



TO: Mayor and Council

FROM: Tom Crawford, Interim City Administrator
Craig Hupy, Public Services Area Administrator

DATE: April 6, 2020

SUBJECT: Water Treatment Plant SCADA Modernization Project Scope

The purpose of this memorandum is to provide a status report on the Water Treatment Plant (WTP) Supervisory Control and Data Acquisition (SCADA) Modernization project, which is the City's first Progressive Design Build (PDB) project. This memorandum will share details on how the project has evolved (both in terms of scope and cost) from its initial conception.

Project Overview

The WTP SCADA system is critical infrastructure that is necessary to control, monitor and communicate all essential operations at the WTP and remote stations. Currently, all major system components are over 20 years old and have been discontinued by their respective manufacturers. Spare parts are no longer available which increases the risk to the WTP operations. Similarly, the software and computers have all reached their update and support limits and cannot be further upgraded. Replacement of the system is required to ensure reliable and secure operation of the WTP.

The WTP SCADA Modernization project was added to the Capital Improvement Plan in 2014. At that time, the main focus of this project was to replace the existing and aging control system hardware and software with modern equivalents that will be reliable and fully supported for the next 20 years.

Project Approach

The existing SCADA system was installed in 1997. Technology has changed significantly since this time, with many generations of control systems introduced since the original installation. The advances in both software and hardware over the last 22 years have increased both the capabilities of a SCADA system as well as its vulnerability. Distilling the options to balance both functionality and security have added to the complexity of the planned work. To leverage the benefit of having contractor and vendor input into the design process to ensure that the final product is optimal, the City decided to employ the Progressive Design Build (PDB) project delivery method. The PDB model combines the Design Engineer and Contractor into one single team. The main advantage of this approach is to utilize the expertise of the Contractor during the design phase, yielding an innovative and forward-thinking project while saving time and money. During the design phase, the PDB team develops a contract price which sets the maximum cost of the project. This reduces the risk to the City for budget overruns.

PDB, as well as other alternative project delivery methods, are becoming increasingly more prevalent. The City will be using this project to pilot this delivery method and determine its applicability for future projects.

Design Phase Findings

The City's original concept of this project focused on the simple replacement of the control system hardware and software. However, the experts on the PDB team demonstrated the shortcomings of the simple replacement and that significant gaps would be left in the control system if the design was completed as originally proposed. Through numerous meetings, design workshops and other collaboration with the PDB team, these critical shortcomings were considered and addressed. The PDB model proved itself valuable in developing implementable solutions that combined the needs of the City with industry-proven solutions and functionality into a modern, highly capable control system.

Examples of the gaps in the original scope and the solutions to rectify them are described as follows:

- Lack of cyber security measures. Since this project was conceived, Congress passed the American Water Infrastructure Act in 2018. This act required utilities that serve greater than 100,000 people (which includes the City of Ann Arbor) to conduct a Risk and Resilience Assessment which includes an assessment of cybersecurity and control systems. Vulnerabilities identified coincident with this effort warranted cyber security improvements that meet current water sector standards.

- The original scope did not integrate the different software platforms used throughout the WTP operations. Integration of SCADA, Laboratory Information Management System (LIMS), and Computerized Maintenance Management System (CMMS) data in a common database will assist in meeting regulatory requirements and develop efficiencies in water quality reporting, maintenance scheduling and prioritization, and asset management.
- The original scope did not address the proprietary data historian from which it was difficult to mine data. The new system includes the capability to share more information with the public to increase transparency.
- The WTP Control room has insufficient security and is poorly designed for current control schemes. The control room is original to the plant and was constructed in 1938. The revised scope includes modifying the control room to remove wall panel motor control stations that date from original WTP construction and are no longer in service to accommodate new technology and a flexible use of space.
- Currently, WTP staff can only monitor data and alarms from workstations at fixed locations in the plant. The new scope includes remote SCADA data availability and alarming capabilities have been added to keep operators closer to critical data no matter where they are in the plant, thus improving response time. Wireless solutions, greater access to workstations, and text-based alarm notifications will all be used to keep critical data in the hands of the operators no matter where they are on the grounds.

By incorporating these modifications to the original scope, the WTP will receive a modern, scalable, supported, and fully integrated SCADA system with an expected life of 20 years.

Budget and Schedule Impacts

The City has completed negotiations of the final contract price with the general contractor that incorporate the added value items identified previously. The revised total project cost for FY20 through FY22 is \$5,103,000 which includes a contract price of \$4,126,502.79 compared to the original project budget of \$2,250,000. The construction portion of the project is scheduled for FY20 through FY22. This revised project budget has been incorporated into the Water Fund CIP that was presented to Council during the budget work session on February 24, 2020. In order to minimize the financial impact of the cost adjustment for this project, the schedule of some lower priority projects were pushed out in the CIP schedule, resulting in no net change in the Water Fund CIP total for the period of FY20-22.

Recommendation

Due to additional scope, the City investigated multiple alternatives to minimize the cost impact associated with the scope change. Options included delaying the project, phasing the project, or completing the project with the original scope. Because of the critical nature of this project and need to modernize the SCADA system to improve the reliability and security of the water system's controls, staff are recommending moving forward with the expanded scope of services, delay some lower priority water system improvements, and complete the project over the next two fiscal years. It is this recommendation that is before you for consideration as part of Agenda Item 20-0412.