

COUNCIL ACTION FORM

SUBJECT: CHANGE ORDER NO. 6 - UNIT 7 TURBINE GENERATOR MAJOR OVERHAUL

BACKGROUND:

The Power Plant's two steam turbine-generator units must be periodically disassembled for inspection and repair. The basic scope of work is commonly referred to as "open, clean, and close." In this process, the turbine-generator is opened (disassembled), cleaned (key parts and components are measured, cleaned, and repaired or replaced), and closed (reassembled for operation). The 2018/19 Capital Improvements Plan included a project to perform this type of overhaul on the Unit 7 turbine and generator.

Several mechanical parts of the Unit 7 turbine were repaired or replaced during the fall 2019 overhaul. Several of the parts require high precision machining and clearance tolerances to maintain proper function while the unit is online. The parts include: turbine blades, turbine diaphragms, bearings, and mechanical seals. Due to these modifications, it is imperative that original equipment manufacturer (OEM) recommended clearances are met, to prevent mechanical components from "rubbing" while online which could result in additional equipment wear or even catastrophic failure.

To help ensure that the turbine/generator clearances are acceptable online, it is highly recommended by the OEM and industry professionals to do additional vibrational and balance testing during first start-up after turbine/generator overhauls. This includes on-site assistance from a machinery diagnostics expert. This industry expert monitors turbine/generator vibrations while the unit is online to determine if vibration levels are acceptable, and to identify imbalances in the turbine/generator units. These imbalances are often addressed by adding balance weights to the generator rotor at the recommendation of the onsite expert.

Historically, the City of Ames has used an independent contractor for this support during start-up, and thus was not included in the original bid pricing. However, the City of Ames has received three quotes from machinery diagnostics experts, and has determined that IMD, LLC has the expertise to perform the online diagnostics to perform the necessary online testing.

PRIOR ACTIONS

On June 11, 2019, the Ames City Council approved a contract with HPI, LLC in the amount of \$411,464 to overhaul the Unit 7 turbine-generator at the City's Electric Plant. This contract is for the "open, clean, and close" type of work as previously described.

Change Order No. 1, for \$15,482.45, was approved by staff for additional electrical tests recommended by GE (the OEM) to be performed on Unit 7 generator.

Change Order No. 2, for \$225,361.55, was approved by Council on September 17, 2019 for shop Rotor and Diaphragm repairs to be performed on Unit 7 turbine as recommended by GE (OEM).

Change Order No. 3, for \$28,386.00 was approved by staff for the additional labor, materials, and equipment necessary to ship the Unit 7 turbine rotor and diaphragms for repairs.

Change Order No. 4, for \$14,290.00 was approved by staff for shop repairs on steam seal bushing and spill strips.

Change Order No. 5, for \$3,412.50 for shipping on the Unit 7 turbine to Orbital Energy for erosion repairs and additional charges due to crane delay.

THIS ACTION

IMD Startup Support is needed for start-up support per OEM recommendations and industry standards to ensure the safe and reliable operation of the Unit 7 turbine and generator during plant operation.

This extra work is priced at \$18,600.75 according to the quotation from HPI dated November 4, 2019. HPI's quotation references a detailed description of work and pricing from its subcontractor.

Therefore, this action is to request approval of Change Order No. 6 to HPI, LLC for \$18,600.75 for the necessary IMD Startup Support on the steam turbine as described. HPI is not licensed to collect Iowa sales tax, so the City will be responsible for paying sales tax directly to the state. The sales tax amount is \$1,302.05.

The approved FY 2018/19 Capital Improvements Plan includes the following funding for the Unit 7 Turbine Generator Overhaul.

2017/18 Engineering/Parts	\$750,000
2018/19 Labor	\$1,500,000
2018/19 GE Tech Support	<u>\$300,000</u>
TOTAL	\$2,550,000

Contracts awarded to date on this project are:

HPI LLC (<i>Perform Overhaul</i>)	\$716,997.25
Change Order #6	18,600.75
General Electric (<i>Field Engineering Services</i>)	\$287,986.22
Change Order #3	40,000.00

MD&A (<i>Turbine Parts</i>)	\$139,936.42
Argo (<i>Turbine Parts</i>)	\$336,159.04
<u>Burns & McDonnell (<i>Engineering</i>)</u>	<u>\$43,000.00</u>
TOTAL	\$1,582,679.68

ALTERNATIVES:

1. Approve Change Order No. 6 to HPI, LLC in the amount of \$18,600.75 for IMD Startup Support to Unit 7's steam turbine.
2. Do not approve the requested change order.

CITY MANAGER'S RECOMMENDED ACTION:

These repairs to Unit #7's steam turbine are critical to restore the performance and integrity of the unit. The tests proposed are considered normal for the start-up of a turbine/generator after a major unit overhaul. Engineers from the Electric Department have evaluated the proposed work in the change order and agree that the scope and pricing are appropriate.

Therefore, it is the recommendation of the City Manager that the City Council adopt Alternative No. 1 as described above.