

**CITY OF HAYWARD
WATER POLLUTION CONTROL FACILITY
HEADWORKS BAR SCREEN PROJECT**

SCOPE OF SERVICES

March 25, 2019

TASK 1 – PROJECT MANAGEMENT AND MEETINGS

Task 1.1 – Project Administration and Management. Carollo will provide project administration and management to perform planning, execution, and reporting of this project from design through construction. Carollo will prepare monthly progress letter reports for attachment to the invoice to track and report status of budget expenditures (using a summary table or “S” curve), schedule, and key work products completed during that billing period.

Task 1.2 – Meetings. Carollo will attend and conduct four (4) meetings (each two-hours in duration exclusive of travel time) during the preliminary and final design phases. These include:

- One Kick-Off Meeting - Carollo will review the project scope and deliverables, project cost and schedule, and information requests. Carollo will solicit input from WPCF engineering and O&M staff, discuss the existing headworks and collection system, ask questions, and collect anecdotal information about facility operation, known issues, O&M challenges, and preferences for the improvements. Carollo will conduct a visual check of the existing headworks and surrounding site condition.
- One Preliminary Design Review Meeting - Carollo will review the evaluation approach and present ideas for changes and refinements to the headworks project recommended in the 2019 Preliminary Treatment TM. Carollo will also present the evaluation approach, key findings, and recommendations for the biofilter replacement and the ferric chloride facility improvements.
- Two Design Review Meetings - Carollo will review the submitted documents and respond to City review comments for the 50% and 90% submittals.

Carollo will prepare meeting agenda and minutes after each meeting to document key discussion issues, action items, and decisions made.

Deliverables for Tasks 1.1 and 1.2:

- Monthly progress letter reports with invoices.
- Meeting agendas, handouts, presentation materials, and minutes for the design meetings.
- Updates to action items and project schedule.

TASK 2 – PRELIMINARY DESIGN SERVICES

Task 2.1 – Background Review. Carollo will conduct a background review of the following documents:

- 2019 WPCF Phase II Facility Plan Project Preliminary Treatment TM.
- Plans for the incoming trunk lines.
- 1995 WPCF Headworks Improvements Project Documents.
- 2016 WPCF Headworks Rehabilitation Project Documents.

- Plant operating data concerning flow data, operating levels in the East Barminutor Pit, influent channels, Wet Pits A and B, and other relevant information.

Task 2.2 – Update of Preliminary Treatment TM. Carollo will review the findings of the 2019 WPCF Phase II Facility Plan Project Preliminary Treatment TM and evaluate the following to confirm/refine the recommended design concept(s):

- Hydraulic evaluation and potential impacts on incoming trunk lines including operating levels, solids deposition, odors, and potential areas that could be at risk of overflow.
- Screen sizing (including bar spacing width) based on flow criteria to be provided by the City.
- Modifications required to the three influent gates to accommodate motorized operators and/or gate replacement to accommodate electric actuators.
- Downward opening gates on channel outlets to allow channel isolation that could also serve as weirs when the channel is in operation.
- Overflow management alternatives including options for diverting flow to the center channel.
- Alternatives to eliminate cascading waterfalls on the inlet to and within the channels leading the influent pump station wet wells.
- Overall layout and installation (including structural modifications required in the headworks building) of the new screens, screening conveyance, and screenings handling systems inside the headworks building and truck access to the screenings for disposal on the outside of the headworks building.
- Bypassing operations and/or sequencing during construction of improvements.
- Ventilation system improvements including impacts to existing fans and/or ducting to accommodate new equipment.
- Civil improvements for screenings handling.
- Electrical power supply and distribution alternatives for the new headworks equipment and lighting alternatives for the lower level and upper level of the headworks.
- Schedule for installation of screens.
- Preliminary construction sequencing concepts and contingency planning including possible temporary bypassing of flows.

Carollo will provide the City a list of three facilities located in the San Francisco Bay Area with similar screens and/or screenings handling to visit. City will provide a written summary of findings to Carollo to consider for incorporation into the design. Carollo will arrange for and attend the site visits (8 hours total time) with City staff prior to the Preliminary Design Review Meeting.

Carollo will prepare a Draft TM to summarize the updates to the Preliminary Treatment TM. The Draft TM will include as a minimum the following:

- Preliminary mechanical layout plans and draft specifications for new screens, conveyor, and washer/compactor.
- Preliminary structural modification plans for the upper level, lower level, and roof (if necessary) of the headworks.
- Preliminary channel modification plans to accommodate conveyance of overflows.
- Preliminary influent gate improvement plans to accommodate motorized operation.
- Preliminary ventilation system improvement plans to accommodate the new screenings equipment inside the existing headworks and meet NFPA 820 guidelines.
- Preliminary plans for routing a new 3" 3W plant water pipe to the headworks for hose

down and cleanup.

- Preliminary electrical lighting improvement plans for the lower level and upper levels of the headworks.
- Preliminary design construction cost estimate.

City will have 14 days to review and provide Carollo with one collated set of written comments to address. Carollo will incorporate applicable City comments into the Final TM.

Task 2.3 – Biofilter Replacement Evaluation. Carollo will evaluate replacing the City’s existing biofilter in-kind, retrofitting the City’s existing biofilter with different types of media, and replacing the City’s existing biofilter with an alternative technology. Three alternative technologies, packaged biofilter systems, chemical scrubbers, and carbon scrubbers will be compared to the City’s existing biofilter technology. Sizing of the upgraded odor control system will be coordinated with the ventilation system improvements evaluation in Task 2.2. The results of this evaluation will be used to develop recommendations to replace or retrofit the existing odor control system.

Carollo will prepare a Draft TM to summarize the Biofilter Replacement Evaluation. City will have 14 days to review and provide Carollo with one collated set of written comments to address. Carollo will incorporate applicable City comments into the Final TM.

Task 2.4 – Ferric Chloride Facility Evaluation. Carollo will evaluate the application of ferric chloride at the City’s WPCF. Carollo will perform jar testing at two sets of flows to estimate the ferric chloride and polymer dosages needed to enhance primary sedimentation. Carollo will also take samples upstream of the ferric chloride application point and downstream of the headworks and test for dissolved sulfide concentrations to assess the effectiveness of applying ferric chloride for sulfide reduction and corrosion control at the headworks. The results of these analyses will be used to develop recommendations to for sizing and layout of a new ferric chloride facility at a new location within the WPCF to be determined with plant staff that would better facilitate O&M needs and chemical delivery access.

Carollo will prepare a Draft TM to summarize the Ferric Chloride Facility Improvements Evaluation. City will have 14 days to review and provide Carollo with one collated set of written comments to address. Carollo will incorporate applicable City comments into the Final TM.

Deliverables for Tasks 2.1 to 2.4:

- Updated Preliminary Treatment TM in PDF format.
- Biofilter Replacement TM in PDF format.
- Ferric Chlorine Facility Improvement TM in PDF format.

TASK 3 – FINAL DESIGN SERVICES

Task 3.1 – Final Design (50%, 90%, and 100% Design). Carollo will prepare biddable construction documents (drawings and specifications) based on the preliminary findings and recommendations in Task 2.2. For this task, design is assumed to include the following project elements:

- Two new multi-rake bar screens located at the lower level of the headworks to replace the two existing grinders. It is assumed the two screening channels will be modified to be made wider (but not deeper) to accommodate the new screens.
- One new screenings conveyor and one new screenings washer/compactor located at the upper level of the headworks. It is assumed that a new stairwell structure will be provided on the exterior side of the headworks to provide stair access to the lower level of the headworks.
- Three new influent gates with motorized operators.
- Ventilation system improvements (fans, ducting, etc.) for the lower level and upper level of the headworks to

accommodate the new screenings equipment.

- A new 3" 3W plant water pipe to the headworks for hose down and cleanup.
- Civil improvements for screenings handling outside of the headworks.
- Electrical improvements including new lighting for the lower level and upper level of the headworks.
- Instrumentation and control improvements to accommodate the new equipment and associated control strategies.

Drawings will be prepared using Carollo's CADD drafting standards. Specifications will be prepared using the City's front-end specifications and Carollo's technical specifications. Front-end specifications will include general bidding requirements, general conditions, and special conditions. Technical specifications will be prepared using Carollo's standard CSI format for Divisions 2 through 17.

Carollo will prepare and submit 50% and 90% design documents to the City for review and comment. The 50% drawings will include the following disciplines: general, typical details, demolition, civil, structural, mechanical, HVAC, electrical, and instrumentation. The instrumentation drawings will include process and instrumentation drawings (P&IDs) completed to a 90% design level. The 50% specifications will include all divisions except for the City's front-end specifications. City will have 14 days to review the 50% design and provide Carollo with one collated set of written comments to address.

The 90% design submittal will be a completed set of contract documents to be submitted concurrently to the City and Carollo's in-house technical checking team for review and comment. The 90% design submittal will include applicable comments from the 50% design review. Preliminary construction cost estimate and schedule will also be provided. City will have 14 days to review the 90% design and provide Carollo with one collated set of written comments to address.

Applicable review comments from the City's and Carollo's in-house technical checking team at the 90% design stage will be incorporated into the 100% design submittal for bidding. The City will reproduce and distribute bid documents to prospective bidders. Changes following the 100% design submittal will be made by addenda to the bid documents.

The following subconsultants will perform the following work to assist Carollo with final design:

- Ewing Construction Services will prepare a preliminary construction schedule at the 50% and 90% design stages.
- Towill will perform aerial photography of the WPCF including the sludge drying beds and prepare digital planimetric/topographic mapping for only the area surrounding the headworks to serve as a base map for the Headworks Bar Screen Project.
- Fugro will provide geotechnical design parameters for improvements for the headworks area based solely on reviewing available geotechnical reports for the project site to be provided by the City.

Task 3.2 – Construction Cost Estimates. Carollo will prepare construction cost estimates at the 50%, 90%, and 100% design stages.

Deliverables for Tasks 3.1 and 3.2:

- Aerial photography for the WPCF including the sludge drying beds with digital planimetric/topographic mapping for only the headworks area.
- Geotechnical design parameters for the headworks area.
- 50%, 90%, and 100% design documents in PDF format. Plans will be provided in half-size

(11x17). Final bid documents will be produced in both half-size and full size (22x34) PDF format.

- 50%, 90%, and 100% design documents in hard copy format. Provide 5 hard copies of the plans and 2 hard copies of the specifications.
- 50%, 90%, and 100% specifications in MS WORD format.
- Construction cost estimates at 50%, 90%, and 100% completion in PDF and MS EXCEL format.
- Construction schedules at 50% and 90% completion in PDF format.

TASK 4 – BID PERIOD SERVICES

Task 4.1 – Prebid Meeting. Carollo will attend the pre-bid meeting and site walk to be scheduled and conducted by the City. Carollo will assist the City with answering technical questions from prospective bidders.

Task 4.2 – Addenda. Carollo will respond to bidders' questions and assist the City in preparing up to two addenda during the bid period. The City will reproduce and distribute each addendum to prospective bidders.

Task 4.3 – Conformed Documents. Carollo will prepare conformed documents based on incorporating changes outlined in the addenda. For budgeting purposes, 80 hours have been assumed for this task.

Deliverables for Tasks 4.1 to 4.3:

- Addenda.
- Conformed documents in PDF format (both half-size (11x17) and full size (22x34), as well as MS WORD documents for the specifications and AutoCAD files for the drawings.

TASK 5 – ENGINEERING SERVICES DURING CONSTRUCTION

Task 5.1 – Submittal Review. Carollo will review and respond to submittals from the Contractor that have been screened by the City's construction manager. For budgeting purposes, Carollo will respond to 50 submittals and 30 resubmittals at an average review time of 5 and 3 hours per submittal and resubmittal, respectively.

Task 5.2 – RFI Review. Carollo will review and respond to RFIs from the Contractor that have been screened by the City's construction manager. For budgeting purposes, Carollo will respond to 40 RFIs at an average review time of 4 hours per RFI.

Task 5.3 – Design Clarifications. Carollo will prepare as-needed design clarifications to clarify and/or change the intent of the contract documents at the request of the City. For budgeting purposes, Carollo will prepare 4 design clarifications at an average preparation time of 10 hours per design clarification.

Task 5.4 – Site Visits. Carollo will perform as-needed site visits to review construction related issues at the City's request. For budgeting purposes, Carollo will make 6 site visits at an average site visit time (including travel time) of 6 hours per site visit.

Task 5.5 – Record Drawings. Carollo will prepare record drawings based solely on as-built drawing markups received from the Contractor and the City's construction manager. For budgeting purposes, 120 hours have been assumed for this task.

Deliverables for Tasks 5.1 to 5.5:

- Submittal review comments.
- RFI responses.

- Design clarifications.
- Record drawings in PDF format in half-size and full-size, and in AutoCAD files.

TASK 6–OPTIONAL SERVICES

The following optional services tasks can be provided to cover additional engineering services to be requested by the City. Each task will only be performed by Carollo upon receiving separate written approval from the City in advance of the work to be completed.

Task 6.1 – Final Design Services for a New Ferric Chloride Facility. Carollo will prepare biddable construction documents (drawings and specifications) based on the preliminary findings and recommendations in Task 2.4. For this task, design of a new ferric chloride facility is assumed to include a slab on grade structure with a canopy, one ferric chloride storage tank, two metering pumps, and associated piping and valves to enable discharge to one location at a time. Final design services for the 50%, 90%, and 100% design documents will generally follow the scope outlined in Task 3.1 and the 100% design submittal will be incorporated into the Headworks Bar Screen Project as a single design package for bidding and construction. In addition, Fugro will provide the required geotechnical design parameters for this work based solely on reviewing available geotechnical reports for the project site to be provided by the City. Towill will prepare the required digital planimetric/topographic map for the work to serve as a base map.

Deliverables for Task 6.1:

- 50%, 90%, and 100% design documents in PDF format.
- Additional geotechnical design parameters.
- Additional digital planimetric/topographic maps in AutoCAD file format.

Task 6.2 – Final Design Services for Odor Control Facility. Carollo will prepare biddable construction documents (drawings and specifications) based on the preliminary findings and recommendations in Task 2.3. For this task, design retrofit of the existing biofilter is assumed to include replacement of the existing media and air distribution piping with new organic media and underlying air distribution piping. Final design services for the 50%, 90%, and 100% design documents will generally follow the scope outlined in Task 3.1 and the 100% design submittal will be incorporated into the Headworks Bar Screen Project as a single design package for bidding and construction. In addition, Fugro will provide the required geotechnical design parameters for this work based solely on reviewing available geotechnical reports for the project site to be provided by the City. Towill will prepare the required digital planimetric/topographic map for the work to serve as a base map. Mizutani Environmental will prepare an application package for the biofilter replacement for the City to submit to BAAQMD to obtain an Authority-to-Construct permit.

Deliverables for Task 6.2:

- 50%, 90%, and 100% design documents in PDF format.
- Additional geotechnical design parameters.
- Additional digital planimetric/topographic maps in AutoCAD file format.
- Application package for BAAQMD Authority-to-Construct permit.

Task 6.3 – Final Design Services to Relocate West Trickling Filter Equipment. Carollo will prepare biddable construction documents (drawings and specifications) to relocate the West Trickling Filter Equipment if determined to be required to accommodate improvements for the headworks. For budgeting purposes, Carollo has included 40 hours for evaluation and 200 hours for design of this task. Final design

services for the 50%, 90%, and 100% design documents will generally follow the scope outlined in Task 3.1 and the 100% design submittal will be incorporated into the Headworks Bar Screen Project as a single design package for bidding and construction. In addition, Fugro will provide the required geotechnical design parameters for this work based solely on reviewing available geotechnical reports for the project site to be provided by the City.

Deliverables for Task 6.3:

- 50%, 90%, and 100% design documents in PDF format.
- Additional geotechnical design parameters.

Task 6.4 – Pre-Purchase Equipment Assistance. Carollo will assist the City with preparing pre-purchase documents (drawings and specifications) for new screens, conveyor, and washer/compactor so they can be delivered to the WPCF and assigned to the contractor for installation, testing, and startup. The pre-purchase documents will include applicable mechanical and P&ID drawings and technical equipment and control specifications for these equipment. City will be responsible for preparing the front-end purchasing documents and manage the procurement process with assistance by Carollo.

Deliverables for Task 6.4:

- Pre-purchase documents in PDF format.
- Submittal review comments.

Task 6.5 – CFD Modeling. Carollo will perform three-dimensional (3D) computational fluid dynamics (CFD) modeling of the screening channels' flow path to simulate flow interaction between channel geometry and fluid flow and evaluate potential modifications and/or improvements to create more uniform flow conditions upstream and downstream of the proposed screen.

Deliverables for Task 6.5:

- 3D CFD summary results in PDF format.

Task 6.6 – Additional Surveying. Towill will prepare additional digital planimetric/topographic maps of the entire WPCF (minus the areas already completed above) and the sludge beds including the area south of where Depot road would extend onto the project site to serve as AutoCAD base maps for the City's use on other design projects by others.

Deliverables for Task 6.6:

- Additional digital planimetric/topographic maps in AutoCAD file format.