

Appendix A

Basic Services of Engineer

W.O. 22-11 Staples Reservoir Evaluation/Design

Section 1. Engineer's Rights and Duties.

- A. To furnish all labor, materials, equipment, supplies, and incidentals necessary to conduct and complete the Engineer's portion of the project as defined in the scope of work and to prepare and deliver to Billings all plans, specifications, bid documents, and other material as designated herein.
- B. Ascertain such information as may have a bearing on the work from local units of government, utility companies, and private organizations and shall be authorized to procure information from other authorities besides Billings but shall keep Billings advised as to the extent of these contacts and the results thereof.
- C. Prepare and present such information as may be pertinent and necessary in order for Billings to pass critical judgment on the features of the work. The Engineer shall make changes, amendments or revisions in the detail of the work as may be required by Billings. When alternates are being considered, Billings shall have the right of selection.
- D. Engineer's work shall be in accordance with the standards of sound engineering and present City, State, and National standards and policies currently in use.
- E. Conform to the requirements of the Montana Code Annotated Title 18 "Public Contracts" and more particularly Sections 18-2-121 and 18-2-122, and all other codes of the State of Montana applicable to providing professional services including codes and standards nationally recognized.
- F. The Engineer shall certify with the submission of final plans that the plans are in conformance with applicable sections of Title 69, Chapter 4, Part 5, of the Montana Code Annotated as pertaining to existing utilities.
- G. To perform professional services in connection with the project and will serve as Billings' representative in those phases of the project to which this agreement applies.
- H. Where Federal funds are involved, the necessary provisions to meet all requirements will be complied with and documents secured and placed in the bidding documents.
- I. Submit an estimated progress schedule as to time and costs at the beginning of the work, and monthly progress reports thereafter until complete. The reports will include any problems, potential problems, and delays as foreseen by the Engineer. Reports will be submitted in a timely manner to permit prompt resolution of problems.

- J. Name a Task Director who shall be the liaison between Billings and the Engineer. For this project the Task Director designated for the Engineer is Craig Habben working under, Jared Harris.

Section 2. Billings Rights and Duties.

- A. To furnish all labor, materials, equipment, supplies, and incidentals necessary to conduct and complete Billings' portion of the project as designated in the scope of work.
- B. Name a Task Director who shall be the liaison between the Engineer and Billings. For this project, the Task Director designated is Will Robbins, working under the City Engineer, Mac Fogelsong.

Section 3. Scope of Work.

The W.O. 22-11, Staples Reservoir Evaluation/Design will examine the Staples 6 million gallon (6 MG) Reservoir to attempt to determine the cause of the recent leaks, the stability of the sandstone bedrock and the structural condition of the reservoir. The evaluation will also include how the distribution system operates with the 6 MG, how it might operate without the 6 MG, how planned storage projects in other zones can benefit the system, and how replacement and/or new Zone 2 storage could be accomplished. Short-term and long-term concepts will be developed and the short-term repair designed.

A summary of the Scope includes:

- Reservoir Evaluation
 - Survey roof and floor slab for comparison of survey done in 2010.
 - Survey site in area of 6 MG for potential reservoir replacement options.
 - Inspect reservoir inside and outside.
 - Provide 3D lidar laser scan of interior of reservoir and exterior of the roof to help identify crack locations.
 - Core holes in interior slab to evaluate sandstone bedrock competency.
 - Bore holes on exterior of reservoir to evaluate sandstone bedrock competency.
 - Concrete and Shotcrete evaluation
 - Use cores in floor and visual observations to provide a basic summary of the concrete and shotcrete condition.
- Short-Term Repair Design
 - Evaluate one short-term repair option by December of 2021:
 - The repair will be completed by May 2022.
 - Cost estimate will be completed.
 - Include anticipated design life/life cycle cost.
 - Provide design of repair
 - Base design of repair on using flexible tape all the way around reservoir.
 - Assume some repairs to cracks in floor using flexible tape.
 - Assume no repairs to baffle wall will be required.
 - Provide repairs to core holes including liner.

- Zone 2 Storage Evaluation
 - Summarize Zone 2 storage requirements with and without the 6 MG
 - Include how system could operate without the 6 MG during peak and non-peak seasons.
 - Include how planned reservoirs in other zones could benefit Zone 2 storage and water system operation.
 - Evaluate options to replace the 6 MG
 - Replace reservoir in-place.
 - New 6 MG reservoir on Staples site but not completely in existing location.
 - Round or rectangular
 - Replace 6 MG with two smaller reservoirs on the Staples site in phases.
- Excluded Tasks to be added by amendment as needed
 - Bidding services
 - Construction services
 - Programming services
 - Design of long-term solution
 - Design of new reservoir(s)

DETAIL SCOPE OF SERVICES

The scope of services that will be utilized on the Staples Reservoir Evaluation/Design Project is presented in the summaries for Tasks 100 through 400. The scope of services is organized as follows:

<u>Task Series</u>	<u>Description</u>
100	Project Initiation, Coordination and Management
200	Reservoir Evaluation
300	Short-Term Repair Design
400	Zone 2 Storage Evaluation
500	Long-Term Solution Design (to be added by amendment if necessary)
600	Bidding Services (to be added by amendment)
700	Construction Services (to be added by amendment)
800	Programming Services (to be added by amendment)
900	Design of New Reservoir(s) (to be added by amendment if necessary)

TASK SERIES 100 – PROJECT INITIATION, COORDINATION AND MANAGEMENT

101 – Project Initiation

The purpose of this task is to kick off the project externally and internally. A project management plan (PMP) and all the support paperwork will be developed for all team members to have available to understand the project, the project team and the project requirements. The PMP is updated with significant changes in the project.

102 – Project Management

As part of this task, the Engineer's Project Manager will lead coordination of the HDR team with the City as well as supervise the team. Project Manager and Accountant will monitor project status, maintain project schedule and prepare financial documents.

- Deliverable – Monthly invoices

TASK SERIES 200 – RESERVOIR EVALUATION

201 – Survey

Prior to the 6 MG being taken out of service, the roof will be surveyed in a grid similar to the 2010 survey. The floor monitoring rods installed in 2010 will also be surveyed. The Staples site around the 6 MG and east up to the 3 MG Reservoir and the pump station will be surveyed including obtaining utility and topography information. When the reservoir is emptied the roof will again be surveyed and the floor of the reservoir will be surveyed.

- Deliverables – Survey information in Autocad files.
- Assumption – City will provide assistance and equipment for confined space entry and adequate lighting for reservoir floor survey.

202 – Geotechnical Investigations

A soils consultant will perform geotechnical investigations to determine the competency of the sandstone bedrock on the south exterior perimeter of the reservoir and below the reservoir floor. An estimated 7 bore holes will be drilled along the outside perimeter of the reservoir and into competent bedrock or to point of refusal. An estimated 10 holes will be cored in the reservoir floor and the sandstone bedrock evaluated at those holes. A price per hole for both investigation types is provided in case more or less holes are needed than estimated. Sample soils for soil corrosivity to assist in shotcrete evaluation.

- Deliverable – Geotechnical Report
- Assumption – Cored holes and lining will be repaired in the temporary repair project.

203 – Reservoir Inspection

HDR will inspect the exterior roof of the existing reservoir and surrounding ground. HDR will also inspect the interior of the reservoir for cracking and any structural damage. HDR will perform a 3D lidar laser scan of the interior of the reservoir and the roof of the reservoir on the exterior to facilitate locating cracks.

- Assumption – City will provide assistance and equipment for confined space entry and adequate lighting.

204 – Concrete Evaluation

The interior concrete cores from the geotechnical investigation will be observed as well as visual observation of the all the concrete to try to determine any concrete or rebar deterioration or corrosion. Shotcrete on the exterior of the reservoir will be inspected.

- Assumptions – The City will dig down alongside the reservoir 5 feet in three places for observation of the shotcrete condition.
- Deliverables – Brief summary of concrete and shotcrete condition in Task 205.

205 – Reservoir Evaluation Memorandum

A summary of the reservoir inspection, concrete evaluation and results from the Geotechnical Report and survey will be include in a technical memorandum. Two meetings will be held. One meeting that summarizes the inspections and observations and a second meeting that reviews the draft memorandum and conclusions.

- Deliverables – Meeting minutes.
- Deliverables – Draft and Final Technical Memorandum.

TASK SERIES 300 – SHORT-TERM REPAIR DESIGN

301 – Design Development

Based on observations from the reservoir inspection and from diver video, the flexible tape repair option with a neoprene pad over the observed crack will be evaluated as the short-term repair option and if it can be completed by May of 2022 as well as what the cost estimate is and the design life. One meeting will be held with the City review the short-term repair option and to determine whether to move forward with design.

- Deliverables – Meeting minutes.

302 – 95% Design

Drawings and specifications of the short-term repair and cored holes repair will be produced to the 95% design level for internal and City review. The design scope and fee are based on installing one or two layers of flexible tape over a neoprene pad around the full wall to floor joint. Internal QC will be performed. A review meeting with the City will be conducted.

- Deliverables – 95% drawings and specifications by December 15, 2021
- Deliverables – Summary of review meeting with the City.

303 – Final Design

Final drawings and specifications. Review comments from the 95% design will be incorporated to produce final design documents ready for advertisement. The cost estimate from the design development will be updated.

- Deliverables – Final drawings and specifications by December 31, 2021
- Deliverables – Summary of review meeting with the City.

TASK SERIES 400 – ZONE 2 STORAGE EVALUATION

401 – Distribution System Storage Evaluation

Provide an analysis of the distribution storage with and without the 6 MG on-line for current demands and 2030 projected demands for both summer and winter. Update the analysis, with the 6 MG off-line, incrementally based on the sequence of planned upcoming reservoir additions. Review with the City the storage scenarios including allocation of storage to various zones. Determine if staff is comfortable with allocations and resultant reservoir operation.

402 – Options for Replacing 6 MG

Evaluate options for replacing the 6 MG with new Zone 2 storage on the Staples site. Options to include new storage at the existing 6 MG location and smaller reservoir(s). No storage options will be analyzed at locations other than Staples. Evaluation to include project/life cycle costs and sequencing.

403 – 6 MG Long-Term Repair Options

Evaluate options to provide a long-term repair of the 6 MG reservoir that would improve sandstone stability or compensate for the sandstone instability. Structural improvements to the floor will also be analyzed based on the sandstone condition. Cost estimates for each option will be completed. Two review meetings will be conducted for Tasks 401, 402 and 403.

- Deliverables – Summary of review meetings with the City.

404 – Zone 2 Storage Recommendation

Summarize the information from Task 301 identifying the projected design life of the short-term repair, Task 401 establishing Zone 2 storage needs, Task 402 to identifying the best approach for additional Zone 2 storage and Task 403 stipulating the most cost-effective long-term repair. Based on the design life of the 6 MG currently, the estimated design life of the short-term and long-term repairs and the options for new Zone 2 storage, develop recommendation for repairs to the 6 MG and/or new Zone 2 storage. Use life cycle costs to facilitate the analysis. One meeting will be included for review of options. Complete by December 31, 2021.

- Deliverables – Summary of meeting
- Deliverables – Draft and final technical memorandum.