

# EXHIBIT A

## 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: MSA PROFESSIONAL SERVICES, INC.  
Address: 332 W. Superior St., Suite 600, Duluth, MN 55802

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 510-500-1905-5533, Util-1779; Project # 1779; and Resolution No. 19-0479R, passed on July 8, 2019.

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

Project Number: 1779  
Project Name: Design for Middle Booster Station  
Project Description: **Design and bidding services for improvements to the Middle Booster Station**

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 checked="" 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 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 A.

8) Completion Time

The Study and Report Phase shall be completed and report submitted by August 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 A.
- 5) Completion Time  
The preliminary survey phase shall be completed and submitted by September 30, 2019.

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 A.

8) Completion Time

The Preliminary Design Phase shall be completed and report or plan submitted by October 1, 2019.

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 A.

8) Completion Time

The Final Design Phase shall be completed and contract documents submitted by February 15, 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 A.

6) Completion Time

The bidding phase shall be completed by March 31, 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 A.

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 A.

18) Completion Time

The construction administration and inspection phase shall be completed by n/a.

### **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 one hundred forty-eight thousand, five hundred seventy-eight and 60/100 dollars (\$148,578.60).

**SECTION VI. SPECIAL PROVISIONS**

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

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

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**

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

Attest:

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

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

Countersigned:

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

Approved as to Form:

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

**MSA PROFESSIONAL SERVICES,  
INC.**

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

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

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



June 26, 2019

Amanda Ashbach, Purchasing Agent  
City of Duluth - Purchasing  
411 W. 1st Street, Room 210 City Hall  
Duluth, MN 55802

Aaron Soderlund, Project Engineer  
City of Duluth - Engineering Division  
411 W. 1st Street, Room 211 City Hall  
Duluth, MN 55802

**Re: Proposal for Middle Booster Station Design and Bidding Phase  
RFP 19-99446, Project Number 1779**

Dear Amanda and Aaron,

The operation and maintenance of the Duluth Water System certainly is one of the City's most important services, **ensuring the provision of a safe and reliable water supply to the City and surrounding communities.** The Middle Booster Station is a critical facility for the required operation of the water system. The City of Duluth is looking for a consultant to provide design and bidding services for improvements to the Middle Booster Station. MSA Professional Services, Inc. (MSA) is ready to serve as that partner. Our experts have proven themselves to be leaders in delivering innovative and cost-effective design services for similar endeavors, and we look forward to working alongside you to complete this important project.

We have assembled a team of professional engineers with comprehensive experience on water system and pumping facility projects. Our project team has a clear understanding of your project, your expectations and your standards. The MSA team is experienced in the planning, designing and commissioning of water treatment and water pumping projects. We have worked alongside many communities, including the City of Duluth, to develop and implement innovative and forward-thinking solutions for potable water pumping projects that are practical and cost effective. **We'll combine your local expertise with our technical knowledge, leveraging both to create an effective, personalized design for the City of Duluth.**

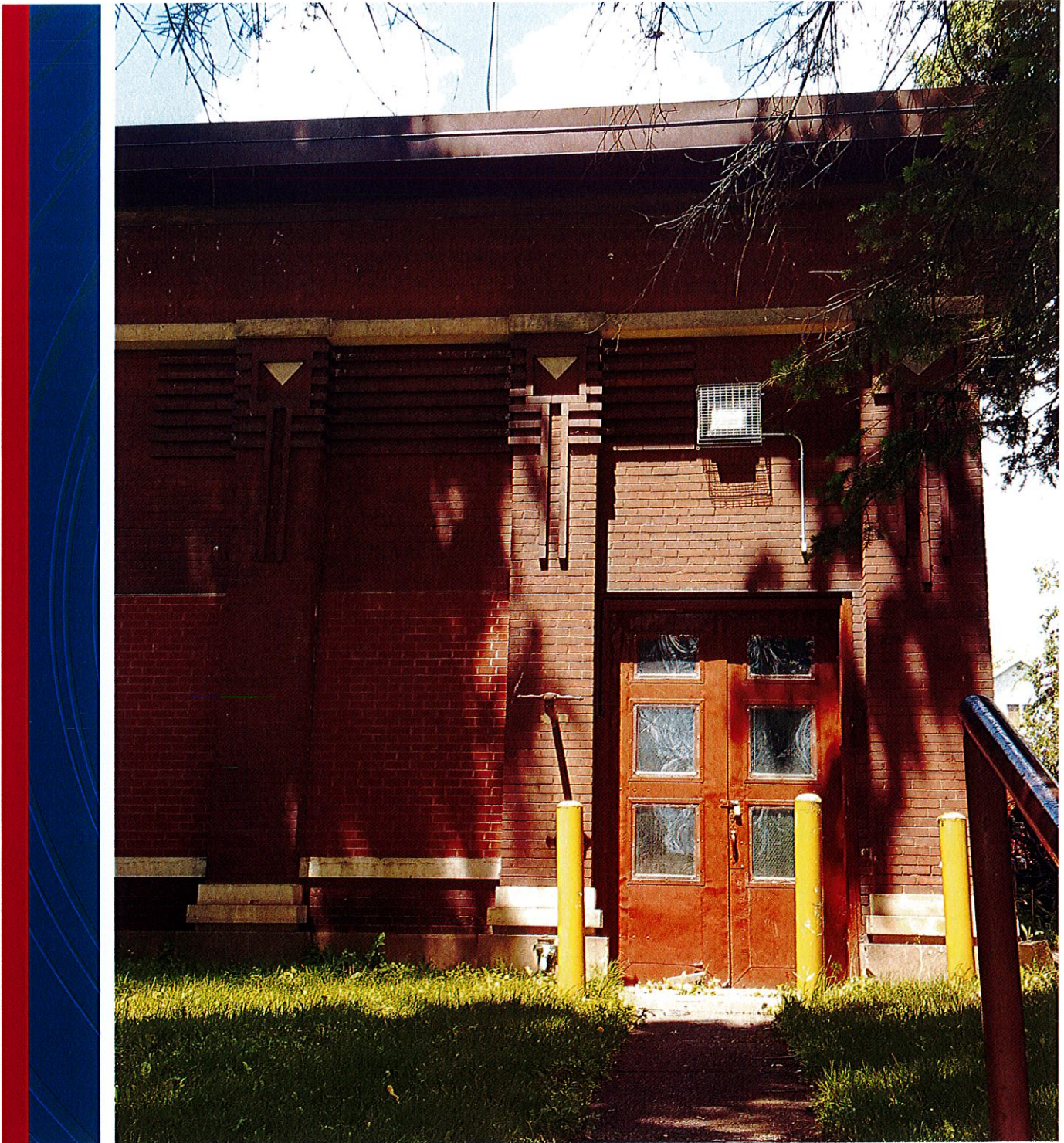
MSA has worked with the City of Duluth on the design of water pumping, water treatment, storage, supervisory control and data acquisition (SCADA), and piping improvement projects for more than 40 years, dating back to the engineering firm known as RREM, which MSA acquired in 1998. Our past project success is evidence that we will effectively manage our resources, formulate innovative yet practical designs, and maintain consistent communication throughout the project. **It is MSA's flexible approach, however, that sets us apart from our competitors.** We understand that the project will present different challenges, and we will collaborate with you and your staff to ensure that the completed project reflects your requirements.

MSA is excited to begin this important project for improving the Middle Booster Station in the City of Duluth. We look forward to discussing this proposal to provide engineering services. Please contact me at (608) 355-8868, or [schilson@msa-ps.com](mailto:schilson@msa-ps.com), with any questions about this proposal, or if you would like additional information.

Sincerely,  
MSA Professional Services, Inc.

A handwritten signature in black ink, appearing to read "Scott R. Chilson".

Scott Chilson, PE  
Senior Project Manager



**PROPOSAL FOR:**

Middle Booster Station Design and Bidding Phase  
RFP 19-99446, Project Number 1779

**Prepared for:**

City of Duluth  
June 26, 2019



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### **MSA PROFESSIONAL SERVICES, INC.**

332 W. Superior Street, Suite 600, Duluth, MN 55802

Contact: Scott Chilson, PE | Senior Project Manager  
Phone: (608) 355-8868  
Email: [schilson@msa-ps.com](mailto:schilson@msa-ps.com)  
Website: [www.msa-ps.com](http://www.msa-ps.com)





## Goals and Objectives

### PROJECT UNDERSTANDING

The City of Duluth owns and operates the Lakewood Water Treatment Plant (WTP) and pump station, 11 water booster/pump stations, 15 water storage facilities, and over 400 miles of water distribution mains. The Middle Booster Station (MBS) is located near the intersection of 15th Avenue East and 6th Street adjacent to the Endion Reservoir. The Lakewood Pump Station supplies water from the WTP to the low zone, Endion Reservoir and Reservoir A. The Middle Booster Station pumps water from the Endion Reservoir (Low Pressure Zone) into the Middle Pressure Zone and the two Middle Reservoirs which are located along Central Entrance adjacent to the Arlington Booster Station. The Middle Pressure Zone includes the middle portion of the hillside that Duluth extends across. The Middle Booster Station is a major component of the Duluth Water System. Besides supplying water to the Middle Pressure Zone, it also supplies water to a portion of the Woodland Pressure Zone, to the Highland Pressure Zone, and to the Hermantown Water System.

The City of Duluth is looking for an engineering consultant to provide design and bidding engineering services for mechanical and electrical improvements to the Middle Booster Station. The required engineering services and improvements include: validation of interior and exterior process piping between the Endion Reservoir

and the Middle Booster Station pumps (not including the interior of the reservoir); hydraulic evaluation and capacity analysis of the Middle Booster Station; process piping and discharge connection to the Middle Pressure Zone; and design of a new triplex booster pump system (including 20" diameter discharge header and appurtenances, discharge flow meter, dual feed 480 VAC electrical service [coordinated with MN Power], and variable frequency drive motor controls for the three pumps); evaluation and design of air-conditioning system or ventilation system for heat produced by the new VFDs; and upgrades to the existing sewage ejector station. The project will also include upgrades to booster station controls, by coordinating with the City's SCADA system provider for control and human-machine interface improvements.

As described above, the project will focus on essential mechanical, pumping, electrical, and control improvements. Due to budget constraints, the project is not anticipated to include building enhancements or improvements. We understand the project approach will be to reuse the existing doors, restroom, wall paint, exterior facade, heating units, receptacles, lighting, sanitary drain and waste piping, flooring, etc. Items not included in the scope of this project may be addressed separately by City Department staff. Construction staging will be a key consideration in the design development, since the Middle Booster Station must remain operational during all stages of construction. MSA has worked with

# GOALS AND OBJECTIVES

City of Duluth Engineering and Operations staff to deliver numerous past project designs that provided multi-phased construction, avoiding interruptions of service and maintaining robust operation of the existing facilities until the new facilities were commissioned and deemed reliable.

The Middle Booster Station is one of the oldest water pumping stations in the City of Duluth water system. The building is of classic masonry construction, and is long, narrow, and tall, containing a large process room. The building has an area in the rear that was originally used as living quarters for the operators. This space is currently unheated and unused.

MSA's scope of services as detailed in this proposal includes the engineering services and other work necessary to provide final design and bidding documents for the improvements to the Middle Booster Station. Construction services are not included in this proposal. The project deliverables will include plans, specifications, cost estimate, meeting minutes, and a Technical Memo summarizing hydraulic evaluation and recommended booster pump(s). The deliverables will be formatted in accordance with the most current version of the City of Duluth Standard Specification and Engineering Guidelines.

MSA understands that Minnesota Public Facilities Authority (PFA) funding may be utilized. If PFA funding is used, MSA will support the city is developing and submitting the project for review to the Minnesota Department of Health.

## Electrical System and Controls

MSA has worked with the City of Duluth on past improvement projects for many years. Our team has a unique knowledge of the City's preference as a result of that experience. Our familiarity with the City and with City standards extends to the electrical and controls portions of facility improvement projects. MSA has a good working relationship with Minnesota Power and their Energy Incentive partners. MSA will continue to provide coordination so that the City qualifies for the maximum energy incentives available.

Part of the work MSA provided in the development of the Pre-Design for the Middle Booster Station project included planning -level coordination with Minnesota Power engineers to determine the feasibility of providing a second utility feed to the Middle Booster Station. Minnesota Power has given preliminary approval to the concept of providing a second utility feed, a utility-owned automatic transfer switch, new underground primary feeder to a new utility-owned, 480VAC transformer and secondary metered service to the Middle Booster Station. Minnesota Power

understood that the construction of the new service would be installed while maintaining the existing service for a short overlap period of approximately two- to three-months. This overlap period will allow phased construction, installation and commissioning of the new electrical service, electrical gear, controls, one or two of the new pumps, and piping, prior to decommissioning the existing electrical service, controls and pumps. This phased construction will be included in the plans and specification so the Contractor will have a clear understanding of the sequence of construction required to keep the Middle Booster Station in service.

MSA understands the objective of the City is to reuse the existing low voltage devices, lighting panels, receptacles, switches, and circuits as much as possible.

MSA's team is experienced in the design of power and motor controls for water pumping systems. MSA understands the City's commitment to standardization, safety, and reliability of the electrical power systems. MSA proposes to design a power system that is similar the Lakewood Water Treatment Plant, West Duluth and the Arlington Water Booster Station. The design will provide isolated service disconnect, metering, with switchboard distribution to free-standing isolated VFD motor controllers. This arrangement will be confirmed with City staff as part of the project kick-off meeting and preliminary design phase. This layout allows City staff to isolate and de-energize the VFD motor controllers for maintenance while keeping the other pumps and stations automatic-control functional.

The City and MSA evaluated and elected to standardize on Eaton Cutler Hammer VFDs approximately 12 years ago while upgrading the West Duluth Booster Station. After 12 years, Eaton is updating their VFD offering to new models. During the preliminary design, MSA will work with the City to confirm that the new Eaton VFDs will become the new City standard, or if another brand should be considered. MSA has knowledge of the City's equipment, manufacturer, and vendor preferences based on past projects, and has developed good relationships with City staff. These relationships, developed over the many years and many projects allow MSA to deliver projects that match the City standards in process, equipment, and layout. MSA understands that these standards save the city money in both operation and maintenance.

As a standard for variable frequency drives and solid state reduced voltage starters, MSA recommends the provision of input contactors ahead of Smart Motor Controllers (i.e. the drives or starters). MSA is aware that City staff have mixed feelings regarding the input contactors. MSA will review this with City staff

# GOALS AND OBJECTIVES

as part of the preliminary design effort. If the City elects to keep the input contactors in the motor circuits, MSA will provide control power and test switch control to facilitate set-up, troubleshooting and maintenance of the motor controllers.

When implementing new VFDs into a building system, rejected heat must be evaluated. Regional conditions and the building envelope define the capacity to absorb heat. Heat is the enemy to mechanical systems. VFDs work best when they are kept dry and cool (<100 degrees ambient in the building). VFDs reject heat at a rate of about 2.5% of the power demand. If the proposed pumps are 350 HP, the rejected heat per VFD could be as much as 7 KW/hour into the building. The motors and low-voltage transformers are other sources of rejected heat into the building. The Middle Booster Station building is a large open room that has partially buried walls. The building is expected to have some thermal buffering capacity. As part of the design, MSA will evaluate the thermal characteristics of the building and make recommendations for addressing the potential accumulation of heat. The evaluation will consider options such as air conditioning, VFD enclosure cooling, ceiling destratification fans, exhaust fans, and portable dehumidifiers. MSA recognizes the regional weather in Duluth may only contain a few hot humid days per year, but one might expect high water demands on those hot days; therefore, in the future, multiple pump operations may coincide with those hot days.

Because MSA prepared the Technical Memo No.1 for Middle Water Pump Station Improvements (April 11, 2019), we have an excellent understanding of the electrical improvements. During the development of that memo, we coordinated directly with Minnesota Power to confirm the feasibility of constructing a second service feed from a second power grid to the MBS. The City is interested in a second electrical service feed after experiencing an interruption of service about three years back and after identifying that a standby generator for the Middle Booster Station is not cost effective. Further, MSA worked with City to identify the advantages of converting the service to this facility from 2400 VAC to 480 VAC.

The Middle Booster Station electrical service consists of a single overhead feed. The existing service is medium voltage - 2,400 VAC power. The existing electric service enters the building and feeds utility metering equipment and a large fused medium voltage service disconnect. The service disconnect is tapped to feed the three booster pump motor controllers and a transformer for 240/120VAC lighting and appliance power. The primary protection and disconnect for the 2,400-240/120VAC low voltage transformer is a massive medium voltage enclosed fused switch hanging approximately 8 feet above the floor. In order to access and operate the disconnect switch, an electrician is required to stand on a ladder

in front of the switch, for manual operation. The City intends to eliminate the safety concerns associated with the existing medium voltage gear, and address the lack of operation flexibility provided by the existing layout at this facility. The current layout requires the City to open the main disconnect in order to access any of the three pump motor controllers. This inconvenience is made worse by the low voltage power circuit being fed from the Main, because when the Main Switch is opened, power to the low voltage lighting and power systems is also disconnected. As a result, the City must bring in temporary power and lighting to work on the existing gear or access the equipment with energized feeders.

The City has determined the existing Pump No.1 motor controller is unsafe to operate. The motor controller is many years beyond it's expected service life. Pump No. 1 is not connected to the SCADA system; therefore, an operator must manually operate the pump. That process requires starting the pump locally at the motor controller, and then manually actuating the pump discharge control valve. Pumps No.2 and 3 are connected to the SCADA system and are operated automatically and remotely from the Lakewood Water Treatment Plant.

The City has decided to convert from 2,400VAC to 480VAC at this facility for several reasons, including safety, increased availability and lower cost of 480VAC gear.

An overall objective of this project is to improve the reliability of the Middle Booster Station so that the City can provide uninterrupted service to its water customers. To accomplish this objective, the design will eliminate single points of potential failure as much as reasonably and economically possible. MSA has worked with City staff to develop standards for power and control systems for City pumping facilities, for both the water and sanitary sewer systems. This provides uniformity and streamlines operations and maintenance for the City operations staff. MSA will provide a design for this project with robust and reliable power, control, and pumping equipment that is similar in layout and construction to other recent City water and wastewater pumping stations.

MSA understands the City's commitment to safety. MSA integrates safety into the electrical design by providing gear that can be de-energized for safe (de-energized) access for operation and maintenance, while also keeping the facility operational. The construction documents will require the electrical contractor to provide power systems analysis and commissioning for proper calibration and set up of the electrical equipment. This process will provide the City with a Code-recommended arc flash study and coordination of information specific to the actual construction of the system.

# GOALS AND OBJECTIVES

## **SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA)**

MSA has worked with the City in the planning, design, bidding, and construction of the City's SCADA system. The SCADA system is used to operate and control the City of Duluth gas, water, and sanitary sewer systems. MSA has knowledge and background of the controls and the process necessary to provide enhancements to future City utility projects. MSA understands the existing controls at the Middle Booster Station. The upgrade of the controls required for this project will only necessitate minor improvements, but will include making Booster Pump No.3 operational from the SCADA system. MSA understands the City's goal is to reuse the existing controls and instrumentation devices as much as possible.

MSA understands the control and integration of the Duluth water facilities because we designed the current SCADA system. The SCADA system is now 10 to 12 years old, and has evolved somewhat over time. As part of the system control, MSA knows City staff prefers standard controls, instruments and devices. This includes the preferred actuators for the pump control valves. MSA has continued to work with the City over the years and remains knowledgeable of the current control and SCADA system. The control upgrade that will be included in the Middle Booster Station improvements will not be a complete re-build. MSA understands the City's goal is to reuse as much of the existing instrumentation and controls as possible. Because the project will be phased and include operation the existing and new equipment at the same time, some new instruments and devices may be provided. Upon completion of the project, all materials will be recovered and turned over to the City to provide spare stock.

## **PUMPING EQUIPMENT AND PIPING**

The existing Booster Pump No.1 at the Middle Booster Station is a dual-stage split-case pump with a 400-horsepower synchronous motor. The condition of the pump is uncertain, since it has not been operated for some time. The City reportedly had the pump seals, bearings and internals visually inspected by a third party; however, it is planned that this pump be replaced as part of the project.

The existing Booster Pump No.2 is a single-stage split-case pump with a 250-horsepower induction motor. This pump exhibits noise and vibration issues, suggesting cavitation or imbalanced operation. Upon inspection, we noticed the pump suction piping includes a horizontal 90-degree bend directly connected to the pump inlet. Split-case booster pump impellers have two inlets, one on either side. If water is introduced into the pump with a horizontal bend, the water may preferentially feed one side of the impeller, causing an imbalanced load to the impeller, shaft, bearings and seals. MSA identified the imbalanced feed to the

suction of the pump as a likely cause of the noise and vibration issues. It was recommended that relatively simple re-piping could solve the situation. MSA understands that proper pump suction design is critical to pumps operation, and we have encountered many existing installations where the the suction piping layout is less than optimal, including the use of oversized suction piping. Correct sizing and orientation of the pump and piping will result in the longest pump life cycle.

Pump No.3 is similar in size and capacity to Pump No.2, but is of a different manufacturer than Pumps No.1 and No.2.

MSA understands the City intends to replace all three existing pumps as part of this project. We will evaluate the existing control valves and other components of the piping system for potential re-use in the upgrades where appropriate and cost-effective.

During development of the Pre-Design Technical Memo for the Middle Booster Station, MSA discussed the specific project objectives of the City. The City's goal is to reuse the existing suction piping under the concrete floor (if possible), and construct a new above-floor discharge header with a flow meter, air release valve, and potentially a pressure relief valve, to connect the three new booster pumps. The new discharger header will extend across the mechanical room to the front wall. The header will extended down through the floor and under the footing to exit the building. The discharge pipe will extend out to the street and be connected to the water main in front of the MBS. MSA is familiar with City of Duluth standard materials for above-grade and below-grade construction. The design will be developed to comply with City standards.

## **HYDRAULICS**

MSA has a good understanding of the City of Duluth water system and facilities because we have worked on projects at all of the water facilities. MSA developed and maintains a working water model of the Duluth water system. This water model has been used to design the upgrades to the Arlington and Highland Booster Stations. MSA will use Bentley Systems WaterGEMS modeling software with the Duluth water model to evaluate hydraulic conditions of the system and recommended new booster pumps for the Middle Booster Station. The hydraulic evaluation will include several steps to confirm existing piping is correctly included in the model, validate the model output based on existing conditions, create a model for the new pumps and new piping, and evaluate the system characteristics based on average daily demand and maximum system capacity. The new pumps will be controlled with VFDs; therefore, multiple-speed analysis is included in the evaluation. The evaluation will consider several scenarios depending on current and future demands of the

# GOALS AND OBJECTIVES

system. MSA understands the operation of the Arlington Booster Station directly impacts Middle Booster Station pumps. Other system characteristics such as large demands in the low zone, and whether the Woodland and/or West Duluth booster station are operating, may impact suction conditions at the Middle Booster Station pumps. Reservoir A and the Endion Reservoir water levels will also be factors in the evaluation of suction pressure and NPSH available (versus NPSH required) for the new pumps. Discharge pressures formatted for the Middle Booster Station will need to be evaluated depending on the status and condition of the water main in the Middle Zone near Central Entrance. MSA will work with the City early in the design process to identify initial limitations and future possible limiting factors to be considered in the design.

## SEQUENCE OF CONSTRUCTION

The preliminary concept plan for the sequence of construction for the Middle Booster Station includes the following components:

- City of Duluth may authorize Minnesota Power to initiate construction of new dual feed service extension ahead of bidding.
- Advertisement for Bids, Bid Opening, and Evaluation of Bids.
- Award and execution of construction contract with qualified Bidder/Contractor.
- Contractor to obtain necessary permits for construction.
- Contractor to submit electric and natural gas utility service requests depending on whether the City has already initiated this work.
- Pre-construction meeting.
- Critical and long lead time item shop drawing review.
- Construction begins.
- Installation of erosion control.
- Construction of new discharge water main from the connection at the existing water main in the street into the Middle Booster Station Building.
- Construct improvements to the existing wastewater sump and ejector pump.
- Removal of Pump No.1 and motor controller (the existing Pump No.2 & No.3 shall temporarily remain in service).
- Installation of new electrical service and electrical gear.
- Installation on new Pump No.1 and VFD motor controller.
- Tie-over low voltage power system to the new service.
- Construct of new pump discharge header.
- Initial start-up of pump controls.
- Start-up and commissioning of new Pump No.1, including SCADA and controls for automatic control. Training of City Utility staff.
- Run Pump No.1 until City deems the new pump and controls are reliable.
- Remove existing Pump No.2 and motor controller. (Existing Pump No.3 shall remain in service temporarily as back-up.)
- Installation of new Pump No.2 and VFD motor controller.
- Connect new Pump No.2 to the new discharge header.
- Start-up and commissioning of new Pump No.2, including SCADA and controls for automatic control. Training of City Utility staff.
- Run Pump No.1 and No.2 until City deems the new pumps and controls are reliable.
- Demolish existing electrical service and service gear, remove existing Pump No.3 and motor control.
- Abandon the existing below-grade discharge pipe in place and connect to the water distribution main in the street.
- Executed complete restoration of the exterior surfaces.
- Installation on new Pump No.3 and VFD motor controller.
- Connect new Pump No.3 to the new discharge header.
- Start-up and commissioning of new Pump No.3.
- Complete SCADA and control installation and commissioning, including training of City Utility staff.
- Complete Arc Flash study and Coordination study and adjustments.
- Final inspection and punch list.
- Complete project closeout documentation.

The Project Schedule is outlined in the Work Schedule section of this Proposal.

# EXPERIENCE

## Experience

MSA is a full-service, multidisciplinary firm with core services matching the engineering requirements of the Middle Booster Station project. This project will combine our water and municipal engineering programs to provide a well-balanced team to maximize project efficiency. The talented individuals identified in the Personnel section of this Proposal have considerable local knowledge of the specific elements required for the design of the project. MSA's project team has worked with the City on many complex and multi-phase projects. MSA has a strong track record for meeting schedules and milestones. The following examples of completed projects highlight our team's experience, which we will draw on to meet the design and schedule challenges set forth in the project RFP.

## WATER BOOSTER STATION EXPERIENCE

MSA has worked with the City of Duluth on the design of water modeling, SCADA controls, pumping, storage and piping improvement projects for more than 40 years, dating back to the engineering firm known as RREM, which MSA acquired in 1998. Throughout this time, MSA has developed familiarity and knowledge of the City's standard practices with respect to wastewater lift stations and other components of the City's wastewater collection system.

### Arlington Pump Station

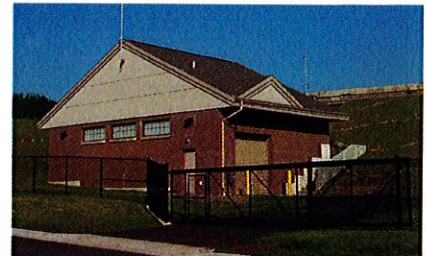
Duluth, MN

#### PUMP STATION DESIGN AND ELECTRICAL CONTROL DESIGN

In the spring of 2008, MSA Professional Services was selected to design a completely new pump station facility to replace the existing aging infrastructure. This was a result of a recommendation to increase capacity noted during a prior MSA pressure zone modeling project. In order to ensure future year 2,025 demands, the project was to provide 3,400 gpm capacity. This capacity would have several benefits including:

- Several hundred feet of process piping needed to be increased from 12 inches to 16 inches to supply the new pumps with an adequate supply of water. Three 250-horsepower horizontal split case pumps are incorporated into the facility to overcome the challenging 325 feet of dynamic head losses.
- A sophisticated control system to increase operational flexibility and add redundancy. It also provides the City with the ability to closely monitor and control system pressures and reservoir elevations.
- A hydraulic surge suppression system was installed to protect a major water artery from pressure spikes that cause pipeline stress and failures.

The main challenge was constructing a new water facility with the inability to shut down the crucial utility system. With this in mind, MSA's approach to the project included detailed phasing plans to limit shutdowns to just one 12-hour period. Other challenges during this project included difficult site topography and limited space to locate a new building. MSA provided the construction inspection and oversight services, during the construction phase in the spring and summer of 2009.



#### KEY STAFF

- **Scott Chilson, PE** - Project Engineer
- **Phil Lockett** - Construction Inspection
- **Al Szymanski, AIA, PE** - Project Architect
- **Carolyn Wastlund, LEED® AP BD+C** - HVAC

### Lakewood Water Treatment Plant and Pump House Evaluation

Duluth, MN

#### PUMP STATION AND ELECTRICAL CONTROL KNOWLEDGE

The City of Duluth and surrounding communities' water supply is provided by the Lakewood Pump House and Water Treatment Plant. The pump house is nearly 120 years old and the water treatment plant is nearly 40 years old. The Lakewood facility's rate capacity is 32 mgd. The pump house includes 1,000 hp, 1,500 hp and 2,000 hp high lift pumps. The high lift pumps convey treated water from Lake Superior through a 36-inch and 48-inch pipeline.

In 2010, MSA worked with the City to complete an evaluation of the Pump House and Water Treatment Plant. MSA developed an extensive Capital Improvement Plan including priority evaluation and phased upgrade to keep this facility operating. MSA remains the only A/E consultant to work at the Lakewood facility in past 20 years.

#### KEY STAFF

- **Scott Chilson, PE**  
Project Engineer
- **Phil Lockett**  
Client Liaison
- **Al Szymanski, AIA, PE**  
Project Architect



## West Duluth Booster Station

Duluth, MN

The City of Duluth was experiencing industrial growth in the western portion of the City on the downstream side of its existing West Duluth Booster Station. The existing station was providing 9.95 MGD. The City's industrial client needed an increase in available water volume by 4.1 MGD for its Phase 2 expansion and an additional 4.1 MGD for its Phase 3 expansion. An additional challenge to providing increased volume to the paper plant was its location with respect to the water supply intake at Lakewood (approximately 12 miles west) and the three reservoirs and pump stations located between the Lakewood intake and the West Duluth Booster Station.

Using the water system model developed by MSA, the system was analyzed to determine the changes in supply piping and pumping capacity that would be required to provide the proposed increases in demand. The model showed that the required demand from the West Duluth Booster Station, including all demands, would be 17 MGD for the Phase 2 expansion and 21 MGD for the Phase 3 expansion. In addition, supply and discharge water main near the booster station would have to be increased in size. MSA also evaluated an alternate location for the booster station and the required changes in water main to serve that location.

## Highland Booster Station

Duluth, MN

MSA Professional Services was selected to design improvements to the Highland Booster Station and to replace the two existing Elevated Storage Towers (EST). This project was a result of a recommendation provided in a prior MSA pressure zone modeling project. The Highland pump station and ESTs required updating and capacity enhancements.

The Highland Booster Station is located on a narrow lot that was formally a street right-of-way. The station was adjacent to the existing ground reservoir and the existing vertical turbine pumps booster water up into the two ESTs. The towers are located directly above the pump station connected by the former ROW. The property was narrow and steep. One project challenge was to stage construction to rehabilitate the pump station and build a new 1-million-gallon EST in the same location as the existing tanks.

Service to the Pressure Zones could not be interrupted. MSA worked closely with Duluth staff to design the updates to the existing pump house and water tanks. MSA used the water model of the City Duluth water system to validate pump design and to finalize the overflow elevation of the new EST. The design identified a multi-phase construction staging plan. The staging plan included construction of a temporary pump station outside the existing pump house to maintain service. In a separate contract, MSA designed a construction staging plan to demolish the smaller existing water

### PUMP STATION DESIGN, ELECTRICAL CONTROL DESIGN, MULTI-PHASED KNOWLEDGE

#### KEY STAFF

- **Scott Chilson, PE**  
Project Engineer



A new booster station was constructed near the location of the existing station. The new station was provided with two 8,000-GPM pumps. The new station also had piping installed to accommodate a third pump to supply volume for the future Phase 3 expansion of the paper plant. In addition, 8,000 feet of 36-inch water main was installed on the suction side of the new booster station.

Recently, MSA helped the City of Duluth evaluate horsepower requirements at this station for a reduced flow of 6,000 gpm and prepared a design for installation of pressure relief valve to allow the City to remove the West Duluth Reservoir from service for maintenance. MSA helped Duluth downsize the motors from 300 hp to 200 hp and with the installation of new VFDs. This project qualified for energy incentives.

### PUMP STATION DESIGN, ELECTRICAL CONTROL DESIGN, MULTI-PHASED PROJECT EXPERIENCE

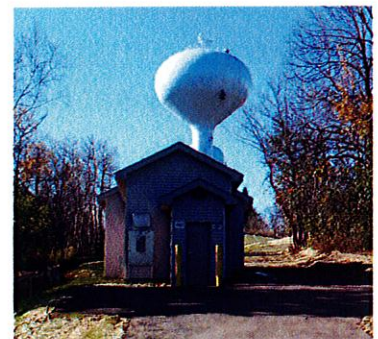
#### KEY STAFF

- **Scott Chilson, PE** - Project Engineer
- **Phil Lockett** - Construction Inspection
- **Al Szymanski, AIA, PE** - Project Architect
- **Carolyn Wastlund, LEED® AP BD+C** - HVAC

tower, maintaining service using the existing 400,000 EST while the contractor constructed a new 1-MG Pedosphere EST. Once the new tower was commissioned, the existing tower was demolished.

The project included several complex tasks and construction techniques.

In addition to the construction of the new EST and improvements to the booster station building, MSA provided design of suction piping between the existing ground reservoir and the suction to the booster pump, new transfer main from the booster station to the new EST, and construction of a Radio Telemetry Building (RTU) with utility tunnel connecting the new EST to the RTU Building.



# EXPERIENCE

## Lift Station No. 6 | East Interceptor Sanitary Sewer Overflow Storage Facility Phase 1, 2 & 3

Duluth, MN

### MULTI-PHASED PROJECT EXPERIENCE

#### KEY STAFF

- **Scott Chilson, PE** - Project Engineer | SCADA
- **Phil Lockett** - Construction Inspection
- **Al Szymanski, AIA, PE** - Project Architect
- **Carolyn Wastlund, LEED® AP BD+C** - HVAC

The City of Duluth was under strict orders from the Environmental Protection Agency (EPA) to control and eliminate the occurrences of sanitary sewer overflows (SSO). The City of Duluth hired MSA to complete this project because of MSA's previous completion of several successful SSO storage facilities and understanding of the City's sanitary sewer system.

The first phase of the project included constructing a 48-inch diversion sewer beneath the Lakewalk and nearby railroad, and relocating Duluth's largest sanitary lift station. The new lift station allowed the existing station to be demolished so the location could be utilized for the SSO storage facility. Due to heavy public use of this area, construction of the diversion sewer and pump station was performed during the winter months. Relocating the lift station required 700 feet of new 36-inch and 48-inch influent sewers to route around the future SSO storage facility location. A new 24-inch force main was also extended to the new pump station to convey the design flows of 8 MGD. The new lift station contains three submersible 50 HP pumps and a 36-inch influent sewer grinder to replace the manually-raked bar screen. Excavating the lift station site required environmental monitoring, special handling, characterization and disposal of contaminated soils. Hundreds of feet of utilities, including water, storm sewers, sanitary sewers, and communication and electrical lines had to be relocated in preparation for the 1.1-acre footprint of the storage facility constructed in Phase 2 of the project.

The second phase of this project consisted of construction of a new SSO storage facility. The location for the SSO storage facility was proposed by the City based on land ownership, allowing the SSO flows to travel to the storage



facility by gravity, and the ability to transfer the stored volume back to the sanitary sewer system. The site selected had many unique challenges including environmental contamination. The property and surrounding land use has experienced industrial, commercial and residential development for over 100 years. Therefore, following the selection of this site, the City contracted with MSA to complete a Phase I Environmental Site Assessment (ESA). The Phase I ESA identified several recognized environmental issues associated with past operations on or directly adjacent to the property, including railroad ownership from the early 1900s to the mid-1980s, a former sewage treatment plant, a former scrap iron company, a former coal storage facility, former gas stations, a former bulk oil storage facility, and an abundance of fill material of unknown origin.

The third phase of this project consisted of rerouting 16-inch water main in Michigan Street to avoid conflict with Minnesota Power underground electrical ductbanks. The project location was along 3<sup>rd</sup> Avenue East in Duluth and consisted of a 16-inch ductile pipe along Superior Street, down 2<sup>nd</sup> Avenue W. to Michigan Street, and along Michigan Street to 1<sup>st</sup> Avenue W, where it connects to the water main that runs under Interstate Highway 35.

## SCADA EXPERIENCE

### Comprehensive SCADA System

Duluth, MN

### ELECTRICAL CONTROL DESIGN, MULTI-PHASED PROJECT EXPERIENCE

#### KEY STAFF

- **Scott Chilson, PE** - Project Manager

The City of Duluth retained MSA to explore the possibility of upgrading the outdated control systems for the various utilities by developing a single, comprehensive communication backbone and SCADA system for the City's 108 facilities. The planning and design phase of this project required extensive coordination with utility management, operational and maintenance staff, as well as City IT, radio maintenance and public protection service personnel (police, fire). The comprehensive project included three separate utilities (Wastewater, Water, & Gas). The MSA team conducted detailed site investigation of each utility site to document the existing system and identify its operational needs. Functional requirements were identified for the entire system.

Planning for this project began in 2005, and final phases of construction occurred in 2013. The system replaced four existing SCADA systems and combined Water, Sewer and Natural Gas departments under a single platform. This allowed the City to have individual access and security.



## OTHER MSA EXPERIENCE ON CITY OF DULUTH WATER UTILITY PROJECTS

- Duluth Water System Operations and Needs Study
- Lakewood HVAC Improvements Project
- Lakewood Pump Station Pump No.2 VFD Evaluation
- Lakewood WTP Power Usage Evaluation
- Duluth SCADA Project
- West Duluth Booster Station Improvements project
- Standby Power Study for all Duluth Water System Facilities
- MCC replacement Evaluation for Bayview Booster Station Lift Station No. 53

### Morgan Park Water and Sewer Replacement

Duluth, MN

#### PHASED PROJECT EXPERIENCE

The City of Duluth's Morgan Park neighborhood suffered from a high amount of water and sewer main failures. Existing utilities were installed in the early 1900s when the neighborhood was constructed to provide housing for workers at the nearby steel mill. A needs assessment for the aging water and sewer systems was recommended to relocate all the utilities from the alleys to the streets.

MSA was hired to review the earlier study, make recommendations and provide design and construction services for Phase 1 of the project. MSA agreed that the water line should be relocated to the street and recommended that they be installed by directional drilling to minimize disruption to neighbors and repair of City streets. Water service laterals were also being directionally drilled.

This project was constructed in four phases. All the water mains were replaced during Phases 1 and 2. These projects included a total of 20,000 feet of 6-, 8- and 10-inch directionally drilled HDPE water main and 8,000 feet of directionally drilled HDPE and copper water services. The sanitary and storm sewers were replaced or rehabilitated using cured-in-place pipe lining or pipe bursting. Within Phases 1, 2, 3 and 4, over 7,100 feet of sanitary sewer were replaced and 4,800 feet were repaired with trenchless technologies. A new sanitary lift station was also constructed.

#### KEY STAFF

- **Phil Lockett** - Construction Inspection



## MSA EXPERIENCE ON MULTI-PHASED AND COMPLEX PROJECTS WITH THE CITY OF DULUTH WATER UTILITIES

The following projects required planning, design, and construction executed to prevent interruption of service during construction.

- Duluth SCADA project was executed in three primary phases, the construction spanned 2-3 years.
- Highland Booster Station and Elevated Storage Tank.
- Duluth Lift Station No.8 Reconstruction.
- City of Duluth Lakeside Interceptor Overflow Facilities / Phases 1 & 2.
- Many other projects executed with the City of Duluth and other municipalities. MSA's team is experienced in developing designs that provide a sequence of construction that limits risks and interruptions during construction.

## OTHER MSA EXPERIENCE ON CITY OF DULUTH WATER UTILITY PROJECTS

- Duluth Water System Operations and Needs Study
- Lakewood HVAC Improvements Project
- Lakewood Pump Station Pump No.2 VFD Evaluation
- Lakewood WTP Power Usage Evaluation
- Duluth SCADA Project
- West Duluth Booster Station Improvements project
- Standby Power Study for all Duluth Water System Facilities
- MCC replacement Evaluation for Bayview Booster Station Lift Station No. 53

# PERSONNEL

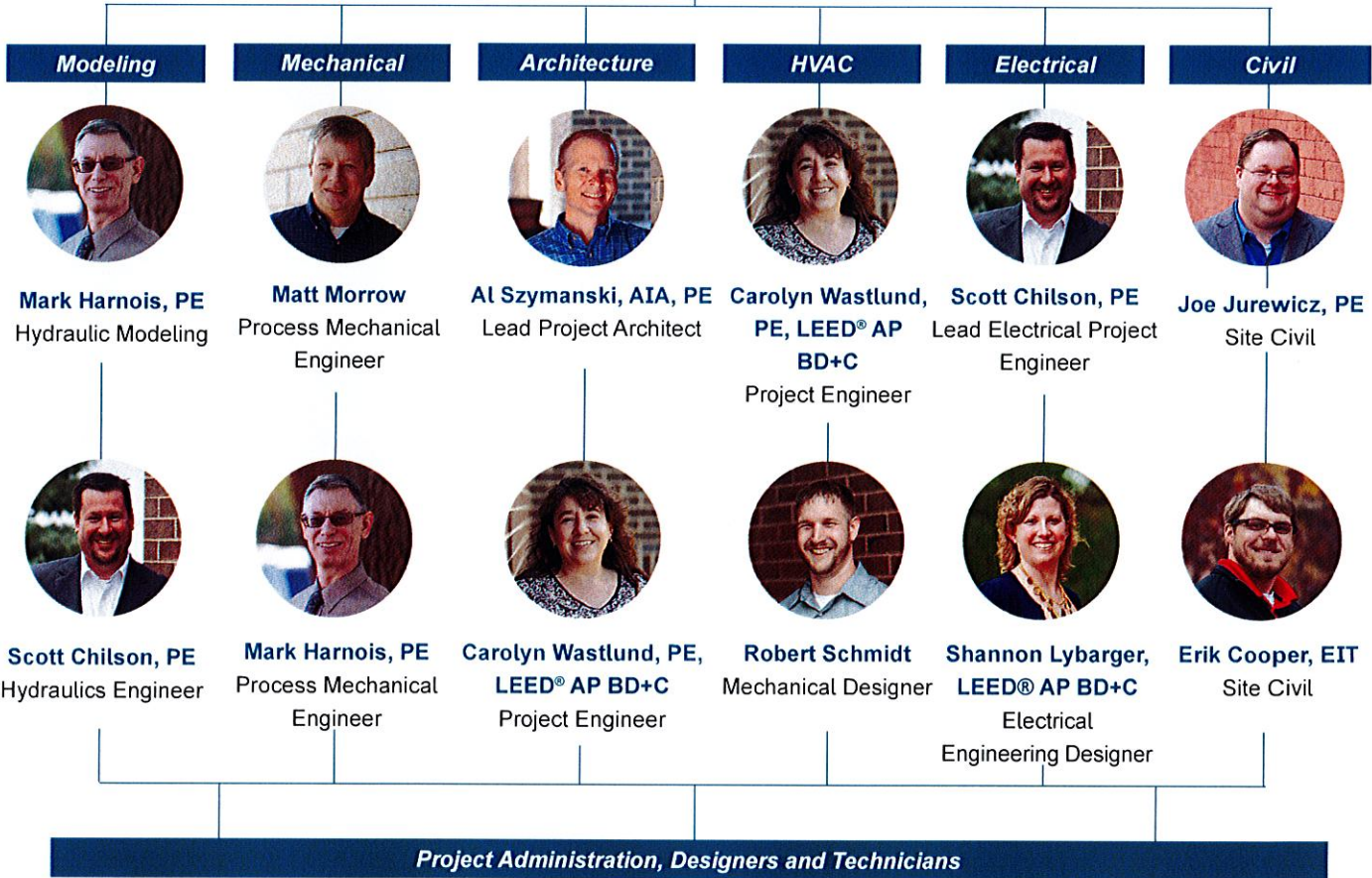
## Organizational Chart



**Scott Chilson, PE**  
Sr. Project Manager



**Phil Lockett**  
Client Liaison, QA/QC,  
Topo and Environmental



**Todd Halvorson, GISP**  
GIS



**Jessie Phillips**  
Architectural &  
Structural Tech



**Anna Seczko**  
Administration



**Jill Benner**  
Administration



**Adam Killian**  
Engineering  
Technician



**Keith Schinkoeth**  
Structural Engineer



**Scott Chilson, PE**

Senior Project Manager,  
Process & Electrical Engineer

**Project Role:** *Scott will manage the overall project delivery. He will provide hydraulic process mechanical and electrical engineering. Scott will coordinate completion of project deliverables, lead City staff and project stakeholder meetings, and is the primary point of contact for City of Duluth staff.*

Scott is a senior project engineer with two decades of experience. He works closely with municipal governments to provide planning, design, and construction management services for municipal infrastructure projects and related facilities. Scott has a diverse background related to the technical design and implementation of municipal infrastructure, complex pumping, mechanical systems, and water & waste water treatment facilities. Scott spent several years working with Muermann Engineering, where he designed electrical power systems and process & instrumentation controls for municipal projects. His expertise includes low voltage power distribution, stand-by power, SCADA network design, and instrumentation and controls (I&C) design. Scott has been involved in City of Duluth lift stations, water pump stations, water treatment plant and SCADA projects since 2007.

SELECTED PROJECT EXPERIENCE

- **Arlington Booster Station**, Duluth, MN
- **Highland Booster Station**, Duluth, MN
- **West Duluth Booster Station**, Duluth, MN
- **Lakewood Pump House Evaluation**, Duluth, MN



**Phil Lockett**

Client Liaison | QA/QC,  
Topographic Survey  
Environmental

**Project Role:** *Phil will serve as the client liaison and provide overall QA/QC for the project and process. He will also provide topographic survey and environmental support as needed.*

Phil has been with MSA since 1998 and has worked in the industry since 1993. Over this period, he has worked on a wide variety of projects for clients in Minnesota. In addition to construction inspection and management experience, he provides experience in the collection of topographic data for the completion of design surveys and surveys for construction staking projects.

SELECTED PROJECT EXPERIENCE

- **Lift Station No. 1, 6, 8, 9, 11, 14, 16, 39, 45**, Duluth, MN
- **Oneota Lift Station, WLSSD**, Duluth, MN
- **East Interceptor Sanitary Sewer Overflow Storage Facility Phase 1, 2 and 3**, Duluth, MN
- **Parkland Sanitary District No. 1**, South Range, WI
- **Morgan Park Water and Sewer Replacement**, Duluth, MN
- **Fitger's Overflow Structure**, Duluth, MN
- **Phase 1A and 1B Water and Sewer Extension**, Rice Lake, MN
- **WLSSD Hwy 210 Forcemain Replacement**, Duluth, MN



**Mark Harnois, PE**

Hydraulic Modeling,  
Sr. Water Resources Engineer

**Project Role:** *Mark will provide hydraulic evaluation for the design. He will use his years of experience to develop and model the Middle Booster Station improvement.*

Mark has worked on stormwater and bridge hydraulic projects throughout the majority of his 36 years with MSA. His experience includes hydrologic and hydraulic modeling. He has experience using a variety of programs including WATERGEMS, HydroCAD, TR-55, TR-20, HY-8, WSPRO, HEC2, and HEC-RAS. He has analyzed the hydraulics of many municipal water system and boost station designs.

SELECTED PROJECT EXPERIENCE

- **City of Duluth Stream Bank Stabilization Project**, Duluth, MN
- **Water Booster Station**, Hillsboro, WI
- **Water Booster Station**, Elroy, WI
- **Water Booster Station**, Galena, IL
- **Water Booster Station**, Lodi, WI
- **Water Booster Station**, West Baraboo, WI
- **Water Booster Station**, Galena, IL

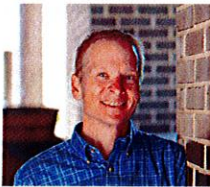
# PERSONNEL



## **Matt Morrow | Process Mechanical Engineer**

**Project Role:** Matt will provide process mechanical design of the project.

Matt provides complete infrastructure design and construction management services for a wide variety of public and private clients. His past project experience with the City of Duluth includes Lift Station No. 8 and the ongoing design of Lift Station No. 15.



## **Al Szymanski, AIA, PE | Lead Project Architect**

**Project Role:** Al will provide QA/QC for architectural and structural design elements of this project. Al will support the process designer with building modifications required in the demolition and installation of the pump(s) and electrical gear.

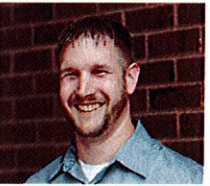
Al has experience in the architectural and structural design of municipal facilities. He worked on the Lift Station No. 8, Arlington Booster Station, Highland Booster Station, Wastewater Utility Garage and East Interceptor SSO Phase 3 project in the City of Duluth.



## **Carolyn Wastlund, PE, LEED® AP BD+C | Project Engineer**

**Project Role:** Carolyn will assist with element of the project that related to architectural, structural, plumbing and HVAC design for this project. Carolyn will provide building thermal envelope evaluation and design to accommodate increase heat loads being added by the new VFDs.

Carolyn has more than 25 years of diversified experience in the architectural, structural, plumbing, fire protection, and heating, ventilating, and air conditioning design of projects, including Arlington Booster Station, Highland Booster Station and many others in Duluth.



## **Robert Schmidt | Senior Engineering Tech**

**Project Role:** Robert will assist with the HVAC design for this project.

Robert has served as a project designer on several MSA projects. His experience includes the preparation of working drawings, construction administration, and coordination with clients, contractors, and other consultants. Shannon has worked on a variety of projects.



## **Shannon Lybarger, LEED® AP BD+C | Electrical Engineering Designer**

**Project Role:** Shannon will assist with the electrical design for this project.

Shannon has served as a project designer on several MSA projects. Her experience includes the preparation of working drawings, construction administration, and coordination with clients, contractors, and other consultants. Shannon has worked on a variety of projects, including multi-story student housing, private schools, retail/commercial buildings, senior housing, site/roadway layouts, and several LEED-certified projects.



## **Joe Jurewicz, PE | Site Civil**

**Project Role:** Joe will lead the site/civil engineering services for this project. Primary work on this project will be exterior surface restoration and design of the new discharge main from the Middle Booster Station connecting with the water system.

Joe has more than 16 years of experience completing multi-discipline engineering projects, including water distribution and sewer collection systems, sewer condition evaluations and rehabilitation, site paving and grading, stormwater management, and management and negotiation of planning and zoning issues.



## **Erik Cooper, EIT | Utility Design Engineer**

**Project Role:** Erik will assist Joe with the utility design for this project.

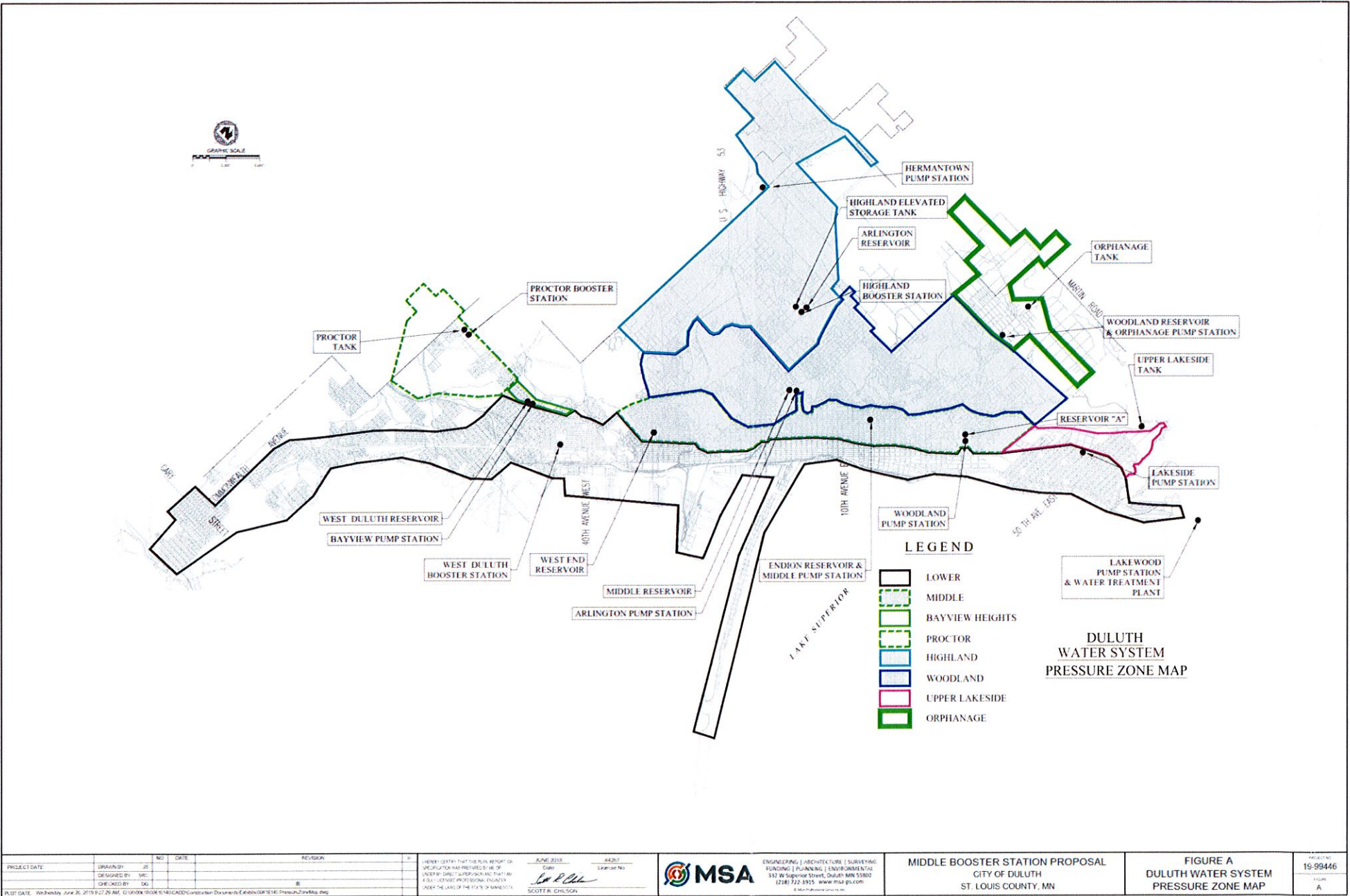
Erik has more than four years of engineering experience. He has worked on a variety of municipal engineering projects ranging from lift station rehabilitation projects to culvert surveys, to road reconstruction projects and wastewater collection system projects.

**Knowledge of Duluth Requirements**

MSA has maintained offices in Duluth and worked with the City on the design of water and wastewater pumping, water and wastewater storage, and piping, and utility improvement projects for more than 40 years, dating back to the engineering firm known as RREM, which MSA acquired in 1998. We have developed project designs, specifications and drawings to the City Street and Utility Standards since those standards were developed more than 20 years ago. Phillip Lockett has been a key member of the MSA Duluth team throughout that time period. Phillip's role as Quality Control/Quality Assurance Manager is to assure that the project plans and specifications are biddable, buildable, and meet the City's expectations for contract document content and format per the requirements of the Street and Utility Standards.

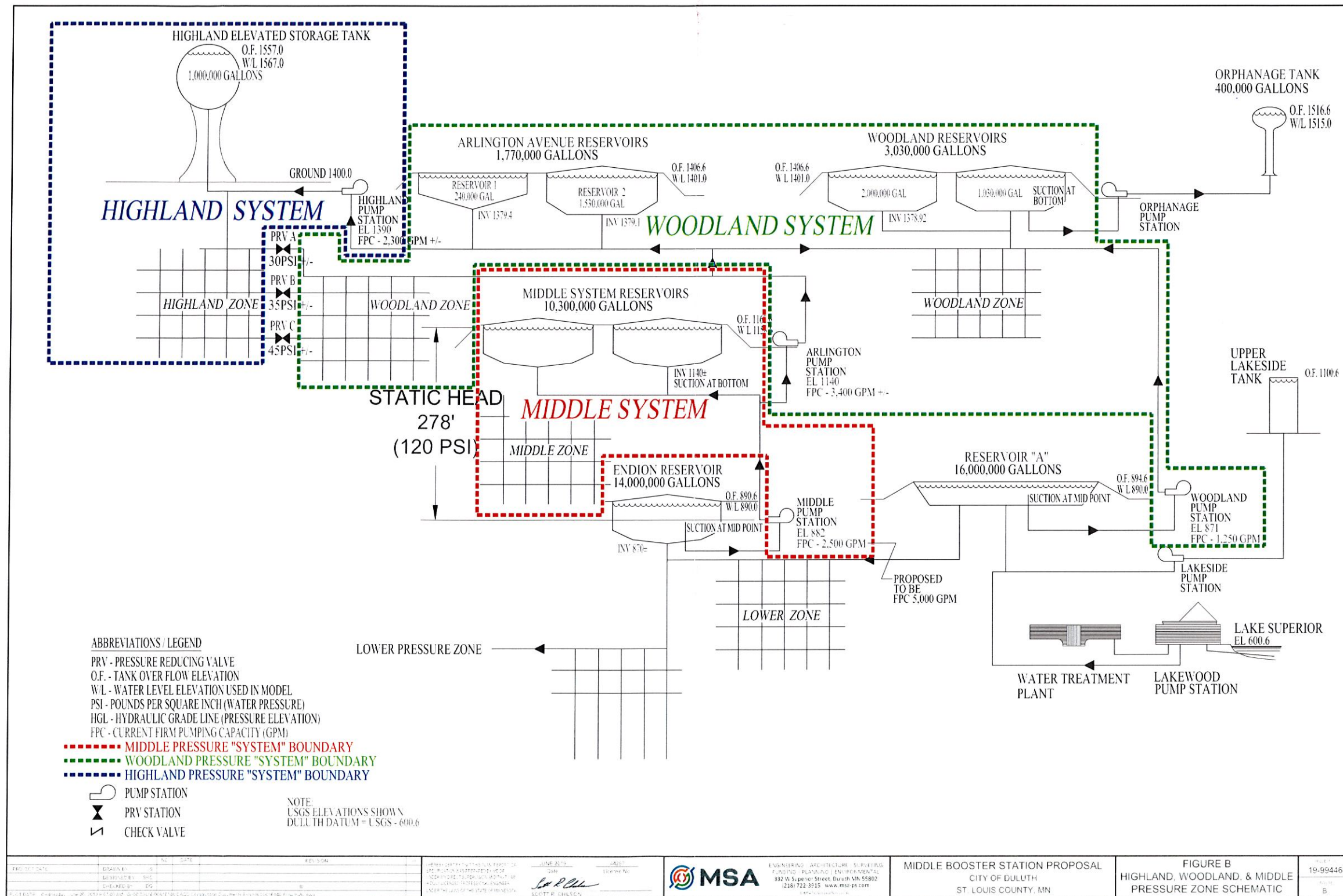
MSA has comprehensive knowledge of Duluth standards, policies, process, and water systems. MSA developed a hydraulic water model for the City of Duluth water system. MSA has used the water model to provide past studies and water system improvement projects. MSA's history and knowledge of the SCADA control, power systems, pressure zones, Water Treatment Plant, and booster stations is extensive. MSA provided the attached: Figure A: Duluth Water System Pressure Zone Map and Figure B: Highland, Middle and Woodland Pressure Zone Schematic to demonstrate our knowledge of the Duluth's water system architecture and operation. The Highland, Woodland, and Middle pressure zone schematic directly applies to the design of the proposed improvements to the MBS.

**FIGURE A**



# KNOWLEDGE OF DULUTH REQUIREMENTS

FIGURE B



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## Work Plan

This proposal contains all work necessary to provide final design including plans and specifications and bidding services that are in compliance with City Standard Specifications and Engineering Guidelines. Construction administration, construction observation services, property surveying, reservoir diving, and Geotechnical services are not included, but can be provided upon request.

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### KICK-OFF MEETING/ INITIAL SITE VISIT AND CONSULTATION

A project kick-off meeting will be held with representatives of MSA, the City Engineering Department, and City staff responsible for the operation and maintenance of MBS. The purpose of this meeting is to collaborate with key City staff so that City personnel become an integral part of the design process. Projects all have challenges and limitations that must be solved during design. MSA firmly believes project success and Owner satisfaction begins with the City's involvement in the project. This vested interest and input early in the design has helped many of MSA's clients and client staff retain control of their projects, which results in a final product that reflects their needs and values. The staff attending the kick-off meeting will be at the discretion of the City.

The project objectives, scope of services, schedule and Preliminary Design Activities will be reviewed at the kick-off meeting. MSA will prepare meeting minutes for distribution to meeting attendees.

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### PRE-PROJECT KICK-OFF MEETING AGENDA AND PRELIMINARY DESIGN ACTIVITIES

The kick-off meeting will include a site visit to verify the dimensions of existing structures and other as-built conditions. As part of the visit, MSA will survey, evaluate, and document the existing station and facilities including interior and exterior process piping. A topographic survey of the site and adjacent areas will be conducted to provide information for use in the preliminary and final design of new structures, piping, building, and site improvements. MSA will develop a kick-off meeting agenda/pre-design memo that will include the following items:

- Request City GIS utility and property files for existing MBS, and utilities and right-of-way maps for the project area.
- Request and review existing MBS drawings and other relevant documents to validate proposed MBS and utility layouts.
- Request current water system operational data of the system. Update and test water model to assure it is up to date and outputs fall within expected range. Work with city to identify controlling factors in the system operation and pumping requirements.

- Conduct initial site visit and consultation with City staff.
- Contact Minnesota Power to coordinate electrical service.
- Contact Minnesota Power to initiate energy incentives.
- Develop concept layout for building layout with three phases of construction.
- Conduct topographical construction survey.
- Initiate hazardous materials survey of existing MBS building.
- Develop concept layout for building layout with three phases of construction.
- Develop preliminary site layout.
- Develop preliminary construction staging and start-up plan.
- Identify known risks and information that is needed for the successful design and construction of MBS.
- Develop preliminary cost estimate.
- Deliver agenda to City for review ahead of the kick-off meeting.

---

### PRELIMINARY DESIGN PHASE 0% - 30%

In this phase of the design, MSA will develop the preliminary layout of MBS and the proposed layout of the site to reflect the City's comments from the kick-off meeting. The preliminary design memo will be developed to incorporate City staff comments and will establish the layout of the new pumps and piping, the site layout with new electrical service, proposed building layout with new pumps and electrical equipment, construction materials, preferred pump manufacturer, electrical controls, SCADA functions, etc. The design memo will provide hydraulic design and evaluation, proposed pumps, anticipated system capacity and performance, summary of the proposed controls and electrical equipment and performance of the preliminary opinion of probable cost will be developed based on the project components as approved by the City staff.

MSA will prepare plans and list of anticipated specifications including the special provisions and project bid form for review and comment. MSA will deliver 50% documents to the City for review and comment. MSA will attend a meeting with City staff to present 50% design documents.

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### DESIGN DEVELOPMENT PHASE 50% - 95%

In the design development phase, MSA will complete drawings and specification to be ready for the city's final review. The 95% set of plans and project manual (specifications) will be provided to the City staff for final review and comment prior to bidding.

MSA will attend a meeting with City staff to present 95% design documents.



# WORK PLAN

MSA will develop construction documents for the improvements to the MBS, discharge water service and connection, and demolition of the existing process and electrical systems. MSA will provide the construction contract for the project that will include the City's "front end" bidding documents, including General Conditions, the City standard for the Contractor's insurance requirements, etc. Contract documents include drawings and specifications that will be prepared in accordance with the City Standard Specification and Engineering Guidelines. The contract drawing will be arranged and sequenced in compliance with City of Duluth format. Drawings will include all necessary maps, site layouts, plans, elevations, sections, details required to describe the necessary construction and preferred installation. Construction documents will be based on meeting all City of Duluth standards, preferred vendors and equipment, safety devices and high-efficiency energy equipment and materials.

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## FINAL DESIGN PHASE 95% - 100%

In the final design phase, MSA will complete drawings and specification to be bid-ready. The Bid Documents (plans and project manual (specifications)) will be provided to the City staff for bidding.

MSA will attend a meeting with City staff to present 100% design documents. MSA and city may elect to hold this meeting in an early phase of the design. It may offer more value to the team and design effort.

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## CONSTRUCTION COST ESTIMATE

MSA will develop itemized preliminary and final construction estimates based on the documents developed during design.

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## PROJECT BIDDING

MSA will provide bid documents including drawings and specifications to the City for advertising and posting on the City website. MSA will contact local contractors to generate contractor interest in the project. MSA will administer bidding efforts including answering bidder questions and developing addenda if formal clarification is required. MSA will attend a pre-bid conference. MSA will assist City staff in the review of bids, development of contracts, and award of construction contract.

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## CONSTRUCTION ADMINISTRATION

Construction management and observation services are not included in this proposal, but can be provided upon request.

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## CONSTRUCTION INSPECTION

Construction observation services are not included, but can be provided upon request as T&M.

## Scope of Services

### 1. PRELIMINARY DESIGN PHASE 0-50%

- Kick-off meeting.
- Provide minutes from kick-off meeting.
- Identify proposed sequence of construction.
- Preliminary design for new dual feed 480 VAC electrical, pump, VFD Motor Controls, discharge header, exterior water service, sump and ejector improvements.
- Evaluate Water system hydraulics and recommend new pumps.
- Evaluate building layout and materials of construction.
- Evaluate and design HVAC requirements for building. Alternatives may include AC or Ventilation with Dehumidification.
- Confirm if the city would like a standby generator connection circuit and Junction box.
- Perform a field topographic survey and verify dimensions of existing structures. Coordinate directly with utility providers to locate existing utilities, including gas and electric, to minimize design and construction conflicts.
- Perform field inspection and measurement of all systems inside the MBS building such as process piping, electrical, pumps, sump, etc.
- Prepare preliminary site layout drawing and submit to City for review and comment.
- Prepare preliminary design memo including hydraulic evaluation and submit to City for review and comment.
- Update preliminary site layout per City comments.
- Update preliminary design memo per City comments.
- Prepare preliminary opinion of probable cost.
- Perform hazardous materials survey and establish building demolition requirements.
- Begin coordination with MN Power and Energy Incentive Partner.
- Submit 50% plan set to City staff for review and comment.
- Conduct a meeting with City staff to discuss the 50% plan review and comments.
- Preliminary Design Phase Deliverables:
  - » Preliminary design memo and kick-off meeting agenda.
  - » Preliminary site layout drawing.
  - » Technical Memo included water system and MBS hydraulic evaluation, recommended pumps, etc.
  - » Preliminary cost estimate.

## 2. DESIGN DEVELOPMENT PHASE 50-95%

- Update site, building, utilities and MBS layouts per City comments.
- Complete design for pumps, piping, utilities and mechanical including suction piping connections and new discharge header.
- Complete design for building improvements including process elements, new electrical service, Power systems, Motor Controls, SCADA Controls process piping, etc.
- Finalize design for process controls and SCADA.
- Finalize design.
- Finalize demolition requirements.
- Finalize site improvements.
- Finalize design for process controls and SCADA.
- Complete process design of pumping and piping systems.
- Submit 95% plan set to City staff for review and comment.
- Conduct a meeting with City staff to discuss the 95% plan review and comments.
- Design Phase Deliverables:
  - » 95% plans and specifications.

## 3. FINAL DESIGN PHASE 95-100%

- Update site, building, utilities and lift station layouts per City comments.
- Incorporate 95% review comments from the City into the final plan set and technical specifications.
- Prepare opinion of probable construction cost based on final design.
- Provide final construction plans, specifications and bidding documents necessary for public bid process to the City for review.
- Submit 98% plan set to City staff for review and comment.
- Conduct a meeting with City staff to discuss the 98% plan review and comments.
- If PFA funding is needed, develop Department of Health submittal in collaboration with City staff.
- Final Design Phase Deliverables:
  - » 99% plans and specifications.
  - » Bid ready plans and specifications.
  - » Final cost estimate.

## 4. BIDDING PHASE

- Assist the City in advertising for and obtaining bids for project construction.
- Answer questions from prospective bidders and suppliers of materials and equipment.

- Issue addenda as appropriate to interpret, clarify or expand the bidding documents.
- Attend the pre-bid conference.
- Review bids, provide written recommendation, and assist the City in evaluating bids and in assembling and awarding contract for construction.
- Bidding Phase Deliverables:
  - » Prepare and issue addenda as necessary.
  - » Bid evaluation and recommendation of award.

## 5. CONSTRUCTION PHASE

Not included, the scope of engineering services to be determined by future amendment to Owner-Engineer Agreement.

## 6. ASSUMPTIONS

1. The City will provide copies of as-built drawings of MBS.
2. The City will assist MSA in gathering operation data of the MBS for validation of the hydraulic model.
3. The City currently owns all property or has permanent easements in place where the construction will occur.
4. No agency permits or submittal during design or bidding phases required beyond City review. (Exception is submittal to Department of Health if PFA funding is required.)
5. The City will provide assistance with SCADA communication if required.
6. The City will support coordination with MN Power and procurement of a new second feed to the MBS.
7. The City will support coordination with all utilities that are required.
8. Surface restoration for the water service/discharge header will be match the existing. Extensive exterior enhancements are not included.
9. The City will lead coordination with neighbors. The proposed service may effect neighbors' perception and use of adjacent city property.

# WORK PLAN

Work Plan																			
City of Duluth - Middle Booster Station Improvements Design and Bidding																			
RFP-19-99446 / City Project Number 1779																			
Phase	Project Manager/ Process Mechanical/Electrical Chilson	Client Liason/ QA-QC/ Environmental Lockett	Process Mech. Project Engineer Morrow	Hydraulic Engineer Harnois	Process Mech. Technician Killian	Electrical Designer Lybarger	Lead Civil Engineer Jurewicz	Civil Engineer Cooper	GIS Technician Halvorson	Lead Arch. Szymanski	Structural Engineer Schinkoeth	Struct./Arch./Plumbing/HVAC Engineer Wastlund	Arch./Struct. Designer/Technician Phipps	HVAC Technician Schmidt	Admin Benner	Admin Seczko	TOTAL HOURS		
Phase No.	Task / Deliverable	Task No.	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours	Estimated Hours		
(Notes)	Subtasks/Task notes & details																		
100	Administration		102	0	0	0	0	0	0	0	0	0	0	0	0	0	4	106	
	Contract Administration	102	8														4	12	
	Billing	104	18															18	
	Owner Coordination	106	36															36	
	MSA Team Coordination	108	36															36	
	Close-Out	110	4															4	
200	Preliminary Design Phase		242	40	16	80	16	16	1	12	8	0	0	0	0	0	11	272	
	Topographic Survey/Field Measurements	202		16														24	
	GIS Request and Base Map Development	204								8								8	
	Hazardous Materials Survey	206		12							8							16	
	Contact and Coordinate with MN-Power	208	4	8														12	
	Preliminary Design Memo and KO Agenda	210	2														1	3	
	Preliminary Design / Base Drawing Layout	212	8		16		16	16	1	4			8					69	
	Construction Phasing Plan	214	8															8	
	Hydraulic Modeling	216	16			64												80	
	Basis of Design Memo	218	16			16												36	
	Kick-Off Meeting	220	8	4														13	
	Kick-Off Meeting Minutes	222	2															3	
300	Preliminary Design (0-30%) Review Meeting		8	4	0	0	0	0	0	0	0	0	0	0	0	0	0	14	
	PR Meeting	302	8	4														14	
400	Design Development Phase (50-95%) Review Meeting (Progress)		4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	14	
	FR Meeting	402	4	8														14	
500	Final Design Phase (95-100%) Review Meeting		4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	14	
	FR Meeting	502	4	8														14	
600	General Construction Documents Development		32	0	0	0	0	0	0	24	0	0	0	0	0	0	8	56	
	Specifications	602	16															48	
	Drawings	604	8							24								32	
	Cost Estimate	606	8															8	
700	Site/Water Service		2	2	0	0	0	0	6	36	0	0	0	0	0	0	4	44	
	Design	702	2							8								10	
	Demo Design	704								2								2	
	Specifications	706								8							4	12	
	Drawings	708								8								8	
	Cost Estimate	710								4								4	
	QA/QC	712		2					6									8	
800	Process Mechanical		18	0	24	8	40	0	0	0	0	0	0	0	0	0	0	184	
	Design	802	8		32	8												48	
	Demo Design	804			8													8	
	Specifications	806	2		8												4	14	
	Drawings	808			32		40											72	
	Cost Estimate	810			4													4	
	QA/QC	812	8															8	
900	Architectural/Structural/Plumbing Design		0	0	0	0	0	0	0	0	6	7	20	0	0	0	4	48	
	Design	902									4	8						12	
	Demo Design	904										4						4	
	Specifications	906										8					4	12	
	Drawings and Detailing	908									2	8	16					26	
	Cost Estimate	910									1	1	4					6	
	QA/QC	912								6								6	
1000	Mechanical (HVAC) Design		2	0	0	0	0	0	0	0	2	0	4	10	0	0	2	53	
	Design	1002	2										12					14	
	Specifications	1004										8					2	10	
	Drawings and Detailing	1006										6		16				22	
	Cost Estimate	1008										1	4					5	
	QA/QC	1010								2								2	
1100	Electrical		25	0	0	0	0	28	0	8	0	0	0	0	0	0	0	106	
	Design	1102	16					24										40	
	Demo Design	1104	4					8										12	
	Specifications	1106	16														8	24	
	Drawings	1108	16					64										80	
	Cost Estimate	1110	4															4	
	QA/QC	1112								6								6	
1200	Submittal Preparation for Department of Health		8	0	0	0	0	0	0	12	0	0	0	0	0	0	0	12	
	DOH Submittal	1202	8							12								32	
2000	Bidding		62	4	0	0	0	0	0	0	0	0	0	0	0	0	0	71	
	Bidder Questions	2002	40															40	
	Addendums	2004	8															16	
	Pre-Bid Conference	2006	10	4														14	
	Bid Evaluation/Recommendation	2008	4															4	
8000	Non-Billable Expenses *		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Travel KO *	8002	12															12	
	Travel PR Meeting *	8004	12															12	
	Travel FR Meeting *	8006	12															12	
	Travel BD Meeting *	8008	12															12	
	Travel Pre-Bid Meeting *	8010	12															12	
	<b>GRAND TOTAL</b>		<b>422</b>	<b>66</b>	<b>100</b>	<b>84</b>	<b>96</b>	<b>112</b>	<b>7</b>	<b>78</b>	<b>8</b>	<b>14</b>	<b>7</b>	<b>56</b>	<b>32</b>	<b>16</b>	<b>8</b>	<b>87</b>	<b>1157</b>

Notes: \* Non-Billable Expenses is time and expenses that will not be charged or paid by the City of Duluth. MSA is a local full service consultant committed to provides expert staff with skills specific to the project needs.

# WORK SCHEDULE

## Work Schedule

DATE	TASK
June 26, 2019	Proposal Due
June 28, 2019	Selection of Consultant
July 8, 2019	Council Approval to Award Contract
October 1, 2019	50% Plan Submittal
December 2, 2019	Plans Submitted for Initial City Review
January 14, 2020	Plans and Specifications Complete
January 20, 2020	Plans and Specifications to Department of Health for Review (if PFA Funding is utilized)
February 12, 2020	Advertise for Bids
March 18, 2020	Recieve Bids
April 2020	Start Construction
December, 2020	Construction Completion
February, 2021	Submittal of Record Drawings

## REFERENCES

### City of Rice Lake, MN

#### John Werner

Mayor  
4107 W. Beyer Road  
Rice Lake, MN 55803  
(218) 721-3778  
Clerk1@RiceLakeCityMN.com

### City of Lodi, WI

#### Kennan Buhr

130 S. Main Street  
Lodi, WI 53555  
(608) 592-3246  
kbuhr@wppienergy.org

### Village of Cottage Grove, WI

#### JJ Larson

Director of Public Works  
221 East Cottage Grove Road  
Cottage Grove, WI 53527  
(608) 839-5813  
jl Larson@village.cottage-grove.wi.us

### Beaver Dam Utilities

#### Rob Minnema

Director of Utilities  
108 Myrtle Road  
Beaver Dam, WI 53916  
(920) 887-4625  
rminnema@cityofbeaverdam.com

# ADDENDUM #1



**CITY OF DULUTH**  
PURCHASING DIVISION  
Room 120 City Hall  
411 West First Street  
Duluth, Minnesota 55802-1199  
218/730-5340  
[purchasing@duluthmn.gov](mailto:purchasing@duluthmn.gov)

**Addendum # 1**  
**File # 19-99446**

**Project: Professional Services for Middle Booster Station**

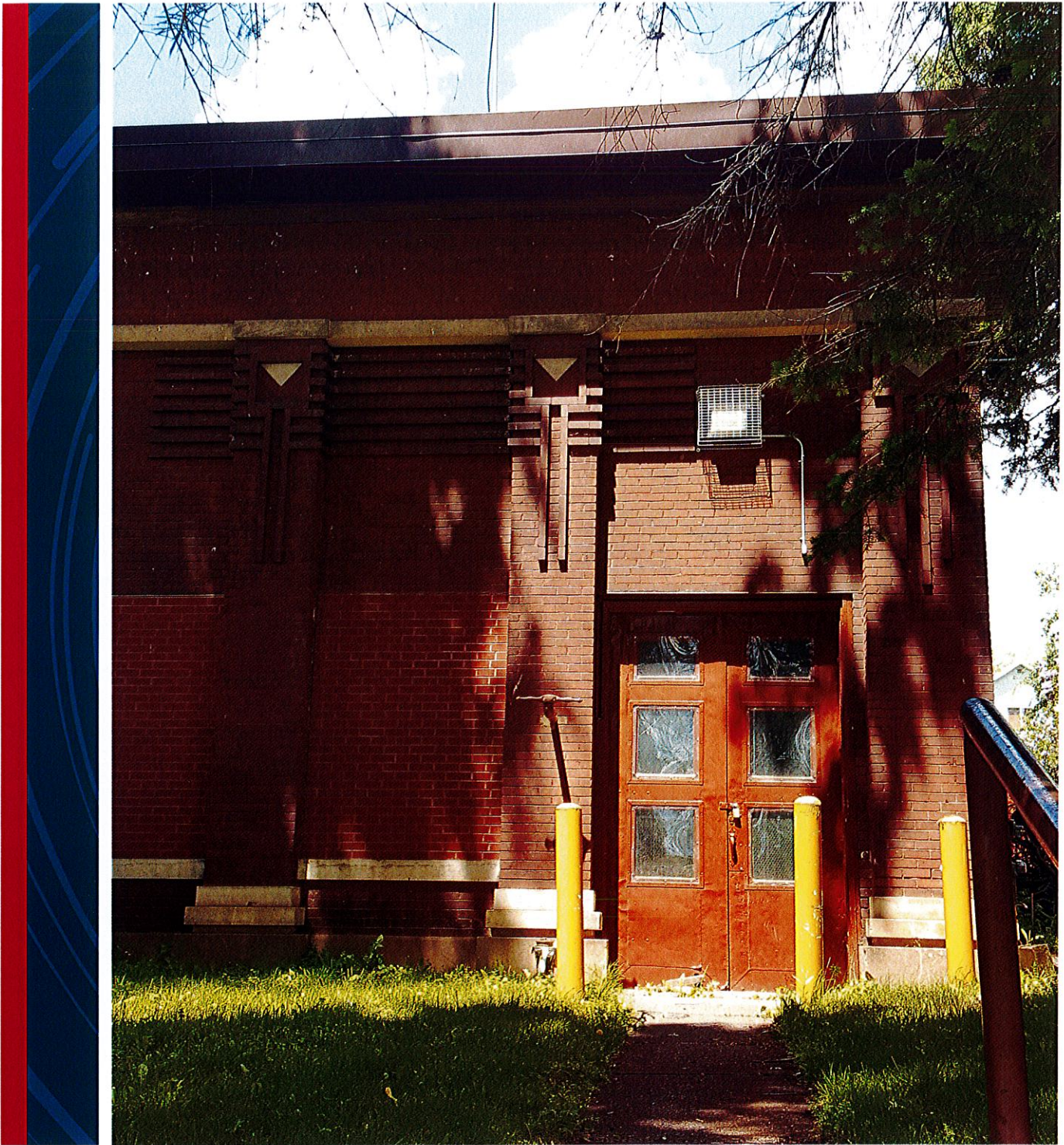
This addendum serves to notify all bidders of the following Clarifications to the solicitation documents:

- 1) Scope of the project includes selection of appropriate sized pumps for the station to meet the target flow rate. The pumps included in the cost estimate were chosen by City of Duluth staff and will need to be verified as part of the booster station design.
- 2) Raw data files from the City of Duluth's Synergi Water model will be available to the chosen consultant after project is awarded.

Please acknowledge receipt of this Addendum by including a copy of it with your proposal.

Posted Date: 6/17/2019

*An Equal Opportunity Employer*



**COST PROPOSAL FOR:**

Middle Booster Station Design and Bidding Phase  
RFP 19-99446, Project Number 1779

**Prepared for:**

City of Duluth  
June 26, 2019

**ORIGINAL**





June 26, 2019

Amanda Ashbach, Purchasing Agent  
City of Duluth - Purchasing  
411 W. 1st Street, Room 210 City Hall  
Duluth, MN 55802

Aaron Soderlund, Project Engineer  
City of Duluth - Engineering Division  
411 W. 1st Street, Room 211 City Hall  
Duluth, MN 55802

**Re: Proposal for Middle Booster Station Design and Bidding Phase  
RFP 19-99446, Project Number 1779**

Dear Amanda and Aaron,

Below and enclosed is the cost proposal from MSA Professional Services, Inc. (MSA) for the Middle Booster Station Improvements project. The cost proposal is based on the following:

- The breakdown of hours by task and employee, which matches the Work Plan included in the project proposal.
- Direct expenses and unit cost rates, which are summarized in the cost proposal and broken out with cost rates, can be found on the last page.

#### **COST PROPOSAL**

MSA Fees	\$147,439.00
Direct Expenses	\$1,139.60
<b>TOTAL PROJECT COST (Design and Bidding Engineering Services - not to exceed)</b>	<b>\$148,578.60</b>

The labor rates included in this proposal will remain in effect through project completion, which is expected before December 31, 2020.

Sincerely,  
MSA Professional Services, Inc.

A handwritten signature in black ink, appearing to read "Rob Uphoff".

Rob Uphoff, PE  
Vice President | Southwest Program Manager





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# COST PROPOSAL

## Extra Services

No additional services are anticipated at this time.

Work Plan										
		Prints / Copies	Mileage	Plots	Postage	Survey GPS	Survey Truck	Misc (Postage, survey supplies)	TOTAL EXPENSE	
Phase	Unit Cost	\$0.10	\$0.580	\$10.00	\$1.00	\$40.00	\$0.70	\$1.00		
Phase No.	Task / Deliverable	Unit	Each	Miles	Each	Dollars	Hours	Miles	Dollars	
<b>100 Administration</b>										
	Contract Administration	102								\$ -
	Billing	104								\$ -
	Owner Coordination	106								\$ -
	MSA Team Coordination	108								\$ -
	Close-Out	110								\$ -
<b>200 Preliminary Design Phase</b>										
	Topographic Survey/Field Measurements	202					8			\$ 320.00
	GIS Request and Base Map Development	204								\$ -
	Hazardous Materials Survey Lab Testing	206		24					\$ 250.00	\$ 263.92
	Contact and Coordinate with MN-Power	208								\$ -
	Preliminary Design Memo and KO Agenda	210								\$ -
	Preliminary Design / Base Drawing Layout	212								\$ -
	Construction Phasing Plan	214								\$ -
	Hydraulic Modeling	216								\$ -
	Basis of Design Memo	218								\$ -
	Kick-Off Meeting	220		24						\$ 13.92
	Kick-Off Meeting Minutes	222								\$ -
<b>300 Preliminary Design (0-50%) Review Meeting</b>										
	PR Meeting	302		24						\$ 13.92
<b>400 Design Phase (50-95%) Review Meeting (Progress)</b>										
	FR Meeting	402		24						\$ 13.92
<b>500 Final Design Phase (95-100%) Review Meeting</b>										
	FR Meeting	502		24						\$ 13.92
<b>600 General Construction Documents Development</b>										
	Specifications	602	5000							\$ -
	Drawings	604	5000							\$ 500.00
	Cost Estimate	606								\$ -
<b>700 Site/Water Service</b>										
	Design	702								\$ -
	Demo Design	704								\$ -
	Specifications	706								\$ -
	Drawings	708							\$ -	\$ -
	Cost Estimate	710								\$ -
	QA/QC	712								\$ -
<b>800 Process Mechanical</b>										
	Design	802								\$ -
	Demo Design	804								\$ -
	Specifications	806								\$ -
	Drawings	808								\$ -
	Cost Estimate	810								\$ -
	QA/QC	812								\$ -
<b>900 Architectural/Structural/Plumbing Design</b>										
	Design	902								\$ -
	Demo Design	904								\$ -
	Specifications	906								\$ -
	Drawings and Detailing	908								\$ -
	Cost Estimate	910								\$ -
	QA/QC	912								\$ -
<b>1000 Mechanical (HVAC) Design</b>										
	Design	1002								\$ -
	Specifications	1004								\$ -
	Drawings and Detailing	1006								\$ -
	Cost Estimate	1008								\$ -
	QA/QC	1010								\$ -
<b>1100 Electrical</b>										
	Design	1102								\$ -
	Demo Design	1104								\$ -
	Specifications	1106								\$ -
	Drawings	1108								\$ -
	Cost Estimate	1110								\$ -
	QA/QC	1112								\$ -
<b>1200 Submittal Preparation for Department of Health</b>										
	DOH Submittal	1202								\$ -
<b>2000 Bidding</b>										
	Bidder Questions	2002								\$ -
	Addendums	2004								\$ -
	Pre-Bid Conference	2006								\$ -
	Bid Evaluation/Recommendation	2008								\$ -
<b>8000 Non-Billable Expenses</b>										
	Travel KO	8002		1500						\$ 1,040.00
	Travel PR Meeting	8004		300						\$ -
	Travel FR Meeting	8006		300						\$ -
	Travel BD Meeting	8008		300						\$ -
	Travel Pre-Bid Meeting	8010		300						\$ -
<b>GRAND TOTAL</b>			<b>5000</b>	<b>1620</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>1250</b>	<b>1139.60</b>