



DATE: April 9, 2019

TO: Mayor & City Council

FROM: Director of Public Works

SUBJECT Authorization for the City Manager to Execute a Professional Services Agreement with Carollo Engineers for Engineering Services for the WPCF Headworks Bar Screens Project (No. 07567) in an Amount Not-to-Exceed \$1,071,028

RECOMMENDATION

That Council adopts the attached resolution authorizing the City Manager to execute a professional services agreement with Carollo Engineers for engineering services for the WPCF Headworks Bar Screens Project in an amount not-to-exceed \$1,071,028.

SUMMARY

The Water Pollution Control Facility (WPCF) collects and treats wastewater from the City's residents and businesses. The WPCF headworks facility is the first treatment process in the plant and is responsible for removing large debris that can harm downstream pumps and other equipment. Currently, the headworks relies on grinders to protect downstream equipment. In recent years with the increasing popularity of "disposable" wipes, downstream processes have been impacted by the inability of the grinders to remove these wipes that cause pumps and pipes to clog. In addition, wipes collect in the digesters reducing their capacity and causing them to be removed from service more frequently for cleaning. This project includes installing new bar screens to replace the grinders. Bar screens are much more effective at removing wipes and are typically employed throughout the industry in headworks designs. This project also includes related evaluations and optional design services for the ferric chloride and odor control facilities.

BACKGROUND

The WPCF treats an annual average flow of twelve million gallons per day (MGD) and meets current requirements to discharge treated effluent to the deep waters of the San Francisco Bay. All flow coming to the WPCF passes through the Headworks facility where it is collected in pump station wetwells prior to being pumped to the WPCF treatment units. Upon entering the pump station wetwells, the influent flow is conveyed through influent channels that contain grinders designed to break down large debris prior to pumping. The headworks was constructed in 1996 and is essential to plant operations. In 2016, a project was completed that rehabilitated interior concrete surfaces that had deteriorated from corrosion.

In 2018, Council authorized a professional services agreement with Black and Veatch to perform the WPCF Phase II Facilities Plan that is to serve as a comprehensive planning document and identify WPCF infrastructure needs for the next 25 years. A headworks evaluation was performed as part of the planning effort. The evaluation recommended replacing the existing grinders with new bar screens to address operational issues at the WPCF. In addition, several other related improvements including motorized actuators for operating the influent gates, odor control improvements, and preliminary design considerations for an improved ferric chloride facility are included in the project.

DISCUSSION

Bar Screens

The recommendation from the Phase II Facilities Plan is to replace the plant's existing grinders with new bar screens and related equipment (screenings conveyance and screenings washer/compactor). The grinders are designed to protect influent pumps from large debris; however, they do little to prevent rags and other stringy material from passing through to downstream processes. This has been further exacerbated by the proliferation of "disposable" wipes that are flushed down toilets and end up at the WPCF. These wipes cause significant problems because they do not break down in the collection system like toilet paper, creating solids that build up in tanks and piping systems. The impact of disposable wipes to the wastewater industry is well documented and is reflected in the significant mechanical hardships and maintenance time at the WPCF in downstream processes.

Bags and disposable wipes end up in the "digester" and reduce the space available for organic matter that can produce beneficial bio-gas. Currently, WPCF staff take a digester out of service annually for cleaning and rag removal. The WPCF has three digesters, which means they are rotated out of service for cleaning once every three years. Typically, facilities that have effective rag removal at their headworks facilities can go five or more years between digester cleanings. The most recently cleaned digester had fifteen dumpster sized loads of rags removed after only a few years since it was last cleaned. The annual expense for cleaning, screening for rags, and disposal can be up to \$35,000 a year, not including staff time. In addition, one of the two grinders are removed from service annually for re-tooling the cutting blades. This costs the City over \$60,000 annually in maintenance costs.

Motorized Valve Actuators for Influent Gates

The headworks has three influent channels (two with grinders and one with a manual bar rack). During the dry weather season, normally only one grinder channel is in service. During the wet weather season, a second channel is placed into service when flows exceed approximately 20 million gallons per day (mgd). Currently, the level is monitored, and the Operator is alerted via a high-level alarm to place a second channel in service. The gates are manually operated and due to their size, opening and closing the gates requires significant effort and time. Electrically operated gates will greatly simplify the operations of the facility by allowing channels to be placed into service more quickly and from remote locations,

allowing Operators to attend to more pressing matters that frequently occur during wet weather.

Ferric Chloride Facility

There is a ferric chloride facility immediately adjacent to the Headworks facility that is old and in need of upgrading. Access to the facility is difficult for chemical deliveries and is even more constrained following the completion of Whitesell Street. The chemical is currently used for odor control in the Headworks, and the location could be impacted by the layout of the new equipment including the screenings washer/compactor and associated dumpster. In addition, the ferric chloride facility is not fully contained against accidental spills from leaking pipes and appurtenances and may not be fully code compliant for storage of hazardous materials. This task includes a study of the existing conditions and recommendations for any upgrades required to bring the facility into compliance with current fire codes, and possible relocation to a more accessible area. The scope of work includes preliminary design, and an optional final design task should it be determined that the existing facility needs to be replaced or upgraded.

Ventilation System and Odor Control Improvements

The 2016 Headworks Rehabilitation Project upgraded the ventilation system in the bottom level of the Headworks to draw foul air from the channels and to provide supply air directly to the lower level where most of the odors are generated. With the addition of bar screens and screenings handling/washing equipment, improvements may be required to the upper level as well. The scope of work includes an evaluation of the ventilation system and recommended improvements that would be incorporated into the design. In addition, the existing biofilter that was installed with the original project in 1996 to reduce odors has wood chip media that has degraded and is no longer functioning effectively. This type of odor control technology has limited lifespan, typically 10 to 15 years, and is therefore in need of replacement. The scope of work includes an evaluation of odor control technologies and recommendation for replacement. An optional final design services task has been included pending the outcome of the evaluation.

Optional Services

The area adjacent to the headworks is congested and contains several large fans serving the West Trickling Filter. Depending on the layout needed for the screenings washer compactor equipment, and possible exterior entry stairway to the station's lower level to free up room in the upper level for screenings conveyance, an optional design task was included for relocating some of the existing equipment. Since the need to relocate the equipment will not be known until further refinement of the design concepts, an optional task is included for this item.

The preference in performing this work during the summer, dry months is to minimize possible bypass pumping costs, and reduce risks of encountering high flows during construction. Depending on the equipment selection and lead time for fabrication, the City may elect to pre-purchase the equipment to ensure delivery in time to install during the dry

season. This approach may also result in reduced construction time and costs. Staff will evaluate if this approach makes sense during the preliminary design phase, and if so, optional services are included to assist the City with pre-purchase contract documents. Staff will return to Council for authorization to pre-purchase the equipment if this approach allows procurement in time for installation during dry weather.

An optional design task is also included for computation fluid dynamics (CFD) modeling of the influent wetwell. CFD modeling might be beneficial to determine if the influent flow can be channeled or modified to improve the approach to the bar screens. Increased screenings efficiency might be achievable with minor modifications of the channel to reduce turbulence and improve the flow profile upstream of the bar screens.

Staff will evaluate and authorize these additional design services only if needed and as determined during further design development in the preliminary design stage.

Consultant Selection

On January 23, 2019, staff issued requests for proposal to consulting firms with specialized experience and knowledge of headworks facilities. On March 12, staff received three proposals from Black and Veatch, Carollo Engineers, and Lee & Ro. After reviewing the submitted proposals, staff recommends Carollo Engineers for the project based on their responsiveness to the proposal and schedule, extensive knowledge of headworks facilities, and the experience of the proposed team in designing similar retrofit projects. 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 Engineers has completed several projects for the City including the 2018 Headworks Rehabilitation Project, and the highly successful cogeneration project at the WPCF.

Staff has reviewed the proposed scope of work and has negotiated a final proposal fee of \$693,249 for final design services and engineering services during construction, and optional design services not to exceed \$377,779. As noted above, optional tasks may or may not be authorized pending the outcome of preliminary design work. Due to uncertainties in the design scope of this kind of complicated work, staff has requested an additional \$82,000 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 professional services are about 15% of the estimated total construction cost, which is reasonable given the scope of work and the nature of complicated retrofit projects. The engineering services during construction is about 4.5% of total construction cost, which is reasonable for these types of projects.

ECONOMIC IMPACT

Replacing the grinders with bar screens are part of an effort to modernize and upgrade existing facilities. The project will reduce operations and maintenance costs associated with

repairing grinders and cleaning digesters. In addition, unplanned outages and staff time attending to issues related to accumulations of rags and wipes in the piping and pumping systems will be reduced. 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 2019 through FY 2028 Capital Improvement Program (CIP) includes funding for the projects described in the Sewer Replacement Fund (Fund 611). The projects are described in the approved CIP as follows:

FUND	PROJECT No.	DESCRIPTION	BUDGET
612	07567	WPCF Sludge Screening	\$ 2,315,000
611	07677	WPCF Biobeds Media Replacement	\$282,000
611	07619	WPCF Motorized Valve Actuators for Influent Gates	\$105,000
		Total	\$2,702,000

The breakdown for project costs is as follows:

Total Project Cost

Design and Engineering Services During Construction (Consultant)	\$ 1,071,028
Design Administration – City Staff	100,000
Construction Contract (Estimated)	4,352,000
Inspection and Testing (Estimated)	100,000
Total	<u>\$5,623,028</u>

The construction cost is only an estimate and assumes all project elements will be constructed. Note this will be confirmed during the preliminary design phase. Should the construction cost exceed the funds currently allocated in the CIP, staff will return to Council to request that additional funds be appropriated to cover the additional cost.

STRATEGIC INITIATIVES

This agenda item does not directly relate to one of Council's Strategic Initiatives.

SUSTAINABILITY FEATURES

No sustainability features are associated with this item.

PUBLIC CONTACT

All project work will be within the WPCF boundary; therefore, no public contact is necessary for this project.

NEXT STEPS

Following Council approval, staff will finalize a professional services agreement with Carollo Engineers and issue a Notice to Proceed. Staff will return to the City Council for approval of the final design plans and specifications and call for bids in December.

The following schedule has been developed for this project:

City Council Approval	April 9, 2019
Approval of Plans and Specifications and Call for Bids	December 1, 2019
Award of Construction Contract	February 2020
Construction Completion	February 2021

Prepared by: Suzan England, Senior Utilities Engineer

Recommended by: Alex Ameri, Director of Public Works

Approved by:



Kelly McAdoo, City Manager