

Part III

Project Narrative

Section A – Description, Objectives and Project Overview

The main objective of the Revere CWSRF planning and construction project is to continue the progress made in the City of Revere's efforts to identify, assess, prioritize, and implement improvements to both their sewer and storm drain systems. Ultimately the program will serve to protect the water bodies of the Commonwealth, mainly water bodies in the Mystic River/Boston Harbor basins and the Saugus River/North Coastal basins, including the Rumney Marshes, an Area of Critical Environmental Concern (ACEC).

In December 2005, the City received a request for information from the U.S. Environmental Protection Agency (EPA), under Section 308 (a) of the Clean Water Act, for submittal of information relative to the City's sewer and stormwater drainage systems. In 2007, the City of Revere received an Administrative Consent Order (ACO) from the EPA relative to violations of the Clean Water Act (a copy of the ACO is provided in Appendix B). The ACO included requirements for extensive Geographic Information System (GIS) mapping, field investigations and planning associated with the City's sewer and storm drain systems. In addition, the ACO contained requirements for semi-annual reporting of Sanitary Sewer Overflows (SSOs), development of an Illicit Discharge Detection and Elimination (IDDE) program along with a Capacity, Management, Operation and Maintenance (CMOM) Program Self Assessment; preparation of a CMOM Corrective Action Plan; and development of a Hydraulic Model/Modeling Report that included a Wastewater collection System Capacity Assessment. These documents have been previously submitted to MassDEP and to EPA under separate cover, copies of report covers are included in Appendix C (full copies of each report can be provided upon request).

The EPA issued a Consent Decree (CD) in fall 2010 (Appendix B). The CD includes extensive requirements for aggressive and comprehensive rehabilitation of the City's municipal wastewater and stormwater drainage infrastructure per EPA and MassDEP requirements. The recommendations for future capital improvements will be based on the results previously completed work by the City of Revere, the data developed during the ongoing Sewer System Evaluation Surveys (SSESs) funded in part by CWSRF Planning Grants and based on the recommendations developed in the Comprehensive Wastewater and Stormwater Planning efforts to be completed by the City of Revere in accordance with the CD requirements. Covers of the Phase I, II, and III SSES reports are found in appendix C.

Project Background

As illustrated by the map included in Appendix A, Revere is a highly developed urban environment which contributes significant stormwater to both Boston Harbor and the North Coastal watershed, including several major tributaries. The City of Revere is primarily included within the Mystic River watershed, part of the larger Boston Harbor basin. However, portions of Revere are within the Saugus River watershed, part of the larger North Coastal basin. A significant portion of the Rumney Marshes, an Area of Critical Environmental Concern (ACEC), is within the North Coastal River basin in Revere. Information regarding the Rumney Marshes ACEC along with completed, planned and ongoing

restoration efforts is included in Appendix D. The Pines River is located within the Rumney Marshes area and is tributary to the Saugus River, which is part of the North Coastal basin.

Revere is part of the Massachusetts Water Resources Authority's (MWRA's) sewer system, with the City's Department of Public Works (DPW) responsible for wastewater collection system and storm water management system operation and maintenance. The City has several known problems with its storm drain and sewer systems including SSOs, Inflow/Infiltration and Illicit Discharges. Manhole surcharges in the sewer system occur during extreme wet weather events due to surcharging in the system. Excessive inflow due to illicit sump pumps and roof leaders connected to the sewer system also contribute to problems. Details regarding the current Clean Water Act violations are included in the reports provided in the Appendices of this PEF along with recommendations for further study and/or construction of improvements necessary to address the water quality impacts.

The City has proposed to work collectively and on a regional basis with other Lower Mystic River communities (Chelsea, Everett, Malden and Medford) to appropriately address the physical and operational characteristics of the stormwater and sewer infrastructure whose major components were installed prior to the beginning of the last century. In addition, the Department of Conservation and Recreation (DCR), the Massachusetts Bay Transportation Authority (MBTA) and the Massachusetts Department of Transportation (MassDOT) maintain extensive utilities and transportation infrastructure within the City of Revere. The City is also working with these agencies to develop comprehensive solutions to the infrastructure needs of Revere.

The City has taken a proactive approach to correct many of the problems in the sewer and drainage systems, including an aggressive television inspection and cleaning program, pipe lining and rehabilitation, and pump station rehabilitation, among other improvements. The City has also prepared numerous stormwater assessment reports and conducted improvements to its stormwater system in various areas within the City. In addition, the City has utilized planning funds from the CWSRF program in CY-2007, CY-2008, CY-2009, CY-2010, CY-2011, CY-2012, and CY-2013 to complete development of a GIS system and to begin the SSES investigations necessary to develop a comprehensive wastewater management plan and a comprehensive stormwater management plan in accordance with anticipated CD requirements.

The intent of this PEF and the request for planning and construction funding under the CWSRF Program, is to provide the City with the financial resources necessary to implement construction of capital improvements as identified by the ongoing SSES activities and/or as identified by other planning activities undertaken by the City. It is the City's intention to complete construction improvements identified in this PEF by August 2016 in accordance with the requirements of the CD. The specific activities and benefits for the planning and construction projects are described in greater detail below.

Planning Project Description

As previously stated, The City of Revere was issued a Consent Decree by the EPA in response to wet weather sewer capacity limitations including back-ups and sanitary sewer overflows (SSO). Required improvements will include the development and implementation of a sump pump and illicit connection removal program to reduce private inflow into the sanitary sewer system.

The planning project focuses on the assessment of the wastewater system along with support of the City's ongoing development of a state-of-the-art GIS system. Further technical support for implementation and use of the GIS system will be available through the planned scope of work for this planning study to allow Revere to continue to identify assess, prioritize and complete improvements to the city's sewer system.

Significant components of the planning efforts include field investigations and evaluation of the City's wastewater system. The following field investigations and technical activities are planned: supplemental flow isolation, closed circuit television inspection, dye testing, smoke testing, and house-to-house inspections. These investigations will lead to the evaluation of the wastewater collection system and will provide support for ongoing assessments of Infiltration/Inflow Removal (I/I Removal).

The following tasks are expected to be performed under the planning project.

Planning Project 01 – Citywide Supplemental Field Investigations and Supplemental CWMP/CSMP

Sewer System Facility Mapping and System Implementation

To support in the SSES activities and to help prioritize sewer improvements updated information will be collected and integrated into the existing GIS system. This process will be completed by building upon and supplementing information compiled during previous and ongoing sewer asset inventories.

The items to be enhanced as part of this task include:

- Continue the review of current sewer mapping to identify incomplete mapping areas or areas that require additional research or field investigation.
- Continue to review of historical sewer system mapping including plans owned by the city that contain any sewer information that is not currently in the GIS system.
- Continue to field locate missing sewer structures to confirm pipe sizes, pipe flow direction, materials and condition. Confirm structures that are dry wells.
- Continue to perform additional testing required to determine flow of any structures where flow cannot be determined.
- Continue to develop asset inventory and system mapping that incorporates information gathered as part of this process. This will result in a detailed system inventory including piping networks and flow direction(s).
- Continue to integrate the completed sewer inventory into the city's existing GIS environment and supplement the exiting tools to allow staff to easily access, query, and manipulate information.
- Continue the development of the supplemental Comprehensive Wastewater Management Plan and Comprehensive Stormwater Management Plan (CWMP/CSMP). CWMP/CSMP details can be found under section "Consent Decree Deliverables/Requirements".

These tasks will result in a more accurate and up to date sewer inventory that will allow the City to plan and construct system improvements, improve water quality, and better maintain and protect city infrastructure and environment.

Field Investigations

Field investigations will be completed to ascertain the condition and operation of the sanitary sewer system. Field investigations will include the following primary activities:

- **Supplemental Flow Isolation** – Flow isolation will be conducted to quantify infiltration rates and identify the pipe reaches with the highest amount of infiltration per inch-diameter mile. These pipe reaches will then be further investigated with television inspection to determine the causes of the high infiltration rates. The work will be performed between the hours of midnight and 5:00 a.m., when it is assumed that 90% of the flow in the sewer system is infiltration. This information gathered during this investigation will be incorporated into the GIS system for use with future compliance activities.
- **Closed-Circuit Television Inspection**- The execution and supervision of television inspection will be completed as necessary in various diameter sewers based on results of SSES activities. The television inspection will be used to identify specific sources of inflow and infiltration including leaking joints, damaged pipe and defective service connections. The television inspection work shall include initial cleaning of the sewer pipe prior to inspection. It is assumed that up to seventy percent of the sewers will require light to moderate cleaning and thirty percent will require heavy cleaning. These quantities may vary once field work begins. TV inspection video and reports will be developed. TV inspection data will be integrated into the GIS system for use with future compliance activities.
- **Dyed Water Flooding**- Dyed water flooding will be completed as necessary in various diameter sewers based on results of ongoing SSES activities. Concurrent with the dye water flooding, the sewer line will be televised to identify the exact location where the inflow enters the sewer system. A TV inspection Dyed Water Flooding memorandum will be developed and information included in the final report.
- **Smoke Testing**- Smoke testing will be completed by licensed contractors for the purpose of locating sources of storm water inflow to the sanitary sewer system. The study will locate direct and indirect connections such as catch basins, area drains, roof drains, broken sewer pipe and deteriorated pipe joints. During testing, white smoke is introduced through the sanitary sewer system via a smoke generating machine. During the procedure white smoke will be venting from holes in manhole covers located on the street and plumbing vent pipes located on or near roof surfaces.
- **House-to-House Inspections** – Exterior building inspections will be performed in order to visually identify inflow sources confirmed during the smoke testing program, and to investigate potential approaches to disconnecting the private inflow sources from the sanitary sewer. The inspections cover the exteriors of each property only and the crews document findings using

sketches and digital photographs. All confirmed inflow sources are summarized and mapped for visual clarity and for assistance in designing the removal of the inflow sources.

Planning Project 02- Illicit Connection Detection Program

The second planning project will consist of a continuation of citywide field investigations in order to determine illicit sewer connections. The field investigations will include the following components:

- Continued implementation of a city-wide sump pump amnesty program;
- Evaluation of methods of illegal sump pump removal;
- Continuation of public information mailings;
- Advertisement of the amnesty program;
- Public informational meetings;
- Development of an informational city web page;
- Processing of amnesty responses via the internet; and
- Inspection of homes that respond to program.

Planning Projects Cost Summary

The following tables present a summary of estimated planning costs.

Estimated Planning Costs

Item	Description	Total
P01	Citywide Supplemental Field Investigations (\$800,000) and Supplemental CWMP/CSMP (\$400,000)	\$1,200,000
P02	Citywide field investigations for determination of illicit sewer connections	\$700,000
Total		\$1,900,000

Construction Project Description

As stated above, the City of Revere is currently under Consent Decree (CD) to comply with Federal Clean Water Act regulations. As required by the CD, the City has contracted CDM Smith to perform a minimum of three construction projects for the 2015 Construction Season to improve deficiencies within the existing sanitary sewer system as identified by the Phase III SSES. The two construction contracts will include wastewater and storm drain system improvements to address deficient sewer piping and reduce infiltration and sources of extraneous inflow.

This work will drastically reduce the volume of infiltration and inflow (I/I) within the system. The work will also reduce the amount of stormwater entering the City's wastewater collection system and unnecessarily being treated at the Deer Island Sewage Treatment Plant. In addition, the proposed

projects will also serve to improve the performance of the City's collection system and reduce or eliminate SSOs during wet weather events.

Construction Project 01 – Comprehensive Infrastructure Improvements

This Comprehensive Infrastructure Improvements construction project will include cured-in-place pipe (CIPP) lining, sewer spot repairs, replacements, new sewer lines, cleaning, pump station improvements and rehabilitation, drainage improvements, and additional wastewater metering.

Rehabilitation of pipelines, manholes, and the removal of public and private inflow sources is necessary to reduce I/I from the system and significantly reduce or eliminate sewer system overflows from occurring at sewer manholes and at wastewater pumping stations. This project includes cured-in-place pipe (CIPP) lining and service lateral connection lining to eliminate I/I. Manholes throughout the City have also been identified as being in need of monolithic cementitious lining or epoxy to eliminate I/I. It is also anticipated that some new sewer pipe and sewer manholes will be necessary to replace existing pipes and manholes that are irreparable. Furthermore, the upsizing of some sewer mains may need to be conducted to increase capacity in strategic locations. In addition, given the current age and condition of many of the City's wastewater pump stations the City has included an allowance to complete rehabilitation and/or replacement of the pump stations based on the pending results of ongoing investigations.

Additionally, depth sensors (Smart Covers) may be installed at key wastewater manholes so that the City can more proactively monitor potential SSO locations and take precautions to minimize SSOs. Smart Covers are depth sensors mounted to the bottom of sewer manhole covers that continuously monitor the water level within the sewer manhole. When the water level rises above a predetermined threshold specified by the City, an alarm is sent directly to emergency response personnel. This enables the City to receive advance notice so that corrective action may be taken.

Finally, flow meters may also be installed in the sewer collection system to monitor flows and determine the effectiveness of I/I removal programs to date.

Construction Project 02 – Illicit Connection and Sump Pump Removal Program

The Illicit Connection and Sump Pump Removal Program will consist of removing illegal sump pumps and other illegal connections connected to the sewer system detected during inspections. The Engineer will select private contractors to perform sump pump redirection for sewer bank credits.

Removal and/or re-directing public and private inflow sources is critical to the success of the program given the enormous increase in rain related inflow during storm events. This construction contract will include catch basins and private properties confirmed to have inflow sources into the sanitary sewer system. Removals will include catch basins, area drains, sump pumps, floor drains, driveway drains, and roof leaders.

An Illicit Discharge Detection and Elimination (IDDE) Program will also be initiated to identify locations where sewer flows are entering the city's storm drain system. This program will seek to eradicate sewer flows from the storm drain system and free up capacity for redirected inflow sources.

The city also hopes to acquire catch basin cleaning equipment to further improve their operations and maintenance procedures related to the drainage system.

The illicit connections detection and elimination program is moving forward for several reasons. These reasons include:

- Removal of I/I will lessen occurrences of surcharging, backups, and sewer overflows through manholes.
- Removal of I/I will lessen the impacts of the sewer on the watershed area by restoring natural stormwater and groundwater flow.
- Removal of excessive I/I is cost effective.

Contract documents for the above listed projects were developed following survey and TV inspection of sewers. TV inspection was used to identify recommended rehabilitation methods or to determine if sewer replacement was necessary.

The initial project activity cited above will improve the sewer system and reduce the incidence of sanitary sewer overflows (SSO's). The projects however may not completely eliminate SSO's. An understanding of the entire sewer system and elimination of illicit connections is required to properly manage the wastewater flows in the system and to achieve the elimination of SSO's in this important watershed.

Construction Projects Cost Summary

The following tables present a summary of the total conceptual level engineer's estimate of probable construction costs based on quantities developed using the preliminary results of the Phase I, II and III SSES. Estimated quantities are provided in the summary tables with unit costs based on recent bid prices for similar projects and inflated to reflect a construction start of spring 2014.

City of Revere, MA CY-2014 Wastewater/Stormwater CIP

Construction PEF Conceptual Level Engineers Estimate of Probable Construction Cost

Item	Construction Sub-Total	Contingency	Construction Services	Police Details	Total
WW-001	\$10,000,000	\$1,000,000	\$1,750,000	\$700,000	\$13,450,000
WW-002	\$4,000,000	\$400,000	\$700,000	\$700,000	\$5,800,000
Total	\$14,000,000	\$1,400,000	\$2,450,000	\$1,400,000	\$19,250,000