Berkeley County Council

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Memorandum

To: Berkeley County Council

From: Gary A. Wine, Deputy County Administrator

Date: 04/26/2019

Re: Dunn Building HVAC upgrade

On Thursday, April 11, 2019 bids for the HVAC upgrade in the Dunn Building were opened and read into public record. There was a sole bid from Boland Trane Services, Inc. from Gaithersburg Maryland.

The design of the request for proposal was to obtain a solution that addresses all issue within the Dunn Building. The current system has multiple components that have created the failed chiller plant. The list below are more specific items that will be addressed with the upgrade:

- **Hot/Cold water control valves** – The proposed solution will migrate our system away from 3-way valves and covert to a 2-way configuration. This will address our "low Delta T syndrome" (when the in/out water temperatures are too close together) and protect the compressors at the chiller plant from short cycling. Several industry studies have referenced as many as 300 hours/year chiller usage reduction with a 16% electricity consumption reduction when this issue is remedied. A brief summary of the 2-way valve type is listed below:

  Two Way Valves are a simple and straight-forward design. A 2-way valve is any type of valve with two ports: an inlet and an outlet port, typically labeled "A" and "AB" respectively. 2-way valves are used in many applications, from basic on/off to more complex variable flow applications with pumps and VFDs.

  - In addition to migrating from 3-way to 2-way valves we are proposing the installation of valves designed and manufactured by Belimo. These valves measure, observe, record and trend performance data. These features will ensure that we can best configure, support and analyze our usage to maximize efficiency and reduce and extend the longevity of the new system. Another advantage of these devices is that

they will work in conjunction with our BAS (Building Automation System) to ensure we take full advantage of what the products offer.

- *The proposed valves are delivered with a 5 year warranty with years 1 – 2 unconditional and years 3 - 5 covered for malfunction NOT caused by ordinary wear.*

- **VFD (Variable Frequency Drives)** to be installed in 42 existing air handlers - The proposal also addresses airflow in all of our current air handlers. The current configuration utilizes a simple on/off environment with constant volume airflow. With the VFD's we will have the ability to adjust the speed of the fans based on demand. Below is a list a general advantages of adding VFD's to our environment:
  - Operating at less than full load. Building systems are sized for peak load conditions. In typical applications, peak load conditions occur between 1 and 5 percent of the annual operating hours. This means that pump and fan motors are using more energy than necessary 95 to 99 percent of their operating hours.
  - Oversized system designs. Designing for peak load oversizes the system for most operating hours. This condition is further compounded by the practice of oversizing the system design to allow for underestimated and unexpected loads as well as future loads that might result from changes in how the building space is used.
  - Motor energy use is a function of speed. The most commonly used motor in building HVAC systems is the induction motor. With induction motors, the power drawn by the motor varies with the cube of the motor's speed. This means that if the motor can be slowed by 25 percent of its normal operating speed, its energy use is reduced by nearly 60 percent. At a 50 percent reduction in speed, energy use is reduced by nearly 90 percent.
    - *The proposed drives have a standard warranty period of 36 months from startup or 42 months from shipment. The warranty covers materials and workmanship and includes parts, labor, travel and expenses.*

- **Chiller** – The proposed chiller is a Trane ACRA-250 that will provide 250 ton of cooling capacity. This is an air-cooled chiller that will provide industry leading efficiency as well as low sound levels. The unit will have lower maintenance requirements and is designed for routine maintenance to be easier and less frequent.
  - The solution offers options based on our RFP to provide a 10 year parts only warranty at the price of $ 8,313 on the **chiller** and covers the items listed below:
    - All parts except the starter or AFD assembly on the serialized unit as it was configured, ordered and shipped from the Trane manufacturing location.
  - An extended Warranty is also offered for 5 years at the price of $3,691 to cover the **Whole enclosure** which would be in addition to the Chiller (which is 10) and cover pumps, ice storage.
  - Both Warranty extensions are of great value and will protect our investment into the future.

- **Ice Storage:** Part of our request for proposal was the installation of auxiliary Ice storage. This technology allows us to reduce the size of the compressor(s) on the chiller allowing for initial purchase cost savings, lower annual energy consumption as well as recurring maintenance cost reduction. Utilizing the auxiliary Ice storage will allow us to operate our compressors in the cooler times of the day/night and use less energy during the high temperature times of the day. Implementing Ice storage to augment our Chiller plant is expected to reduce energy costs between 20-40%.

- **Temporary Cooling -** The proposed solution accounts for and includes ALL temporary cooling necessary for the extent of the project. The RFP was specific and stated that the building could NOT be without conditioned air at any time during the project. It is understood however that as they retrofit the existing air-handlers that those specific units will be down for the period of the upgrade which should be not more than 4 – 6 hours per unit. Most office have multiple units so other than the inconvenience of being displaced while the service is performed the building should see no interruptions.

- **Maintenance Contract** – We have protected our investment by covering the equipment with a full-service maintenance contract in other buildings like the Judicial Center. This contract has extended the life of the equipment and helped keep our overall costs well below industry standards. The specifications we published made it mandatory that the successful vendor be able to factory service the installed equipment. The service contract is also necessary to take advantage of the extended warranty offered by Trane. The contract would be **$ 9,650** annually totaling **$ 48,250** for the five years.

- **Itemized costs** – There are costs in this proposal that are important to identify. First would be the necessary repair or replacement of the existing chiller unit at the Dunn Building. As you are aware, this unit has estimated repair of approx. $100k and increased recurring maintenance costs. Secondly, we have modified the configuration of the Chiller and Ice Storage to accommodate the Crawford Building demands when it comes on line in the future.

  Costs for both above listed items are below:

  - Replace the existing failed chiller at the Dunn Building. The current unit has repair costs that out way its value and replacement is recommended. **Estimate cost $ 400,000**
  - Sizing changes to accommodate bringing online the Crawford Building for Judiciary expansion. Estimated cost **$ 325,000 – $ 375,000**

- **Items not included in proposal:**

- Additional glycol and inhibitor required to stabilize the hydronic system. An estimate of replacing ALL glycol would be $8,000

- **Summary:** After a complete review of the proposal we feel that this solution will address the failing components of our current system and provide for greater energy efficiency and longevity for the future. Addressing all aspects of the design will allow us to predict recurring annual maintenance costs and allow us to continue to leverage technology to better our building conditions.

  We have provided both an outright purchase option in the table below as well as estimated finance options for both a 5 and 10 year scenario. If the Council choses, it is our recommendation that we move forward with the purchase from Boland Trane Services in the amount of **$ 1,688,953.00**

Cost review –

Dunn Building Chiller Bid Overview	
Bid including all hardware and configuration	$ 1,628,699.00
Bid total	**$** 1,628,699.00
Optional warranty extension	
10 year parts only on chiller	$ 8,313.00
5 year parts on ALL outside plant	$ 3,691.00
Optional Full system maintenance contract	
5 year Maintenance contract (5 Year)	$ 48,250.00
-Can be billed annually	$ 9,650.00
Total with annual maintenance contract payment	$ 1,640,703.00
Total with 5 year maintenance contract included	$ 1,688,953.00
Financing Options (Estimates) @ 2.75%	
5 year with Annual payments	$ 370,366.68
-- Total Interest Paid	$ 123,520.14
10 Year with Annual payments	$ 197,880.12
-- Total Interest Paid	$ 250,488.49