

**AMENDMENT NUMBER 1 TO
AGREEMENT FOR PROFESSIONAL SERVICES
BETWEEN
GEI CONSULTANTS OF MICHIGAN, P.C.
AND
THE CITY OF ANN ARBOR**

The City of Ann Arbor, a Michigan municipal corporation, with offices at 301 E. Huron St. Ann Arbor, Michigan 48107-8647 ("City") and GEI Consultants of Michigan, P.C., having its offices at 940 N. Main Street, Ann Arbor, MI 48104 ("Contractor") agree to amend the professional services agreement for the project Hydroelectric Dams FERC Part 12 Inspection and Report executed by the parties dated February 6, 2018 ("Agreement") as follows:

- 1) Article I, DEFINITIONS is amended to read as follows
 - A. Administering Service Areas/Units means Water Treatment Services Unit.
 - B. Contract Administrator means Water Treatment Senior Utilities Engineer or whomever the Contract Administrator may from time to time designate.
 - C. Deliverables means all Plans, Specifications, Reports, Recommendations, and other materials developed for or delivered to City by Contractor under this Agreement.
 - D. Project means Hydroelectric Dams FERC Part 12 Inspection and Report - STID and DSSMP Updates for Barton and Superior Dams.

- 2) Article III., SERVICES, is amended to read as follows:
 - A. The Consultant agrees to provide professional dam engineering services ("Services") in connection with the scope of services as described in Exhibits A and A-1. The City retains the right to make changes to the quantities of service within the general scope of the agreement at any time by a written order. If the changes add to or deduct from the extent of the services, the contract sum shall be adjusted accordingly. All such changes shall be executed under the conditions of the original agreement.

- 3) Article V, COMPENSATION OF CONSULTANT is amended to read as follows:
 - A. The Consultant shall be paid on the basis of time spent and materials used at the rates and prices specified in Exhibit B for the Services described in Exhibit A, and in Exhibit B-1 for the services described in Exhibit A-1, for acceptable work performed and acceptable deliverables received. The total fee to be paid the Consultant for the Services shall not exceed \$166,350.00. The original contract

amount was \$118,500.00. The Amendment No. 1 amount is \$47,850.00. Payment shall be made monthly following receipt of invoices submitted by the Consultant, and approved by the Contract Administrator.

All terms, conditions, and provisions of the Agreement, unless specifically amended above, shall apply to this Amendment and are made a part of this Amendment as though expressly rewritten, incorporated, and included herein.

This Amendment to the Agreement shall be binding on the Parties' heirs, successors, and assigns.

For Contractor

For City of Ann Arbor

By _____

By _____
Christopher Taylor, Mayor

Its:

Date: _____

By _____
Jacqueline Beaudry, City Clerk

Approved as to form and content

Approved as to substance

Stephen K. Postema, City Attorney

Howard S. Lazarus, City Administrator

Craig Hupy, Public Service Area Administrator

EXHIBIT A-1 SCOPE OF SERVICES

The scope of services includes the following:

Scope of Services

Based on communication following the submittal of both reports, GEI has included a scope and cost for updating the STID and DSSMP for both Barton and Superior Dams. These tasks were divided as shown below to complete the requested scope of services:

- Task 1 – Barton Dam STID Updates
- Task 2 – Barton Dam DSSMP Updates
- Task 3 – Superior Dam STID Updates
- Task 4 – Superior Dam DSSMP Updates
- Task 5 – IC Review of NTH Reports and Supplement
- Task 6 – Miscellaneous Tasks

These services are described in detail in the following sections.

Task 1 – Barton Dam STID Update

GEI will update Barton Dam STID which will include revisions to all sections, preparation of a revision log documenting the updates, incorporation of necessary drawings, and other items recommended in Section 1.3.7 of the CSIRs.

Document Review

GEI will review the STID to identify all source documents that are referenced within the STID. We will compare the list of the source documents cited within the STID to the document provided to GEI by the City during the 2018 Part 12D Inspection and will provide a list of the missing references to the City. GEI assumes the City will search their archives to attempt to locate the missing references. If the City is unable to locate the references and wants GEI to provide a staff member to search through hard copy records, this service can be performed as an additional service on a time-and-materials basis. After completing the review of available documents, GEI will update the STID to include appropriate references and clearly mark which references were not able to be located.

There are several references that are critical to updating the STID. These references, along with GEI's assumptions, are given below:

- Original design drawings and drawings for each significant dam improvement (1972, 1983, 1986, 1991, 1997, 2000, 2013, etc.)
 - GEI assumes these drawings are available and can be provided electronically
- Documentation for the spillway rating curve
 - GEI assumes this documentation cannot be located and it needs to be redeveloped
- Documentation for the development of shear strength parameters used in the powerhouse and spillway stability analyses
 - GEI will update the stability analyses for the powerhouse and spillway for the FERC-required loading conditions using drained strength parameters

Update the STID per the CSIR Recommendations

GEI will update Section 1 to provide a comprehensive summary table of PFMs as included in Section 1.3.3 of the CSIR. The previous PFMA reports will be added as exhibits to the revised STID. Within Section 2, the text will be updated to clarify discrepancy between the as-built condition of the timber piles and sheet pile seepage cutoff wall and the design drawings. GEI will also include aerial photographs that better depict the Project structures. GEI will generate a drawing of the right embankment that clearly identifies the right embankment stationing by drawing the stationing line at the crest onto an image from a previous plan set.

GEI will update Sections 2 and 3 to reflect the bulkheading of Bay 1 and lack of access to this barrel arch. GEI will rely on the City to provide any reports or construction history regarding this work. GEI assumes representative copies of the original design drawings and drawings for each significant dam improvement (1972, 1983, 1986, 1991, 1997, 2000, 2013, etc.) are available and can be scanned and electronically sent to GEI from the City.

Section 3 will be updated to include references with particular attention paid to design reports, pertinent memoranda from licensing and permitting documents, laboratory investigations, construction testing, field geotechnical investigations, construction reports, and specification documents.

GEI will update Section 4 to include normal reservoir operation levels and thresholds and include a reference to the reservoir elevation regulations. Section 5 will be updated to include references for the regional and local geology description and Section 5.8 will be updated to include the most recent artesian conditions at the site relating to the right embankment.

Section 6 will be revised to include a description of the IDF development in greater detail,

including a review of the documentation provided to develop the IDF and better document assumptions and calculations. GEI will complete a wave runup analysis under IDF conditions to allow the City to better understand the risk associated with prolonged wave overtopping of the embankment.

Based on a review of the materials provided during the 2018 Part 12D inspection, GEI assumes documentation does not exist for the spillway rating curve and that it will need to be redeveloped to provide adequate documentation. The hydrology, hydraulics, and water conveyance systems information will also be revised and updated. All revisions will be completed in accordance with the FERC required outline found in Appendix I of the Engineering Guidelines for the Evaluation of Hydropower Projects (Chapter 14 of the DSPMP Guidelines).

GEI will remove text within Section 7 and add a reference to the DSSMP, which is managed as a separate document.

Within Section 8, GEI will include a summary of the analyses and associated references that represent the record analyses for the project. This includes updating Appendix F and using specific exhibits to organize the record analyses. If available, GEI will include or reference the laboratory test results that support the material properties used in the analyses. GEI assumes the development of shear strength parameters used in the powerhouse and spillway stability analyses cannot be identified. Therefore, GEI will update the stability analyses for the powerhouse and spillway for the FERC-required loading conditions using drained strength parameters.

GEI will update Section 9 to include the latest gate certifications, Section 10 to include the latest correspondence through the end of 2018 (provided by the City) and update the Reference list in Section 11.

A draft of the STID with changes tracked will be electronically submitted to the City for review and comment in MSWord and Adobe .pdf formats. GEI proposes to host a meeting via conference call to review the draft STID/DSSMP updates for Barton Dam. Upon receipt of all City review comments, GEI will finalize the STID updates and issue an electronic copy in .pdf format to the City.

Task 2 – Barton Dam DSSMP Updates

In conjunction with completing Task 1, GEI will provide updates to the DSSMP for Barton Dam following the recommendations provided in Section 1.3.7 of the CSIR reports.

GEI will include the new PFMs within the latest CSIR Update. GEI will also update the right embankment stationing drawing completed under Task 1 to include right embankment drains and filter blankets. GEI will complete a procedure to plot both the historic piezometer data and data from the last 5 years. This will show both long term trends and detail fluctuations. The plots will include tailwater on the plots and threshold lines.

Regarding survey procedures, GEI will update survey procedures for plotting data with time, implement movement threshold of +/- 0.02 feet, post-processing adjustments for increased accuracy, and include a bathymetric survey protocol.

GEI will write a protocol for future dive surveys to be conducted on all underwater concrete structures upstream and downstream of the dam. Finally, GEI will include a description of how action and threshold levels were generated and what instruments are used to monitor general health of the structures.

The draft DSSMP updates with tracked changes will be shared with the City and discussed on the conference call, along with the STID updates. Both the final STID and DSSMP will be sent via electronic files to the City. The electronic files will include a directory structure that allows facilitation of future updates.

Task 3 – Superior Dam STID Update

Following the completion of updates to the Barton Dam STID, GEI will complete the updates to the Superior Dam STID. This task will include revisions to all sections requiring updates, preparation of a revision log documenting the updates, incorporation of necessary drawings, and other items recommended in Section 1.3.7 of the CSIRs.

Task 3a – Document Review

GEI will complete a review of references for Superior Dam as described above for Barton Dam. Like Barton, there are several references that are critical to updating the STID. These references, along with GEI's assumptions, are given below:

- Original design drawings and drawings for each significant dam improvement (1972, 1983, 1986, 1991, 1997, 2000, 2013, etc.)
 - GEI assumes these drawings are available and can be provided electronically
- Documentation for the spillway rating curve
 - GEI assumes this documentation cannot be located and it needs to be redeveloped
- Documentation about the 1968 flood related to the Geddes Dam failure
 - GEI assumes the FERC can locate this information and it can be provided electronically. We understand the City has been unable to locate this reference.

Task 3b – Update the STID per the CSIR Recommendations

GEI will update Section 1 to provide a comprehensive summary table of PFMs as included in Section 1.3.3 of the CSIR. The previous PFMA reports will be added as exhibits to the revised STID. Within Section 2, GEI will include more descriptive aerial photographs that better depict the Project structures. GEI will clarify the text within this section regarding the extent of the sheet pile seepage cutoff wall and update the text to describe the apron/still basins downstream of the sluiceway and spillway. GEI will also take the existing hydraulics and hydrology information included within Appendix B – Project Drawings and move to Appendix D – H&H. GEI assumes representative copies of the original design drawings and drawings for each significant dam improvement (1972, 1983, 1986, 1991, 1997, 2000, 2013, etc.) are available and can be scanned and electronically sent to GEI from the City.

GEI will update the references within Section 3 with particular attention paid to design reports, pertinent memoranda from licensing and permitting documents, laboratory investigations, construction testing, field geotechnical investigations, construction reports, and specification documents.

GEI will update Section 4 to include normal reservoir operation levels and thresholds and include a reference to the reservoir elevation regulations. We will also update Section 5 to include references for the regional and local geology description.

Within Section 6, GEI will describe the IDF development in greater detail, including a review of the documentation provided to develop the IDF and better document assumptions and calculations. GEI assumes documentation does not exist for the spillway rating curve and therefore will redevelop the calculations and provide adequate documentation. The hydrology, hydraulics, and water conveyance systems information will also be revised and updated. All revisions will be completed in accordance with the FERC required outline found in Appendix I of the Engineering Guidelines for the Evaluation of Hydropower Projects (Chapter 14 of the DSPMP Guidelines).

GEI will use information provided by the City regarding the 1968 flood related to the Geddes Dam failure. With the information provided, GEI will better document the flows produced by this failure at Superior Dam and the reservoir elevations during the flood. This description will be done to the greatest extent possible knowing that minimal documentation is available for this flooding event.

GEI will remove the text within Section 7 and add a reference to the DSSMP, which is managed as a separate document. Within Section 8, GEI will comment on the stability of the left embankment, complete a stability analysis for the sluiceway structure, include a summary of the analyses completed to date and include references. This includes updating

Appendix F and using specific exhibits to organize the record analyses. If available, GEI will include or reference the laboratory test results that support the material properties used in the analyses.

GEI will update Section 9 to include the latest gate certifications and including flashboard analyses, Section 10 to include the latest correspondence through the end of 2018 (provided by the City) and update the Reference list in Section 11.

A draft of the STID with changes tracked will be electronically submitted to the City for review and comment in MSWord and Adobe .pdf formats. GEI proposes to host a meeting via conference call to review the draft STID/DSSMP updates for Superior Dam. Upon receipt of all City review comments, GEI will finalize the STID updates and issue an electronic copy in .pdf format to the City.

Task 4 – Superior Dam DSSMP Updates

Concurrent with Task 3, GEI will provide updates to the DSSMP for Superior Dam following the recommendations provided in Section 1.3.7 of the CSIR reports.

GEI will edit minor errors including changing the high headwater alarm from El. 797.8 to 730.8, include a high tailwater alarm of 714.80, and update the action level for the Lower Left observation well from El. 718.90 to El. 718.50. Regarding PFMs, GEI will include the new PFMs within the latest CSIR Update. GEI will also update the right embankment stationing drawing completed under Task 3 to include right embankment drains and filter blankets. GEI will complete a procedure to plot both the historic piezometer data and data from the last 5 years. This will show both long term trends and detail fluctuations. The plots will include tailwater on the plots and threshold lines.

GEI will update the survey information to acknowledge the disturbance of the ½-inch iron rod on the right embankment and its replacement with S-CP-E I 2018. Regarding survey procedures, GEI will update survey procedures for plotting data with time, implement movement threshold of +/- 0.02 feet, post-processing adjustments for increased accuracy, and include a bathymetric survey protocol.

GEI will write a protocol for future dive surveys to be conducted on all underwater concrete structures upstream and downstream of the dam. Finally, GEI will include a description of how action and threshold levels were generated and what instruments are used to monitor general health of the structures.

The draft DSSMP updates with changes tracked will be shared with the City and discussed on the conference call, along with the STID updates. Both the final STID and

DSSMP will be sent via electronic files to the City. The electronic files will include a directory structure that allows facilitation of future updates.

Task 5 – IC Review of NTH Reports and Supplement

GEI understands there is a current stability and seepage assessment being conducted by NTH Consultants for a critical portion of the right embankment for Superior Dam. A report summarizing the results is anticipated in 2019. The CSIR recommended that this analysis be completed and specifically address the risk of ground loss (seepage analysis) and slope instability under normal and flood conditions, and both heave and blowout failure modes should be considered. In addition, the slope stability analyses should include pore pressures estimated by a seepage model calibrated to the observed field conditions. It is assumed that the report will be submitted to GEI as a draft. GEI proposes to provide review comments and recommendations to finalize the report. Review comments will be submitted electronically.

Following finalization of the NTH reports, GEI proposes to issue a CSIR supplemental report. This supplemental report is recommended within the CSIR and will include a discussion of the NTH report findings, address the remaining Category III failure modes, and provide any necessary recommendations associated with the seepage conditions within the right embankment at Barton. A draft of the supplement will be submitted for review prior to finalizing.

Task 6 – Miscellaneous Tasks

Task 6 will consist of tasks proposed and authorized by the City. These tasks may include, but are not limited to, on-site document searches, responding to FERC questions, and other related tasks.

EXHIBIT B-1
FEE SCHEDULE

The fees are broken down as follows:

Task	Subtask Cost	Task Cost
<i>Task 1 – Barton Dam STID Updates</i>	-	\$17,500
Review references, general text updates, and meetings	\$6,000	-
Recreate rating curve documentation, wave run-up analysis, revisions to Section 6	\$3,800	-
Powerhouse and spillway stability analyses, revisions to Section 8	\$7,700	-
<i>Task 2 – Barton Dam DSSMP Updates</i>	-	\$3,500
<i>Task 3 – Superior Dam STID Updates</i>	-	\$13,600
Review references, general text updates, and meetings	\$6,000	-
Recreate rating curve documentation, revisions to Section 6	\$3,000	-
Sluiceway stability analysis, revisions to Section 8	\$4,600	-
<i>Task 4 – Superior Dam DSSMP Updates</i>	-	\$3,250
Total Lump Sum Cost:	-	\$37,850
<i>Task 5 – IC Review of NTH Reports and Supplement</i>	-	\$5,000
<i>Task 6 – Miscellaneous Tasks</i>		\$5,000
Total Cost Plus Not-to-Exceed Cost:	-	\$10,000
Maximum Total Cost Not-to-Exceed:	-	\$47,850