



City of Grand Island

Tuesday, October 10, 2006

Council Session

Item G22

**#2006-304 - Approving Engineering Services for Platte River
Pumping Station Pump Intake Modifications - Utilities Department**

Staff Contact: Gary R. Mader; DaleShotkoski

Council Agenda Memo

From: Gary R. Mader, Utilities Director
Dale Shotkoski, Asst. City Attorney/Purchasing

Meeting: October 10, 2006

Subject: Engineering Services for Platte River Pumping Station
Pump Intake Modifications

Item #'s: G-22

Presenter(s): Gary R. Mader, Utilities Director

Background

The Utilities Department has periodically retained the services of an engineering consultant to review the City's water system for deficiencies and to assist in planning future requirements. The water system must meet certain operational standards to be suitable both for human consumption and for fire protection. These operational standards include analyzing chemical and microbiological components of the water, and hydraulic testing of the system for flow and pressure characteristics. The consultant also projects future system demands and recommends improvements for pumping and distribution components of the system, as well as groundwater sources.

The last study was conducted in 2001 by CH2MHill, which resulted in a Master Plan for the water system. From this Master Plan, areas of deficiency were noted, as well as general timetables for completing corrective action. If these activities required additional engineering support, detailed proposals were solicited from CH2MHill because of their prior familiarity with the details of the City's water system. Some of the projects previously authorized for this engineering support have been the corrosion control system, modifications to the Platte River Pumping Station, repairs to the Kimball Reservoir, and expansion of Rogers Pumping Station. CH2MHill's past engineering services have been entirely satisfactory.

Discussion

The Pump #3 at the Platte River Pumping Station transfers water from the well field to the Rogers Reservoir Pumping Station for distribution to the City water system. This pump was replaced in 2003 with a larger pump to allow for water capacity additions at the Rogers Reservoir site. This pump experiences cavitation under normal operating

conditions. Long-term operation of a pump under this condition will result in damage and premature failure. Attempts to improve pump hydraulics with the installation of a vortex breaker and cone strainer in the suction piping have produced only limited results. Performance monitoring by CH2MHill and utility staff suggests that the configuration of the pump suction piping may be the source of the cavitation. In response to the Utilities Department's request, CH2MHill prepared a proposal to provide computer modeling of the pump and suction piping for possible corrective action for an estimated cost of \$27,044. Terms would be as stated in the existing Engineering Services Contract. City personnel will do the modifications to the piping.

Alternatives

It appears that the Council has the following alternatives concerning the issue at hand. The Council may:

1. Approve the award of Engineering Services for Platte River Pumping Station Pump Intake Modifications
2. Refer the issue to a Committee
3. Postpone the issue to future date
4. Take no action on the issue

Recommendation

The review and design of modifications to the Platte River Pumping Station intake piping would be best performed by an outside consultant with specialized expertise in this engineering area. Department engineering staff has reviewed the proposal from CH2MHill and find it to be satisfactory.

It is the recommendation of City Administration that CH2MHill be authorized to proceed with Engineering Services for Platte River Pump Station Pump Intake Modifications, for an engineering fee of \$27,044.

Sample Motion

Motion to approve the proposal from CH2MHill for Platte River Pumping Station Pump Intake Modifications in the amount of \$27,044.

Scope of Services

City of Grand Island, Nebraska

Platte River Wellfield Pump No. 3 Pump Suction Improvements

Background

The City of Grand Island, Nebraska (CITY) Platte River Wellfield Pumping Station provides raw water to three ground storage reservoirs located within the City limits. This pump station contains three horizontal split case pumps. One of these pumps, Pump No. 3, continues to experience what appears to be cavitation under normal operating conditions. This pump was replaced in late Fall 2003 and was designed to deliver raw water to Rogers Reservoir located on the west side of the City. The pump was taken out of service and inspected in early 2005 due to improvements at the Rogers Reservoir and Pump Station site. While there appears to have been no damage to the pump to date, there are concerns that long term operation of this pump under these conditions could significantly shorten the useful life of this pump.

Attempts to improve system hydraulics through the installation of vortex breaker below the pump suction bell and cone strainer in the suction piping have produced limited positive results. Pump performance testing conducted in April 2005 suggests that the pump is operating on its curve and that the configuration of the pump suction piping may be a primary source of the problem. Based on our current understanding of the pump suction hydraulics, it has been recommended by Tullis Engineering Consultants and CH2M HILL (CONSULTANT) that improvements to the pump suction piping and the wellfield collection basin supply piping be designed and constructed to improve pump suction conditions and reduce the potential for pump cavitation. An alternative to inject air into the suction pipeline upstream of the pump will also be investigated. The intent of this project is to significantly improve system hydraulics; however, it is possible that the proposed modifications may result in no improvements to the operation. The following summarizes the scope of services for the design of the aforementioned improvements. It is assumed that the CITY will procure and construct these improvements.

Task 1 – Design

- 1.1 CONSULTANT shall prepare construction drawings and technical specifications for the construction of improvements to the Platte River Wellfield Pump No. 3 suction piping and collection basin supply piping. CONSULTANT shall provide six copies of drawings and specifications to the CITY for review at the 90 and 100 percent design stages.
- 1.2 CONSULTANT shall perform computational fluid dynamic (CFD) modeling of proposed improvements to evaluate performance of proposed improvements. This analysis shall be performed in combination with Task 1.1 to ensure optimal results are achieved through the design. It is assumed that no more than two (2) CFD model scenarios will be performed.
- 1.3 CONSULTANT shall prepare and provide to CITY an engineer's estimate of probable construction cost.

Task 2 – Regulatory Review

- 2.1 CONSULTANT shall submit, on behalf of the CITY, construction drawings and specifications to the Nebraska Department of Health and Human Services (NHHS) for regulatory compliance review.
- 2.2 CONSULTANT shall provide written responses to comments received by NHHS and submit to NHHS on the CITY's behalf.

Task 3 – Project Management

- 3.1 CONSULTANT shall provide routine project management services including, but not limited to, budget and schedule tracking, project team coordination, progress updates, preparation of invoices, and quality control activities.

Compensation

The estimated cost for design services to complete this scope of services is \$27,044 which will be billed on a time and materials basis in accordance with contract terms and conditions. The cost breakdown is shown in Exhibit A.

Schedule

It is anticipated that the project will be constructed by City staff in the early Spring 2007. The schedule for delivery of final construction documents is anticipated to be January 1, 2007.

Attachment A												
Project: Platte River Wellfield Pump No. 3 - Design of Pump Cavitation Mitigation Measures												
City of Grand Island, Nebraska												
Prepared By: Doug Simon												
Date: September 8, 2006												
Attachment 2												
	Doug Simon	Bill Day	Allen Davis	Mike Monahan	Ranae Decker	Accounting	Labor	Total Labor	Computers & Communications	Other Expenses	Total Expenses	Total Labor & Expenses
Task Description	\$ 140.00	\$ 161.00	\$ 180.00	\$ 100.00	\$ 88.00	\$ 66.00	(hours)	(\$)	(\$)	(\$)	(\$)	(\$)
1.0 Design												
1.1 Drawings & Specifications	4	80		20	8		112	\$ 16,144	\$ 721	\$ 2,200	\$ 2,921	\$ 19,065
1.2 CFD Modeling	4	4	12				20	\$ 3,364	\$ 129		\$ 129	\$ 3,493
1.3 Engineers Estimate		2					2	\$ 322	\$ 13		\$ 13	\$ 335
2.0 Regulatory Compliance												
2.1 Preparation of NHHS Submittal	2					2	4	\$ 412	\$ 26	\$ 1,000	\$ 1,026	\$ 1,438
2.2 Response to NHHS Comments	2	2					4	\$ 602	\$ 26		\$ 26	\$ 628
3.0 Project Management	8	2				8	18	\$ 1,970	\$ 116		\$ 116	\$ 2,086
TOTAL	20	90	12	20	8	10	160					\$ 27,044

R E S O L U T I O N 2006-304

WHEREAS, in 2001, a study was conducted by CH2MHill to review the City of Grand Island's water system for deficiencies and to assist in planning future requirements; and

WHEREAS, as a result of said study, deficiencies were noted and a master plan was created by CH2MHill along with general timetables for completing corrective action; and

WHEREAS, Pump #3 at the Platte River Pumping Station has produced limited results and the pump is in need of repairs to the pump hydraulics; and

WHEREAS, under the direction of the Utilities Department, CH2MHill submitted a proposal to provide engineering services for computer modeling of the pump and suction piping for design of corrective action; and

WHEREAS, CH2MHill submitted a proposal not to exceed the cost of \$27,044.00 for such modeling; and

WHEREAS, past engineering services of CH2MHill have been entirely satisfactory to the Utilities Department of the City of Grand Island.

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND COUNCIL OF THE CITY OF GRAND ISLAND, NEBRASKA, that the proposal of CH2MHill to provide engineering services for computer modeling of the pump and suction piping for possible corrective action at the Platte Generating Station is hereby approved at a cost of \$27,044.00.

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Adopted by the City Council of the City of Grand Island, Nebraska, October 10, 2006.

Jay Vavricek, Mayor

Attest:

RaNae Edwards, City Clerk

Approved as to Form	☐ _____
October 6, 2006	☐ City Attorney