Utility Board Agenda

For Meeting of February 9, 2018
7:00 PM to 9:00 PM
City Council Chambers, City Hall

Board Members:	Kwan Wong, Chairman, Tim O'Connell, Vice Chairman, Tom DeBoer, Mary Grady, Stephen Milton, William Pokorny and Brian Thomas
Council Liaison:	Council Member David Wisenteiner
Staff:	Jason Kintner, Public Works Director
	Chip Corder, Finance Director
	Francie Lake, Deputy Finance Director
	Patrick Yamashita, City Engineer
	Anne Tonella-Howe, Assistant City Engineer
	Brian McDaniel, Utilities Operations Manager
	Asea Sandine, Recording Secretary

Agenda topics

7:00 PM	Approve Minutes of January 16, 2018	All
	SCADA Master Plan Update	Brian McDaniel
	Work Plan	All

Transmitted via Email:
Agenda
Meeting Minutes
Work Plan

Next Meeting: April 10, 2018

UTILITY BOARD
REGULAR MEETING MINUTES
JANUARY 16, 2018

CALL TO ORDER:

Vice Chair O'Connell called the regular meeting of the Utility Board to order at 7:04 p.m. in the Council Chambers Room at City Hall, 9611 SE 36th Street, Mercer Island, WA.

ROLL CALL:
Vice Chair Tim O'Connell, Tom DeBoer, Mary Grady, Stephen Milton, Will Pokorny, and Brian Thomas present. Council Liaison David Wisenteiner joined the meeting later and Kwan Wong was absent.

City Staff: Jason Kintner, Public Works Director, Francie Lake, Deputy Finance Director, Anne Tonella-Howe, Assistant City Engineer and Asea Sandine, Recording Secretary were also present.

MINUTES:
Board Member Thomas moved to approve the minutes from the November 14, 2017 meeting. Board Member Porkorny seconded the motion. The Board unanimously approved the minutes.

REGULAR BUSINESS:

GENERAL SEWER PLAN UPDATE

Tonella-Howe introduced Lara Kammereck and Dan Reisinger of Carollo Engineers who presented the two remaining chapters of the Draft General Sewer Plan; the Capital Improvement Program (CIP) Chapter and the Financial Chapter. Tonella-Howe advised the Draft General Sewer Plan would to be presented to the City Council in February before it continues through the approval process. Kammerack shared that Mercer Island is unique with widespread pipes and a Lakeline that makes operations and maintenance difficult. Reisinger provided an overview of the analyses conducted during the Plan development He noted the Plan recommends high, medium and low categories for the rehabilitation and replacement (R/R) of pipes; identified pump stations have the most immediate R/R needs; and recommended a comprehensive Lakeline condition assessment be conducted to identify future reinvestment strategies Reisinger continued with a description of the 20-year CIP, describing the four categories in the CIP: General, Pipelines, Pump Stations, and LakeLine, and the projects identified within those categories. Reisinger concluded by sharing the total projected CIP cost over the next 20 years. Lake discussed the analysis she ran and presented one possible rate funded scenario to show funding for the first six-year's of the 20-year plan. The Board discussed concern over how the City will pay for the projected work, specifically whether the City will pay over a period of time with incremental rate adjustments or to consider funding some reinvestment with a potential future bond measure.

2018 WORK PLAN

O'Connell inquired if there had been any new information regarding the King County Sewer Interceptor project. Tonella Howe reported that King County has prepared plans to a 30% design level. Staff suggested this topic be added to a future Board meeting at a time when the County has new or updated information to share.

NEXT MEETING: The next scheduled meeting is February 13, 2018.

ADJOURNMENT: 8:44PM

_____

Asea Sandine
Recording Secretary

Memorandum

CITY OF MERCER ISLAND, PUBLIC WORKS DEPARTMENT
9611 S.E. 36th St. • Mercer Island, WA 98040-3732
(206) 275-7608 • FAX: (206) 275-7814
www.mercergov.org

To: Utility Board

Date: February 8, 2018

From: Brian McDaniel, Utilities Operations Manager
Michael Karl, Brown and Caldwell Engineers

Re: SCADA Master Planning Update

A Master Planning process is currently underway to outline the implementation strategy of the City's Supervisory Control and Data Acquisition and Telemetry (SCADA) system. The goal of the master plan is to identify short and long-term goals to serve the Mercer Island customers that includes maintaining existing service levels and meeting regulatory obligations. Using a proactive approach (20-year planning horizon), the Master Plan will identify areas of risk (identifying areas of immediate and long-term needs) while providing recommendations to reduce those risks along with improving redundancies that will result in protection of public health by having reliable utility services.

The City of Mercer Island's (City) sewer collection and water distribution systems are monitored and controlled independently. The City fully relies on the SCADA system for all control and alarm notifications; it is imperative that this system operate with highest reliability to protect the environment and effectively provide reliable and safe water and sewer services to the City's customers.

In 2017, the City was informed that some critical components of the SCADA system were obsolete and no longer available by the manufacturers. In addition, frequent alarms, fragmented SCADA components, and loss of reliability within the system prompted an internal evaluation of the SCADA System.

The City hired Brown and Caldwell (BC), an engineering firm specializing in SCADA system planning for sewer and water utilities. The master plan is being developed in the following phases:

- Phase 1 – Vision and condition assessment
- Phase 2 – Technology evaluation and selection
- Phase 3 – Cost-effective project prioritization
- Phase 4 – Implementation and lifecycle planning
- Phase 5 – Master plan development and executive summary report

At tonight's Utility Board meeting, BC staff will make a presentation to the Board regarding the drafted SCADA master plan. Following the meeting, staff will incorporate feedback and comments received.

Executive Summary (Draft)

The City of Mercer Island's (City) water distribution and sewer collection systems are monitored and controlled by two supervisory control and data acquisition (SCADA) systems. The City fully relies on the SCADA system for all control and alarm notifications; it is imperative that this system operate with upmost reliability to provide reliable and safe water and sewer services to the City's customers.

In 2017, the City was informed that some critical components of the SCADA system were obsolete and no longer available by the manufacturers. In addition, frequent alarms, fragmented SCADA components, and loss of reliability within the system prompted an internal evaluation of the SCADA system. Due to the age of the systems and complexities for system component improvements or replacement, the City began the SCADA master planning process to thoroughly evaluate the SCADA system, establish goals, create a strategic vision, and define a long-term plan for continued operation and maintenance, component expansion, and upgrades. This master plan is intended to provide a long-term framework that will ensure improvements work towards improved functionality and reliability for the City's water and sewer services.

To create the master plan, the City identified the need for engineering consulting services to assist in the development by providing an independent evaluation of the SCADA system for the sewer and water utilities. Brown and Caldwell (BC) was selected through competitive procurement to assist the City. The master plan was developed in the following phases:

- Phase 1 – Vision and condition assessment
- Phase 2 – Technology evaluation and selection
- Phase 3 – Cost-effective project prioritization
- Phase 4 – Implementation and lifecycle planning
- Phase 5 – Master plan development and executive summary report

Vision

The City's long-term vision is implementing a Smart Utility, where information can be pulled from various City applications into one place for efficient and effective information exchange to improve operations and support more informed decisions.

Smart Utility will improve City operations and efficiencies by integrating SCADA with other City enterprise business applications, including computerized maintenance management system (CMMS), geographic information system (GIS), utility billing, and grow with future systems that may include automated meter infrastructure (AMI) applications.

Smart Utility will equip system operators with time-valuable data to make data-driven decisions and improve operational efficiencies.

The City's vision for SCADA is centered around a reliable system that is intuitive for operators to understand and use for system operations. Operators will be able to effectively understand the needs of the control system and provide routine maintenance, troubleshooting, and perform interim upgrades utilizing internal resources. This will reduce the reliance on external support.

Condition Assessment and Recommendations

During the condition assessment, the City and BC (team) reviewed both the water and sewer systems. The City's SCADA equipment varies in age and condition, with some components installed as early as 1968. Much of the equipment has far exceeded normal life expectancy. Currently, the SCADA system for the water and sewer utilities operate independently, and both systems present failure points. The probabilities of failure present unacceptable levels of risk to the City and its customers. Many of these failures can result in loss of reliable data and access to critical system alarms. Without this information, operators lose all insight into the process operation, with significant consequences if not addressed, including impacts to public health, life safety, or disruption of water and sewer services for the City's customers.

In addition to these unacceptable risks and consequences, it was determined that the SCADA system for both water and sewer lacks a user-friendly operator interface and proper documentation of how it works. Operators are unable to use the system to perform routine control functions and have very limited access to basic historical data, trending, and reporting that are essential to daily operations. Due to the age and configuration of the system, it is lacking many modern tools to enable an efficient and mobile workforce.

SCADA systems comprise different layers of technology, as shown in Figure ES-1, that need to work together with perfect integration. Each layer relies heavily on the layer above or below it, communicating or receiving information from the associated layers. The components within each layer age and become obsolete at different rates and represent significant challenges. The SCADA system hasn't had a complete system upgrade since the original install. Reactionary upgrades as components fail have only provided short-term solutions. This has left the City with a fragmented system with no easy path for individual component replacement. Figure ES-1 summarizes the results of the condition assessment and includes the age of existing components. The ages in Figure ES-1 refer to the hardware ages. The software or application program ages for the human machine interface (HMI), master terminal units (MTUs), and remote terminal units (RTUs) are significantly older than the hardware.

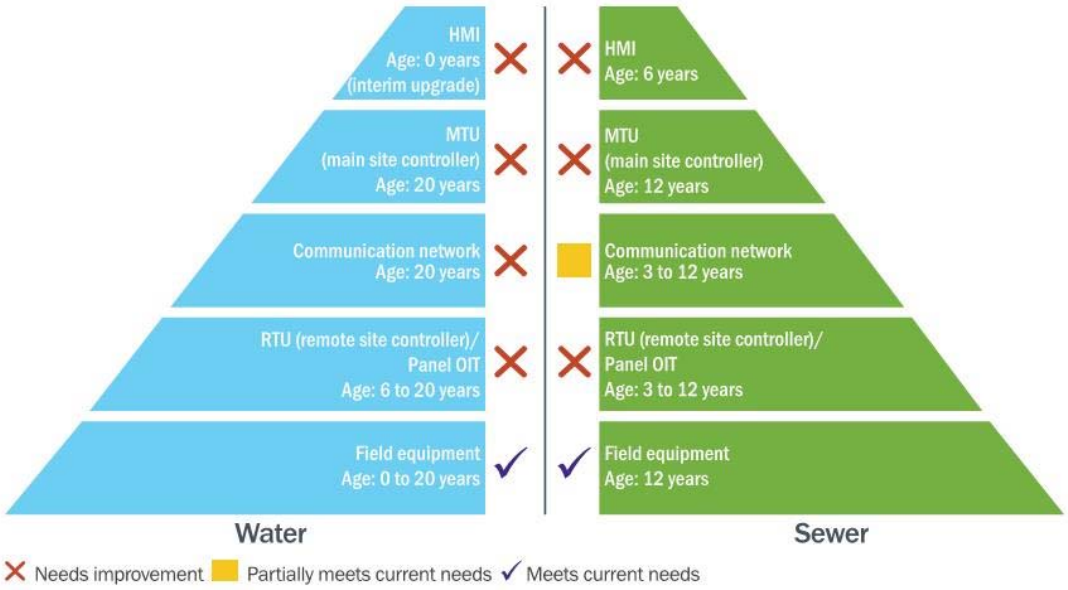

Figure ES-1. Mercer Island SCADA system hardware condition assessment

During the condition assessment, the following key findings and recommendations were identified:

- **Merge Water and Sewer SCADA systems:** An evaluation of retaining separate water and sewer SCADA systems or merging into one SCADA system was evaluated and discussed. The City decided to combine water and sewer into one SCADA system and leverage the same technology for streamlined maintenance, service, training, and spare parts.

  A merged SCADA system provides the following advantages:

  - Cost savings and optimization of capital to support SCADA
  - Streamlined maintenance and updates
  - Reduced number of spare parts
  - Information from one central location
  - Shared information technology (IT) services
  - Streamlined standards to reduce training time
  - Reduced number of network communication complexities to secure, monitor, and maintain a system
- **Operational control strategies**: The City's SCADA system provides local automated control and remote monitoring/control of the water and sewer sites. Recommend adding additional control and monitoring capabilities to enhance operator understanding, provide proactive alerts and alarms to prevent system disruptions, and improve process operations.
- **Existing controller platforms:** The current controllers are a collection of different technologies with many components no longer available or supported by the manufacturer. Recommend replacing the controllers with a major industry vendor platform to allow the City to standardize on a single platform and reduce the amount of spare parts and training required.
- **Existing security and communications**: The communications systems use a combination of different methods with little to no cyber security defense in depth strategies. Some have limited network speed, and many have reliability issues. Recommend that the City implement a new communications system to provide standardization, long-term stability and support, and increased data transfer speed with backup communications at high-priority water and sewer sites.
- **Human-machine interface (HMI) platforms**: Access to historical data, trending, and reporting is difficult to use or non-existent. The lack of system redundancy, along with aging components, puts both water and systems at risk of failure with significant consequences, including prolonged SCADA downtime. Recommend that the HMI platforms be upgraded with built-in redundancy to reduce failures.
- **Support and maintenance**: The current support and maintenance structure results in heavy reliance on outside vendors and consultants. Reliance on external consultants and lack of staff training has led to operational inefficiencies and loss of operator knowledge on the SCADA system. Due to the criticality of the SCADA system to maintain essential City services, it was determined that the most efficient and reliable method to protect and steward this investment was for the City to have staff with expertise to provide continued support and maintenance of the system. It is recommended that the City implement a training program, provide routine maintenance and troubleshooting with internal resources, and hire an internal instrument technician to be trained on the new SCADA system. The City does not currently have a technician

within existing resources. Adding this resource will reduce the reliance and cost associated with outside vendors and keep knowledge on the SCADA system within the City.

Technology Evaluation and Selection

It was determined that the City needed a strong technology partner that could provide a guarantee of long-term value and a reliable upgrade path for support and renewal of technology over the life span of the SCADA system. During the planning process, the City evaluated and selected a new SCADA technology platform through the request for proposals (RFP) process. Selecting a technology platform prior to design and project implementation was key to allowing the City to have more control over the features and outcome of the SCADA system. The City selected SCADA technologies that would enable integration with Smart Utility to meet the City's long-term vision. Selecting a technology partner that has a proven track record for providing continuing technology support and migration was also a key factor in the decision. The City selected Siemens with their WinCC OA platform that guaranteed support for 10 years. This selection process allowed the City to meet their goal of standardizing on a single SCADA platform for water and sewer services and to minimize maintenance, service, training, and spare part costs.

Project Prioritization

The team discussed project recommendations and options for implementation with consideration for overall system value, areas of greatest risk, and opportunities for cost savings. The recommendations were evaluated based on the associated risks and consequences of component failures at individual sites, the age of the current technology, and the average technology life spans. The City decided to proceed with a complete replacement of the SCADA system over a 3-year project.

This approach was selected for the following reasons:

- **Lower overall capital investment** as compared to phasing projects
- **Reduced risk** by replacing aging hardware and software
- **Supports the City's goal** to merge the water and sewer systems
- **Shorter implementation timeline** which will allow staff and operations to benefit from the replacement sooner and spend less time supporting interim projects
- **Consolidation of technology** to minimize maintenance, service, training, and spare parts
- **Increased operator efficiency** through improved understanding of alarms, clarity of process conditions, and reduced training time on a new SCADA system

Implementation Plan

An implementation plan was developed to organize the recommended project of a complete SCADA system replacement into major tasks with a detailed schedule and budgetary estimates. The implementation plan has been reviewed with project stakeholders, and the following provides an overview of the major implementation tasks:

- **Implementation Task 1—Design:** Includes designing a complete SCADA replacement system using the technology selected during the RFP process.
- **Implementation Task 2—System Integration:** Includes software programming for the SCADA system components, as well as configuration, startup services, and training. This task includes pilot testing, to allow the City to provide feedback and ultimately have more control over the outcome of the system.

- **Implementation Task 3—Construction:** Includes site staging; construction sequencing; permitting; traffic control; furnishing of SCADA system equipment; fabrication; installation work; electrical work; and commissioning of a new SCADA system.

Following implementation of the SCADA system replacement project, the **future improvements** provides an overview of the recommended projects to leverage Smart Utility benefits. Smart Utility will improve City operations and efficiencies by integrating SCADA with other City enterprise business applications.

Lifecycle Planning

A lifecycle plan was developed to address annual support needs and 3-year computer upgrades along with other upgrades for the next 10 to 15 years. A lifecycle plan was developed to address annual support needs along with other upgrades needed over a 15-year planning horizon. Considerations include replacement based on expected useful life, routine software and hardware upgrades, and integration with Smart Utility. These are provided in Table ES-1 for future capital planning needs.

Table ES-1 Lifecycle Planning Summary

Task	Timeline
Software patches and upgrades	Annually
Instrumentation renewal and replacement	Annually
Computer hardware upgrades	Every 3 years
Revisit master plan and revise as needed	Every 3 years
Smart Utility integration	Beginning in 2021
PRV monitoring (10 sites as pilot)	2022
PRV monitoring (remaining sites)	2025

Utility Board
2018 Work Plan

Meeting Date	Agenda Item
January 16	General Sewer Plan - CIP Focus
February 13	Scada Master Plan
March 13	Recess
April 10	Solid Waste Contract Review and Schedule
May 8	Water Quality Metrics & CIP Classification EAM Implementation Update
June 12	Board Elections Utility CIP Preview
July 10	2018 Project Updates
August 8	Recess
September 11	Sewer Budget & Rates Stormwater Budget & Rates
October 9	Water Budget & Rates EMS Rates
November 13	Solid Waste Contract
December 11	Meter Master Plan Implementation
To Be Scheduled	Rate Methodology