

# PROFESSIONAL ENGINEERING SERVICES AGREEMENT

## ENGINEER & CITY OF DULUTH

THIS AGREEMENT, effective as of the date of attestation by the City Clerk, is made by and between the City of Duluth, Minnesota hereinafter referred to as the "City" and:

Name: HGA, Inc.  
Address: 420 North 5th Street, Suite 100, Minneapolis, MN 55401

hereinafter referred to as the "Engineer", in consideration of the mutual promises contained herein.

Payments as described in Section V shall be made from Funding 540-0920-1499-5530 and Resolution No. 19-0820R, passed on December 9, 2019.

The professional engineering services obtained by the City under this agreement concern the following described project hereinafter referred to as the "Project":

Project Name: Engineering Services for DES Balance of Plant  
Project Description: Provide an engineered Balance of Plant package which, when connected to the Steam Converter System (SCS), results in the completed component of the Hot Water Distribution System local to the Plant.

The professional engineering services to be provided under this agreement consist of those phases A through G checked below. A more particular description of each phase is contained in Section II, "Basic Services", of the agreement.

	<u>Phase</u>	<u>Description</u>
<input checked="" type="checkbox"/>	A.	Study and Report Phase
<input type="checkbox"/>	B.	Preliminary Survey Phase
<input checked="" type="checkbox"/>	C.	Preliminary Design Phase
<input checked="" type="checkbox"/>	D.	Final Design Phase
<input checked="" type="checkbox"/>	E.	Bidding Phase
<input type="checkbox"/>	F.	Construction Survey and Layout Phase
<input checked="" type="checkbox"/>	G.	Construction Administration and Inspection Phase

### SECTION I. GENERAL

#### A. ENGINEER

The Engineer shall provide professional engineering services for the City in all phases of the Project to which this agreement applies, serve as the City's professional engineering representative for the Project as set forth below and shall give professional engineering consultation and advice to the City during the performance of services hereunder. All services provided hereunder shall be performed by the Engineer in accordance with generally accepted Engineering standards to the satisfaction of the City.

#### B. NOTICE TO PROCEED

The Engineer shall only begin performance of each Phase of work required hereunder upon receipt of a written Notice to Proceed by City representative with that Phase.

#### C. TIME

The Engineer shall begin work on each successive phase promptly after receipt of the Notice to Proceed and shall devote such personnel and materials to the Project so as to complete each phase in an expeditious manner within the time limits set forth in Section II. Time is of the essence to this agreement.

#### D. CITY'S REPRESENTATIVE

The City's representative to the Engineer shall be the City Engineer or his or her designees assigned in writing.

E. ENGINEERING GUIDELINES

All work performed as part of this project shall conform to the most current edition of the Engineering Guidelines for Professional Engineering Services and Developments as approved by the City Engineer and on file in the office of the City Engineer.

F. SUBCONSULTANTS

Engineer may contract for the services of sub-consultants to assist Engineer in the performance of the services to be provided by Engineer hereunder but the selection of any sub-consultant to perform such services shall be subject to the prior written approval of the City Engineer. Engineer shall remain responsible for all aspects of any services provided by such sub-consultants to City under this Agreement. City shall reimburse Engineer for sub-consultant services under the categories of services to be provided by Engineer under Phases A through G, as applicable.

**SECTION II. BASIC SERVICES**

A. STUDY AND REPORT PHASE

- Included in this Agreement
- Not included in this Agreement

The Engineer shall:

1) City's Requirements

Review available data and consult with the City to clarify and define the City's requirements for the Project.

2) Advise Regarding Additional Data

Advise the City as to the necessity of the City's providing or obtaining from others data or services in order to evaluate or complete the Project and, if directed by the City's representative, act on behalf of the City in obtaining other data or services.

3) Technical Analysis

Provide analysis of the City's needs, planning surveys, site evaluations, and comparative studies of prospective sites and solutions.

4) Economic Analysis

Provide a general economic analysis of various alternatives based on economic parameters and assumptions provided by the City.

5) Report Preparation

Prepare a report containing schematic layouts, sketches and conceptual design criteria with appropriate exhibits to indicate clearly the considerations involved and the alternative solutions available to the City and setting forth the Engineer's findings and recommendations with opinions of probable total costs for the Project, including construction cost, contingencies, allowances for charges of all professionals and consultants, allowances for the cost of land and rights-of-way, compensation for or damages to properties and interest and financing charges (all of which are hereinafter called "Project Costs").

6) Report Presentation

Furnish three copies of the report and present and review the report in person with the City as the City Representative shall direct.

7) Supplementary Duties

The duties and responsibilities of Engineer during the Study and Report Phase shall also include any additional duties and responsibilities to be provided pursuant to the Engineer's proposal attached as Exhibit B.

8) Completion Time

The Study and Report Phase shall be completed and report submitted by December 31, 2019.

B. PRELIMINARY SURVEY PHASE

- Included in this Agreement
- Not included in this Agreement

After written authorization by the City's representative to proceed with the preliminary survey phase, the Engineer shall:

- 1) General  
Perform topographic survey as necessary to prepare the design and provide Construction Survey and Layout as described in Section II.F
- 2) Boundary Survey  
Perform boundary survey if checked.
- 3) Document Presentation  
Furnish a CADD file of the survey base map to the City. Files shall be in the software specified in the Engineering Guidelines for Professional Engineering Services and Developments described in Section I.E.
- 4) Supplementary Duties  
The duties-responsibilities of the Engineer during the preliminary survey phase shall also include any additional duties and responsibilities to be provided pursuant to the Engineer's proposal attached as Exhibit B.
- 5) Completion Time  
The preliminary survey phase shall be completed and submitted by n/a.

C. PRELIMINARY DESIGN PHASE

- Included in this Agreement
- Not included in this Agreement

After written authorization by the City's Representative to proceed with the Preliminary Design Phase, the Engineer shall:

- 1) Preliminary Design Documents  
Prepare preliminary design documents consisting of final design criteria, preliminary drawings and outline specifications.
- 2) Revised Project Costs  
Based on the information contained in the preliminary design documents, submit a revised opinion of probable Project costs.
- 3) Preparation of Grants; Environmental Statements  
Preparation of applications and supporting documents for governmental grants, loans or advances in connection with the Project, preparation or review of environmental assessments and impact statements; review and evaluation of the effect on the design requirements of the Project of any such statements and documentation prepared by others; and assistance in obtaining approvals of authorities having jurisdiction over the anticipated environmental impact of the Project.
- 4) Renderings and Models  
Providing renderings or models for the City's use.
- 5) Economic Analysis  
Investigations involving detailed consideration of operations, maintenance and overhead expenses; providing value engineering during the course of design; the preparation of feasibility studies, cash flow and economic evaluations, rate schedules and appraisals; assistance in obtaining financing for the Project; evaluating processes available for licensing and assisting the City in obtaining licensing; detailed quantity surveys of material, equipment and labor; and audits of inventories required in connection with

construction performed by the City.

6) Document Presentation

Furnish three copies of the above preliminary design documents and present and review such documents in person with the City as the City Engineer may direct.

7) Supplementary Duties

The duties and responsibilities of the Engineer during the Preliminary Design Phase shall also include any additional duties and responsibilities to be provided pursuant to the Engineer's proposal attached as Exhibit B.

8) Completion Time

The Preliminary Design Phase shall be completed and report or plan submitted by February 3, 2020.

D. FINAL DESIGN PHASE

Included in this Agreement

Not included in this Agreement

1) Drawings and Specifications

On the basis of the accepted preliminary design documents and the revised opinion of probable Project costs, prepare for incorporation in the contract documents Construction Plans to show the character and extent of the Project and specifications.

2) Approvals of Governmental Entities

Furnish to the City such documents and design data as may be required for, and prepare the required documents so that the City may apply for approvals and permits of such governmental authorities as have jurisdiction over design criteria applicable to the Project, and assist in obtaining such approvals by participating in submissions to and negotiations with appropriate authorities.

3) Adjusted Project Costs

Advise the City of any adjustments to the latest opinion of probable Project costs, identify cause of change and furnish a revised opinion of probable Project cost based on the drawings and specifications.

4) Contract Document Preparation

Prepare for review and approval by the City, its Attorney and other advisors, contract agreement forms, general conditions and supplementary conditions and (where requested) bid forms, invitations to bid and instructions to bidder, including for federally funded Projects, all documentation, including wage determinations, in order to comply with Davis-Bacon Act or City code requirements, and assist in the preparation of other related contract documents. To the extent possible, the Engineer will follow the document format supplied by the City and use the standard terms and conditions supplied by the City in preparation of these documents.

5) Real Estate Acquisition: Legal Description

Based on preliminary design documents, furnish a legal description and recordable reproducible 8-1/2" X 11" plat of each parcel of real estate in which the City must acquire an interest in order to proceed with construction of the Project.

6) Document Presentation

Furnish three copies of the above documents and present and review them in person with the City.

7) Supplementary Duties

The duties and responsibilities of the Engineer during the Final Design Phase shall also include any additional duties and responsibilities to be provided pursuant to the Engineer's proposal attached as Exhibit B.

8) Completion Time

The Final Design Phase shall be completed and contract documents submitted by March 25, 2020.



E. BIDDING PHASE

- Included in this Agreement  
 Not included in this Agreement

The Engineer shall:

1) Assist in Bidding

Assist the City in obtaining bids for each separate City contract for construction, materials, equipment and services.

2) Advise Regarding Contractors and Subcontractors

Consult with and advise the City as to the acceptability of subcontractors and other persons and organizations proposed by the City's contractor(s) (hereinafter called "Contractor(s)" for those portions of the work as to which such acceptability is required by the bidding documents).

3) Consult Regarding Substitutes

Consult with and advise the City as to the acceptability of substitute materials and equipment proposed by the contractor(s) when substitution prior to the award of contracts is allowed by the bidding documents.

4) Evaluation of Bids

Assist the City in evaluating bids or proposals and in assembling and awarding contracts.

5) Supplementary Duties

The duties and responsibilities of the Engineer during the Bidding Phase shall also include any additional duties and responsibilities to be provided pursuant to the Engineer's proposal attached as Exhibit B.

6) Completion Time

The bidding phase shall be completed by April 30, 2020.

F. CONSTRUCTION SURVEY AND LAYOUT PHASE

- Included in this Agreement  
 Not included in this Agreement

1) General

This phase of work may or may not be performed in conjunction with Phase G, "Construction Administration and Inspection Phase" of this agreement. Inclusion of this phase in the agreement does not imply that services identified under Phase G are to be provided unless specifically indicated in this agreement.

2) Duties

The Engineer shall provide horizontal and vertical control line and grade to enable construction of the improvement as depicted in the Project plans. The number of control points to be established by the Engineer shall be sufficient to permit the construction contractor to construct the improvement within the construction tolerances established in the Project specifications. In addition, the number of control points shall be consistent with standard engineering practice.

3) Accuracy

The Engineer shall provide the horizontal and vertical control points within the same measurement tolerances as the construction tolerances established in the Project specifications. The Engineer shall be responsible for the accuracy of the control points which are established. The Engineer shall be responsible for costs which may result from errors in placement of control points. The Engineer shall be required to establish control points at Engineer's costs only one time. Control points which are lost, damaged, removed or otherwise moved by the Contractor or others shall be promptly replaced by the Engineer and costs for such replacement shall be computed on a time and materials basis, and reimbursed by the City. The Engineer shall take all reasonable and customary actions to protect the control points established by the Engineer.

4) Supplementary Duties

The duties and responsibilities of the Engineer during the construction survey and layout phase shall also include any additional duties and responsibilities to be provided pursuant to the Engineer's proposal attached as Exhibit B.

5) Completion Time

The construction survey & layout phase shall be completed by n/a.

G. CONSTRUCTION ADMINISTRATION AND INSPECTION PHASE

Included in this Agreement

Not included in this Agreement

1) General Duties

Consult with and advise the City and act as its representative as provided herein and in the General Conditions of the construction contract for the Project. This phase of the work may or may not be performed in conjunction with Phase F "Construction Survey and Layout Phase" of this agreement. Inclusion of this phase in the agreement does not imply that services identified under Phase F are to be provided unless specifically indicated in this agreement.

2) Construction Inspection and Reporting

Make visits to the site with sufficient frequency at the various stages of construction to observe as an experienced and qualified design professional the progress and quality of the executed work of the contractor(s) and to insure that such work is proceeding in accordance with the contract documents. During such visits and on the basis of on-site observations, the Engineer shall keep the City informed of the progress of the work, shall endeavor to guard the City against defects and deficiencies in such work and may disapprove or reject work failing to conform to the contract documents.

3) Warranty Inspection

Eleven months following construction completion, conduct an inspection to document any items to be repaired by the contractor under the conditions of the construction contract warranty. Submit work to be corrected to the Contractor and the City.

4) Review of Technical and Procedural Aspects

Review and approve (or take other appropriate action in respect to Shop Drawings), the results of tests and inspections and other data which each contractor is required to submit, determine the acceptability of substitute materials and equipment proposed by the contractor(s), and receive and review (for general content as required by the specifications) maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection which are to be assembled by the contractor(s).

5) Contract Documents

Receive from each contractor and review for compliance with contract documents all required document submissions including but not limited to performance and payment bonds, certificates of insurance report forms required by any City, State or Federal law or rule or regulation and submit the forms to the City for final approval.

6) Conferences and Meetings

Attend meetings with the contractor, such as preconstruction conferences, progress meetings, job conferences and other Project-related meetings, and prepare and circulate copies of the minutes thereof including to the City.

7) Records

a) Maintain orderly files for correspondence, reports of job conferences, shop drawings and samples, reproductions of original contract documents, including all work directive changes, addenda, change orders, field orders, additional drawings issued subsequent to the execution of the contract, the Engineer's clarifications and interpretations of the contract documents, progress reports, and other Project-related documents.

b) Keep a diary or log book, recording the contractor's hours on the job site, weather conditions, data

relative to questions of work directive changes, change orders, or changed conditions, list of job site visitors, daily activities, decisions, observations in general, and specific observations in more detail, as in the case of observing test procedures and send copies to the City. Take multiple photographs of the Work and keep a log and file of the photos. Specifically maintain records of acceptance and rejection of materials and workmanship.

c) Record names, addresses and telephone numbers of all the contractors, subcontractors, and major suppliers of materials and equipment.

8) Reports

a) Furnish the City periodic reports, as required, on progress of the work and of the contractor's compliance with the progress schedule and schedule of shop drawings and sample submittals.

b) Consult with the City, in advance of scheduled major tests, inspections, or start of important phases of the Work.

c) Draft proposed change orders and work directive changes, obtaining back-up material from the contractor, and make recommendations to the City regarding change orders, work directive changes and field orders.

d) Report immediately to the City upon the occurrence of any accident.

9) Contract Interpretation, Review of Quality of Work

Issue all instruction of the City to the contractor(s); issue necessary interpretations and clarifications of the contract Documents and in connection therewith prepare change orders as required, subject to the City's approval; have authority, as the City's representative, to require special inspection or testing of the work; act as initial interpreter of the requirements of the contract documents and judge of the acceptability of the work there under and make decisions on all claims of the contractor(s) relating to the acceptability of the work or the interpretation of the requirements of the contract documents pertaining to the execution and progress of the work.

10) Change Orders and Revisions

Prepare change orders to reflect changes in the Project requested or approved by the City, evaluate substitutions proposed by the contractor(s) and make revisions to drawings and specifications occasioned thereby, and provide any additional services necessary as the result of significant delays, changes or price increases occurring as a direct or indirect result of material, equipment or energy shortages.

11) Review of Applications for Payment

Based on the Engineer's on-site observations as an experienced and qualified design professional and on review of applications for payment and the accompanying data and schedules, determine the amount owing to the contractor(s) and recommend in writing payments to the contractor(s) in such amounts; such recommendations of payment will constitute a representation to the City, based on such observations and review, that the work has progressed to the point indicated, that, to the best of the Engineer's knowledge, information and belief, the quality of such work is in accordance with the contract documents (subject to an evaluation of such work as a functioning Project upon substantial completion, to the results of any subsequent tests called for in the contract documents, and to any qualifications stated in his recommendation), and that payment of the amount recommended is due the contractor(s).

12) Determination of Substantial Completion

Conduct an inspection to determine if the Project is substantially complete and a final inspection to determine if the work has been completed in accordance with the contract documents and if each contractor has fulfilled all of his obligations there under so that the Engineer may recommend, in writing, final payment to each contractor and may give written notice to the City and the contractor(s) that the work is acceptable (subject to any conditions therein expressed).

13) Authority and Responsibility

The Engineer shall not guarantee the work of any contractor or subcontractor, shall have no supervision or control as to the work or persons doing the work, shall not have charge of the work, shall not be responsible for safety in, on, or about the job-site or have any control of the safety or adequacy of any equipment, building component, scaffolding, supports, forms or other work aids. If the Engineer determines that there are deficiencies in materials or workmanship on the Project, or otherwise deems it to be in the best interest

of the City to do so, the Engineer shall be responsible to stop any contractor or subcontractor from performing work on the Project, until conditions giving rise to this need, therefore, are rectified.

14) Engineer Not Responsible for Acts of Contractor

The Engineer shall not be responsible for the supervision or control of the acts or omissions or construction means, methods or techniques of any contractor, or subcontractor, or any of the contractor(s)' or subcontractors' or employees or any other person (except the Engineer's own employees and agents) at the site or otherwise performing any of the contractor(s) work; however, nothing contained in this paragraph shall be construed to release the Engineer from liability for failure to properly perform duties undertaken by him in these contract documents or this agreement.

15) Preparation of Record Drawings

The Engineer shall prepare a set of record drawings in accordance with the Engineering Guidelines for Professional Engineering Services and Development described in Section I.E.

16) Manuals

The Engineer shall furnish operating and maintenance manuals; protracted or extensive assistance in the utilization of any equipment or system (such as initial start-up, testing, and adjusting and balancing); and training personnel for operation and maintenance.

17) Supplementary Duties

The duties and responsibilities of the Engineer during the construction administration and inspection phase shall also include any additional duties and responsibilities to be provided pursuant to the Engineer's proposal attached as Exhibit B.

18) Completion Time

The construction administration and inspection phase shall be completed by July 31, 2020.

### **SECTION III. CITY'S RESPONSIBILITIES**

**A. FURNISH REQUIREMENTS AND LIMITATIONS**

Provide all criteria and full information as to the City's requirements for the Project, including design objectives and constraints, space, capacity and performance requirements, flexibility and expendability, economic parameters and any budgetary limitations; and furnish copies of all design and construction standards which the City will require to be included in the Drawings and Specifications.

**B. FURNISH INFORMATION**

Assist the Engineer by placing at the Engineer's disposal all available information reasonably known to and in possession of the City.

**C. REVIEW DOCUMENTS**

Examine all studies, reports, sketches, drawings, specifications, proposals and other documents presented by the Engineer.

**D. OBTAIN APPROVALS AND PERMITS**

Furnish approvals and permits from all governmental authorities having jurisdiction over the Project and such approvals and consents from others as may be necessary for completion of the Project.

**E. ACCOUNTING, LEGAL AND INSURANCE SERVICE**

Provide such accounting, independent cost estimating and insurance counseling services as may be required for the Project, such auditing service as the City may require to ascertain how or for what purpose any contractor has used the monies paid to him under the construction contract, and such inspection services as the City may require to ascertain that the contractor(s) are complying with any law, rule or regulation applicable to their performance of the work except as otherwise provided in Section II.

**F. NOTIFY THE ENGINEER OF DEFECTS OR DEVELOPMENT**

Give prompt written notice to the Engineer whenever the City observes or otherwise becomes aware of any development that affects the scope or timing of the Engineer's services, or any defect in the work of the

contractor(s).

G. COSTS OF THE CITY'S RESPONSIBILITIES

Bear all costs incidental to compliance with the requirements of this Section III.

SECTION IV. GENERAL CONSIDERATIONS

A. SUCCESSORS AND ASSIGNS

The City and the Engineer each binds their respective partners, successors, executors, administrators and assigns to the other party of this agreement and to the partners, successors, executors, administrators, and assigns of such other party, in respect to all covenants of this agreement; the Engineer shall not assign, sublet, or transfer their respective interests in this agreement without the written consent of the City. Nothing herein shall be construed as creating any personal liability on the part of any officer or agent of any public body which may be a party hereto, nor shall it be construed as giving any rights or benefits hereunder to anyone other than the City and the Engineer.

B. OWNERSHIP OF DOCUMENTS

All drawings, specifications, reports, records, and other work product developed by the Engineer in connection with this Project shall remain the property of the City whether the Project is completed or not. Reuse of any of the work product of the Engineer by the City on extensions of this Project or any other Project without written permission of the Engineer shall be at the City's risk and the City agrees to defend, indemnify and hold harmless the Engineer from all damages and costs including attorney fees arising out of such reuse by the City or others acting through the City.

C. ESTIMATES OF COST (COST OPINION)

Estimates of construction cost provided are to be made on the basis of the Engineer's experience, qualifications and the best of their professional judgment, but the Engineer does not guarantee the accuracy of such estimates as compared to the contractor's bids or the Project construction cost.

D. INSURANCE

1) Engineer shall provide the following minimum amounts of insurance from insurance companies authorized to do business in the state of Minnesota unless Engineer shall have successfully demonstrated to the City Attorney, in the reasonable exercise of his or her discretion that such insurance is not reasonably available in the market. If the Engineer demonstrates to the reasonable satisfaction of the City Attorney that such insurance requires hereunder is not reasonably available in the market, the City Attorney may approve an alternative form of insurance which is reasonably available in the market which he or she deems to provide the highest level of insurance protection to the city which is reasonably available.

- a) Workers' compensation insurance in accordance with the laws of the State of Minnesota.
- b) Public Liability Insurance and Automobile Liability Insurance with limits not less than **\$1,500,000** Single Limit, and twice the limits provided when a claim arises out of the release or threatened release of a hazardous substance; shall be in a company approved by the city of Duluth; and shall provide for the following: Liability for Premises, Operations, Completed Operations, Independent Contractors, and Contractual Liability.
- c) Professional Liability Insurance in an amount not less than **\$1,500,000** Single Limit; provided further that in the event the professional malpractice insurance is in the form of "claims made," insurance, Engineer hereby commits to provide at least 60 days' notice prior to any change to the Professional Liability Insurance policy or coverage ; and in event of any change, Engineer agrees to provide the City with either evidence of new insurance coverage conforming to the provisions of this paragraph which will provide unbroken protection to the City, or, in the alternative, to purchase at its cost, extended coverage under the old policy for the period the state of repose runs; the protection to be provided by said "claims made" insurance shall remain in place until the running of the statute of repose for claims related to this Agreement.
- d) **City of Duluth shall be named as Additional Insured** under the Public Liability and Automobile Liability, or as an alternate, Engineer may provide Owners-Contractors Protective policy, naming himself and City of Duluth. Engineer shall also provide evidence

of Statutory Minnesota Workers' Compensation Insurance. Engineer to provide Certificate of Insurance evidencing such coverage with notice to City of cancellation in accordance with the provisions of the underlying insurance policy included. The City of Duluth does not represent or guarantee that these types or limits of coverage are adequate to protect the Engineer's interests and liabilities.

- e) If a certificate of insurance is provided, the form of the certificate shall contain an unconditional requirement that the insurer notify the City without fail not less than the notice provisions contained in the underlying insurance policy or policies. In addition, Engineer commits to provide to City notice to City at least 30 days prior to any change of the policy or coverages.
- 2) The insurance required herein shall be maintained in full force and effect during the life of this Agreement and shall protect Engineer, its employees, agents and representatives from claims and damages including but not limited to personal injury and death and any act or failure to act by Engineer, its employees, agents and representatives in the performance of work covered by this Agreement.
- 3) Certificates showing that Engineer is carrying the above described insurance in the specified amounts shall be furnished to the City prior to the execution of this Agreement and a certificate showing continued maintenance of such insurance shall be on file with the City during the term of this Agreement.
- 4) The City shall be named as an additional insured on each liability policy other than the professional liability and the workers' compensation policies of the Engineer.
- 5) The certificates shall provide that the policies shall not be cancelled during the life of this Agreement without advanced notice being given to the City at least equal to that provided for in the underlying policy of insurance.
- 6) Except as provided for in Section IV.D.1.d) above, Engineer hereby commits to provide notice to City at least 30 days in advance of any change in the insurance provided pursuant to this Section IV or in advance of that provided for in the underlying insurance policy or policies whichever is longer. For the purposes of Section IV.D of this Agreement, the term, "changed", shall include cancellation of a policy of insurance provided hereunder and any modification of such policy which reduces the amount of any coverage provided thereunder below the amounts required to be provided hereunder or otherwise reduces the protections provided under such policy to City.

#### E. HOLD HARMLESS

The Engineer agrees that it shall defend, indemnify and hold harmless the City of Duluth and its officers, agents, servants and employees from any and all claims including claims for contribution or indemnity, demands, suits, judgments, costs and expenses asserted by any person or persons including agents or employees of the City of Duluth or the Engineer by reason of death or injury to person or persons or the loss or damage to property arising out of, or by reason of, any act, omission, operation or work of the Engineer or its employees while engaged in the execution or performance of services under this Agreement except to the extent that such indemnification is specifically prohibited by Minnesota Statutes Chapter 337 or Section 604.21. Engineer shall not be required to indemnify City for claims of liability arising out of the sole negligent or intentional acts or omission of the City but shall be specifically required to and agrees to defend and indemnify City in all cases where claims of liability against the City arise out of acts or omissions which are passive or derivative of the negligent or intentional acts or omissions of Engineer, including but not limited to, the failure of the City to supervise, the failure to warn, the failure to prevent such acts or omission by Engineer and any other such source of liability. On ten days' written notice from the City of Duluth, the Engineer shall appear and defend all lawsuits against the City of Duluth growing out of such injuries or damages.

#### F. TERMINATION

- 1) This agreement may be terminated in whole or in part in writing by either party in the event of substantial failure by the other party to fulfill its obligation under this agreement through no fault of the terminating party; provided that no such termination may be affected unless the other party is given not less than fifteen (15) calendar days' prior written notice (delivered by certified mail, return receipt requested) of intent to terminate.
- 2) This agreement may be terminated in whole or in part in writing by the City for its convenience; provided that the Engineer is given (1) not less than fifteen (15) calendar days' prior written notice

(delivered by certified mail, return receipt requested) of intent to terminate and (2) an opportunity for consultation with the City prior to termination.

3) Upon receipt of a notice of intent to terminate from the City pursuant to this agreement, the Engineer shall (1) promptly discontinue all services affected (unless the notice directs otherwise), and (2) make available to the City at any reasonable time at a location specified by the City all data, drawings, specifications, reports, estimates, summaries, and such other information and materials as may have accumulated by the Engineer in performing this agreement, whether completed or in process.

4) Upon termination pursuant to this agreement, the City may take over the work and prosecute the same to completion by agreement with another party or otherwise.

#### G. LAWS, RULES AND REGULATIONS

The Engineer agrees to observe and comply with all laws, ordinances, rules and regulations of the United States of America, State of Minnesota, the City of Duluth and their respective agencies and instrumentalities which are applicable to the work and services to be performed hereunder.

#### H. INDEPENDENT CONTRACTOR STATUS

Nothing contained in this agreement shall be construed to make the Engineer an employee or partner of the City. The Engineer shall at all times hereunder be construed to be an independent contractor.

#### I. FEDERAL FUNDING

If Federal Funds (i.e. HUD, FEMA, Revenue Sharing) are utilized as a source of Project funding, the Engineer shall abide by the terms of all Federal requirements in the performance of duties hereunder.

#### J. AMENDMENT OF AGREEMENT

This agreement shall be amended or supplemented only in writing and executed by both parties hereto.

### SECTION V. PAYMENT

#### A. BASIS OF BILLING

City shall pay the Engineer based on hourly rates for all services rendered under Section II Phases A through G, an amount not to exceed the amount in Section V.C, including any and all Project-related expenses such as travel, reproduction of reports and drawings, tolls, mileage, etc. For the purposes of this agreement, the principals and employees of the Engineer and their hourly rates are set forth in Exhibit A.

#### B. PAYMENT FOR WORK COMPLETED

1) Monthly progress payments may be requested by the Engineer for work satisfactorily completed and shall be made by the City to the Engineer as soon as practicable upon submission of statements requesting payment by the Engineer to the City. When such progress payments are made, the City may withhold up to five percent (5%) of the vouchered amount until satisfactory completion by the Engineer of all work and services within a phase called for under this agreement. When the City determines that the work under this agreement for any specified phase hereunder is substantially complete, it shall release to the Engineer any retainage held for that phase.

2) No payment request made pursuant to subparagraph 1 of this Section V shall exceed the estimated maximum total amount and value of the total work and services to be performed by the Engineer under this agreement without the prior authorization of the City. These estimates have been prepared by the Engineer and supplemented or accompanied by such supporting data as may be required by the City.

3) Upon satisfactory completion of the work performed hereunder, and prior to final payment under this agreement, and as a condition precedent thereto, the Engineer shall execute and deliver to the City a release of all claims against the City arising under or by virtue of this agreement.

4) In the event of termination by City under Section IV.F., upon the completion of any phase of the Basic Services, progress payments due Engineer for services rendered through such phase shall constitute total payment for such services. In the event of such termination by City during any phase of the Basic Services, Engineer also will be reimbursed for the charges of independent professional associates and consultants

employed by Engineer to render Basic Services, and paid for services rendered during that phase on the basis of hourly rates defined in Exhibit A of this agreement for services rendered during that phase to date of termination by Engineer's principals and employees engaged directly on the Project. In the event of any such termination, Engineer will be paid for all unpaid additional services plus all termination expenses. Termination expenses mean additional expenses directly attributable to termination, which, if termination is at City's convenience, shall include an amount computed as a percentage of total compensation for basic services earned by Engineer to the date of termination as follows: 10% of the difference between the amount which the Engineer has earned computed as described in paragraphs A and B of this section and the maximum payment amount described in paragraph C of this section. The above applies only if termination is for reasons other than the fault of the Engineer.

C. TOTAL NOT TO EXCEED:

All payments under this Contract are not to exceed Ninety-Seven Thousand Five Hundred and no/100ths Dollars (\$97,500.00).

**SECTION VI. SPECIAL PROVISIONS**

The following exhibits are attached to and made part of this agreement:

- 1) Exhibit A, Engineer's Hourly Rates
- 2) Exhibit B, Engineer's Proposal

In the event of a conflict between the agreement and any Exhibit, the terms of the Agreement will be controlling.

**SECTION VII. COUNTERPARTS**

This Agreement may be executed in two or more counterparts, each of which shall be deemed to be an original as against any party whose signature appears thereon, but all of which together shall constitute but one and the same instrument. Signatures to this Agreement transmitted by facsimile, by electronic mail in "portable document format" (".pdf"), or by any other electronic means which preserves the original graphic and pictorial appearance of the Agreement, shall have the same effect as physical delivery of the paper document bearing the original signature.

*[Remainder of this page intentionally left blank. Signature page to follow.]*



IN WITNESS WHEREOF, the parties have hereunto set their hands on the date of attestation shown below.

**CITY OF DULUTH-Client**

**HGA, Inc.**

By: \_\_\_\_\_  
Mayor

By: \_\_\_\_\_

Attest:

Its: \_\_\_\_\_  
Title of Representative

By: \_\_\_\_\_  
City Clerk

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Countersigned:

\_\_\_\_\_  
City Auditor

Approved as to Form:

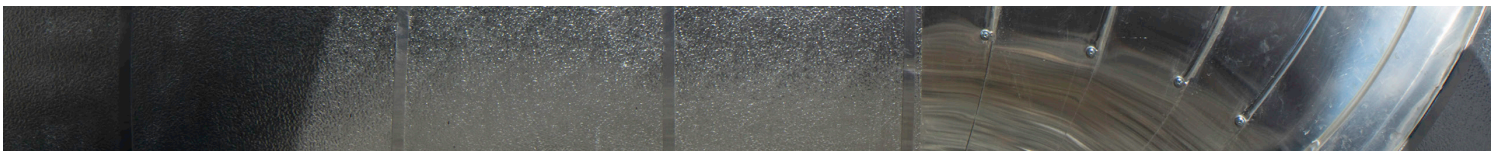
\_\_\_\_\_  
City Attorney



HGA

TECHNICAL PROPOSAL PREPARED FOR CITY OF DULUTH

City of Duluth | Engineering  
Services for DES HW Distribution  
System Balance of Plant





## PROPOSAL CONTENTS

1. Proposal Cover Sheet
2. Proposed Project Team
3. Representative Project Experience
4. Approach / Methodology
5. Acknowledgment of Addenda





November 8, 2019

City of Duluth  
Attn: Purchasing Division  
City Hall, Room 120  
411 West 1ST Street  
Duluth, MN 55802

Re: Engineering Services for DES HW Distribution System Balance of Plant

Dear Kris,

As Mayor Larson has stated, "Duluth has a proud history of addressing challenges while delivering innovation." Transitioning from steam to hot water is an important step towards maintaining that legacy.

During our walk-through of your facility earlier this week, we were able to glean important insight into the present operation. This project presents an opportunity to renew aging systems, improve energy efficiency, save water, reduce chemical use, and keep loads centralized, allowing for future opportunities to incorporate heat recovery or renewable energy sources. You also shared with us three primary factors of how you'd define success:

- Designing for the range of system flows and pressures
- Addressing pressure control and ratings across the system
- Building in opportunity for efficient growth

To ensure your success, we've assembled a team of great minds to help lead you down the path. This includes our lead mechanical engineer, Joe Witchger, who has a long history of successful collaboration with Evergreen.

There are several items regarding the Canal Park connection that may have to be designed differently than the RFP envisions. We would like to discuss these with you during the negotiation phase.

Congratulations again on taking this importance next step to ensure reliability and resiliency of this important asset for the City of Duluth. We can't wait to begin this journey with you! Please call my cell if you have questions.

Sincerely,




Peter K. Dahl, Ph.D., LEED APBD+C & O+M, CEM  
Principal – Energy & Infrastructure Group  
PDahl@hga.com | 612.758.4410



# PROPOSAL COVER SHEET

CITY OF DULUTH  
RFP# 19-24AA

BIDDER INFORMATION:	
BIDDER NAME	HGA, Inc.
MAILING ADDRESS	420 N 5th Street, Minneapolis, MN 55401
CONTACT PERSON	Peter K. Dahl, Ph.D., LEED APBD+C & O+M, CEM
CONTACT PERSON'S PHONE NUMBER	612.758.4410
CONTACT PERSON'S E-MAIL ADDRESS	PDahl@hga.com
FEDERAL ID NUMBER	41-0778838
AUTHORIZED SIGNATURE	
TITLE	Principal – Energy & Infrastructure Group

# 2.

# PROPOSED PROJECT TEAM

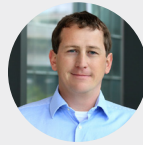
City of Duluth

Duluth Energy Systems (DES)

## TEAM LEADERSHIP



Peter K. Dahl  
Ph.D., LEED APBD+C & O+M, CEM  
PRINCIPAL



Matt Linder  
PE  
PROJECT MANAGER

## PROJECT TEAM

### HGA ENGINEERING



Joe Witchger  
PE  
LEAD MECHANICAL ENGINEER



Joe Wetternach  
PE, LEED AP® BD+C  
LEAD ELECTRICAL ENGINEER

### MBJ ENGINEERING



Ben Helmer  
PE  
STRUCTURAL ENGINEER (MBJ)



Paul A. Johnson  
PE  
ASSOCIATE/STRUCTURAL ENGINEER (MBJ)

### ARCHITECTURAL



Stephen Peper  
ARCHITECTURAL DESIGNER



# PETER K. DAHL

PH.D., LEED AP® BD+C  
& O+M, CEM

## PRINCIPAL – ENERGY & INFRASTRUCTURE GROUP

Peter brings operational insight to HGA’s design teams. He is driven by the pursuit of sustainability, implementing energy efficiency improvements to realize measurable cost savings and environmental benefits. Peter leads project teams by clearly communicating the big picture (the end goal) and defining key parameters with the client to guide our engineers to develop the best solution. He invests in team relationships to develop a true partnership among disciplines and client stakeholders. He remains actively involved in his projects and is quick to recognize when focus is getting off track, guiding the team back towards the end goal. Peter completed his graduate studies in Architectural Engineering to evaluate the actual performance of LEED certified buildings. His expertise includes sustainable design, resiliency assessments, and building performance evaluations.

## SELECTED EXPERIENCE

MetroHealth | Campus Transformation  
Cleveland, Ohio

Andersen Corporation | Energy Master Plan and Retro-commissioning  
Bayport, Minnesota

Campbell County Hospital District | Retro-commissioning and Energy Audit  
Gillette, Wyoming

Milwaukee County Zoo | Clean Energy Plan  
Milwaukee, Wisconsin

Abbott Northwestern Hospital | Chilled Water Plant Optimization  
Minneapolis, Minnesota

## EDUCATION | AFFILIATIONS

Ph.D. in Architectural Engineering  
Pennsylvania State University

Integrated Bachelor & Master, Architectural Engineering  
Pennsylvania State University

Certified Energy Manager  
#22187



# JOE WITCHGER

PE

## LEAD MECHANICAL ENGINEER / CENTRAL PLANT LEADER

Joe is an expert in energy management systems and is HGA’s Central Plant leader. He provides oversight throughout analysis and implementation and educates clients on how efficiency can be improved by taking better use of plant equipment. Joe is passionate about enhancing plant efficiency, regularly speaking about design innovations at national district energy conferences, like IDEA and Big 10 & Friends. With 35 years’ experience in mechanical engineering, he also has significant experience in life cycle cost analysis, pipe stress, compressible flow and hydraulic modeling.

## SELECTED EXPERIENCE

General Services Administration | Confidential Central Utility Plant 2  
Washington, DC

University of Virginia | North Grounds Mechanical Plant  
Charlottesville, Virginia

MetroHealth System | Campus Transformation | Central Utility Plant  
Cleveland, Ohio

Evergreen Energy | Capital Chiller Plant DCSP Bypass Connection  
St. Paul, Minnesota

Evergreen Energy | State of Minnesota Chiller Plant Expansion  
St. Paul, Minnesota

## EDUCATION | AFFILIATIONS

Bachelor of Mechanical Engineering  
University of Notre Dame

Registered Mechanical Engineer  
Minnesota, Illinois, Michigan, Wisconsin

International District Energy Association Member | American Society of Heating, Refrigerating and Air Conditioning Engineers  
Member





**MATT  
LINDER**  
PE

**PROJECT MANAGER**

Matthew is a mechanical engineer and brings nearly 15 years of experience in domestic and global design of Heat Recovery Steam Generators (HRSGs), Waste Heat Boilers (WHBs), and balance of plant equipment. Employing a collaborative approach, he works closely with clients to solve complex plant issues, delivering clear technical solutions within the project budget and schedule needs. Additional areas of expertise include plant efficiency improvements, emissions control and industry BACT, and steam/water systems up to 1800PSI and 950°F.

**SELECTED EXPERIENCE**

General Services Administration | Confidential Central Utility Plant 2  
Washington, DC

MetroHealth System | Campus Transformation | Central Utility Plant  
Cleveland, Ohio

Edward Hines Jr. VA Hospital | Physical Plant Replacement  
Hines, Illinois

White River Junction VA Medical Center | CHP Fuel Systems Upgrade  
White River Junction, Vermont

Togus VA Medical Center | Investment Grade Audit for Fuel Conversion  
Augusta, Maine

**EDUCATION | AFFILIATIONS**

Bachelor of Science, Mechanical Engineering  
University of St. Thomas, 2006

Registered Mechanical Engineer  
Minnesota (#49860)

International District Energy Association | American Petroleum Institute  
Member



**JOE  
WETTERNACH**  
PE, LEED AP® BD+C

**LEAD ELECTRICAL ENGINEER**

Joe will assess the current conditions of the electrical infrastructure and associated systems, provide design direction that balances programmatic needs with first costs, and review current code implications on legacy infrastructure. With a career spanning 20 years in electrical design, Joe employs technical expertise and leadership to facilitate the design of integrated power distribution and low-voltage solutions for corporate, government, hospitality, and performing arts spaces. He is experienced in complex infrastructure systems and high rise buildings. He has an intricate understanding of how electrical systems support diverse building programs, while also considering the architecture and interiors of the space they serve.

**SELECTED EXPERIENCE**

General Services Administration | Confidential Central Utility Plant 2  
Washington, DC

White River Junction VA Medical Center | CHP Fuel Systems Upgrade  
White River Junction, Vermont

Togus VA Medical Center | Investment Grade Audit for Fuel Conversion  
Augusta, Maine

State of Minnesota Capitol Building | Interior Restoration | HVAC Remodeling | Lighting System Upgrades | Roof Replacement  
Saint Paul, Minnesota

**EDUCATION | AFFILIATIONS**

Bachelor of Electrical Engineering  
University of Minnesota

Registered Electrical Engineer  
Minnesota, California, South Dakota, Vermont, NCEES

LEED AP® BD+C

Building Industry Consulting Services International | North Central Electrical Engineering Society | Institute of Electrical and Electronic Engineering  
Member



**BEN  
HELMER**  
PE

**STRUCTURAL ENGINEER (MBJ)**

Ben is a well-rounded project engineer experienced in using a variety of structural systems, including concrete, post-tensioned concrete, and steel, with a strong focus on wood construction. His academic study of building materials composition informs and benefits the design planning process, bringing added value to projects. He is experienced with design-build and traditional bid delivery systems, as well as fast-track projects. In his role as a project engineer, Ben participates in the design process, prepares structural drawings, reviews shop drawings, and provides construction administration. Ben brings excellent problem-solving and communication skills to his projects, using Revit as a design and communication tool with other members of the project team. As a graduate assistant in UMD’s Civil Engineering Department, Ben was a lecturer for the “Infrastructure Materials” course.

**SELECTED EXPERIENCE**

**LISI Medical Manufacturing Facility Expansion**  
Big Lake, Minnesota

**Louisiana Pacific Manufacturing Process Improvements and Platform Design (Multiple Projects)**  
Hayward, Wisconsin; Tomahawk, Wisconsin; and Two Harbors, Minnesota

**Evergreen Energy Piping and Tank Support, Underground Structures (Multiple Projects)**  
Duluth, Minnesota

**EDUCATION | AFFILIATIONS**

**Master of Science, Civil Engineering**  
University of Minnesota-Duluth

**Bachelors of Science, Civil Engineering**  
University of Minnesota-Duluth

**Registered Structural Engineer**  
Minnesota

**American Society of Civil Engineers | American Wood Council | American Institute of Steel Construction**  
Member



**PAUL A.  
JOHNSON**  
PE

**ASSOCIATE/STRUCTURAL ENGINEER (MBJ)**

Paul Johnson manages MBJ’s Duluth office, bringing more than 30 years of structural engineer-ing experience and expertise in all types of structural materials to clients. As project manager, he coordinates all activities of the structural team, including structural design, specification preparation, construction documents, and construction administration. Paul’s experience with a variety of delivery methods and construction materials allows him to keep firm control over the project as it moves forward, helping to ensure on-schedule, within-budget delivery.

**SELECTED EXPERIENCE**

**Louisiana Pacific Manufacturing Process Improvements and Platform Design (Multiple Projects)**  
Hayward, Wisconsin; Tomahawk, Wisconsin; and Two Harbors, Minnesota

**Evergreen Energy Piping and Tank Support, Underground Structures (Multiple Projects)**  
Duluth, Minnesota

**LISI Medical Manufacturing Facility Expansion**  
Big Lake, Minnesota

**Midco Head End Telecom Building**  
Grand Forks, North Dakota

**Minnesota Power Boswell Energy Center**  
Cohasset, Minnesota

**Minnesota Power Taconite Harbor**  
Schroeder, Minnesota

**Seagate Technology Equipment Support (multiple projects)**  
Minneapolis, Minnesota

**EDUCATION | AFFILIATIONS**

**Bachelors of Science, Civil Engineering**  
University of Minnesota

**Registered Structural Engineer**  
Minnesota, Wisconsin, North Dakota, North Carolina



# STEPHEN PEPER

## ARCHITECTURAL DESIGNER

Stephen has more than 15 years' experience focused on programming, planning and design. As a team member with strong technical expertise, he collects data, analyzes project goals and objectives, and organizes information to assist in multi-disciplinary design processes. Additionally, Stephen prepares technical contract documents and specifications while ensuring compatibility with drawings and technical conditions.

## SELECTED EXPERIENCE

City of Minneapolis | Municipal Building Commission (MCB) Exterior Improvements

Minneapolis, Minnesota

GSA | FBI Minneapolis Office | FBI Cincinnati Office | FBI San Diego | FBI Portland

Multiple Locations

City Center Realty Partners | 800 Washington Public Area Interior Renovation

Minneapolis, Minnesota

Honeywell | SSEC Utility Enhancement and Ventilation Remodel Projects

Golden Valley, Minnesota

Honeywell | HTC Facility

Minneapolis, Minnesota

Daikin McQuay | Global Technology Center

Plymouth, Minnesota

## EDUCATION | AFFILIATIONS

Bachelor of Bachelor of Architecture

Oklahoma University

Drafting and Estimating

Dunwoody Industrial Institute







3.

# REPRESENTATIVE PROJECT EXPERIENCE







# DELIVERING IMPROVED RELIABILITY AND SERVICE

**GENERAL SERVICES ADMINISTRATION | CONFIDENTIAL CENTRAL UTILITY PLANT 2 | WASHINGTON, DC**

HGA partnered with Balfour Beatty Construction to design a new central utility plant for a confidential Federal Government client. The plant offers improved reliability and service in addition to achieving significant energy savings – a 30% improvement above 2007.

CUP 2 is tied to several miles of distribution piping in tunnels utilizing 24 inch CHW mains and 18 inch HHW mains. Heating hot water is distributed to the campus at 200°F, while Chilled Water is supplied at 40°F. While at present only a few buildings are tied to the loops, the ultimate configuration resulted in the potential to over-pressurize the lower buildings on the system. To reduce operating pressures and limit expansion tank requirements, buildings were isolated from the main with plate and frame heat exchangers sized for a 2°F approach temperature.

The chilled water system will ultimately use seven 1,300-ton chillers to produce 9,100 tons of cooling. Three Heating Hot Water Boilers will eventually generate up to 1,500 Boiler-Horsepower of water. Available utility natural gas pressure created a challenge to achieve equipment turndown and maintain efficiency. The utility can only provide 5 psig of natural gas pressure to the site. All equipment is controlled using HGA's predictive optimization strategies, programmed into the plant control system. This helps achieve efficiencies rivaling the performance of active optimization control strategies at a fraction of the cost.





CONDENSER WATER SUPPLY  
← CONDENSER WATER SUPPLY

CONDENSER WATER RET. TANK  
← CONDENSER WATER RET. TANK

WARNING  
DANGER  
HIGH VOLTAGE



# A NEW STANDARD FOR HEAT RECOVERY EQUIPMENT

UNIVERSITY OF VIRGINIA | NORTH GROUNDS MECHANICAL PLANT | CHARLOTTESVILLE, VIRGINIA

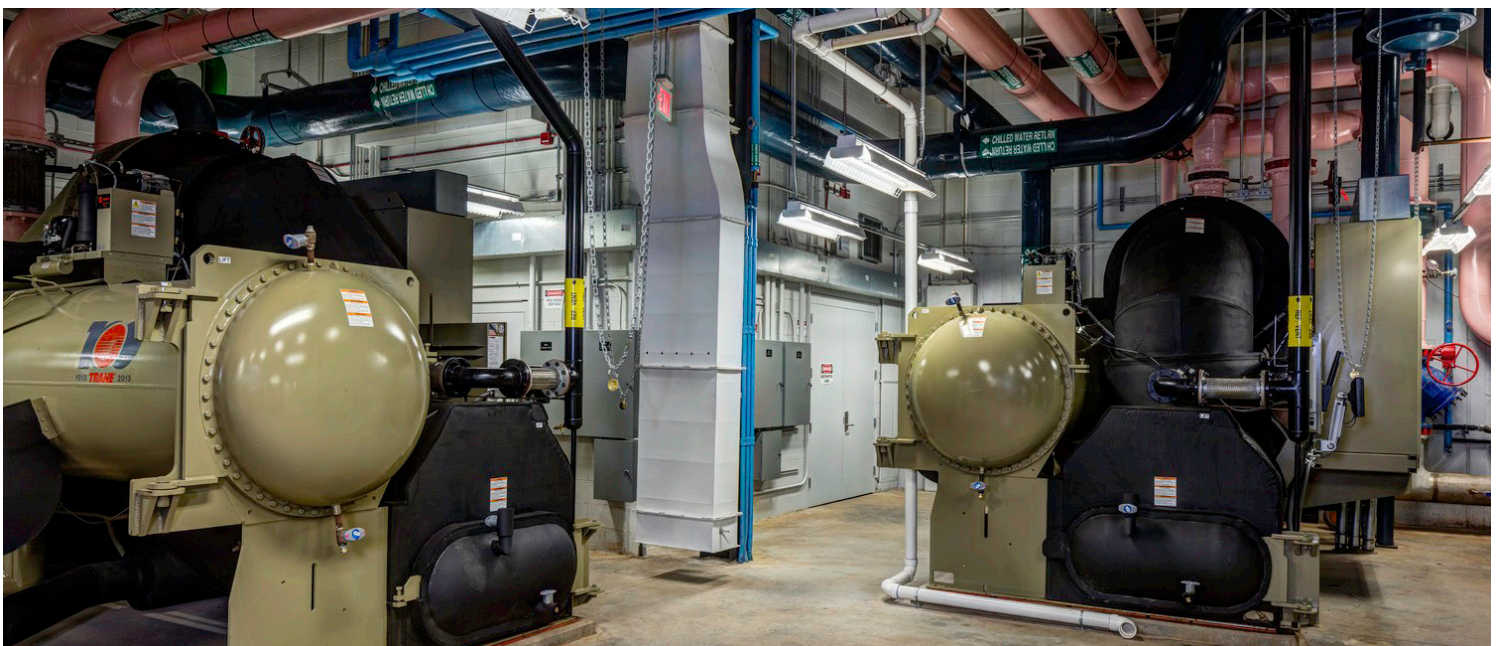
UVA wanted to address the aging infrastructure of their North Grounds Mechanical Plant, serving the prestigious Business, Law and JAG Schools. HGA identified innovative strategies to balance environmental, social and economic goals of the plant, and to maximize the use of low temperature water for heating, in turn maximizing the value of the heat pump systems.

HGA was selected for this project, in part, because of our diverse experience implementing conventional and demonstration plants, utilizing an array of fuel sources. This allowed us to present physical, budgetary and operational considerations, then use customized modeling software to forecast environmental and operating costs for multiple options of plant configurations and distribution system modifications.

The team conducted a comprehensive energy analysis, which showed that the demand for simultaneous heating and cooling in the 40- to 50-year old buildings could be best addressed with heat recovery chillers that heat the hot water system with energy rejected from the cooling loop. Innovations included combining modular and industrial cooling equipment, open and closed systems, and adapting systems designed for higher temperatures to a LTHW distribution. The control strategies leap-frogged the current state-of-the-art and set a new standard for efficiently dispatching heat recovery equipment.

The plant uses the highest efficiency equipment available, but dispatches it to serve loads only after maximum advantage is taken of available heat recovery (HR) system operating at a combined effective COP of 6.0. Based on current loading, the cooling load served by chillers is reduced by 30% and heating load served by boilers drops by 60% with heat recovery equipment. Annual source energy use is reduced by 34%, while site energy drops from 72,500 MBH to 34,200 MBH- a 52% reduction.

Comprehensive submetering systems in place at the site, before and after construction, show the plant is exceeding energy efficiency goals after the first year of operations. Overall plant energy use was reduced to 51% over the baseline year, greenhouse gas emissions dropped by 46%, and water and energy costs were reduced to less than half the original annual energy costs.







# ELEVATING THE SCIENCE OF CENTRAL PLANT EFFICIENCY

LEXINGTON VA MEDICAL CENTER | CENTRAL PLANT UPGRADE | LEXINGTON, KENTUCKY

The new chiller plant offers improved efficiency, resulting in expected savings of \$70,000 per year, and anticipated to save more than 1 million kWh annually. The new chiller minimum efficiency is 0.585 kW/ton at full load with water conditions below 0.38 kW/ton NPLV

In collaboration with AE Works, HGA upgraded the 2,700-ton chiller plant with a peak flow rate of 6,500 gpm to serve the 135-acre Lexington VA Medical Center campus. The original chiller plant, which consisted primarily of three centrifugal water cooled chillers and five induced draft cooling cells, did not provide sufficient cooling for the campus on peak days. HGA, as the mechanical engineer, worked with VA staff to determine the best solution to optimize their operations with a reliable, energy efficient and flexible chilled water system.

Existing distribution systems were reconfigured in a phased approach to maintain operations and limit disruption.

The size and logistics for this project are very similar to what will be required for Duluth Energy Systems. HGA's recommended option was to demolish the existing piping system and replace it with a new, all-variable chilled water plant layout.



# ULTIMATE FLEXIBILITY

METROHEALTH SYSTEM | CAMPUS TRANSFORMATION | CLEVELAND, OHIO

HGA's engineering and sustainability teams continuously research new operational processes and delivery methods to address patients' diverse needs, while considering campus and energy system limitations. With HGA, they formed a research-focused team to identify and address best practices to fulfill the health system's promise to patients: to design a cost-effective, sustainable and patient-focused hospital campus.

HGA worked closely with MetroHealth to identify Owner Project Requirements for the new Central Utility Plant that would support a continuously changing healthcare environment. This concept was embodied in the concept of a "Process Neutral" building and systems that would respond to changing needs of the healthcare delivery system over time. A wide range of CUP configurations and systems were considered, including Combined Heat and Power and various heat recovery strategies. The final CUP configuration integrated generating and distribution systems

for the heating and cooling plants for multiple campus buildings.

Ongoing hospital operations required project phasing to maintain the existing steam service while the hospital is being converted to low temperature hot water (LTHW). The Energy and Operating Cost Savings were summarized in a sensitivity analysis, which used the USDOE- EIA inflation projections applied to current costs (indicated by the green arrow in the graph at right) and a range of gas and electric costs.



# 4.

# APPROACH & METHODOLOGY

## PROJECT UNDERSTANDING

This project scope connects the new Steam to hot water converter system (SCS) to the new Duluth HHW distribution system. The Duluth HHW distribution system will serve buildings in Downtown Duluth that are currently served by steam. Some buildings may have both steam and hot water services. Buildings will be brought onto this new District Hot Water system in phases, so the interface being designed must effectively handle initial system loads as well as the full build out. Areas in the Duluth Steam plant have been cleared out for this work and the installation of the SCS. With limited load bearing capacity, an independent structure is being built inside the plant to support the heat exchangers and condensate system. The PDP system will need to be located adjacent to the SCS system and will require structural design for support. We are teaming with MBJ, the structural engineer on the SCS project to most effectively coordinate physical space and structural support in the existing plant.

## OUR APPROACH

Upon notice to proceed, HGA will lead a kick-off meeting where we strongly encourage participation from key facilities personnel so we may all understand the design process and the desired outcomes for this effort. HGA will facilitate a structured discussion to define standards that will be used to document the Owners Project Requirements – this will provide the basis for HGA to evaluate existing building systems to meet current and future operational needs.

## ASSESSMENT

After the kick-off meeting, the HGA team will conduct the existing condition assessment for systems and equipment included in the scope, including steam, existing DECC and Hotel HW loops, and electrical service. The objective of this assessment is to understand system configurations, document operation and equipment condition. Since limited documentation is available for the electrical system in the plant, HGA will perform a preliminary electrical analysis to provide power to the system. HGA will

collect load information for utility service and generation distribution. Mechanical, electrical and structural systems elements will be identified for selective demolition to accommodate the new PDP system. With limited information available for the HHW systems also, we will conduct a site investigation to obtain the required data. We may use our 360 degree camera or laser scanner to document existing piping and equipment.

HGA will schedule a review meeting with DES to review initial findings and the preliminary electrical analysis as an early deliverable. HGA will present photo documentation of building systems and discuss system operation with facility staff. This strengthens our working relationship, and keeps DES facility staff engaged in our assessment process.

## DESIGN

HGA will proceed to design the BOP scope including:

- Primary Distribution Pump (PDP) system as described in the RFP
- A new 10" tap from 20" HPS main at the northwest corner of the Plant (exterior)
- Main hydronic headers connecting the SCS (SCS take-offs by Others) to the 20" HWS/HWR Distribution circuit (included in BOP scope)
- 10" piping and controls design that extends to the existing Canal Park "Hotel Loop" and "DECC Loop"

There are several key elements in this project that must be addressed to ensure success. These design elements include the following.

1. Support of piping and equipment, including the routing of piping around the building and over corrugated metal roof with little or no additional load bearing capacity.
2. Electrical tie in. There was no readily available existing documentation on the electrical system. Electrical switchgear and motor control centers are aging so that spare parts may or may not be available.



3. Pressure control. Options to address this will be left to initial project discussions along with the electrical scope.
4. Safety Valve coordination- Existing DECC and Hotel loops have safety valves installed. On the hotel loop, they are on the heat exchanger side of the isolation valves. On the DECC loop, the safety valves are on the suction header side of the pumps as well as on the cross connect between the two existing HHW loops. The setpoints of these will have to be coordinated with new system extension into these branches.
5. Existing Expansion tanks need to be isolated under normal operation. Until the final work is done, the new system connection will leave existing equipment in place as a backup. If existing heat exchangers and pumps are left in the system, a means to isolate the expansion tanks must be provided.
6. Pumping control across the range of operation. Potential to running out beyond end of pump curves.
7. New Expansion tank sizing based system pressure limitations, static and pump head, and the distribution system design. We will explain the inter-relationships of these factors as we work through the design.
8. Steam piping design from the 20" header to the SCS tie-in point will include pipe stress analysis, trapping, valves, expansion compensation and condensate handling. An existing pipe stress analysis is assume to exist and we will extend the analysis into the new system.
9. When extending new 10" HHW piping from the 20" header leaving the plant back to the Canal Park loads, pipe support and hydronics will be considered. We will design to eliminate Bullhead tees where feasible to avoid unpredictable pressure losses.
10. The Canal Park branch loads will likely have a lower pressure drop than the remainder of the system. We will design the system so these loads do not adversely impact the downtown mains.
11. Our design will include allowances for the future system buildout as identified in the RFP.
12. Control sequences will be generated that will allow operation of the Canal Park loops in independent

and cross connected modes. Independent mod will be based on existing controls, while the cross connected mode will take pumps and expansion tanks out of the systems to allow the new SCS system to provide heating and flow to the DECC and Hotel loops.

HGA will design general equipment arrangements and review with DES to discuss alternate layouts (i.e., accessibility, maintainability, cost).

HGA will develop a phasing and coordination plan with DES and Other Engineering Packages.

### **CONSTRUCTION ADMINISTRATION**

- Assistance with bid related RFI's. Participation, on-site, with bid walk-through
- Project management and engineering support as required to coordinate execution of this Consultant's design and to efficiently coordinate with other Consultants, Contractors and DES/EGE personnel during the construction phase.

### **DELIVERABLES WILL INCLUDE**

1. Preliminary electrical analysis – early deliverable. This analysis will evaluate existing power infrastructure as it pertains to electrically driven equipment in the BOP scope, with recommendations of required improvements and an accompanying Opinion of Probable Cost (OPC).
2. 50% General Arrangement drawings as described in the RFP – February 3rd 2020.
3. A fully (MESC) engineered construction drawing package that incorporates the BOP system identified in the included 'Hot Water Distribution System Schematic.pdf' – March 25th 2020. This includes, but is not limited to:
  - a. Focus on mechanical system design that anticipates - and allows for – a variable pumping operation that accounts for both current and future load profiles
  - b. General Arrangement drawings; plans, elevations, isometric 3D (Revit preferred. Note: SCS assembly will be available in Revit for coordination)
  - c. Schedules, details, phasing/coordination plan

- d. Demolition drawings as required (note: there is not a significant amount of demolition anticipated as part of this Project)
  - e. Control sequences and devices that will allow proper integration of the new PDP system (controlled by the SCS) with the existing pumps that serve the Canal Park "Hotel Loop" and "DECC Loop"
  - f. Full Specification Documentation that covers all applicable tenets of ASME B31.1, NEC, NFPA and ASCE, with modern Division nomenclature. Note: Spec-On-Plan is not acceptable for any discipline
  - g. Fully detailed Piping and Instrumentation Diagrams (P&ID)
  - h. Project Manual, turned over when Project is completed
4. BOP Construction Package issued for bid – April 3rd 2020

**INFORMATION/SERVICES ANTICIPATED FROM DES/OTHERS:**

1. Drawings for the existing plant
2. Steam line stress analysis for the existing steam main showing pipe stresses are within code allowable limits.
3. Complete hydronic model of the system
4. Electrical one-line diagrams for the plant
5. Electrical inspection and testing
6. Commissioning

Note: HGA is available to complete these scope items as additional services upon request from DES.

<b>ANTICIPATED SCHEDULE</b>	
Formal Notice to Proceed	November 26th, 2019
BOP Design Conceptual Approval (50% Drawing Package)	February 3rd, 2020
BOP Design Complete (100% Bid Drawing Package) with final DES approval	March 25th, 2020
BOP Construction Package Issued for Bid	April 3rd, 2020
BOP Construction Begins (By Others)	May 4th, 2020
BOP Substantial Completion (By Others)	July 31st, 2020
Start-up and commissioning	Start August 18th, 2020 Complete September 29th, 2020

# 5.

# ACKNOWLEDGMENT OF ADDENDUM #1



**Purchasing Division**  
Finance Department

Room 120  
411 West First Street  
Duluth, Minnesota 55802



218-730-5340



[purchasing@duluthmn.gov](mailto:purchasing@duluthmn.gov)

## **Addendum #1** **RFP # 19-24AA**

### **ENGINEERING SERVICES FOR DES HW DISTRIBUTION SYSTEM BALANCE OF PLANT**

This addendum serves to notify all bidders of the following responses to submitted questions:

1. How much of the steam converter system is 3D modeled in Revit and available for reference into the BOP project?  
**It is expected that the entire SCS assembly will be provided for use in general arrangements.**
2. Are there existing drawings that document as-built conditions of the plant for use in this project, including mechanical steam and hydronic piping and support, electrical, structural, and architectural information?  
**There are limited original architectural drawings, some mechanical and boiler layouts and very limited structural. They will be made available but they are not comprehensive. Exploratory investigation will be required for all disciplines.**
3. Is the remainder of the existing plant systems 3D modeled in Revit for use in the BOP project system routing?  
**No, unknown if MBJ uses Revit as part of their Plant-external piping design.**
4. What is the estimated capital expenditure for the project?  
**Unknown until a design has been presented for pricing.**
5. Have piping support analyses been completed on the steam and hydronic portion upstream from the BOP connection points?  
**The new steam and hydronic piping supports *outside* the plant walls are designed by MBJ. The piping internal to the SCS assembly boundary is by Campbell-Sevey. All piping defined as in-scope in the RFP schematic will require support analyses by this consultant. Including:**
  - **Steam header (inside the plant) and individual steam train supports serving the SCS**
  - **The service catwalk for those steam trains**
  - **ALL water piping (including the water headers connected to the SCS)**
  - **Pumps**
  - **Expansion tanks**
  - **Piping extensions to the Hotel and DECC loops (including any portions that might be external to the Plant – this routing design TBD by this Consultant)**
6. Will any of the equipment be procured for the City of Duluth/DES, such as the pumps, or is it all to be purchased by the bidding contractor in the construction phase? For any equipment procured by the City, will a procurement specification in addition to equipment sizing be required from the design team?  
**All material items will be procured by Contractor.**
7. Is there capacity in the existing controls system controllers for the BOP pumps? Is the controls for the pump VFDs (wiring, software, programming, hardware) to be part of the BOP scope?  
**There is no effective integrated existing 'control system'. The SCS vendor will provide a control panel for SCS operations. This Consultant will interface with that system via a separate control panel or, potentially, integrating with their panel altogether.**
8. Do the drawings need to be certified by a registered Professional Engineer/Architect?  
**Yes.**

9. Is there any scope associated with permitting the project, either the piping system design or any potential building addition?

**Unsure, but you may exclude this from your scope.**

Please acknowledge receipt of this Addendum by including a copy of the Addendum in your proposal.

Posted: **November 5, 2019**







HGA

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# COST PROPOSAL

HGA proposes design fees of \$97,500 in response to RFP Number 19-24-AA"