

Metropolitan Government of Nashville and Davidson County
MWS Water Services
Central Wastewater Treatment Plant Capacity Improvements and CSO Reduction
SCOPE OF WORK – HAZEN AND SAWYER
JULY 24, 2015

SECTION 1 – GENERAL DESCRIPTION

1.01 Objective and Intent

Hazen and Sawyer (Hazen) will provide MWS Water Services (MWS) and its Clean Water Nashville Overflow Abatement Program (CWNOAP) with the following engineering services for the project identified in the this document, and will be delivered in the following three phases:

- Phase 1 Prepare a *Basis of Design Report* through the combined and collaborative efforts between the Hazen and Brown and Caldwell teams. Hazen’s evaluation scope includes all of the work elements identified in Section 1.02. As part of the effort, Hazen’s scope also includes the services detailed in Section 3 of this document.
- Phase 2 Create and provide MWS with detailed design packages in accordance with the delivery plan developed in Phase 1. A detailed Scope of Services and fee for detailed design Work will be negotiated at the end of Phase 1 after the project delivery methods have been selected.
- Phase 3 Provide construction phase services (administration and/or representation, as applicable) commensurate with the level of effort required for each project delivery type identified during Phase 1. A detailed Scope of Services and fee for construction phase services will be negotiated as appropriate after the project delivery methods have been selected.

1.02 Evaluation Work Elements

The following elements will be evaluated during Phase 1:

1. Coarse and fine screening and grit removal alternatives for flow from the Central Pumping Station:
 - Vortex type technology for maximizing grit removal for flow from the combined sewer system along with necessary upstream screening to protect grit units
 - Modification of existing grit pumps, cyclones, or classifiers (analysis and results provided by BC for inclusion in evaluation)
 - The Optimization Study’s recommended screening alternative
 - A new coarse screening facility (with rock trap and bypass) downstream of the Central Pumping Station and upstream of the South Grit Tank and the future equalization storage tank(s). Also, replacement of the existing coarse screens with fine screens and bypass channels
 - A new headworks facility that includes screening and grit removal upstream of primaries and equalization storage
2. CSO equalization storage systems alternatives to achieve a total volume of 15-20 MG:
 - Conversion of the currently abandoned old south treatment system tankage to equalization storage
 - Consideration of “sequential” EQ upstream of high rate treatment
 - Pipe routing for flow to the tanks and from the tanks back into the Central Pumping Station. Use of a two-way pipe will be considered.
 - Addition of new equalization storage to obtain the required balance of storage volume
 - Site evaluation to determine the best location for new storage
 - Construction of a new equalization storage basin to provide the entire EQ volume
 - Pipe routing for flow to the tanks and from the tanks back into the Central Pumping Station
 - Site evaluation to determine the best location (or locations) for storage
3. As specified in Section 2, participation in other evaluations to determine the best design alternative for elements led by Brown and Caldwell.

SECTION 2 – PHASE 1 SCOPE OF WORK

TASK 100 PROJECT ADMINISTRATION

Task 101 – Administration/Coordination

Hazen and Sawyer (Hazen) will provide administration, coordination, and management of the Hazen's staff and sub-consultants and their inter-relationship with MWS, CWNOAP's Program Management and Construction Management staff, and the Brown & Caldwell (BC) Team.

Assumptions:

- 11-month Phase 1 duration (48 weeks)
- 4 hours per week for the Hazen Project Manager (PM) during first 7 months, 2 hours per week during last 4 months
- 2 hours per week for the Smith Seckman Reid (SSR) and Wade Trim PM during first 7 months
- 1 hour per week for all other Hazen team sub-consultants

Task 102 – Monthly Progress Reports

A *Monthly Progress Report (MPR)* will be prepared and submitted with Hazen's monthly invoice. The MPR will describe Phase 1 activities for each month, clearly identify outstanding issues requiring resolution, establish the time frame and person(s) responsible for achieving the resolution, and report issues that have been resolved and the nature of the resolutions. The MPR will contain sufficient information to allow monitoring of the project's progress and tasks. The MPR will provide details about future deadlines and information required by MWS and will indicate upcoming meetings, events, milestones, etc.

As part of the MPR, Hazen will provide an update to the schedule that identifies the major milestone dates and includes a narrative describing any schedule changes from the previous month and the reasons for the changes. Hazen will submit schedule updates to BC for inclusion in an overall Phase 1 schedule so that the entire project schedule can be coordinated between the two teams.

The MPR will include a summary of the budget expended to date and projections of the estimated cost at completion. Each MPR will identify any MWS-requested work items that are deemed to be out of the negotiated Scope of Work and the estimated impact to the budget to complete these items.

The MPR and monthly progress schedule will be submitted every month even if, for any reason, an invoice is not submitted. Conversely, if an invoice is submitted without a MPR, the invoice will be rejected.

- **Deliverable: Monthly Report as part of invoice**

Task 103 – Monthly PM Meetings

Hazen will help coordinate and attend a monthly Project Management meeting with MWS staff. The meeting will also be coordinated with BC to provide MWS with a comprehensive view of overall Phase 1 project progress. If possible, the meeting will be scheduled to coincide with monthly invoice submittal to provide an overall update on project progress and coordination between MWS, Hazen and BC. Hazen's key team members will attend these meetings, as required, either in person or remotely via phone or video conferencing services.

- **Deliverable: Monthly PM Meeting notes**

Task 104 – Project Document Control

Hazen will submit all data and documents electronically and in hard copy format at the deliverable milestones. Hazen will provide four (4) hard copies of each submittal (draft and final). Electronic files will be submitted in indexed PDF format.

MWS will provide Hazen access to the PMIS site (limited to five (5) users) to allow the submittal of documents including, but not limited to, deliverables, Change Order requests, and correspondence. The entry of information exchanged and transferred between Hazen and sub-consultants shall be the responsibility of Hazen.

Invoices will be submitted in hard copy format.

Task 110 – Project Work Plan

Hazen will develop a *Project Work Plan* (PWP) within thirty (30) calendar days following the receipt of the Notice to Proceed for the project. The PWP will define how Hazen will comply with their contractual obligations for Phase 1. The PWP will be used by Hazen to monitor and control the project's progress. Hazen will coordinate with BC to ensure consistency across project teams relative to project protocols. At a minimum, the PWP will include the following elements:

- Hazen's Scope of Work describing each major task and associated assumptions.
- Hazen's schedule with key deliverable milestones in a Gantt-chart format. The number of days from the NTP to each milestone will be included. The schedule will be coordinated with Brown and Caldwell (BC) so that workshops and other tasks are planned efficiently. Four weeks duration will be provided for review of each submittal by MWS.
- Hazen's budget. A budget summary will be provided for each task.
- A deliverable list including milestone and interim deliverables.
- Hazen's *Project Safety Plan*.
- Hazen's *Project Quality Plan Checklist*.
- Hazen's *MWS Staff Coordination Plan* describing how the Hazen plans to coordinate with MWS staff and BC to balance information needs with the daily obligations required of MWS staff.
- Hazen's *Project Communications Plan*.
- Hazen's *Sub-consulting Plan*. Provide the following:
 - List of sub-consultants
 - Work to be performed
 - Narrative of how team coordination and monitoring of sub-consultants' work will be accomplished.

➤ Deliverable: Project Work Plan

Task 111 – Project Communications Plan

Hazen will develop a Project Communications Plan (PCP) will include a proposed "chain of communications" that includes procedures for information sharing and procedures to identify when direct communication can be used to make the work effort more efficient. The intent is to implement a PCP that keeps project management team members informed of project's progress, issues, and issue resolutions. Hazen will coordinate with BC to ensure consistency across project teams relative to project protocols. An effective PCP will be especially important since two engineering teams will work together to accomplish the goals of the project.

➤ **Deliverable: Project Communications Plan**

Task 112 – Quality Management Plan

Hazen will develop a Quality Management Plan (QMP). The plan will include assignment of individuals assigned to specific review tasks and hour/fee budgets for quality control of Phase 1 of the project.

➤ **Deliverable: Quality Management Plan**

Task 113 – Technical Reviews and Quality Control

Individuals assigned to the various technical and QC reviews will provide review and comment based on the established schedule and budget for each specific review task. The designated reviewer for each project will perform the following duties:

- Provide input and guidance throughout the project to ensure that all technical aspects of the project are considered and consistent with achieving the project goals and objectives.
- Provide technical reviews during various stage of the project, including each deliverable and other work products.

Comments generated by the Hazen's internal quality checking and review process will be addressed and the deliverables will be revised accordingly prior to the submittal of all design milestone deliverables. Hazen will provide documentation that all deliverables have been reviewed in accordance with Hazen's internal *Project Quality Plan Checklist*.

Task 114 – Peer Review Services

Hazen can provide peer review for work elements developed by BC under Element B of the Central Wastewater Treatment Plant Capacity Improvements & CSO Reduction project on an as-needed basis under an allowance not included in the base fee. Hazen team members can meet with BC team members during the initial stages of evaluation of each work element and will discuss alternatives and associated opinions / concerns. Collaboration can continue in meeting settings as the evaluation is carried out. Hazen can also meet with BC prior to workshops scheduled with Metro to review project elements and associated conclusions. The goal across the two teams' evaluations is to achieve a consensus opinion on recommended alternatives. Likewise, it is anticipated that BC can provide similar services to work products developed by Hazen. Coordination of all such peer review services will be provided under this task.

TASK 200 MEETINGS AND WORKSHOPS

For workshops pertaining to work elements assigned to Hazen, Hazen will prepare and distribute meeting agendas, attend and document the meetings, and provide meeting minutes for the project record via PMIS. It is noted that a standing agenda item at every meeting will be to discuss key project decision issues. Hazen team members will also attend and participate in workshops pertaining to work elements assigned to BC as appropriate for peer review and input.

Task 201 – Kick-off Meeting

Hazen will participate in a meeting to discuss concept design, design standards, administrative procedures, the *Project Work Plan*, the *Project Communications Plan*, the schedule, coordination with MWS staff, and deliverable submittal requirements. The meeting will be a coordinated meeting to include MWS, Hazen and BC to discuss all elements of the project.

Task 202 – (a) Treatment Capacity and (b) Feasible Alternatives to Bypass (FAB)

Hazen can participate in a meeting with MWS and BC to identify wet weather scenarios with different

unit operations in services to evaluate the susceptibility of the facility to excursions of effluent limitations with the goal of verifying the firm wet weather treatment capacity of the activated sludge system.

Hazen can review the LTCP and the optimization study to confirm the wet weather flows to be directed to the WWTP as a result of LTCP implementation in the CSS. Taking in to consideration the firm wet weather treatment capacity established via Tasks 202 (a) and 301, Hazen can work with MWS and BC to identify potential alternatives for equalization, secondary bypass and/or auxiliary treatment to be considered in a feasible alternatives to bypass analysis.

This will be provided on an as-needed basis under an allowance not included in the base fee.

Task 203 – Draft BODR Review Meeting

Hazen will present the *Basis of Design Report's* key aspects in a workshop with MWS and BC. Hazen will co-present with BC the findings and conclusions of the draft report. The draft BODR will be delivered to MWS one week prior to the meeting. Following the meeting, three weeks will be provided for the completion of MWS review of the draft document.

Task 204 – TDEC BODR Review Meeting

Hazen will participate in an informational meeting with TDEC to discuss the BODR and to receive TDEC's comments.

Task 205 – TDEC Feasible Alternatives to Bypass (FAB) Review Meeting

Hazen can coordinate and lead a meeting with TDEC to discuss the FAB report and TDEC's input and comments. This will be provided on an as-needed basis under an allowance not included in the base fee.

Task 206 – Training and Operations Tools Framework Meetings

Hazen will coordinate and lead meetings for the development of a training framework and operations tools framework. The intent of the meetings is to discuss and gain consensus on the framework for developing the training and operations tools during Phase 2 and Phase 3. Appropriate MWS staff to attend each meeting will be identified by MWS. BC will also participate in the evaluation/development of alternatives and the meetings. The meetings envisioned include the following.

- Discuss training objectives and long-term staff training needs.
- Discuss recommended training and format.
- Discuss existing information and format, as well as desired information and content in new eO&M manual. Examples of content developed for other utilities will be presented to aid in the identification of required content.
- Discuss comments on memorandum and to finalize the content and structure desired for the O&M.
- Discuss initial concepts for data management and process monitoring needs. Hazen will present examples of content / methodology used by other utilities for process monitoring.
- Discuss memorandum and final draft dashboard concepts / plan.

Task 207 – Hazen Team Kick-off Meeting

Hazen will coordinate a kick-off meeting that will include representatives from all sub-consultants included on Hazen Team. The intent of the meeting will be to establish team communications, clearly delineate team member roles and responsibilities, and discuss schedule and deliverable milestones for the project. The meeting will be coordinated in conjunction with other project activities to minimize cost.

Task 210 – Hazen Alternatives Evaluation Workshops

Hazen will coordinate alternative evaluation workshops to present, discuss and receive feedback regarding potential alternatives for process areas included in the scope of work. Hazen will coordinate and lead the workshops. Appropriate MWS staff to attend each workshop will be identified by MWS. BC will also provide technology-specific participants for each workshop to provide input and perspective on the alternatives and to provide potential conflict/coordination with BC-lead facility improvements. BC will also participate in workshop preparation through review of the slides and concepts to be presented.

Hazen Alternative Evaluation Workshops are anticipated to include the following. However, the topics will change as appropriate.

1. Evaluation of South screening and grit removal – Pt. 1
 - o Technology and layout alternatives
2. Evaluation of South screening and grit removal – Pt. 2
 - o Short-list, detail considerations
3. Evaluation of CSO equalization storage systems – Pt. 1
 - o Technology and layout alternatives
4. Evaluation of CSO equalization storage systems – Pt. 2
 - o Short-list, detail considerations

Assumptions:

- Four Alternatives Evaluation Workshops will be coordinated and led by Hazen for Hazen scope alternatives
- Four Hazen Team attendees will attend each Hazen Alternatives Evaluation Workshop; Four hours for workshop attendance and 80 hours per workshop for preparation of materials and slides has been assumed.

Task 220 – BC Alternatives Evaluation Workshops

Hazen will attend and participate in BC Alternatives Evaluation Workshops. Hazen will provide technology-specific participants for each workshop to provide input and perspective on the alternatives to provide input and to provide potential conflict/coordination with Hazen-lead facility improvements. Hazen will also participate in workshop preparation through review of the slides and concepts to be presented. The number and identity of Hazen attendees at each workshop will vary depending on the topic and the contribution desired by MWS.

Assumptions:

- Six BC Alternatives Evaluation Workshops will be attended by Hazen
- Two Hazen Team attendees will attend each BC Alternatives Evaluation workshop; Eight hours per attendee per workshop has been assumed. Time includes preparation time prior to workshop, workshop attendance, and providing follow-up notes/information after workshop.

TASK 300 CENTRAL IMPROVEMENTS COORDINATION TASKS

Task 301 – Feasible Alternatives to Bypass Analysis

Hazen can lead the development of the Feasible Alternatives to Bypass (FAB) analysis with collaboration from BC. Following the Treatment Capacity Evaluation Workshop (see previous section), BC can conduct process model runs with the identified scenarios. Hazen can work with BC to compare the results against current effluent limitations and verify the firm wet weather treatment capacity of the activated sludge system. Hazen can develop a technical memorandum with BC input that documents the firm capacity and evaluation methodology.

Following the FAB Workshop, Hazen can collaborate with BC to evaluate the alternatives for equalization, secondary bypass and/or auxiliary treatment identified for the FAB analysis taking into consideration the factors included but not limited to:

- Protection of biomass
- Life-cycle costs, benefits, and risks
- Asset management principles
- Appropriate levels of service
- Triple bottom line
- Sustainable return on investment

Hazen can produce a FAB report with BC input that supports the recommended wet weather treatment alternative. In addition, Hazen can coordinate with appropriate regulatory agencies during Phase 1 to assure all regulatory requirements are understood for inclusion in the scope of design and construction of selected alternatives.

This will be provided on an as-needed basis under an allowance not included in the base fee.

- **Deliverable: Firm Capacity Evaluation Technical Memorandum**
- **Deliverable: FAB Report**

Task 302 – NPDES Permit Assistance

Hazen will lead permit assistance and regulatory coordination services with collaboration from BC. We will provide as-needed assistance and regulatory coordination services regarding NPDES permit considerations. These services may include discussions and negotiations related to permit reissuance, secondary treatment capacity, wet weather treatment capacity, permit limits, permit-required sampling, potential future permit constraints, or other related issues. These services will be provided on an as-needed basis as determined by MWS staff.

Task 303 – Design Standards

BC will lead development of common design standards for Phase 2 and Early Action Projects. Hazen and Sawyer will collaborate with BC on the development of the standards. Hazen will provide content and input to the team developing the design standards.

Task 304 – Construction Delivery Method Coordination

BC will lead this task. Hazen team members will collaborate with BC team members to develop a Project Design and Construction Delivery Implementation Plan that defines work package options for alternate delivery methods for the construction tasks contained in the *Basis of Design Report*. The delivery methods may include design-bid-build, CMAR, MWS-internally performed work, or other methods as determined during preparation of the *Basis of Design Report*. The Scope of Work for each delivery method will be refined during negotiation of the Phase 2 Scope of Work.

If the decision on a particular work package results in MWS perform the work internally, it is assumed that Hazen's work effort for the item will be complete as of the end of Phase 1. In this case, an allowance of hours for construction phase services will be implemented to permit Hazen to assist MWS on an as-requested basis.

Task 305 – Sustainability

For each project identified during the evaluation phase, Hazen will score sustainability factors of each

project-specific alternative using the Hazen Envision Pre-Assessment and Sustainability Evaluation Tools which take into account technical aspects of each alternative, while also considering factors in the Triple Bottom Line: economic, environmental, and social.

Task 306 – Equipment Review and Site Visits

Hazen will identify, coordinate, attend and facilitate beneficial site visits to observe equipment and interview operations staff for treatment technologies being considered for improvements in work elements assigned to Hazen.

Assumptions:

- Three such site visits, including land based travel and one overnight stay per visit for two Hazen team members is assumed. Eight hours per team member are assumed per site visit. Eight hours for visit coordination and visit summary notes development are assumed per visit.

Task 307 – Early Action Projects

An allowance for early action projects is included in the scope. The specific need and scope of work for each early action project will be defined on an as-needed basis.

Task 308 – Training and Operations Support

Hazen will provide as-needed training and operations support services. These services may include refresher or new employee training for existing, modified or new equipment; operations support as various temporary or permanent process treatment approaches are considered or implemented; development of modified or new standard operating procedures; development of process/operational schematics or flow diagrams; or related services. These services will be provided on an as-needed basis as determined by MWS staff. An allowance has been established for this task.

Task 309 – Training and Operator Tools Framework Development

During Phase 1, Hazen will lead discussions regarding a framework for training and operator tools for the Central WWTP. Frameworks for implementation of the following items will be discussed during Phase 1:

- Training: In-class and on-line training; the 360 Water platform will be among the options considered for access and contact hours
- eO&M: Electronic Operation and Maintenance manual; 360 Water platform will be among the options considered
- Operations Dashboards: Suggested operations dashboards for data management, process monitoring, and efficiency

Specific activities include the following:

Training

The following discussions will take place as part of regularly scheduled workshops:

- Training objectives and long-term staff training needs.
- Desired training and format.

If authorized in future phases of the work, specific curriculum and content for training will be developed by Hazen and by BC. The on-line training structure will be developed to allow 24/7 access by staff, monitoring of access, and issuance of training certificates for continuing education credit.

Electronic Operation and Maintenance Manual

During Phase 2 and 3 of the project, the electronic O&M will be developed in a web-based format, to

allow easy access to information as well as editing of content by MWS for future updates. During Phase 1, Hazen will lead discussions regarding the protocol for electronic O&M content. These discussions will take place during the regularly scheduled workshops and will include discussions regarding existing information and format, as well as desired information and content in the new eO&M manual. Examples of content developed for other utilities will be presented to aid in the identification of required content.

Operations Dashboards

Operations dashboards provide a convenient platform for compilation of process, operating costs, and energy usage data. During Phase 1, Hazen will provide recommendations on potential content and will identify options for out of the box software to aid in the development of the dashboards. Hazen will present these recommendations and potential content suggestions as part of regularly scheduled workshops.

TASK 400 ALTERNATIVES EVALUATION

Hazen will evaluate the alternatives summarized in Section 1.02. The following general steps will be followed for each area of improvements to gain project team consensus and make recommendations on final improvements to be designed in Phase 2:

- Gather and review existing information
- Meet with Central WWTP staff to discuss current issues / existing facility information
- Develop list of potential alternatives and associated layouts to conceptual level.
- Organize / lead meetings with MWS project team to discuss potential alternatives for evaluation. Develop short list of alternatives.
- Perform more detailed evaluation of alternatives. Hazen will further develop each alternative with drawings and schematics sufficient to show new facilities / modifications. Capital cost estimates will be developed to an AACE Class 4 level. Life cycle costs for each alternative will also be considered based on common costing factors agreed to by Project Team.
- Rank alternatives and identify recommended improvements. Hazen will facilitate discussion of alternatives and associated ranking based on both cost and non-cost factors. Weighting system may be used for ranking/scoring alternatives based on non-cost criteria.
- Develop technical memorandum for specific alternatives. Submit draft to project team for review.
- Meet with project team to gather comments and incorporate comments into final technical memorandum. Memoranda for each area will be incorporated into the Basis of Design Report, either by appendix or as separate chapters.
- Develop design criteria and preliminary equipment sizing for recommended alternatives, to be incorporated into the Basis of Design Report.
- Develop preliminary drawings to approximately 15% level of completion.

Task 401 – Data Collection and Field Services

Hazen will perform data collection and field services. The services are anticipated to include, but are not limited to, the following activities:

- Collection of any plant operating data, plant permits, and/or as-built drawings deemed pertinent to design of the improvements
- Central site investigations
- Surveys of wastewater facilities (structure elevations, weir elevations for hydraulic analysis, visual inspection of existing structures, etc.) (elevations to be provided under BC contract with surveyor)
- Surface/roadway/building conflict reviews
- Topographic surveys (to be provided under BC contract with surveyor)

Task 402 – Sub-surface Investigation

Hazen will collect and review all available documents and information that may assist in clarifying existing geotechnical conditions, including groundwater levels and detrimental soils conditions likely to be encountered in the area encompassed by the alternatives evaluations led by Hazen. These documents will include related studies and evaluations, plans and specifications, and other documents deemed pertinent to the project.

Hazen is responsible for verifying the constructability of the proposed facilities. If the existing information is inadequate, the Hazen will engage K.S. Ware, the team's geotechnical sub-consultant. The geotechnical Subconsultant is licensed to practice in Tennessee, to perform soil borings and testing for design of new facilities to be designed by Hazen. A report summarizing the results of the soil borings, testing, groundwater data, and geotechnical analysis, with design recommendations, will be prepared and submitted by the geotechnical sub-consultant. This report will include findings, analysis, and recommendations gleaned from the review of any existing geotechnical data as well as soil borings drilled specifically for this project. If requested by MWS, any geotechnical reports produced may be used for future design projects at the risk of the future Designer.

Task 403 – Wet Weather Collection System Modeling Coordination

Hazen will coordinate with CWNOAP staff to obtain hydraulic modeling results required for analysis of required equalization basin peak flow and volume requirements. Peak flow and EQ volume will also be discussed during regularly scheduled workshops.

Task 404 – South Screening and Grit Removal

Hazen will lead the evaluation of screening and grit removal alternatives for the South plant. The alternatives to be evaluated include the following:

- Verify that vortex type technology is appropriate to maximize grit removal for flow from the combined sewer system and determine the upstream screening requirements to protect grit units
- Evaluate the need to modify existing grit pumps, cyclones, or classifiers (analysis and results provided by BC for inclusion in evaluation)
- Implement the Optimization Study's screening alternative
- Building a new coarse screening facility (with rock trap and bypass) downstream of the Central Pumping Station and upstream of the South Grit Tank and the future equalization storage tank(s). Also, replacing the existing coarse screens with fine screens and bypass channels
- Building a new headworks facility that includes screening and grit removal upstream of primaries and equalization storage

Task 405 – South Equalization Storage

Hazen will lead the evaluation of equalization storage alternatives for flow from the Central Pumping Station to achieve a total storage volume of 15-20 million gallons. The alternatives to be evaluated include the following:

- Converting the currently abandoned old south treatment system tankage to equalization storage
 - Evaluate "sequential" EQ upstream of high rate treatment
 - Pipe routing for flow to the tanks and from the tanks back into the Central Pumping Station. Use of a two-way pipe will be considered.
 - Add additional new equalization storage to obtain the required balance of storage volume

- Constructing a new equalization storage basin to provide the entire EQ volume
 - Pipe routing for flow to the tanks and from the tanks back into the Central Pumping Station
- Site evaluation to determine the best location (or locations) for storage

Task 406 – Other Evaluations

Hazen will participate in evaluation of alternatives in other areas of the WWTP on an as-needed basis as part of an allowance not included in the base fee. The level of participation will vary depending on the range of alternatives and the desired level of input and involvement desired by MWS staff.

TASK 500 BASIS OF DESIGN REPORT

Task 501 – Draft Basis of Design Report (BODR)

Hazen will co-develop a draft *Basis of Design Report* for Central WWTP improvements. Hazen will develop specific Technical Memoranda for Items 1 and 2 identified in Section 1.02. BC will develop TMs for the elements included in their scope of work. The overall report and the following sections of the BODR will be co-developed with BC. The BODR will include the following:

1. Results of all evaluations listed in Section 1.02. The evaluations will be provided as Technical Memoranda and will be included as *Basis of Design Report* appendices.
2. Listing of recommendations for separate design packages and delivery approach for construction
3. Design criteria for all design task items
4. Geotechnical findings, analysis, and recommendations
5. Information for any required additional property acquisition and/or any temporary construction easements
6. Listing of required permits and associated fees and a milestone schedule that indicates critical permit preparation milestones that fit within the proposed design completion schedule
7. Preliminary Opinion of Probable Construction Costs with a construction contingency no greater than 25%
8. Preliminary design and construction schedule
9. Preliminary list of CSI Division 1 through 48 specifications
10. Preliminary list of drawings
11. All delineated design elements and all accepted evaluation recommendations will be designed to approximately the 15% design level – Facility improvements shown in plan view, equipment located on the site, building footprints established, major structural improvements to existing basins shown in plan view, ancillary equipment locations, etc.
12. Preliminary process schematics, piping and instrumentation diagrams, and appropriate hydraulic information
13. Sustainability Checklist
14. List of outstanding issues
15. It is anticipated that an informational meeting with TDEC will be held, with the *Basis of Design Report* used as the informational tool.

The *Basis of Design Report* will be formatted to provide design criteria information on a discipline-by-discipline basis. The main body of the text will concisely define all of the project design elements and the criteria used as the basis of design for these elements. All background and supporting information will be provided as appendices to the report.

The draft BODR will be submitted to MWS for review. A workshop to review the draft BODR will be

scheduled. A total of four weeks will be scheduled to allow MWS to review the draft and return any comments.

Task 502 – Final BODR

After all MWS comments have been reviewed and addressed, Hazen will work with BC to finalize the BODR. Once updates are complete, the final BODR will be submitted to MWS.

As part of the regulatory coordination task, Hazen will participate in a presentation to TDEC on recommended improvements included in the BODR. One half day workshop with TDEC, attended by three Hazen team members will be included.

SECTION 3 – PHASE 2 DETAILED DESIGN SERVICES

Phase 2 services are not included in the scope at this time and will be negotiated at the conclusion of Phase 1. Phase 2 services will generally include the following and will be specifically based on the elements included and the delivery method selected for each element, so the scope will be modified as needed.

3.01 Standard Formats for Contract Drawings and Specifications

Hazen will utilize the MWS standard drawing and specification formats for development of Contract Drawings and Contract Specifications. Standard specifications and standard details will be reviewed by Hazen and utilized when appropriate.

3.02 Possible Project Delivery Methods

As noted previously, Hazen will work with BC and MWS to recommend the project delivery method(s) for the construction tasks contained in the *Basis of Design Report*. The delivery methods include CMAR or MWS-internally performed. The Scope of Work for each delivery method will be refined during negotiation of the Phase 2 Scope of Work.

If the decision on a particular work package results in MWS perform the work internally, it is assumed that the Hazen's work effort on this work item is complete as of the end of Phase 1. An allowance of hours for construction phase services will be implemented to permit Hazen to assist MWS on an as-requested basis.

3.03 Construction Management at Risk Project Delivery

CMAR is a form of project delivery whereby MWS enters into a contract with a construction contractor to provide review of and input into the design of the project and to manage the bidding and construction of the project. During the course of design, the contractor will work with Hazen and MWS to develop a "guaranteed maximum price" for the work of the contract and, after this price is agreed upon by all parties, the responsibility for the execution of the project is delegated to the contractor. During construction, Hazen will act as an agent of MWS and provide contractor oversight work on behalf of MWS. MWS and Hazen will negotiate a Scope of Work for the range of services that are required.

SECTION 4 – PHASE 3 CONSTRUCTION SERVICES

Specific Phase 3 services are not included in the scope at this time. Phase 3 services will include the following and will be specifically based on the elements included and the delivery method selected for each element, so the scope will be modified and negotiated as needed.

4.01 General Information

Construction services can vary significantly, depending on the project delivery method. The information provided below concerning these delivery methods is considered general in nature because the Scope of Work will be refined during negotiation of the Phase 3 construction services contract.

4.02 Resident Engineering and Construction Manager Services (All Project Delivery Methods)

Resident Engineering

Hazen will provide resident engineering services during construction. The detailed scope of this effort is dependent on the construction schedule and delivery method for the various project elements.

Construction Manager

Hazen will provide construction administrative services during construction. The detailed scope of this effort is dependent on the construction schedule and delivery method for the various project elements.

Inspection Services

Hazen will provide construction inspection services during construction on an as-needed basis. The detailed scope of this effort is dependent on the construction schedule and delivery method for the various project elements.

4.03 Construction Management at Risk Construction Services

The level of construction phase services provided by Hazen under the CMAR process varies and will be negotiated between MWS and Hazen. Hazen will typically perform the following tasks as described below, but the level of effort could vary. Such services will be negotiated as part of Phase 3.

4.03.01 Support Services during Project Construction

Hazen will support MWS' construction oversight efforts during the construction of each project. Hazen's input will be required in response to requests for information and clarification, shop drawing review, Change Orders, and claims. The extent of these services will be defined during Phase 3 negotiations.

In addition, Hazen will attend project meetings during the construction period and provide input based on their detailed knowledge of the project.

4.03.02 Preparation of Record Drawings

Hazen will prepare record drawings that accurately reflect changes made to the conformed contract documents during the course of construction. Hazen will provide MWS with one (1) electronic indexed PDF copy and four (4) full-size hard copies of the record drawings.

4.03.03 Control Systems Integration Coordination

MWS has a preferred system integrator for the CWWTP. The system integrator will provide system integration services for all CWWTP construction packages. Services will include application programming, screen design for all human-machine interfaces, panel fabrication for project SCADA elements, and field verification of system design (point to point testing). The system integrator will be available to Hazen during Phase 2 design and will be a subcontractor to Hazen during construction.

4.03.04 Start-Up, Commissioning and Training Services

Hazen will provide startup and commissioning services to assist MWS with confirming that equipment and systems start up and operate in accordance with the contract documents and MWS operational intent. Services will include the following:

1. Review and approval of contractor-submitted startup, commissioning, and training plans
2. Attendance at startup and commissioning of equipment
3. Preparation of startup and commissioning reports for submittal to MWS
4. Attendance at contractor-led training sessions
5. On-site presence during several wet weather events.

4.03.05 Operation and Maintenance Manual Preparation

MWS is requesting a fully integrated electronic *Operations and Maintenance (O&M) Manual* for the CWWTP. Based on the framework developed in Phase 1, Hazen will create, populate, test, and train MWS staff on the use of the *O&M Manual* if requested during the scoping of Phase 3. The *O&M Manual* will be turned over to MWS upon MWS' acceptance of the *O&M Manual*.

4.03.06 Punch List and Final Inspection services

Hazen will attend the substantial completion punch list inspection for every construction project under their responsibility. Hazen will create a list of punch list items and will submit it to MWS staff for

inclusion in the overall project punch list. When the contractor addresses the punch list items and requests final payment, Hazen will attend the final completion punch list inspection and submit any comments to MWS for consideration.