



DATE: May 18, 2021

TO: Mayor and City Council

FROM: Director of Public Works

SUBJECT Adopt a Resolution Authorizing the City Manager to Execute a Professional Services Agreement with Carollo Engineers, Inc., for the Water Pollution Control Facility Main Switchboard Electrical Distribution Rehabilitation Project, Project No. 07656, in an Amount Not-to-Exceed \$1,108,835

RECOMMENDATION

That Council authorizes the City Manager to execute a professional services agreement (PSA) with Carollo Engineers, Inc., in an amount not-to-exceed \$1,108,835 for the Water Pollution Control Facility (WPCF) Main Switchboard Electrical Distribution Rehabilitation Project, Project No. 611-07656.

SUMMARY

The WPCF treats an annual average wastewater flow of approximately eleven million gallons per day (MGD) and meets current requirements to discharge treated effluent to the deep waters of the San Francisco Bay. The existing main switchboard (MSB) originally installed in 1982, is a key component of the power distribution system at the WPCF. The MSB along with several related motor control centers (MCCs) have provided power and controls to various plant processes for nearly forty years. Concern over continued reliability of the switchgear due to obsolescence and availability of parts, as well as the current condition and continued deterioration from corrosive atmospheres, prompted staff to request that the electrical system be evaluated as part of the WPCF Phase II Facilities Plan. The Phase II Facilities Plan serves as a comprehensive planning document for the WPCF infrastructure needs for the next twenty-five years. An evaluation of the Old Cogeneration Building Electrical System was performed as part of the planning effort. The evaluation recommended replacing the existing MSB as well as consolidating and replacing several existing aged MCCs, and retrofitting the existing old Cogen Cogeneration System Building to house the new electrical equipment.

BACKGROUND

The WPCF collects and treats wastewater from the City's residents and businesses. The original WPCF 480-volt MSB was designed to power the entire WPCF at the time of its construction and was connected directly to two cogeneration engines that satisfied part of the plant demand, and a standby generator as a backup to Pacific Gas & Electric (PG&E). In 2008,

the Phase 1 WPCF upgrade project was completed that included a new service entrance from PG&E, a new 12-kV switchgear building, a 12-kV power grid, several 12-kV substations to distribute power around the plant, and a new standby diesel generator. The electrical system upgrades were largely constructed to serve new loads added as part of the Phase 1 project and other than sub-feeding the power to the MSB, did not include improvements to the plant's existing 480-volt power system. In 2014, a new 1,132 kW cogeneration system was commissioned as part of the Cogeneration Upgrade Project, and the old cogeneration engines that previously supplied power to the plant through the MSB were decommissioned. The MSB continues to supply power to many vital loads throughout the plant, including the headworks, north and south vacuators, the primary treatment process, the west trickling filter, the anaerobic digesters, the site wastes pump station, and various buildings throughout the plant.

The MSB was installed in 1982, and at nearly forty years in service has exceeded its useful life. Staff have difficulty procuring replacement parts since they are obsolete and no longer being produced. In 2006, an assessment of the existing MSB equipment was performed by Terada Engineering, Inc., which recommended replacement of switchgear components due to component obsolescence. This assessment also noted that the switchgear was housed within a room that was subjected to significant levels of hydrogen sulfide due to its proximity to (the East Barminutor Structure) where two of the City's main sewer lines converge. In 2020, as part of the WPCF Phase II Facilities Plan, an evaluation was completed that confirmed the previous findings that recommended replacing the MSB.

In addition to evaluating the MSB, several of the existing MCCs powered by the MSB were evaluated and recommended for replacement due to their age, and obsolescence. These MCCs were installed at the same time the MSB (1982) and are also at the end of their useful life. These include the obsolete MCC-5B, which primarily includes breakers and starters associated with the old, decommissioned cogeneration equipment, MCC-5A, which supplies equipment located in the boiler room, several obsolete pump control panels serving the flow equalization return pumps, and several starters for the West Trickling Filter ventilation system located in a nearby outdoor MCC (MCC-19) that is in extremely poor condition and slated to be demolished. These MCCs and control panels will be housed in a new MCC panel located adjacent to the new MSB. In addition, the existing supervisory control and data acquisition (SCADA) / remote telemetry unit (RTU) cabinet located inside the electrical switchgear room will be replaced with a new programmable logic controller (PLC) cabinet to serve equipment housed in both the MSB and new MCC.

The Site Waste Pump Station (SWPS) currently houses MCC-2A and 2B which were also installed in 1982 and have reached the end of their useful life. A new replacement MCC and PLC panel is included as well as potential upgrades to the electrical room to achieve compliance with National Electric Code (NEC) and National Fire Protection Association (NFPA) requirements. Pending the results of the NFPA study, the HVAC design for the SWPS is included as an optional task. MCC-2A and 2B provide power and control to many essential plant process areas including primary treatment and anaerobic digestion. Replacement is needed to for continued reliability of the WPCF operations.

The Fluidized Bed Reactor (FBR) houses MCC 4 which was installed in 1982 and is powered from two 500-ampere breakers from the MSB. The FBR facility has been out of service since 2005 and subsequently the existing MCC 4 only serves minimal loads including building lighting and a couple sump pumps. The project includes decommissioning MCC 4, and installing a new 480-volt transformer and panelboard to serve the existing loads. This will both reduce construction costs associated with replacing the large 500-ampere breakers, as well as enhancing safety as MCC 4 and its associated 40-year-old duct banks that are no longer needed for the facility.

In addition to replacing the MSB and MCCs, the Phase II Facilities Plan recommended retrofitting the existing Old Cogeneration Building to provide the required architectural, seismic, and environmental improvements needed to house the new electrical equipment. The improvements include structural retrofits, removing unused equipment formerly associated with the cogeneration system from the roof of the building, sealing openings in the roof and floor associated with the engines and associated piping, installing a new roof, replacing existing louvers with windows or other infill, adding interior finishes, and replacing the heating, ventilation, and air conditioning (HVAC) equipment. A structural and building code evaluation will be included to determine options for potentially repurposing the area within the Old Cogeneration Building formerly housing the cogeneration equipment and standby power generator into an occupied space for use by WPCF staff. The design for repurposing the Old Cogeneration Building into an occupied space is included as an optional task.

As noted above, the building is currently designed in an open louvered and ventilated structure which has resulted in extensive corrosion of the copper components within the electrical enclosure, and corrosion to an elevated copper bus duct and surrounding structure associated with transformer located outside the building. A new transformer is included to replace the existing corroded unit and will be located further away from the existing East Barminutor Structure in a less corrosive atmosphere.

DISCUSSION

The recommendations from the Phase II Facilities Plan are to replace the plant's existing MSB, MCCs, and related equipment. The existing electrical equipment, installed in 1982, has exceeded its useful life. In addition, staff have difficulty procuring replacement parts, as the parts are no longer produced. The existing MSB is at risk of failure due to long-term exposure to hydrogen sulfide and the resulting corrosion of its copper bussing. Replacement is needed for continued operational reliability of the WPCF and many of its essential processes.

On March 1, 2021, staff issued a request for proposals to consulting firms with specialized experience and knowledge of wastewater electrical equipment and facilities. On March 26, 2021, staff received three (3) proposals from Black & Veatch, Brown & Caldwell, and Carollo Engineers. The estimated design and engineering services during construction costs ranged from \$812,660 to \$1,095,694. After reviewing the submitted proposals, staff recommends Carollo Engineers, Inc., (Carollo) for the project based on their responsiveness to the proposal and schedule, extensive knowledge of wastewater plant electrical components and facilities, and experience of the proposed team in designing similar wastewater electrical and facility

improvements. The firm focuses on water and wastewater related projects and has performed recent similar projects for numerous clients in the Bay Area. In addition, Carollo has completed several projects for the City including the 2018 Headworks Rehabilitation Project, 2019 Headworks Bar Screens Project, and the highly successful cogeneration project at the WPCF.

After reviewing the submitted proposals, staff identified additional scope tasks to be included within this design contract, including decommissioning MCC 4, analyzing building code requirements to modify the occupancy at the Old Cogen Building, assessing the required structural and HVAC modifications required to bring the Site Waste Pump Station's electrical room in compliance with NFPA and NEC standards, reviewing the Phase II Facilities Plan for possible additional loads that might be serviced by the new MSB, and a hazardous materials survey that is required for any modifications of existing structures. Design for the Site Waste Pump Station structural and HVAC modifications, and improvements required for repurposing the room formerly housing the old Cogen and standby power diesel engines into an occupied space have been added as optional tasks. Staff will evaluate and authorize these additional design services only if needed and as determined following further design development in the preliminary design stage. In addition, the proposal fees were based on design of MCC 2A and 2B as optional scope items. Staff decided to proceed with design of the MCC 2A and 2B replacement, which added additional effort to engineering services during construction. Given the revised scope of work, staff has negotiated an additional \$146,810 for design services, and an additional \$48,364 in design services for the optional services. In addition, staff is requesting an additional \$100,000 in design contingency be added to the optional services task to cover additional design tasks and/or engineering services during construction if needed. Staff may utilize any additional budget allocated for optional services only after detailed review, on a case-by-case basis. The total not-to-exceed fee with the added scope items including optional services is \$1,108,835.

The total engineering design and engineering services during construction are approximately 13% of the estimated total construction cost, which is in the typical range for projects of this complexity. The total engineering design service fee is competitive given the scope of work and the complicated nature of wastewater electrical equipment and facility project upgrades.

ECONOMIC IMPACT

Replacing the MSB, MCCs, and related electrical equipment are part of an effort to modernize and upgrade existing facilities. The project will greatly improve reliability by reducing staff time associated with breakers tripping causing unplanned outages and staff time attending to issues otherwise related to component failures. The community will enjoy the benefits of the project, including maintaining effective treatment that provides environmental protection of the San Francisco Bay.

FISCAL IMPACT

The FY 2021 through FY 2030 Capital Improvement Project (CIP) includes funding for the projects described in the Sewer Replacement Fund (Fund 611). Table 1 shows the projects as described in the approved CIP.

Table 1. Sewer Improvements Funding

Fund	Project No.	Description	Budget
611	07653	MCC 2 Replacement	\$300,000
611	07707	WPCF MCC 5 & 19 Replacement	\$500,000
611	07719	WPCF Old Cogen Building Repurpose	\$400,000
611	07956	WPCF Main 480V MCC Electrical Distribution Repurpose	\$7,467,000
		Total	\$8,667,000

The breakdown for project costs is as follows:

Total Project Cost

Engineering Services (Consultant)	\$1,108,835
Design and Construction Management – City Staff (Estimated)	\$100,000
Construction Contract (Estimated)	\$8,211,000
Construction Contingency (10% of Construction Contract)	\$821,100
Inspection and Testing (Estimated)	\$100,000
Total	<u>\$10,340,935</u>

The construction cost assumes all project elements will be constructed. The project cost will be confirmed during the preliminary design phase. The construction cost is only a pre-design stage estimate, and staff would return to Council to request that additional funds be appropriated to cover the additional cost of the project if needed after the bids are received.

STRATEGIC ROADMAP

This agenda item supports the Strategic Roadmap of Improve Infrastructure.

SUSTAINABILITY FEATURES

This project will help the City maintain its ability to treat wastewater efficiently and adequately before discharging into San Francisco Bay.

PUBLIC CONTACT

All project work will be within the WPCF plant boundary and should have no impact on area businesses or the public at large; therefore, no public contact is necessary for this project.

NEXT STEPS

If approved, staff will finalize a PSA with Carollo Engineers, Inc., and issue a Notice to Proceed. Staff will return to Council for approval of the final design plans and specifications, and to call for bids in January 2022.

The following schedule has been developed for this project:

Council Approval	May 18, 2021
Approval of Plans and Specifications and Call for Bids	January 2022
Award of Construction Contract	March 2022
Construction Completion	June 2023

Prepared by: Mariza Sibal, Associate Civil Engineer

Reviewed by: Suzan England, Senior Utilities Engineer

Recommended by: Alex Ameri, Director of Public Works

Approved by:



Kelly McAdoo, City Manager