Library Board

Tuesday, August 18, 2020

Regular Meeting

Item F2

Discussion of FY 2020/2021 Budget Process

Our library applied for and will be awarded a $13,070 CARES Act grant from the Nebraska Library Commission for the following:

Connectivity - Purchase of two Dell Latitude 7400 laptop computers, $1,535 each. A staff laptop computer at the new Welcome Desk will allow us to demonstrate services to patrons such as digital checkouts and conduct business from this new location. A second laptop computer is needed for the north side pick-up window to handle an increased volume of business instead of using the check-in computer as in the past.

Digital Content - Due to City budget revenue shortfalls, we will face an 8% reduction in operating expenses next year. Through September 2021 we have a need for $17,673 in our digital content budget to meet current demand for our services. ($13,941 Hoopla and $3,732 Overdrive Advantage). This grant will provide us with $10,000 to help meet this need.

The addition of $13,070 in revenues for the 2020/21 budget will result in these line item increases:

85426 – increase of $10,000 to $108,700 and 85540 – increase of $ 3,070 to $ 12,279

Our HVAC project is part of the Capital Equipment budget proposal. See attached letter.

Staff Contact: Steve Fosselman

Grand Island Public Library

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DATE: August 14, 2020
TO: Jerry Janulewicz, City Administrator
FROM: Steve Fosselman, Library Director
RE: HVAC Capital Equipment Request

Based on discussion about the Library's HVAC project at the August 11th Council meeting, I've had additional discussion with The Clark Enersen Partners, which conducted a review of the existing mechanical systems serving the portion of the library that was the original structure (1973) and presently covers 19,000 square feet of the total 49,000 square foot building.

Despite routine preventive maintenance, deteriorating conditions of our 47-year old system are noted below along with five areas of critical failure and interruption to Library operations. With replacement of this system, see below for energy efficiencies with the AHU fan motors and recommended air cooled chiller, as well as a much more effective system that operates much "better" which means a system that will control temperature and indoor air quality: (dehumidify, cool, heat, improved filtration) all of which the existing unit does not do well or at all.

The Clark Enersen Partners review has examined three system solutions and recommends a multi-zone air handler with remote air-cooled condenser with a probable cost of $720,000 with the components provided below. However, based on the conversation at Council meeting about efficiencies, I was able to obtain from the consultant an option that may provide a more energy efficient method to provide chilled water to the building but has a probable cost of $750,000.

Assessment of Existing Conditions. My assessment of existing conditions to Council was general, however the consultant's report provides additional information.

Chiller

1. The 1973 Trane chiller has had several maintenance items in recent years and is of primary concern for catastrophic failure.
2. The unit utilizes R22 refrigerant which was set to be 100% phased out of production January 1, 2020.
3. It is becoming increasing difficult to attain parts to repair the chiller due to its age and the ongoing refrigerant phase out.
4. The chiller has a single hermetic compressor, so if the compressor were to fail, there is no cooling available at the air handler until the unit is repaired or replaced. New chiller designs have multiple compressors to provide redundancy to prevent a system shut down.
5. The condenser coil has been operating on the well water, which has corroded the air handling coil and will corrode the condenser coil.
6. The ASHRAE life expectancy of a reciprocating chiller is expected to be 20 years, and the chiller has more than exceeded its usability for the library.

7. The loss of the Trane chiller or the domestic water well could leave this 19,000 SF area without cooling in excess of two months.

Air Handling Unit (AHU)

1. The Trane #65 medium pressure, multi-zone, blow thru unit is original to the space, serving 10 zones, some of which have been modified. It no longer meets ASHRAE energy code fan performance. The proposed multi-zone air handler has multiple "smaller" fan motors that will run more effectively at reduced cfms and allow for "variable volume" flow.
2. The unit has noticeable rust on the interior cooling coils, drain pan, lower unit structure, and coil connections; combustible material located within the return air section of the unit; and the insulation liner is deteriorating and losing its adherence to the unit which is causing thermal and air quality concerns.
3. Without the use of the pre-conditioning coil, a percentage of capacity has been lost, and the loss of this capacity does not allow the unit to effectively dehumidify.
4. The cooling coil recently had to be repaired as it sprung a pinhole leak. In order to make the repair a portion of the coil had to be removed, with an estimated 10% loss in capacity resulting from the removal.
5. The air handler has a constant speed supply and return fan that runs at full speed during occupied operation. The use of a variable frequency drive (VFD) would reduce energy consumption considerably, however these fan motors cannot be retrofitted with a VFD.
6. The supply fan has never been replaced or repaired and it is located on top of the air handler.
7. The return fan was replaced approximately 20 years ago. Due to its location, scarcity of parts, and availability of skilled personnel that could repair the fan motors, the AHU could be down for 1-2 weeks before the fans are repaired or replaced.

Hydronic Water, Piping, and Associated Equipment

1. The chilled water piping is in excess of 40 years old and was reported that it has iron deposits within the piping restricting fluid flow.
2. The chilled water pump is undersized to accommodate the required cooling capacity since the system is relying solely on the chiller and has abandoned the pre-conditioning coil.
3. The chilled water pump has no redundancy, so if it were to fail, the system would be down.
4. If the well were to fail, either the pump cannot be replaced or the casing cannot be repaired and the chilled water system will not operate. This has a compounding effect because a completely new heat rejection system would have to be developed, which would change the cooling system entirely. If this were to occur, the cooling system could be down 3-6 months or possibly more.

Critical Failures. My assessment of critical failures to Council was also general, however the consultant's report provides additional information. The items that will have a significant impact to library operations if they were to fail are as follows:

1. Trane Chiller Failure
2. Domestic Water Well Failure
3. AHU Chilled Water Coil Leak
4. Air Handler Supply and Return Fan Failure
5. Hydronic Chilled Water Pump Failure

Expected Efficiencies. The consultant has provided me with information that fan performance from the proposed air handling unit, compared to an induction fan with variable frequency drive (VFD), is expected to show an increase in efficiency of up to 30% as it modulates down or reduces airflow. However, our system is so old that it doesn't have VFD and can't be retrofitted, so the increase in efficiency will be even higher.

The consultant could not determine the existing water source chiller efficiency from the project documents or through a local supplier to compare it to the recommended air cooled chiller which has an EER = 11.2. 2007 Energy Code requires a minimum EER = 9.5. So it is 18% more efficient than the 2007 energy code.

The consultant also indicated that with such a study of existing conditions, return on investment equates to a system that operates much "better" which means a system that will control temperature and indoor air quality: (dehumidify, cool, heat, improved filtration) all of which the existing unit does not do well or at all.

Components and Costs. The consultant's recommendation would utilize a replacement multi-zone air handler with a fan array or similar technology. The replacement air handler would utilize direct expansion or (DX) cooling. A remote air-cooled condenser would be located either on the roof or at grade on the exterior of the building. A pre-heat and reheat heating water coil would be installed in the unit to pre-condition ventilation air and heat the supply air. The multizone air handler would tie into the existing ductwork via zone dampers to serve the underfloor and above floor supply air networks within the library. Due to the location, the unit would need to be provided in sections that can fit through the intake plenums or constructed in place.

The original floor diffusers are in poor shape and would be updated throughout, but the original ceiling diffusers would remain the same. A duct cleaning to include bacteriological fogging would be specified to remove any contaminants from existing infrastructure. System balancing would be required to ensure equal air distribution through the supply and return air network.

Based on the conversation at Council meeting about efficiencies, I was able to obtain from the consultant a couple different options that could occur with the original domestic water well, located in the lower level mechanical room and designed to deliver water through the air handler pre-conditioning coil and then to the condenser on the Trane chiller. The use of the well water was an efficient method to provide chilled water to the building. Several years ago the pre-conditioning coil began to leak excessively in the air handler and had to be abandoned. The untreated well water caused the damage to the coil.

In both options, we will achieve a system that will control temperature and indoor air quality: (dehumidify, cool, heat, improved filtration) all of which the existing unit does not do well or at all. Option two is more expensive than option one, but serves as a more efficient method to provide chilled water to the building.

1) It could be decommissioned in an appropriate manner. It is my understanding that the consultant's cost estimate of $720,000 follows this option.
2) Or through a filtering system it could be used to pre-condition the supply air through a dedicated coil within the air handler. When this water well system eventually fails the coil could be isolated and drained. All DX cooling systems would be sized assuming the pre-conditioning coil is not operational. The existing water well is capable of 100 GPM at an estimated ground temperature of 55 degrees F. If this option is possible, the consultant provided me with a revised cost estimate of $750,000.

While a bid situation is the only way to fully determine the project cost, the consultant did a comprehensive analysis of necessary equipment purchases, installation costs for this equipment, and other factors based on the following:

- Demolition and removal of existing equipment
- Multi-Zone AHU & ACCU including installation
- Multi-Zone Precondition coil & Accessories
- Louvers
- Ductwork (basement)
- Diffuser, Register, Grilles
- Structure for Condenser
- Domestic water well options
- BAS (building automation systems)
- Plumbing and electrical
- Contractor overhead
- Architect/Engineer Design Fee
- Contingency