitary Flow	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	
	Estimated Inflow	0.44	0.44	0.35	0.29	0.26	0.26	0.07	0.05	0.02	0.24	0.10	0.23	0.23	
Malden	Raw Average Daily Flow	10.16	10.29	10.41	10.62	8.50	7.18	6.10	5.81	5.72	6.97	7.22	8.49	8.12	
	Raw Dry Day Average Daily Flow	9.03	9.21	9.50	9.88	8.40	7.01	6.00	5.68	5.53	6.18	7.00	7.87	7.60	
	Raw Estimated Infiltration	4.13	4.31	4.60	4.98	3.50	2.11	1.10	0.78	0.63	1.28	2.10	2.97	2.70	
	MWRA Estimated Infiltration	0.39	0.41	0.43	0.47	0.33	0.20	0.10	0.07	0.06	0.12	0.20	0.28	0.25	
	Final Average Daily Flow	9.77	9.88	9.98	10.15	8.17	6.98	6.00	5.74	5.66	6.85	7.02	8.21	7.86	
	Final Dry Day Average Daily Flow	8.64	8.80	9.07	9.41	8.07	6.81	5.90	5.61	5.47	6.06	6.80	7.59	7.35	
	Final Estimated Infiltration	3.74	3.90	4.17	4.51	3.17	1.91	1.00	0.71	0.57	1.16	1.90	2.69	2.45	
	Estimated Sanitary Flow	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	4.90	
	Estimated Inflow	1.13	1.08	0.91	0.74	0.10	0.17	0.10	0.13	0.19	0.79	0.22	0.62	0.51	
Medford	Raw Average Daily Flow	8.59	8.28	8.77	9.16	6.37	5.31	4.50	4.04	4.02	5.01	5.11	6.82	6.33	
	Raw Dry Day Average Daily Flow	7.28	7.03	7.75	8.22	5.91	5.09	4.26	3.85	3.92	4.30	4.81	6.11	5.71	
	Raw Estimated Infiltration	3.28	3.03	3.75	4.22	1.91	1.09	0.26	0.05	0.12	0.30	0.81	2.11	1.74	
	MWRA Estimated Infiltration	0.38	0.35	0.43	0.49	0.22	0.13	0.03	0.01	0.01	0.03	0.09	0.24	0.20	
	Final Average Daily Flow	8.21	7.93	8.34	8.67	6.15	5.18	4.47	4.03	4.01	4.98	5.02	6.58	6.13	
	Final Dry Day Average Daily Flow	6.90	6.68	7.32	7.73	5.69	4.96	4.23	3.84	3.91	4.27	4.72	5.87	5.51	
	Final Estimated Infiltration	2.90	2.68	3.32	3.73	1.69	0.96	0.23	0.04	0.11	0.27	0.72	1.87	1.54	
	Estimated Sanitary Flow	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.80	3.80	4.00	4.00	4.00	3.97	
	Estimated Inflow	1.31	1.25	1.02	0.94	0.46	0.22	0.24	0.19	0.10	0.71	0.30	0.71	0.62	
Melrose	Raw Average Daily Flow	5.29	5.41	5.82	5.83	4.04	3.23	2.58	2.38	2.24	2.88	3.36	4.28	3.94	
	Raw Dry Day Average Daily Flow	4.50	4.70	5.10	5.36	3.86	3.09	2.52	2.37	2.13	2.43	3.17	3.88	3.59	
	Raw Estimated Infiltration	2.70	2.90	3.30	3.56	2.06	1.29	0.72	0.57	0.33	0.63	1.37	2.08	1.79	
	MWRA Estimated Infiltration	0.52	0.56	0.64	0.69	0.40	0.25	0.14	0.11	0.06	0.12	0.27	0.40	0.35	
	Final Average Daily Flow	4.77	4.85	5.18	5.14	3.64	2.98	2.44	2.27	2.18	2.76	3.09	3.88	3.59	
	Final Dry Day Average Daily Flow	3.98	4.14	4.46	4.67	3.46	2.84	2.38	2.26	2.07	2.31	2.90	3.48	3.24	
	Final Estimated Infiltration	2.18	2.34	2.66	2.87	1.66	1.04	0.58	0.46	0.27	0.51	1.10	1.68	1.44	
	Estimated Sanitary Flow	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
	Estimated Inflow	0.79	0.71	0.72	0.47	0.18	0.14	0.06	0.01	0.11	0.45	0.19	0.40	0.35	

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Community	Flow Characteristic	8-Jun-17												Annual Average (MGD)
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Milton (North Only)	Average Daily Flow	0.19	0.25	0.24	0.29	0.18	0.16	0.16	0.18	0.18	0.18	0.18	0.21	0.20
	Dry Day Average Daily Flow	0.18	0.22	0.22	0.27	0.16	0.15	0.16	0.18	0.17	0.17	0.17	0.20	0.19
	Estimated Infiltration	0.03	0.07	0.07	0.12	0.01	0.00	0.01	0.03	0.02	0.02	0.02	0.05	0.04
	Estimated Sanitary Flow	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
	Estimated Inflow	0.01	0.03	0.02	0.02	0.02	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01
Newton (North Only)	Average Daily Flow	7.16	7.44	7.98	8.73	6.30	5.67	4.74	4.21	3.95	4.49	4.69	5.30	5.88
	Dry Day Average Daily Flow	6.52	6.64	7.59	8.27	6.07	5.62	4.51	4.17	3.86	4.16	4.56	5.10	5.58
	Estimated Infiltration	2.72	2.84	3.79	4.47	2.27	1.82	0.71	0.37	0.06	0.36	0.76	1.30	1.78
	Estimated Sanitary Flow	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
	Estimated Inflow	0.64	0.80	0.39	0.46	0.23	0.05	0.23	0.04	0.09	0.33	0.13	0.20	0.30
Reading	Raw Average Daily Flow	3.09	3.23	3.62	3.49	2.60	2.01	1.67	1.56	1.54	1.80	2.10	2.64	2.44
	Raw Dry Day Average Daily Flow	2.80	2.93	3.31	3.30	2.44	1.93	1.60	1.55	1.44	1.70	2.00	2.52	2.29
	Raw Estimated Infiltration	1.50	1.63	2.01	2.00	1.14	0.63	0.30	0.25	0.14	0.40	0.70	1.22	0.99
	MWRA Estimated Infiltration	0.01	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	Final Average Daily Flow	3.08	3.21	3.60	3.47	2.59	2.00	1.67	1.56	1.54	1.80	2.09	2.63	2.43
	Final Dry Day Average Daily Flow	2.79	2.91	3.29	3.28	2.43	1.92	1.60	1.55	1.44	1.70	1.99	2.51	2.28
	Final Estimated Infiltration	1.49	1.61	1.99	1.98	1.13	0.62	0.30	0.25	0.14	0.40	0.69	1.21	0.98
	Estimated Sanitary Flow	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
	Estimated Inflow	0.29	0.30	0.31	0.19	0.16	0.08	0.07	0.01	0.10	0.10	0.10	0.12	0.15
Revere	Raw Average Daily Flow	6.94	7.34	7.49	7.17	5.38	5.07	4.55	4.54	4.36	5.60	5.05	6.08	5.79
	Raw Dry Day Average Daily Flow	5.97	6.32	6.40	6.35	4.84	4.81	4.34	4.38	4.20	4.57	4.43	5.20	5.15
	Raw Estimated Infiltration	2.47	2.82	2.90	2.85	1.34	1.31	0.84	0.88	0.70	1.07	0.93	1.70	1.65
	MWRA Estimated Infiltration	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Final Average Daily Flow	6.92	7.32	7.47	7.15	5.37	5.06	4.54	4.53	4.35	5.59	5.04	6.07	5.78
	Final Dry Day Average Daily Flow	5.95	6.30	6.38	6.33	4.83	4.80	4.33	4.37	4.19	4.56	4.42	5.19	5.13
	Final Estimated Infiltration	2.45	2.80	2.88	2.83	1.33	1.30	0.83	0.87	0.69	1.06	0.92	1.69	1.63
	Estimated Sanitary Flow	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
	Estimated Inflow	0.97	1.02	1.09	0.82	0.54	0.26	0.21	0.16	0.16	1.03	0.62	0.88	0.65
Somerville	Raw Average Daily Flow	11.88	12.28	12.07	12.67	8.82	7.48	6.73	7.08	6.58	10.04	9.27	9.94	9.56
	Raw Dry Day Average Daily Flow	8.78	8.92	9.70	9.64	7.12	6.18	6.16	6.56	6.01	6.38	7.49	7.52	7.53
	Raw Estimated Infiltration	3.28	3.42	4.20	4.14	1.62	0.68	0.66	1.06	0.51	0.88	1.99	2.02	2.03
	MWRA Estimated Infiltration	0.08	0.08	0.10	0.09	0.04	0.02	0.02	0.02	0.01	0.02	0.05	0.05	0.05
	Final Average Daily Flow	11.80	12.20	11.97	12.58	8.78	7.46	6.71	7.06	6.57	10.02	9.22	9.89	9.51
	Final Dry Day Average Daily Flow	8.70	8.84	9.60	9.55	7.08	6.16	6.14	6.54	6.00	6.36	7.44	7.47	7.48
	Final Estimated Infiltration	3.20	3.34	4.10	4.05	1.58	0.66	0.64	1.04	0.50	0.86	1.94	1.97	1.98
	Estimated Sanitary Flow	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50
	Estimated Inflow	3.10	3.36	2.37	3.03	1.70	1.30	0.57	0.52	0.57	3.66	1.78	2.42	2.03
Stoneham	Raw Average Daily Flow	3.40	3.41	3.72	3.66	2.38	1.91	1.44	1.41	1.43	1.73	1.93	2.40	2.40
	Raw Dry Day Average Daily Flow	2.72	2.88	3.32	3.36	2.21	1.83	1.40	1.36	1.32	1.55	1.80	2.28	2.17
	Raw Estimated Infiltration	1.42	1.58	2.02	2.06	0.91	0.53	0.10	0.06	0.02	0.25	0.50	0.98	0.87
	MWRA Estimated Infiltration	0.23	0.26	0.33	0.34	0.15	0.09	0.02	0.01	0.00	0.04	0.08	0.16	0.14
	Final Average Daily Flow	3.17	3.15	3.39	3.32	2.23	1.82	1.42	1.40	1.43	1.69	1.85	2.24	2.26
	Final Dry Day Average Daily Flow	2.49	2.62	2.99	3.02	2.06	1.74	1.38	1.35	1.32	1.51	1.72	2.12	2.02
	Final Estimated Infiltration	1.19	1.32	1.69	1.72	0.76	0.44	0.08	0.05	0.02	0.21	0.42	0.82	0.72
	Estimated Sanitary Flow	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
	Estimated Inflow	0.68	0.53	0.40	0.30	0.17	0.08	0.04	0.05	0.11	0.18	0.13	0.12	0.23

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average (MGD)	
Wakefield	Raw Average Daily Flow	4.80	4.89	5.41	5.39	3.80	2.86	2.24	2.08	1.99	2.45	2.87	3.73	3.54	
	Raw Dry Day Average Daily Flow	4.30	4.39	4.94	5.07	3.57	2.76	2.18	2.02	1.92	2.22	2.75	3.52	3.30	
	Raw Estimated Infiltration	2.80	2.89	3.44	3.57	2.07	1.26	0.68	0.52	0.42	0.72	1.25	2.02	1.80	
	MWRA Estimated Infiltration	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	
	Final Average Daily Flow	4.79	4.88	5.40	5.38	3.79	2.85	2.24	2.08	1.99	2.45	2.86	3.72	3.53	
	Final Dry Day Average Daily Flow	4.29	4.38	4.93	5.06	3.56	2.75	2.18	2.02	1.92	2.22	2.74	3.51	3.29	
	Final Estimated Infiltration	2.79	2.88	3.43	3.56	2.06	1.25	0.68	0.52	0.42	0.72	1.24	2.01	1.79	
	Estimated Sanitary Flow	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
	Estimated Inflow	0.50	0.50	0.47	0.32	0.23	0.10	0.06	0.06	0.07	0.23	0.12	0.21	0.24	
Waltham	Raw Average Daily Flow	10.01	9.75	10.05	10.61	7.77	6.54	5.66	5.48	5.47	6.65	7.09	7.77	7.73	
	Raw Dry Day Average Daily Flow	8.99	8.88	9.48	10.00	7.40	6.38	5.61	5.46	5.44	6.03	6.91	7.27	7.31	
	Raw Estimated Infiltration	3.59	3.48	4.08	4.60	2.00	0.98	0.21	0.06	0.04	0.63	1.51	1.87	1.91	
	MWRA Estimated Infiltration	0.16	0.16	0.18	0.21	0.09	0.04	0.01	0.00	0.00	0.03	0.07	0.08	0.09	
	Final Average Daily Flow	9.85	9.59	9.87	10.40	7.68	6.50	5.65	5.48	5.47	6.62	7.02	7.69	7.64	
	Final Dry Day Average Daily Flow	8.83	8.72	9.30	9.79	7.31	6.34	5.60	5.46	5.44	6.00	6.84	7.19	7.23	
	Final Estimated Infiltration	3.43	3.32	3.90	4.39	1.91	0.94	0.20	0.06	0.04	0.60	1.44	1.79	1.83	
	Estimated Sanitary Flow	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	5.40	
	Estimated Inflow	1.02	0.87	0.57	0.61	0.37	0.16	0.05	0.02	0.03	0.62	0.18	0.50	0.42	
Watertown	Average Daily Flow	3.68	3.80	3.99	4.09	2.86	2.47	2.27	2.14	2.16	2.42	2.48	2.99	2.94	
	Dry Day Average Daily Flow	3.33	3.39	3.66	3.73	2.71	2.40	2.24	2.12	2.14	2.19	2.37	2.78	2.75	
	Estimated Infiltration	1.23	1.29	1.56	1.63	0.61	0.30	0.14	0.02	0.04	0.09	0.27	0.68	0.65	
	Estimated Sanitary Flow	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	
	Estimated Inflow	0.35	0.41	0.33	0.36	0.15	0.07	0.03	0.02	0.02	0.23	0.11	0.21	0.19	
Wilmington	Raw Average Daily Flow	1.39	1.45	1.49	1.47	1.31	1.26	1.06	1.15	1.12	1.21	1.25	1.27	1.29	
	Raw Dry Day Average Daily Flow	1.36	1.39	1.43	1.43	1.28	1.23	1.03	1.08	1.07	1.17	1.18	1.21	1.24	
	Raw Estimated Infiltration	0.56	0.59	0.63	0.63	0.48	0.43	0.23	0.28	0.27	0.37	0.38	0.41	0.44	
	MWRA Estimated Infiltration	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Final Average Daily Flow	1.38	1.44	1.48	1.46	1.30	1.26	1.06	1.15	1.12	1.21	1.25	1.27	1.28	
	Final Dry Day Average Daily Flow	1.35	1.38	1.42	1.42	1.27	1.23	1.03	1.08	1.07	1.17	1.18	1.21	1.23	
	Final Estimated Infiltration	0.55	0.58	0.62	0.62	0.47	0.43	0.23	0.28	0.27	0.37	0.38	0.41	0.43	
	Estimated Sanitary Flow	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	
	Estimated Inflow	0.03	0.06	0.06	0.04	0.03	0.03	0.03	0.07	0.05	0.04	0.07	0.06	0.05	
Winchester	Average Daily Flow	2.55	2.54	2.91	2.92	1.97	1.58	1.22	1.08	1.05	1.25	1.40	1.83	1.86	
	Dry Day Average Daily Flow	2.17	2.27	2.65	2.79	1.89	1.53	1.19	1.07	1.03	1.13	1.33	1.71	1.73	
	Estimated Infiltration	1.07	1.17	1.55	1.69	0.79	0.43	0.09	0.07	0.03	0.03	0.23	0.61	0.64	
	Estimated Sanitary Flow	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.00	1.00	1.10	1.10	1.10	1.08	
	Estimated Inflow	0.38	0.27	0.26	0.13	0.08	0.05	0.03	0.01	0.02	0.12	0.07	0.12	0.13	
Winthrop	Average Daily Flow	2.09	2.21	2.14	2.06	1.81	1.75	1.62	1.51	1.46	1.83	1.77	2.07	1.86	
	Dry Day Average Daily Flow	1.81	1.91	1.89	1.84	1.61	1.70	1.57	1.46	1.43	1.51	1.65	1.77	1.68	
	Estimated Infiltration	0.71	0.81	0.79	0.74	0.51	0.60	0.47	0.36	0.33	0.41	0.55	0.67	0.58	
	Estimated Sanitary Flow	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	
	Estimated Inflow	0.28	0.30	0.25	0.22	0.20	0.05	0.05	0.05	0.03	0.32	0.12	0.30	0.18	

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Annual Average (MGD)

Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average (MGD)
Woburn	Raw Average Daily Flow	6.98	7.33	8.16	7.99	5.95	5.38	5.09	4.91	4.69	5.28	5.92	7.37	6.25
	Raw Dry Day Average Daily Flow	6.49	6.88	7.59	7.61	5.85	5.20	5.05	4.80	4.58	4.91	5.55	6.77	5.94
	Raw Estimated Infiltration	2.79	3.18	3.89	3.91	2.15	1.50	1.35	1.10	0.88	1.21	1.85	3.07	2.24
	MWRA Estimated Infiltration	0.39	0.45	0.55	0.55	0.30	0.21	0.19	0.16	0.12	0.17	0.26	0.43	0.31
	Final Average Daily Flow	6.59	6.88	7.61	7.44	5.65	5.17	4.90	4.75	4.57	5.11	5.66	6.94	5.94
	Final Dry Day Average Daily Flow	6.10	6.43	7.04	7.06	5.55	4.99	4.86	4.64	4.46	4.74	5.29	6.34	5.62
	Final Estimated Infiltration	2.40	2.73	3.34	3.36	1.85	1.29	1.16	0.94	0.76	1.04	1.59	2.64	1.92
	Estimated Sanitary Flow	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70
	Estimated Inflow	0.49	0.45	0.57	0.38	0.10	0.18	0.04	0.11	0.11	0.37	0.37	0.60	0.31
Subtotal (Northern System)	Raw Average Daily Flow	207.51	218.78	221.69	228.41	180.48	163.47	146.67	145.08	144.39	176.09	168.03	185.09	182.01
	Raw Dry Day Average Daily Flow	179.73	187.57	195.46	203.72	165.19	153.96	142.21	136.82	136.61	145.84	155.84	165.56	163.93
	Raw Estimated Infiltration	58.68	66.52	74.41	82.67	44.14	32.91	21.16	16.07	15.86	24.79	34.79	44.51	42.93
	MWRA Estimated Infiltration	3.80	4.60	5.12	5.91	3.17	2.62	1.94	1.45	1.59	2.21	2.93	3.29	3.21
	Final Average Daily Flow	203.71	214.18	216.57	222.50	177.31	160.85	144.73	143.63	142.80	173.88	165.10	181.80	178.80
	Final Dry Day Average Daily Flow	175.93	182.97	190.34	197.81	162.02	151.34	140.27	135.37	135.02	143.63	152.91	162.27	160.72
	Final Estimated Infiltration	54.88	61.92	69.29	76.76	40.97	30.29	19.22	14.62	14.27	22.58	31.86	41.22	39.72
	Estimated Sanitary Flow	121.05	121.05	121.05	121.05	121.05	121.05	121.05	120.75	120.75	121.05	121.05	121.05	121.00
	Estimated Inflow	27.78	31.21	26.23	24.69	15.29	9.51	4.46	8.26	7.78	30.25	12.19	19.53	18.08
Total (North and South)	Raw Average Daily Flow	324.25	353.42	347.45	360.11	278.96	243.86	215.54	211.43	209.64	253.11	246.84	273.12	276.18
	Raw Dry Day Average Daily Flow	283.66	303.80	310.95	320.56	258.53	231.38	209.44	201.73	200.46	215.45	231.80	249.09	251.18
	Raw Estimated Infiltration	109.31	129.45	136.60	146.21	84.18	57.03	35.09	27.88	26.51	41.10	57.45	74.74	76.90
	MWRA Estimated Infiltration	8.67	10.92	11.58	10.25	7.41	5.49	4.39	3.80	3.69	4.50	5.63	6.32	6.87
	Final Average Daily Flow	315.58	342.50	335.87	349.86	271.55	238.37	211.15	207.63	205.95	248.61	241.21	266.80	269.31
	Final Dry Day Average Daily Flow	274.99	292.88	299.37	310.31	251.12	225.89	205.05	197.93	196.77	210.95	226.17	242.77	244.30
	Final Estimated Infiltration	100.64	118.53	125.02	135.96	76.77	51.54	30.70	24.08	22.82	36.60	51.82	68.42	70.03
	Estimated Sanitary Flow	174.35	174.35	174.35	174.35	174.35	174.35	174.35	173.85	173.95	174.35	174.35	174.35	174.27
	Estimated Inflow	40.59	49.62	36.50	39.55	20.43	12.48	6.10	9.70	9.18	37.66	15.04	24.03	25.00
North System as Reported by NPDES	Average Daily Flow	213.90	226.80	227.50	235.60	190.30	175.90	160.70	158.30	158.20	189.40	181.70	191.00	192.30
Total System as Reported by NPDES	Average Daily Flow	331.60	361.50	354.70	371.10	286.80	255.90	227.30	221.30	220.50	266.10	261.80	281.50	286.37

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Annual
Average
(MGD)

Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average (MGD)	
Chelsea Creek	Average Daily Flow	104.94	109.60	112.33	112.85	86.69	77.15	71.26	66.29	61.86	78.23	75.03	72.61	85.65	
	Dry Day Average Daily Flow	87.55	93.92	98.78	101.07	78.45	71.09	70.48	61.67	59.32	65.05	70.41	69.00	77.16	
	Estimated Infiltration	41.15	47.52	52.38	54.67	32.05	24.69	24.08	15.57	13.22	18.65	24.01	22.60	30.81	
	Estimated Sanitary Flow	46.40	46.40	46.40	46.40	46.40	46.40	46.40	46.10	46.10	46.40	46.40	46.40	46.40	46.35
	Estimated Inflow	17.39	15.68	13.55	11.78	8.24	6.06	0.78	4.62	2.54	13.18	4.62	3.61	8.49	
Columbus Park	Average Daily Flow	31.84	35.43	33.02	35.01	29.61	28.43	25.12	25.87	25.53	33.81	28.40	29.22	30.09	
	Dry Day Average Daily Flow	27.16	28.89	27.00	29.77	26.10	25.89	24.65	22.97	23.80	25.24	25.59	25.50	26.03	
	Estimated Infiltration	6.51	8.24	6.35	9.12	5.45	5.24	4.00	2.32	3.15	4.59	4.94	4.85	5.38	
	Estimated Sanitary Flow	20.65	20.65	20.65	20.65	20.65	20.65	20.65	20.65	20.65	20.65	20.65	20.65	20.65	
	Estimated Inflow	4.68	6.54	6.02	5.24	3.51	2.54	0.47	2.90	1.73	8.57	2.81	3.72	4.06	
Ward Street	Average Daily Flow	63.28	67.41	67.31	71.66	59.88	56.06	53.14	51.87	54.30	59.82	57.09	58.42	59.98	
	Dry Day Average Daily Flow	56.59	60.13	62.11	65.80	55.80	53.99	51.92	49.37	51.07	53.14	54.70	53.72	55.66	
	Estimated Infiltration	12.39	15.93	17.91	21.60	11.60	9.79	7.72	5.17	6.87	8.94	10.50	9.52	11.46	
	Estimated Sanitary Flow	44.20	44.20	44.20	44.20	44.20	44.20	44.20	44.20	44.20	44.20	44.20	44.20	44.20	
	Estimated Inflow	6.69	7.28	5.20	5.86	4.08	2.07	1.22	2.50	3.23	6.68	2.39	4.70	4.32	
Winthrop Terminal	Average Daily Flow	17.33	17.68	16.51	17.99	15.35	15.45	11.80	15.16	16.22	18.88	19.51	19.62	16.78	
	Dry Day Average Daily Flow	15.56	14.48	15.17	15.55	13.82	14.30	11.52	14.80	15.29	16.25	17.24	17.20	15.10	
	Estimated Infiltration	5.76	4.68	5.37	5.75	4.02	4.50	1.72	5.00	5.49	6.45	7.44	7.40	5.30	
	Estimated Sanitary Flow	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	9.80	
	Estimated Inflow	1.77	3.20	1.34	2.44	1.53	1.15	0.28	0.36	0.93	2.63	2.27	2.42	1.69	
Subtotal - Northern Headworks	Average Daily Flow	217.39	230.12	229.17	237.51	191.53	177.09	161.32	159.19	157.91	190.74	180.03	179.87	192.50	
	Dry Day Average Daily Flow	186.86	197.42	203.06	212.19	174.17	165.27	158.57	148.81	149.48	159.68	167.94	165.42	173.95	
	Estimated Infiltration	65.81	76.37	82.01	91.14	53.12	44.22	37.52	28.06	28.73	38.63	46.89	44.37	52.95	
	Estimated Sanitary Flow	121.05	121.05	121.05	121.05	121.05	121.05	121.05	120.75	120.75	121.05	121.05	121.05	121.00	
	Estimated Inflow	30.53	32.70	26.11	25.32	17.36	11.82	2.75	10.38	8.43	31.06	12.09	14.45	18.55	
Headworks as Reported by NPDES	SUM of ADF's	213.90	226.80	227.50	235.60	190.30	175.90	160.70	158.30	158.20	189.40	181.70	191.00	192.30	
Chelsea Creek	Average Daily Flow	101.60	106.20	110.90	111.20	85.60	76.40	70.60	65.60	61.70	77.40	75.40	85.10	85.58	
Columbus Park	Average Daily Flow	31.90	35.60	33.10	35.10	29.80	28.50	25.30	26.00	25.90	33.80	29.10	28.90	30.23	
Ward Street	Average Daily Flow	63.00	67.40	67.10	71.30	59.60	55.70	53.00	51.60	54.30	59.30	57.40	57.70	59.74	
Winthrop Terminal	Average Daily Flow	17.40	17.60	16.40	18.00	15.30	15.30	11.80	15.10	16.30	18.90	19.80	19.30	16.76	
Total System Flow (Southern Collection System Plus Northern Headworks)	Raw Average Daily Flow	334.13	364.76	354.93	369.21	290.01	257.48	230.19	225.54	223.16	267.76	258.84	267.90	286.67	
	Raw Dry Day Average Daily Flow	290.79	313.65	318.55	329.03	267.51	242.69	225.80	213.72	213.33	229.29	243.90	248.95	261.19	
	Raw Estimated Infiltration	116.44	139.30	144.20	154.68	93.16	68.34	51.45	39.87	39.38	54.94	69.55	74.60	86.92	
	MWRA Estimated Infiltration	4.87	6.32	6.46	4.34	4.24	2.87	2.45	2.35	2.10	2.29	2.70	3.03	3.66	
	Final Average Daily Flow	329.26	358.44	348.47	364.87	285.77	254.61	227.74	223.19	221.06	265.47	256.14	264.87	283.01	
	Final Dry Day Average Daily Flow	285.92	307.33	312.09	324.69	263.27	239.82	223.35	211.37	211.23	227.00	241.20	245.92	257.53	
	Final Estimated Infiltration	111.57	132.98	137.74	150.34	88.92	65.47	49.00	37.52	37.28	52.65	66.85	71.57	83.26	
	Estimated Sanitary Flow	174.35	174.35	174.35	174.35	174.35	174.35	174.35	173.85	173.95	174.35	174.35	174.35	174.27	
	Estimated Inflow	43.34	51.11	36.38	40.18	22.50	14.79	4.39	11.82	9.83	38.47	14.94	18.95	25.48	

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Annual Average (MGD)	
Boston (Total)	Raw Average Daily Flow	89.08	101.83	96.57	98.83	83.73	78.80	74.03	74.17	74.85	89.63	81.27	82.93	85.41
	Raw Dry Day Average Daily Flow	76.73	85.44	84.11	83.20	75.80	74.26	72.09	68.96	70.83	73.38	76.30	75.11	76.30
	Raw Estimated Infiltration	18.23	26.94	25.61	24.70	17.30	15.76	13.59	10.46	12.33	14.88	17.80	16.61	17.80
	MWRA Estimated Infiltration	4.18	6.09	6.28	4.53	4.03	3.24	2.95	2.58	2.70	3.00	3.48	3.28	3.85
	Final Average Daily Flow	84.90	95.74	90.29	94.30	79.70	75.56	71.08	71.59	72.15	86.63	77.79	79.65	81.56
	Final Dry Day Average Daily Flow	72.55	79.35	77.83	78.67	71.77	71.02	69.14	66.38	68.13	70.38	72.82	71.83	72.45
	Final Estimated Infiltration	14.05	20.85	19.33	20.17	13.27	12.52	10.64	7.88	9.63	11.88	14.32	13.33	13.95
	Estimated Sanitary Flow	58.50	58.50	58.50	58.50	58.50	58.50	58.50	58.50	58.50	58.50	58.50	58.50	58.50
	Estimated Inflow	12.35	16.39	12.46	15.63	7.93	4.54	1.94	5.21	4.02	16.25	4.97	7.82	9.11
Brookline (Total)	Raw Average Daily Flow	8.62	9.59	9.28	9.91	6.77	5.99	4.69	4.54	4.53	6.04	5.88	6.61	6.86
	Raw Dry Day Average Daily Flow	7.28	8.10	8.10	8.51	6.29	5.60	4.60	4.42	4.32	4.89	5.50	5.84	6.11
	Raw Estimated Infiltration	3.08	3.90	3.90	4.31	2.09	1.40	0.40	0.22	0.12	0.69	1.30	1.64	1.91
	MWRA Estimated Infiltration	0.02	0.02	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	Final Average Daily Flow	8.60	9.57	9.26	9.88	6.76	5.98	4.69	4.54	4.53	6.04	5.87	6.60	6.85
	Final Dry Day Average Daily Flow	7.26	8.08	8.08	8.48	6.28	5.59	4.60	4.42	4.32	4.89	5.49	5.83	6.10
	Final Estimated Infiltration	3.06	3.88	3.88	4.28	2.08	1.39	0.40	0.22	0.12	0.69	1.29	1.63	1.90
	Estimated Sanitary Flow	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20
	Estimated Inflow	1.34	1.49	1.18	1.40	0.48	0.39	0.09	0.12	0.21	1.15	0.38	0.77	0.75
Milton (Total)	Average Daily Flow	3.28	4.15	3.82	4.02	2.45	1.90	1.47	1.35	1.36	1.75	1.90	2.33	2.47
	Dry Day Average Daily Flow	2.83	3.41	3.36	3.39	2.28	1.83	1.45	1.32	1.31	1.68	1.79	2.21	2.23
	Estimated Infiltration	1.58	2.16	2.11	2.14	1.03	0.58	0.20	0.07	0.06	0.43	0.54	0.96	0.98
	Estimated Sanitary Flow	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
	Estimated Inflow	0.45	0.74	0.46	0.63	0.17	0.07	0.02	0.03	0.05	0.07	0.11	0.12	0.24
Newton (Total)	Raw Average Daily Flow	17.68	18.33	18.95	21.27	14.87	11.73	9.42	8.71	8.62	10.70	11.17	12.81	13.67
	Raw Dry Day Average Daily Flow	15.71	16.65	17.35	20.11	14.27	11.33	9.09	8.53	8.38	9.56	10.54	12.26	12.80
	Raw Estimated Infiltration	7.91	8.85	9.55	12.31	6.47	3.53	1.29	0.73	0.58	1.76	2.74	4.46	5.00
	MWRA Estimated Infiltration	0.01	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	Final Average Daily Flow	17.67	18.31	18.93	21.25	14.86	11.73	9.42	8.71	8.62	10.70	11.16	12.80	13.66
	Final Dry Day Average Daily Flow	15.70	16.63	17.33	20.09	14.26	11.33	9.09	8.53	8.38	9.56	10.53	12.25	12.79
	Final Estimated Infiltration	7.90	8.83	9.53	12.29	6.46	3.53	1.29	0.73	0.58	1.76	2.73	4.45	4.99
	Estimated Sanitary Flow	7.80	7.80	7.80	7.80	7.80	7.80	7.80	7.80	7.80	7.80	7.80	7.80	7.80
	Estimated Inflow	1.97	1.68	1.60	1.16	0.60	0.40	0.33	0.18	0.24	1.14	0.63	0.55	0.87

Table 4 - Estimated Community Wastewater Flow Components for 2016

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Annual
Average
(MGD)

Community	Flow Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average (MGD)
Subtotal Northern System CSO Communities Only: [Sum of Boston (North), Cambridge, Chelsea, and Somerville]	Raw Average Daily Flow	103.15	112.19	108.52	113.58	95.90	91.64	85.54	86.97	87.56	107.70	96.02	98.69	98.90
	Raw Dry Day Average Daily Flow	87.12	92.34	92.02	97.42	84.93	84.67	82.67	80.00	81.55	84.97	87.37	85.85	86.70
	Raw Estimated Infiltration	16.92	22.14	21.82	27.22	14.73	14.47	12.47	9.80	11.35	14.77	17.17	15.65	16.50
	MWRA Estimated Infiltration	1.31	1.96	2.00	2.59	1.37	1.52	1.39	1.07	1.33	1.65	1.81	1.43	1.62
	Final Average Daily Flow	101.84	110.23	106.52	110.99	94.53	90.12	84.15	85.90	86.23	106.05	94.21	97.26	97.29
	Final Dry Day Average Daily Flow	85.81	90.38	90.02	94.83	83.56	83.15	81.28	78.93	80.22	83.32	85.56	84.42	85.09
	Final Estimated Infiltration	15.61	20.18	19.82	24.63	13.36	12.95	11.08	8.73	10.02	13.12	15.36	14.22	14.89
	Estimated Sanitary Flow	70.20	70.20	70.20	70.20	70.20	70.20	70.20	70.20	70.20	70.20	70.20	70.20	70.20
	Estimated Inflow	16.03	19.85	16.50	16.16	10.97	6.97	2.87	6.97	6.01	22.73	8.65	12.84	12.20
Subtotal Northern System Without North CSO Communities:	Raw Average Daily Flow	104.36	106.59	113.17	114.83	84.58	71.83	61.13	58.11	56.83	68.39	72.01	86.40	83.11
	Raw Dry Day Average Daily Flow	92.61	95.23	103.44	106.30	80.26	69.29	59.54	56.82	55.06	60.87	68.47	79.71	77.23
	Raw Estimated Infiltration	41.76	44.38	52.59	55.45	29.41	18.44	8.69	6.27	4.51	10.02	17.62	28.86	26.43
	MWRA Estimated Infiltration	2.49	2.64	3.12	3.32	1.80	1.10	0.55	0.38	0.26	0.56	1.12	1.86	1.60
	Final Average Daily Flow	101.87	103.95	110.05	111.51	82.78	70.73	60.58	57.73	56.57	67.83	70.89	84.54	81.51
	Final Dry Day Average Daily Flow	90.12	92.59	100.32	102.98	78.46	68.19	58.99	56.44	54.80	60.31	67.35	77.85	75.63
	Final Estimated Infiltration	39.27	41.74	49.47	52.13	27.61	17.34	8.14	5.89	4.25	9.46	16.50	27.00	24.83
	Estimated Sanitary Flow	50.85	50.85	50.85	50.85	50.85	50.85	50.85	50.55	50.55	50.85	50.85	50.85	50.80
	Estimated Inflow	11.75	11.36	9.73	8.53	4.32	2.54	1.59	1.29	1.77	7.52	3.54	6.69	5.88
Subtotal North/South Systems Without North CSO Communities:	Raw Average Daily Flow	221.10	241.23	238.93	246.53	183.06	152.22	130.00	124.46	122.08	145.41	150.82	174.43	177.28
	Raw Dry Day Average Daily Flow	196.54	211.46	218.93	223.14	173.60	146.71	126.77	121.73	118.91	130.48	144.43	163.24	164.48
	Raw Estimated Infiltration	92.39	107.31	114.78	118.99	69.45	42.56	22.62	18.08	15.16	26.33	40.28	59.09	60.40
	MWRA Estimated Infiltration	7.36	8.96	9.58	7.66	6.04	3.97	3.00	2.73	2.36	2.85	3.82	4.89	5.26
	Final Average Daily Flow	213.74	232.27	229.35	238.87	177.02	148.25	127.00	121.73	119.72	142.56	147.00	169.54	172.02
	Final Dry Day Average Daily Flow	189.18	202.50	209.35	215.48	167.56	142.74	123.77	119.00	116.55	127.63	140.61	158.35	159.22
	Final Estimated Infiltration	85.03	98.35	105.20	111.33	63.41	38.59	19.62	15.35	12.80	23.48	36.46	54.20	55.14
	Estimated Sanitary Flow	104.15	104.15	104.15	104.15	104.15	104.15	104.15	103.65	103.75	104.15	104.15	104.15	104.07
	Estimated Inflow	24.56	29.77	20.00	23.39	9.46	5.51	3.23	2.73	3.17	14.93	6.39	11.19	12.80