Hermanson

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Date: February 15, 2011

To: Mr. Robert Eaton
Park/Facilities Project Coordinator
Parks and Recreation
City of Tukwila, WA

Reference: **Tukwila Pool – Energy Conservation Upgrade Budget Proposal**

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Thank you for the opportunity to provide a Budget Proposal to City of Tukwila Parks & Recreation Department for the Public Pool Energy Conservation Upgrade project.

## EXISTING SYSTEM OVERVIEW

The Tukwila Pool is a masonry 15,000 sqft building constructed in 1973. There are two air handling systems that serve this facility. One is dedicated to the pool area and the other serves the lockers, offices, and common areas around the pool. The pool air handling system is a constant volume fan system with a hot water coil and an air side economizer. Supply air is delivered to the pool area through diffusers located along the east and west walls. Return air grilles are placed on the west wall of the pool.

The locker room system consists of a supply fan and a return fan section and is hung from the ceiling outside the electrical room. It is a 100% outside air constant volume system with a reheat coil and coil bypass face damper. The locker room supply fan delivers air to (4) hot water reheat zones each with a dedicated wall temperature sensor.

A 4500 MBH gas hot water boiler serves the air handlers and the pool heat exchanger. The hydronic system consists of (3) hot water pumps – building hot water pump, pool heat exchanger pump, and pool circulation pump. The boiler is enabled to meet hot water temperature setpoints. DHW is provided by a dedicated 600,000 BTUH gas hot water heater.

The HVAC systems are controller by a time clock, RobertShaw DDC, and pneumatic controls.

## GENERAL

This is a budget proposal to repair and upgrade the air delivery and hot water systems servings the pool building. During our site visit we have observed a few issues related to building maintenance that do impact the efficiency of the existing systems. Our proposal does address those issues as well.

## SCOPE OF WORK

1. Existing system repairs:
   - In order to offer the most cost effective solution for an upgrade of the air delivery and hot water systems we recommend performing a thorough maintenance of the AHU's and reheat zones prior to proceeding with the energy conservation upgrades.
   - This will include cleaning of all supply and return grilles, duct cleaning, cleaning out the intake louvers, coil cleaning, repair of the torn air handler flex connections, and realignment of the pool air handler fan section.
   - Our budget includes a contingency to repair other system components that are likely to be re-used.
   - Completing this task will establish a baseline for the energy conservation upgrade and help keep the cost of the upgrade project down.

2. Pool Air Handler:
   - After completing the necessary air handler work described in item #1 we will replace (1) outside and (2) return air motorized dampers. The condition of these dampers is beyond repairable. Not having working dampers greatly lowers the efficiency of the system.
   - The supply fan seems to be in working condition. We will inspect the fan and recommend a replacement if necessary. Our budget pricing assumes reusing the existing fan.
   - Upgrade the existing fan motor to a premium efficiency motor with a VFD.
   - Replace the existing pneumatic controls with modern DDC controls. The controls upgrade will include new electronic damper and valve actuators, (1) new 2-way hot water coil valve, and all new duct and space sensors needed to run the AHU.
   - The DDC system will replace the time clock and will provide WEB access, scheduling, alarm monitoring, and trend logging functions necessary to operate your systems with the highest possible efficiency.

3. Locker Room Air Handling System and Reheat Zones:
   - After completing the necessary air handler work described in item #1 we will replace (1) outside air, (1) exhaust air and (1) face/bypass motorized damper.
   - Upgrade the supply and exhaust fan motors with premium efficiency motors.
   - The supply and exhaust fans seem to be in working condition. We will inspect the fans and recommend a replacement if necessary. Our budget pricing assumes reusing the existing fans.
   - Replace the existing pneumatic controls with modern DDC controls. The controls upgrade will include new electronic damper and valve actuators, (1) 3-way hot water coil valve, (4) 2-way reheat zone coil valves, and all new duct and space sensors.

4. Building Hot Water and DHW System:
   - Upgrade the building hot water boiler to a high efficiency condensing boiler. The boiler we have priced for the budget proposal was sized to match the existing boiler capacity. Based on our preliminary calculations the existing boiler is oversized. Properly sized boiler can provide additional energy savings and we recommend performing an engineering review of the hot water system prior to installation.
   - Replace the existing pneumatic 3-way bypass vale with an electronic control valve.
   - Upgrade the DHW heater to a high efficiency condensing hot water heater.
   - Reuse the existing pool HX circulation pump, building HW circ pump, and pool circ pump but upgrade to premium efficiency pump motors.
   - Reuse existing piping beyond what is necessary to install the new boilers.
   - Install new temperature well sensors in existing wells.
   - The heating loop control will be provided through a factory boiler control panel.

## ALTERNATE 1

- A possible alternate option to the proposed upgrade would be an installation of a **gas microturbine cogeneration unit**. The unit is a gas turbine that powers a generator that produces electric power. The heat from the turbine is utilized for heating the pool, providing hot water for the AHU coils, or possibly even domestic hot water.
- Application at a Public Pool is ideal because constant heat is required throughout the year, therefore the microturbine can operate and generate power continuously.
- Alternate 1 pricing is only shown as a budget range. To develop an accurate estimate and scope for a microturbine cogeneration system will require additional engineering and analysis of facility operation and energy use.
- This option will get rid of the building gas boiler and possibly even the DHW heater.

## CLARIFICATIONS

1. The energy usage is definitely elevated. This determination was made based on reviewing the gas and electric bills for the past 12 months (see attached). In order to make an accurate calculation of the potential energy savings resulting from the proposed energy conservation upgrades we will have to perform an energy audit. The cost of an Investment Grade Energy Audit is included in the pricing summary.
2. **Items #2, 3, 4 is the energy conservation upgrade portion of the project and will likely qualify for PSE and SCL funding. The funding will be determined by the utility company and if qualified it can be up to 70% of the project cost. The amount of funding largely depends on the annual projected energy savings and project cost.**
3. Work performed during regular working hours.
4. The Locker Room AHU, pool AHU, and reheat zone controls will all be integrated into a single building automation system controlled and monitored from a single operator workstation. DDC system components and workstation provided and installed by Hermanson.
5. The hot water and DHW systems will be controlled through factory controls. DDC interface for monitoring only.
6. Asbestos or other hazardous material removal not figured at this time.
7. Permits included.

## PRICING SUMMARY

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|---|---|
| **Energy Conservation Upgrades - BUDGET** | **$290,000** |
| **Investment Grade Audit** | **$2,940** |
| **Alternate 1 - BUDGET RANGE** | **$300,000 - $500,000** |

(+ Sales Tax)

Thank you for the opportunity to assist you with this quotation. If you have any questions, please feel free to give us a call at your convenience.

Sincerely,

Peter Szabad
Energy Services Account Executive
Hermanson Company