

Work Plan

City of Sacramento Department of Utilities District Metered Areas (DMAs) for Water Loss Control

Project Description

The City of Sacramento Department of Utilities (the Department) is currently augmenting its leak detection and repair program with District Metered Area (DMA) Management. DMAs are discrete areas of the water distribution system that have a defined boundary typically encompassing 500-5,000 metered service connections, and are set up to provide leak detection savings assessment via isolation and installation of sub-meters on specific portions of the system. Areas with existing residential meters with Advanced Metering Infrastructure (AMI) technology are preferred and provide the most accurate data.

The traditional approach to leakage control has been a passive one, whereby the leak is repaired only when it becomes visible. The development of acoustic instruments has significantly improved the situation, allowing invisible leaks to be located as well. But the application of such instruments over the whole of a large water network is an expensive and time-consuming activity. The solution is a permanent leakage control system, whereby, the network is divided into DMAs supplied by a limited number of key mains, on which flow meters are installed. In this way, it is possible to regularly quantify the leakage level in each DMA so that the leakage location activity is always directed to the worst parts of the network.

The project will provide a viable medium to long term intervention strategy that will continue to increase water use efficiency throughout the City. This project is a continuation of the initial pilot-study DMA project which is currently underway. Through this project, the Department will be able to use DMA management as a tool to assess water savings, determine which parts of the distribution system are experiencing the highest level of leakage and determine areas that have limited leakage, so that resources can be targeted to the greatest effect.

The full scope of work will include selecting DMA study areas, DMA implementation and analysis, leak detection and repairs including a homeowner repair funding program to qualified low income residents, and reporting on results. As part of the scope, three to four DMAs will be set up to undertake field leakage measurements to quantify leakage volume, reduce leakage volumes to optimized levels and maintain the achieved leakage savings through ongoing DMA monitoring. The selected areas will be within Disadvantaged Communities (DACs) which will provide the greatest benefit to low income and disadvantaged residents who have limited resources to address service-side leaks within the City, increasing the savings on water losses. Once leaks have been identified and repaired, the DMA leakage measurements will be repeated to quantify leakage/water savings achieved.

The division of a large water network can be a delicate operation, which if not undertaken with care, can cause supply and quality problems. The expected benefits of implementing this project are working with smaller, more manageable areas; more focused active leakage

detection efforts, quicker identification of leaks, and shorter run-time of leaks. By implementing the proposed DMA's and associated repairs, the volume of real losses could be reduced from 135 gallons/connection/day (fiscal year 2012 data) to 40 gallons/connection/day across the distribution network. This will be a 70% reduction in water losses across the distribution network.

Task 1 – Project Management

This task is for the general management of the project and includes the management of City staff, consultants, general oversight of compliance measures and efforts relating to the management of the project including DWR grant coordination, invoicing, and reporting.

Deliverables for this task will be monthly invoices, required quarterly reporting, and completion reports to DWR.

Task 2 – DMA Implementation and Analysis

Task 2.1 – Select Final DMA Study Areas

The goal of this task is to create an additional three to four DMA's coinciding within the City of Sacramento's water distribution service area and DAC areas. The project team will select the final DMA study areas to be funded under this project by looking at the following criteria: DMA size, infrastructure requirements, water quality, hydraulic integrity of DMA, number of supply points into the DMA, inflow chamber design, possible backup supply point, minimum flow and pressure requirements for fire flow and insurance, customer base in DMA, looping and redundancy requirements, and target leakage level.

The data the Department would expect to receive from this project includes baseline customer use, an idea of background leakage, and recognition of the subtle (unreported) leaks that develop with time, and reduction of leakage losses to optimized levels. This is the information that the Department hopes to obtain from the DMA areas, which would then allow the Department to focus the leak detection crew's attention in order to maintain the achieved low levels of leakage.

Task 2.2 – Implement One-year Study

Based upon the final DMA's selected, the chosen areas will be implemented. The boundaries will be isolated and meters will be installed on all supply lines coming into the DMA. Once the DMA boundaries have been isolated, data will be collected and a Water Loss Baseline will be calculated by utilizing the DMA supply meter data collected and the AMR/AMI consumption data from the billing database, which will produce a mass

balance. In addition, the project team will quantify leakage losses in the selected DMAs based on the “Minimum Night Time Flow” measurement principle. These measurements will accurately quantify the leakage volume in each of the DMAs.

Task 2.3 – Report on Results

From the data collection and analysis, the project consultant will compile a report summarizing the results and give a presentation regarding the results. A list of priority areas for leak detection crews to focus on will be compiled.

Deliverables for this task include technical a memorandum summarizing selected DMA attributes, report detailing DMA analysis results, and locations for leak detection crews to concentrate their efforts.

Task 3 – Leak Detection and Fixes

This task includes leak detection and isolation following the results of the DMA studies. Department and contract leak detection crews will isolate leak locations and areas of concern using information and data obtained during the Task 2 phase. This phase is estimated to take 9 months.

Deliverables for this task are a compiled list of leaks found stating location, recommended resolution method, and cost for repair.

Task 4 – Leak Repairs

Repairs to identified leaking infrastructure are the final component of this project following the initial identification through the DMA Implementation task and isolation during the Leak Detection task.

Task 4.1 – Main Line/City Asset Repairs and Replacements

Under this task, the Department will use in-house staff and outside contractors to perform repairs and replacements to City-owned infrastructure as identified during the leak detection phase of the project. It is anticipated that 14 months will be required for this phase of the project.

Deliverables for this task are completed City-asset repairs within the DAC-areas funded through this project.

Task 4.2 – DAC Homeowner Funding Repair Program

Under this task, the Department will develop a DAC Homeowner Funding Repair program that will aid in the funding of service-side repairs for residents of the DAC

areas. Historically, service-side leaks are common within the City; this repair funding program will decrease the burden on low-income area residents to fix property owner service-side leaks. This task includes program start-up, outreach, and funding of the repairs. Program start-up activities will include development of the DAC-area repair funding program, program structure, funding criteria, and funding mechanism. Outreach will include bill inserts, mailers, and other outreach activities designed to provide information about the program to homeowners in the selected areas. The funding program will last approximately 14 months and will provide funding for approximately 125 service-side leak repairs for DAC-area water users.

Deliverables for this task are completed service-side repairs for homeowners within the DAC-areas.

There are no environmental compliance or permitting costs associated with the initial DMA implementation, leak detection, and repair phases. City-asset replacements may require further environmental compliance or permitting costs which will be identified as necessary as they are identified.