REQUEST FOR PROPOSAL
CITY OF DULUTH, MN

June 5, 2019

Middle Booster Station
Design and Bidding Phase

Project No.: 1779

RFP Number: 19-99446

Proposals Due: June 26, 2019
2:00 PM, Local Time

PROJECT OVERVIEW

The City of Duluth is interested in retaining a consultant to provide design and bidding services for an upgrade of the Middle Booster Station. This station is located at 15th Avenue East and 6th Street adjacent to the Endion Reservoir.

BACKGROUND

The Middle Booster Station provides water for the Middle Pressure Zone, part of the Woodland Pressure Zone, the Highland Pressure Zone, as well as the Cities of Hermantown and Rice Lake. Currently three pumps are installed at this facility with the following capacities: 2500 gpm, 2600 gpm and 3480 gpm. It pumps directly to the Middle Pressure Zone as well the Middle Storage Reservoirs located along Central Entrance.

The target flow rate for the upgraded Middle Booster Station is 5,000 gpm with two pumps operating and one in reserve. This capacity was determined by the City of Duluth and is summarized in the attached "Middle and Woodland Pump Station Future Capacity Review", September 2018.

In addition to new pumps, a second electric service will also be installed at the station as part of the project.

A summary of the proposed work and an estimated cost is attached as "Technical Memo No. 1- Middle Water Pump Station Improvements, April 11, 2019", prepared by MSA Professional Services, Inc.

The City of Duluth will provide the following:

- All available building and utility drawings from previous projects.
- Assistance in obtaining other related information in City files pertaining to the project if needed.

GENERAL PROJECT SCOPE

Consulting Engineering Services are expected to include all work necessary to provide final design including plans and specifications and bidding services. Construction services are not included in the proposal and may be solicited in the future.

All work shall be performed in accordance with the most recent version of the City Standard Specifications and Engineering Guidelines (available on the City of Duluth website.)

SCOPE OF SERVICES

1. Initial Site Visit and Consultations

   a. The Consultant shall meet with City of Duluth representatives to review project scope and complexity, design criteria, related requirements, view existing conditions, gather data from the City engineering files and review the two previously prepared reports. Additional consultations shall, where necessary, clarify the technical requirements and objectives of the contract and may be in the form of letters, emails and/or telephone conversations.

b. The Consultant shall provide documentation of meetings and data provided.

c. The Consultant shall ascertain the applicability of information provided, review data for completeness, and notify the City of any additional data required. It shall be the responsibility of the Consultant to determine, by site inspection procedures, the reliability of all the existing pump station plans. The consultant shall include a survey of the existing station including both inside and outside piping. A review of the piping for the Endion Storage Reservoir and site inspection shall be included. Diving of the storage reservoir is not considered necessary and should not be included in the proposal.

2. <u>Plans and Specifications</u>

a. The consultant shall prepare construction drawings as necessary to provide for the upgrade of the Middle Booster Station as described in the attached memo. The City does not have any additional funds available to provide for a total complete overhaul of the building. These drawings shall include all details, plans and specifications necessary for all work as required.

b. The specification preparation shall also include appropriate sections for bidding, bonding, agreements, general and special provisions, and other appropriate contract provisions as well. These sections shall be developed in accordance with the City standards, which shall be made available to the consultant.

c. The drawings shall include all necessary site maps, plans, elevations, sections, details, and notes as needed or necessary to adequately show, explain or describe all features of the project.

3. <u>Cost Estimate</u>

Following the completion of the plans and specifications a quantity takeoff and a detailed itemized construction cost estimate shall be provided.

4. <u>Project Bidding</u>

Upon completion of plans and specifications, the consultant shall provide all documents and services to provide for bidding and award for construction. The consultant shall answer any questions brought up during bidding and attend a pre-bid conference. This design phase shall be considered complete upon award of the project following bidding.

5. <u>Construction Administration</u>

Construction Administration is not included in the proposal.

6. <u>Construction Inspection</u>
Construction Inspection is not included in the proposal.

PROJECT COMPLETION DATES

June 5, 2019	RFP Issued
June 26, 2019	Proposals 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	Receive bids
April, 2020	Start Construction
December, 2020	Construction Completion
February, 2021	Submittal of record drawings

QUALIFICATION PROPOSAL CONTENTS

The proposal shall be submitted in the following format broken into the 7 sections identified below. Proposals not following the specified format will not be reviewed. No additional sections or appendices are allowed. The proposal shall be limited to 20 pages plus a cover letter (The page limit includes all resumes. Proposals that exceed this limit will not be reviewed. Dividers and covers are not included in the page limitation). The proposal format shall be as follows:

1. Goals and Objectives
   A restatement of the goals and objectives and the project tasks to demonstrate the responder's view and understanding of the project.

2. Experience
   An outline of the responder's background and experience with similar projects. Project descriptions shall include a list key staff and their role. Within the experience, the consultant should demonstrate and provide proof of competency in the following areas:
   - Multi-phased projects
   - Pump Station Design
   - Electrical Control Design

3. Personnel
   Identify personnel to conduct the project and detail their training and work experience. Identify how personnel proposed for this project were involved with the projects listed as experience. Identify a professional engineer registered in the State of Minnesota who will oversee the overall project. No change in personnel assigned to the project will be permitted without approval of the City.

4. Knowledge of Duluth Requirements
   Include a description of the firm's knowledge of City of Duluth utility standards. Include a summary to demonstrate understanding of how the City pressure zones work.

5. Work Plan
   Include a detailed work plan identifying the work tasks to be accomplished and the budget hours to be expended on each task and subtask. The work plan shall be in spreadsheet format and shall list each task and the number of hours for each staff person on that task. The work plan shall also identify the deliverables at key milestones in the project as well as any other services to be provided by the City. The City staff intends to be actively involved with the project and three (3) status meetings held at City Hall are to be contained in the work plan in addition to any data collection or input/review meetings. Do NOT include any costs in the work plan.

6. Work Schedule
   An anticipated work schedule shall also be provided. The work schedule shall identify all key milestone dates.

7. References
   A listing of names, addresses and telephone numbers of at least three (3) references for whom the respondent has performed similar booster station design.

COST PROPOSAL CONTENTS

Provide, in separate envelope, one copy of the cost proposal, clearly marked on the outside "Cost Proposal" along with the responder's official business name and address. Terms of the proposal as stated must be valid for the project length of time.

The consultant must include a not to exceed total project cost, as well as subtotals for design services and bidding and any sub consultant fees. The cost proposal shall include all of the following:

- A cover/transmittal letter
- A breakdown of the hours by task for each employee. This shall be in the same format as the work plan in the Qualifications proposal with the addition of costs.
- Hourly rates for each specific employee proposed. (not general rates by category)
- Identification of anticipated direct expenses and rates for miscellaneous charges such as mileage and copies.
- Identification of any assumption made while developing this cost proposal.
- The Consultant must have the cost proposal/cover letter/transmittal signed in ink by an authorized member of the firm.
- The consultant must not include any cost information within the body of the RFP qualification proposal response.

SELECTION

The proposals will be reviewed by City Staff. The intent of the selection process is to review proposals and make an award based upon qualifications as described herein. A 100-point scale will be used to create the final evaluation recommendations. The factors and weighting on which proposals will be judged are:

	Item	Percent
1	Goals and Objectives	5%
2	Experience	20%
3	Personnel	20%
4	Knowledge of Duluth requirements	5%
5	Work Plan	20%
6	Work Schedule	10%
7	History (completeness and timeliness) of past work with the City of Duluth History completing past projects on budget	5%
8	Project costs/fees	10%
9	Completeness of the proposal	5%

Proposals will be evaluated on a best value basis with 90% qualifications and 10% cost consideration. The review committee will not open the cost proposal until after the qualification points have been awarded. Cost proposals will only be opened for the three top ranked firms.

SUBMITTAL DATE

Submit original and four (4) copies in an envelope marked, RFP #19-99446, Middle Booster Station by 2:00 PM CDT, June 26, 2019 to:

Amanda Ashbach, Purchasing Agent
City Purchasing
Room 120 City Hall
Duluth, MN 55802

CONTACT

All questions concerning the project shall be directed to:

Aaron Soderlund, Project Engineer
City of Duluth - Engineering Division
411 W. 1st Street, Room 211 City Hall
Duluth, Minnesota 55802-1191
(218) 730-5083 asoderlund@duluthmn.gov

LIMITATIONS

This Request for Proposal does not commit the City of Duluth to award a contract or pay costs incurred in the preparation of the proposal, or to procure a contract for services or supplies.

The Proposal shall not in any way include any restrictions on the City of Duluth. The Consultant shall NOT provide proposed contract language.

The City of Duluth specifically reserves the right to accept or reject any or all proposals, to negotiate with any qualified source, to cancel in part or in its entirety the Request for Proposal, to waive any requirements, to investigate the qualifications of any proposal, to obtain new proposals, or proceed to have the service provided in any way as necessary to serve the best interests of the City of Duluth.

The selected consultant must sign the City of Duluth standard Professional Engineering Services Agreement. Any questions concerning this agreement should be asked PRIOR to proposal submittal. These questions should be directed to Eric Shaffer in the City Engineering Office.

All materials submitted in response to this RFP will become property of the City and will become public record after the evaluation process is completed and an award decision made.

Prior to entering into an agreement with the city, the consultant shall furnish proof that it has all legal requirements for transacting business in the State of Minnesota.

Attachments:

"Middle and Woodland Pump Station Future Capacity Review", September 2018.

"Technical Memo No. 1- Middle Water Pump Station Improvements, April 12, 2019"

Middle and Woodland Pump Station Future Capacity Review

September 2018

I. INTRODUCTION AND HISTORY

a. Water leaves the Lakewood Water Treatment Facility and is pumped to a row of storage reservoirs feeding what is known as the Lower Zone. This water zone extends from the treatment facility to approximately 46th Avenue West. Above the Lower Zone is the Middle Zone serving the middle portion of the hillside. Water is provided to this zone by the Middle Booster Station located (at 15th Avenue East and 6th Street adjacent to the Endion Reservoir) and the Middle Storage Tank (located along Central Entrance at 14th Street).

The Woodland Zone serves the upper portion of the hillside above the Middle Zone and is supplied water from two locations. The Arlington Booster Station is adjacent to the Middle Storage Reservoir on Central Entrance and pumps water up to the Arlington Storage Tanks along Arlington Road. The Wood Booster Station is located at 34th Avenue East and 4th Street adjacent to Reservoir A and pumps water up to the Woodland Storage Tanks located on Minneapolis Avenue. The Woodland Pressure Zone also supplies water to the Highland Pressure Zone, the Orphanage Pressure Zone, Hermantown and Rice Lake.

A schematic of the water system is included in Appendix A.

b. The Woodland and Middle System Booster Stations were most recently studied by MSA Professional Services, Inc. A report dated August 2007 recommended the replacement of each of the booster stations as well as the water transmission mains serving each of the stations. The 2007 report also recommended increasing size of the pump stations based upon water use projections prepared by the City. This 2018 report will review the flow projections based upon recent water use and update the flow projections for the future.

II. HISTORIC FLOWS RATES

a. Data from all the Arlington, Highland, Woodland, Orphanage, Lakeside and Middle Pump Station is included in Appendix B for the period of 2013 through 2017. A summary of data is as follows:

Pump Station	Average Day (mgd)	Maximum Day (mgd)
Arlington	1.29	2.532
Highland	1.28	2.495
Woodland[1]	1.59	2.57
Orphanage	0.25	0.665
Upper Lakeside	0.17	0.320[2]
Middle	2.47	3.982
Hermantown	0.40	NA[3]

Rice Lake	0.05	NA[3]

1. Data only from December 2017 to June 26^{th} 2018 due to meter failure.
2. Excessive peaks due to water main breaks removed.
3. Based upon 2017 average monthly flows. Daily data not available. The report assumes the new Highland and Arlington Booster Stations and the existing Orphanage Station are of adequate capacity to supply both Hermantown and Rice Lake.

Estimated flow for the actual Middle Zone may be obtained by taking the flow from the Middle Booster Station and subtracting off flows out of the Arlington pump Station.

Source	Flow (mgd)
Middle Booster Station	2.47
Arlington Booster Station	-1.29
Middle Zone	1.18

Estimated flow for the actual Woodland Zone may be obtain by taking the flow from the Woodland and Arlington Booster Stations and subtracting off flows out of the Highland and Orphanage Booster Station.

Source	Flow (mgd)
Arlington	1.29
Woodland Booster Station	1.59
Highland Booster Station	-1.28
Orphanage Booster Station	-0.25
Woodland Zone	1.35

III. PAST FLOW PROJECTIONS

a. The 2007 report from MSA estimated average day, maximum day and peak hour demands for the Middle, Woodland, Highland and Orphanage Zones and for Hermantown. Maximum day was assumed to be twice average day and peak hour is assumed to be 4 times average day. Peak hour flows are buffered by the storage tanks and therefore will not be discussed further. Pump stations are typically designed for maximum day flows. A summary of predicted 2015 and 2025 average flow rates from the report for each system is given below.

	2015 Flow (mgd)	2025 Flow (mgd)
Middle Zone	1.87	2.04
Woodland Zone	2.2	2.51
Highland Zone	0.77	0.80
Orphanage Zone*	0.37	0.41
Hermantown	0.56	0.68

*includes Rice Lake

The City of Rice Lake formerly drew water from the Orphanage Zone using a pump station located on Calvary Road. Recently, Rice Lake started to withdraw water from the Highland Zone instead by gravity through a meter located at the intersection of Rice Lake Road and Ridgeview Roads. Generally, the flow rate for Rice Lake is small enough it does not affect the proposed pumping rates but it will be assumed that they can draw from either location.

IV. MIDDLE BOOSTER STATION FLOW PROJECTIONS

a. Total flows for the Middle Booster Station include the Middle Zone, Highland Zone, a portion of the Woodland Zone, Hermantown and Rice Lake. Past City experience and the 2007 MSA report determined that the Arlington Pump Station delivers approximately 38% of the flow to the Woodland Zone. In recent years, new modeling has shown that under certain conditions, the Arlington Pump Station may actually be delivering as little as 20% of the water to the Woodland Zone. For sizing of the Middle Booster pumps, the worst case of 38% will be used. Based upon the 2007 estimates, the average daily flow for the Middle Booster Station in the year 2015 is:

Source	Flow (mgd)
Middle Zone	1.87
Woodland Zone	38% x 2.2
Highland Zone	0.77
Hermantown	0.56
2015 Predicted Average Daily Flow	4.04

The maximum day flow for the Middle Booster Station in the year 2015 was estimated to be:

2 x 4.04 = 8.08 mgd or 5600 gpm (2015 predicted maximum day)

Based upon the 2007 estimates, the 2025 average day flow for the Middle Booster Station is:

Source	Flow (mgd)
Middle Zone	2.04
Woodland Zone	38% x 2.51
Highland Zone	0.80
Hermantown	0.68
2015 Predicted Average Daily Flow	4.47

The maximum day flow for the Middle Booster Station in the year 2025 is:

2 x 4.47 = 8.95 mgd or 6,214 gpm. (2025 predicted maximum day)

The values shown above would not include Rice Lake.

Actual flows for the Middle Booster Station from January 2013 to December 2017 are as follows:

Actual average day flow 2.47 mgd (2013 thru 2017)

Actual maximum day flow was 4.0 mgd or 2,777 gpm (2103 thru 2017)

Note that the actual maximum day is approximately half of the previously estimated maximum day flow for year 2015. It is obvious that water use has not increased as originally expected back in 2007.

b. Estimated flow for the actual Middle Zone calculated above is 1.18 mgd. Large scale development within this zone is not expected, however there some areas available for new homes. Therefore, some growth should be included in the pump sizing. Allowing for a 20% increase in the average daily demand, the future average flow for the Middle Zone would be:

1.18 *1.2 = 1.4 mgd future average day flow for the Middle Zone

The actual peak factor for maximum day from the data for the Middle Booster Station is 4/2.47 = 1.6. This is less than the maximum day factor of 2 historically used by the City.

b. In the future, the City plans to supply water to the Upper Lakeside Zone from the Middle Zone. The 2013 to 2017 average flow in the Upper Lakeside Zone was 0.17 mgd. The current upper Lakeside Zone is fairly restricted for development within the current streets. However, there is potential for a large amount of new development in this zone if the water mains were ever extended across Seven Bridges Road and Lester Creek. These mains could provide service to the existing Lester Park Golf Course that the City has repeatedly discussed developing over the past few years. As such, 200 to 300 homes could be constructed in this zone. Using 250 gallons per day per home, the future estimated flow is shown below:

0.17 + 300 homes x 250 gpd per home = 0.245 mgd

Maximum day flows vary greatly in this zone due to loss of large amounts of water during water main breaks. Ignoring the high values during the 5-year period known to come from water main breaks, then the maximum day flow for the Upper Lakeside Zone is 0.320 mgd. This provides a maximum day factor of 1.88. This is less than the maximum day factor of 2 historically used by the City.

d. The Arlington Booster Station has been constructed since the 2007 report. The Arlington station has a capacity of 3,000 gpm (4.32 mgd). The Middle Booster Station must have a minimum capacity equal to that of the Arlington Station and the maximum day demand of the Middle Zone and upper Lakeside Zone. This provides a demand as follows:

Item	Average Flow (mgd)	Maximum day (mgd)
Arlington Booster	4.32	4.32
Middle Zone	1.4	1.4 x 1.6 = 2.24
Upper Lakeside Zone	0.245	.245 x 1.88 = 0.46
total	5.97	7.02*

‘* 7.02 mgd = 4875 gpm

The proposed pumping rate for the Middle Booster Station is 7.02 mgd or 4875 gpm. **A rounded off rate of 5,000 gpm is recommended.** This is approximately 1200 gpm less than was originally recommended in 2007 and 1300 gpm more than the peak day flow during the past 5 years.

V. WOODLAND BOOSTER STATION FLOW PROJECTIONS

a. Total flows for the Woodland Booster Station include the Orphange Zone and a portion of the Woodland Zone. Up until recently, Rice Lake was served from the Orphanage Zone but is now served from the Highland Zone. Past City experience and the 2007 MSA report determined that the Woodland Pump Station delivered approximately 62% of the flow to the Woodland Zone. Recent observations have noted that this may actually be as high as 80% during some periods of the year. 80% will be used instead of the 62% from 2007. Based upon the 2007 estimates, the average daily flow for the Woodland Booster Station in the year 2015 is:

Source	Flow (mgd)
Woodland Zone	80% x 2.20
Orphanage Zone	0.37
2015 Predicted Average Daily Flow	2.13

The maximum day flow for the Woodland Booster Station in the year 2015 is:

2 x 2.13 = 4.26 mgd or 2,958 gpm (2015 predicted maximum day)

Based upon the 2007 estimates, the 2025 average day flow for the Woodland Booster Station is:

Source	Flow (mgd)
Woodland Zone	80% x 2.51
Orphanage Zone	0.41
2015 Predicted Average Daily Flow	2.42

The maximum day flow for the Woodland Booster Station in the year 2025 is:

2 x 2.42 = 4.84 mgd or 3,361 gpm. (2025 predicted maximum day)

The values shown above would include Rice Lake.

b. Estimated flow for the actual Woodland Zone may be obtained by taking the flow from the Woodland and Arlington Booster Stations and subtracting off flows out of the Highland and Orphanage Booster Station. Data for the Woodland Booster Station is only available from December 1st of 2017 to June 26th of 2018 due to a flow meter error. The average flow during this time was 1.59 mgd. The maximum day flow during this time was 2.57 mgd.

Item	Average Flow (mgd)	Maximum day (mgd)
Woodland Booster	1.59	2.57
Arlington Booster	+1.29	+2.532
Highland Booster	-1.28	-2.495
Orphanage Booster	-0.25	-0.665
total	1.35	“*1.942

‘* 1.942 mgd = 1,350 gpm

The actual peak factor from the data above is 1.942/1.35 = 1.44

c. Estimated average flow for the actual Woodland Zone is 1.35 mgd. There remain undeveloped areas in the northern parts of Duluth that could be served by either the Woodland or Orphanage Zones. Because of this, we will assume a 40% growth in the current amount of water used by both zones. Using the numbers above, the average day flows would be as follows:

1.35 mgd x 1.4 = 1.89 mgd

Future maximum day flows would be as follows:

1.942 x 1.4 = 2.72 mgd or 1888 gpm.

d. The Orphanage Booster Station has a current capacity of 1100 gpm (1.58 mgd). The updated Woodland Booster Station will need to provide the capacity of the Orphanage Booster Station while also supplying the maximum day demand of 80% of the Woodland Zone.

Item	Average Flow (mgd)	Maximum day (mgd)
Orphanage Booster	1.58	1.58
Woodland Zone	1.89*80%	2.72*80%
Total	3.1	3.76

Based upon the above the discussion, **the proposed pumping rate for the Woodland Booster Station is 3.76 mgd or 2,600 gpm**. This value is about 660 gpm less than the proposed flow from 2007 and 815 gpm more than the historical peak.

Technical Memo No.1

To:	Eric Shaffer, PE, City of Duluth Chief Utilities Engineer
	Aaron Solderlund, PE, City of Duluth Utilities Project Engineer
From:	Scott R. Chilson, PE, Senior Project Engineer
Subject:	Proposed Improvements and System Evaluation
	Middle Water Pump Station
	City of Duluth Water Utility
Date:	April 12, 2019

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Print Name: Scott R. Chilson

Signature: Scott R. Chilson

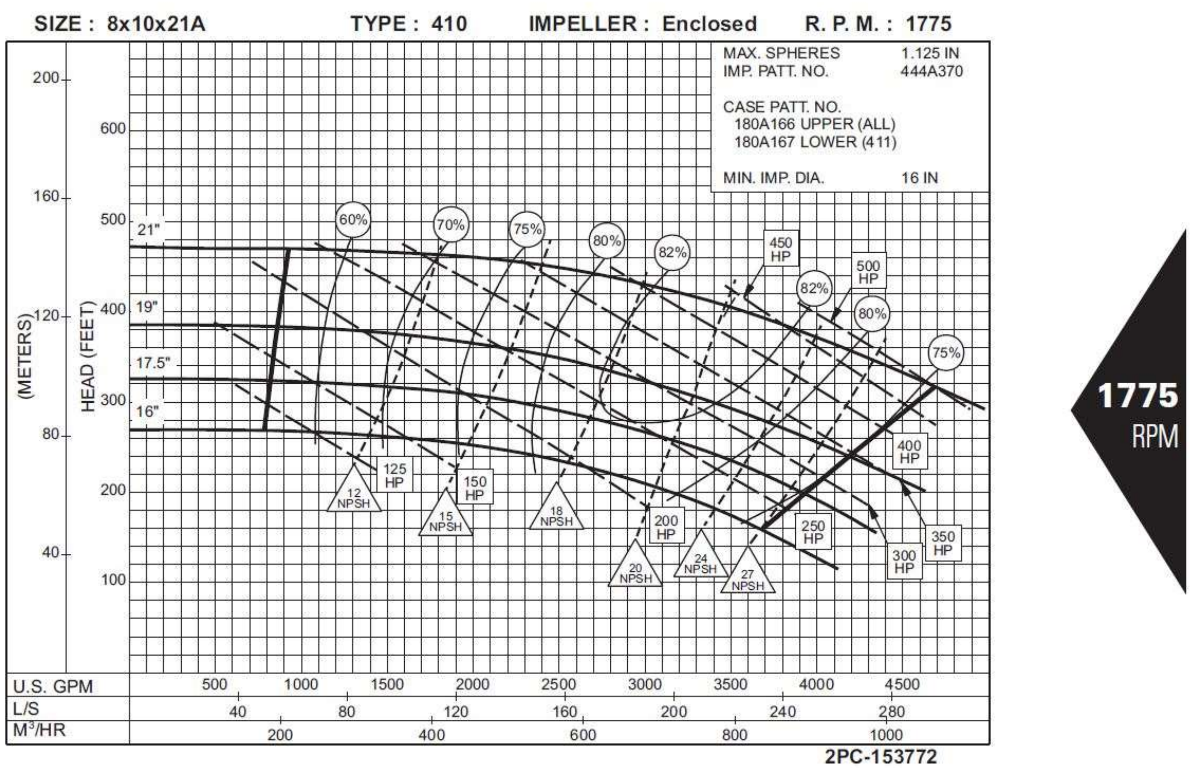
Date: 4/12/2019 License #: 44287

MSA Professional Services, Inc. was hired by the City of Duluth to prepare cost estimates for an upgrade to the existing Middle Booster Station. This station is located on 15th Ave. East and 6th Street. It pumps water from the City's Lower Water Zone to two reservoirs located along Central Entrance. The booster station and the reservoirs feed the City Middle Pressure Zone. The reservoirs also feed the City's Arlington Booster Station, which provides water to the western side of the City Woodland Pressure Zone. Water from the Arlington Booster Station also supplies the City Highland Booster Station and Highland Pressure Zone, the City Hermantown, and the City of Rice Lake. As such, the Middle Booster station is critical to supply throughout the City.

The assumptions for the project defined by the City were as follows:

1. The target flow for the upgraded lift station would be 5,000 gallons per minute. This flow was determined in a capacity report compiled by the City dated September 2018.
2. The existing building and suction piping will be reused. Much of the suction piping is located under the floor of the existing building, and as such it would be expensive to replace. An NPSH analysis was not included in this limited study, but will be required during final design to ensure the suction piping is large enough. Preliminary calculations using the City water model indicate the existing piping is acceptable. It is assumed that all suction piping above the floor in the station will be replaced to fit the new pumps.

3. The existing 16-inch discharge piping located under the floor of the station will be replaced with a larger diameter pipe within the station. There is concern that this pipe will fail due to the higher discharge pressures caused by the increased pump capacity. A failure under the floor of the station could be catastrophic. The new discharge pipe would be located in the building and installed overhead. The pipe will exit through the floor along the south wall extending out of the building to the 16-inch tee located on site. The tee will be replaced with a larger tee. Preliminary calculations indicate that after the “split” at the tee, the increase in discharge pressures would be much less. The City’s preliminary calculations indicate a 20-inch header will be adequate.
4. The existing pump station must remain in operation during construction except for brief interruptions to connect new piping. Interruptions will likely be limited to 24 hours.
5. New flow metering is to be included in the project. The existing venturi tube buried on the pump site will be removed as part of the project. A new magnetic flow meter will be installed on the new pump discharge header.
6. It is assumed that existing valves on the suction piping operate satisfactorily so that flow to the station can be shut off during pump replacement. The City will test the valves during the summer of 2019. If the valves are found not to provide adequate shut off, then they will be replaced during construction. This replacement will require divers to install inflatable plugs in the suction piping within the reservoir.
7. Three new pumps will be installed. Each pump would have the same capacity. The 5,000 gpm flow would be achieved by operating two (2) pumps simultaneously. The proposed pumps for the project are Aurora Type 410 8x10x21A, 1775rpm. This pump was selected by City staff using the City water model. A pump curve for this pump is provided.



8. Existing building components such as paint, restroom, sanitary drain piping, heaters, lights, doors, windows etc. will not be replaced to save money.
9. All electrical controls within the station will be replaced.
10. The pump controls would include variable frequency drives. The drives would aid in pump startup to reduce potential surges. The drives would also provide a limited amount of pump speed turn down. Due to high static heads, it is unlikely the speed can be reduced by more than 10 percent. Heat generation from the VFDs will likely require air conditioning in the building.
11. A secondary power supply from Minnesota Power will also be included in the project. This redundant power supply will greatly reduce the possibility of power outages at the booster station. A backup generator is not included in the project.

Based upon the above assumptions, MSA has compiled a cost estimate for the project. The estimated cost for construction and engineering is $2,400,000. A breakdown of the cost estimate is attached.

5,000 GPM
Preliminary Cost Estimate
Middle Water Pump Station Improvements
City of Duluth, MN
15-Dec-19
City Project Number: TBD
MSA Project Number: 000616138

Division	ITEM	QUANTITY	UNIT	UNIT PRICE	UNIT TOTAL COST	ITEM TOTAL COST
0	PROCURMENT AND CONTRACTING REQUIPMENTS				$ 1,317,000	$ 184,380
	Contract Administration	2	%	$ 1,317,000	$ 26,340	
	Contractor Mark-up	10	%	$ 1,317,000	$ 131,700	
	Bond	1	%	$ 1,317,000	$ 13,170	
	Insurance	1	%	$ 1,317,000	$ 13,170	
1	GERNERAL REQUIREMENTS					$ 53,997
	Project Management	2	%	$ 1,317,000	$ 26,340	
	Mobilization/Demobilization	2	%	$ 1,317,000	$ 26,340	
	Permits	0.1	%	$ 1,317,000	$ 1,317	
2	EXISITNG CONDITIONS					$ 42,600
	Demo Existing Booster Pumps	3	LS	$ 4,000	$ 12,000	
	Demo Pump Sump and Clean	1	LS	$ 2,000	$ 2,000	
	Demo existing venturi meter	1	LS	$ 4,000	$ 4,000	
	Misc. Removals	1	LS	$ 7,500	$ 7,500	
	Electrical Demo					
	Demo Bentec Panel	1	LS	$ 1,600	$ 1,600	
	Demo MV Service and Transformer Pad	1	LS	$ 2,500	$ 2,500	
	Demo MV Metering and Disconnect	1	LS	$ 2,500	$ 2,500	
	Demo Pump MC, feeder duct and cabling	3	LS	$ 3,500	$ 10,500	
	Demo Existing Lighting	0	LS	$ 3,500	$ -	
3	CONCRETE					$ 27,500
	Form and Pour New Pump Base	3	LS	$ 3,000	$ 9,000	
	Form and Pour ATS Pad	1	LS	$ 2,500	$ 2,500	
	Form and Pour Transformer Pad	1	LS	$ 3,500	$ 3,500	
	Form and Pour Housekeeping Pad for Switch Gear	1	LS	$ 2,000	$ 2,000	
	Form and Pour Housekeeping Pad for Motor Controllers	3	LS	$ 1,500	$ 4,500	
	Repair Floor	4	LS	$ 1,500	$ 6,000	
4	MASONRY					$ -
	No work included, Improvements by the City Staff	0	EA	$ -	$ -	
5	METALS					$ -
	No work included	0	EA	$ -	$ -	
6	WOOD, PLASTICS, AND COMPOSITES					
	Roof	0	LS	$ -	$ -	
7	THERMAN AND MOISTURE PROTECTION					
	No work included	0	EA	$ -	$ -	
8	OPENINGS					$ -
	Replace Front Door	0	EA	$ 15,000	$ -	
	Rear Door	0	EA	$ 5,000	$ -	
	Intermediate/Restroom Door to Remain	0	EA	$ 6,000	$ -	
9	FINISHES					$ 15,000
	Interior Walls to be repainted by the City	-	SF	$ 5	$ -	
	Repaint Process Piping, Pumps, and Motors	1	LS	$ 15,000	$ 15,000	
10	SPECIALIES					$ 1,000
	Signage	1	LS	$ 750	$ 750	
	Fire Extinguisher	1	LS	$ 250	$ 250	
13	SPECIAL CONSTRUCTION					$ -
	No work included	-	LS	$ -	$ -	
22	PLUMBING					$ -
	Refurbish Restroom		LS		$ -	
	Repair the Sanitary Drain line broken under the floor		LS		$ -	
23	HVAC					$ -
	Installation	0	LS	$ 23,500	$ -	
	EF	0	EA	$ 5,000	$ -	
	Louvers and Dampers	0	LS	$ 7,500	$ -	
	NG-Fired Heater	0	EA	$ 7,500	$ -	
	Mini-Split AC	0	EA	$ 3,500	$ -	
26	ELECTRICAL					$ 653,500
	SCADA Contractor Allowance (Primex)	1	LS	$ 65,000	$ 65,000	
	Control Panel Updates	1	LS	$ 10,000	$ 10,000	
	General and Misc. Electrical Construction	20	%	$ 465,000	$ 93,000	
	Primary Feeder from ATS to Service Transformer	220	LF	$ 125	$ 27,500	
	New CT Cabinet and Meter	1	LS	$ 7,500	$ 7,500	
	Secondary Feeder Transformer to Metering	50	LF	$ 250	$ 12,500	
	Switch Board	1	LS	$ 75,000	$ 75,000	
	Secondary Feeder	30	LF	$ 250	$ 7,500	
	PDB Enclosure	1	LS	$ 20,000	$ 20,000	
	Feeder from Switch Board to PDB Enclosure	50	LF	$ 100	$ 5,000	
	VFD Motor Controllers	3	EA	$ 90,000	$ 270,000	
	Motor Feeder from Switch Board to Pump SMC No.1	30	LF	$ 75	$ 2,250	
	Power and Control Wiring to Pump 1 SMC to LCP	1	LS	$ 3,500	$ 3,500	
	Motor Feeder from Switch Board to Pump SMC No.2	75	LF	$ 75	$ 5,625	
	Power and Control Wiring to Pump 2 SMC to LCP	1	LS	$ 3,500	$ 3,500	

5,000 GPM
Preliminary Cost Estimate
Middle Water Pump Station Improvements
City of Duluth, MN
15-Dec-19
City Project Number: TBD
MSA Project Number: 000616138

Division	ITEM	QUANTITY	UNIT	UNIT PRICE	UNIT TOTAL COST	ITEM TOTAL COST
	Motor Feeder from Switch Board to Pump SMC No.3	75	LF	$ 75	$ 5,625	
	Power and Control Wiring to Pump 3 SMC to LCP	1	LS	$ 3,500	$ 3,500	
	Lighting Installed (RDA Wall Packs)	0	EA	$ 500	$ -	
	Power and Control Wiring to Pump Control Actuator	3	LS	$ 3,500	$ 10,500	
	Replace 240/120 XFMR	1	LS	$ 2,500	$ 2,500	
	Refeed and Connect new 240/120 XFMR	1	EA	$ 2,500	$ 2,500	
	20" Magnetic Flow Meter and Transmitter	1	EA	$ 16,000	$ 16,000	
	Pressure Transmitter with accessories	2	EA	$ 2,500	$ 5,000	
31	EARTHWORK					$ 2,500
	Erosion Control	1	LS	$ 2,500	$ 2,500	
32	EXTERIOR IMPROVEMENTS					$ 17,200
	Bollards	6	LS	$ 1,200	$ 7,200	
	Upgrade front walk and access to the building	0	LS	$ -	$ -	
	Restoration	1	LS	$ 10,000	$ 10,000	
33	UTILITIES					$ -
	Upgrade front walk and access to the building	0	LS	$ -	$ -	
40	PROCESS INTEGRATION					$ 358,500
	Process Piping					
	General Installation	35	%	$ 263,000	$ 92,050	
	8" Flex Connector	3	EA	$ 500	$ 1,500	
	10" Flex Connector	3	EA	$ 600	$ 1,800	
	SS NTP Piping and valves	1	LS	$ 150	$ 150	
	8x10 FL Reducing Bend	3	EA	$ 2,000	$ 6,000	
	10x12 FL Reducing Bend	3	EA	$ 2,500	$ 7,500	
	12" Flex Check Valve	2	EA	$ 5,000	$ 10,000	
	12" Butterfly Valve	6	EA	$ 4,000	$ 24,000	
	10" Butterfly Valve	3	EA	$ 3,500	$ 10,500	
	Rotorque Actuator	3	EA	$ 6,500	$ 19,500	
	12" FL 90^ Bend	1	EA	$ 2,500	$ 2,500	
	16x12 FL Reducer	1	EA	$ 3,500	$ 3,500	
	16x16x12 FL Tee	1	EA	$ 5,000	$ 5,000	
	20x16 FL Reducer	1	EA	$ 4,500	$ 4,500	
	20x20x12 FL Tee	1	EA	$ 8,000	$ 8,000	
	20" FL 90^ Bend	1	EA	$ 5,500	$ 5,500	
	20" MJ 90^ Bend	1	EA	$ 4,500	$ 4,500	
	20" FL Butterfly Valve with actuator	1	EA	$ 11,000	$ 11,000	
	20" MJ Butterfly Valve with actuator and valve box	1	EA	$ 15,000	$ 15,000	
	16" MJ Tee	1	EA	$ 4,000	$ 4,000	
	20x16 MJ Reducer	1	EA	$ 3,500	$ 3,500	
	10" FLDIP	24	LF	$ 250	$ 6,000	
	12" FL DIP	32	LF	$ 300	$ 9,600	
	16" FL DIP	8	LF	$ 500	$ 4,000	
	20"FL DIP	50	LF	$ 750	$ 37,500	
	16" PE DIP	18	LF	$ 200	$ 3,600	
	20"PE DIP	50	LF	$ 300	$ 15,000	
	Air Release Valve	1	EA	$ 1,800	$ 1,800	
	Piping Insulation Allowance	1	EA	$ 30,000	$ 30,000	
	Misc. Parts	1	LS	$ 7,500	$ 7,500	
	New Pressure Transmitter piping and installation	1	EA	$ 3,500	$ 3,500	
	No Work is included related to under slab modifications					
41	MATERIALS PROCESSING AND HANDING EQUIPMENT					$ 11,500
	Upgrade the existing sump with new pump and cover	1	LS	$ 9,000	$ 9,000	
	Extend Sump Discharge out the wall	1	LS	$ 2,500	$ 2,500	
44	POLUTION CONTROL EQUIPMENT					$ 187,656
	New 350 HP Pump, Base, Motor and Appurtenances	3	EA	$ 62,552	$ 187,656	
	SUB-TOTAL:					$ 1,556,000
	Construction Contingency		20%			$ 312,000
	Annual Inflation from 2019 to 2020		3%			$ 47,000
	Fee from MN Power for Redundant Feed and ATS					$ 142,000
	CONSTRUCTION SUB-TOTAL:					$ 2,057,000
	Engineering:		18%			$ 306,000
	TOTAL:					$ 2,363,000

Notes:
1. Prices do not include AIS.
2. Sub-total and Total are rounded up to the nearest $1,000.
3. Equipment costs are based on pricing provided by Suppliers and Representatives or published price lists.