

November 8, 2016 Study Session – Facility Infrastructure Review

Since the College received its first Energy Grant in 1992, we have periodically completed engineering studies in an attempt to upgrade our facilities and become more energy efficient. These studies have always been funded by either the Federal or State Government or are funded by the engineering firm desiring to obtain a performance contract.

In March of this year, we contracted with 360 Energy Engineers to do a preliminary engineering analysis of our facilities. There was not a cost to the College to perform this service. Their engineers did a comprehensive analysis of the College's aging infrastructure, focusing heavily on the HVAC systems, the control systems, the interior lighting, and our main power distribution equipment.

As with all of these studies, the College needs to determine what the cost benefit would be for various projects and what else should be factored into the equation. The majority of these studies place comfort as their number one priority.

Unfortunately, the campus systems were designed when energy was cheap and that is no longer the case. Many years ago we changed the operation of our systems to maximize efficiency with what we had to work with. This typically conflicts with what the engineering firms would suggest. So, a word of caution when reviewing the study:

- Our infrastructure is now 50 years old and is aging
- Most of our equipment has outlived its typical lifespan
- Our systems will continue to work as long as they are maintained
- Engineers would like to upgrade all facilities as if they were constructed yesterday. Unfortunately, to do so is cost prohibitive. In addition, making some of the upgrades identified in the study would dramatically increase both our maintenance costs as well as our utility costs.
- Some of the changes identified in the study would improve comfort.
- Some of the changes identified in the study will reduce maintenance and will reduce utility costs.

360 Energy Engineers have identified 4 projects that meet either a 10-year payback or deal with a life/safety issue. These projects include:

1. Interior lighting LED retrofits. Estimated cost - \$530,000. Payback 7 years. This project involves replacing all interior lighting with LED lighting.

- In 1992, the College received a grant to complete stage 1 of an interior lighting retrofit. This retrofit included three buildings and switched inefficient T-12 lamps out to efficient T-8 lamps.
- In 1995, the College received a grant to complete stage 2 of an interior lighting retrofit. This retrofit included remaining 5 buildings and switched inefficient T-12 lamps out to efficient T-8 lamps.
- With all construction since then, we have installed either T-8 lamps or T-5 lamps to maintain the best efficiency possible.
- LED lighting in commercial applications is relatively new. Costs are coming down and we are now to a point where we can show decent paybacks by doing LED retrofits(40% savings).
- We are currently in the process of retrofitting all exterior lighting to LED.

2. Weatherization of Exterior Windows/Doors/Structure. Estimated cost - \$103,000. Payback 7-8 years.

- This project includes repairing the exterior building envelope that allows excessively high rates of unwanted air infiltration into the building. Typically they would look at exterior caulking around windows and doors, brick joints, roof connections, etc. All of these areas would be resealed.

3. High Efficiency Hybrid Water Plant Modifications. Estimated cost - \$320,000. Payback 16-19 years.

- Although the estimated payback for this project did not meet the 10-year criteria, there are other factors to consider.
- The project would modify our current heating plant. Our heating plant uses two very large boilers that are original to the College. When operating at a partial load, these boilers are very inefficient (70%). The boilers are also approaching 50 years old and their typical life expectancy is about 25 years.
- The project would include installing 4 small high efficiency condensing hot water boilers in front of the two existing boilers. Both existing boilers would be converted from steam to hot water. This would enable us to use the new efficient boilers (95%+) to heat the campus during partial loads and only use the existing boilers when the heat load is at its maximum.
- This would extend the life of the two existing boilers.

4. Electrical Distribution. Estimated cost - \$500,000. Payback – Financial none, life/safety issue.

- In the past three years we have experienced two major fires with our electrical distribution equipment. In both cases, we were able to clean the equipment up, and make unconventional repairs to keep the campus operating. All of this equipment was installed when the campus was built.
- The fires were caused by large breakers that did not trip when they should have. It is unknown if we currently have other breakers that will fail in the event of an overload.
- Replacement parts for this equipment is no longer available.
- Some switchgear no longer shuts off the power supply. This is a life/safety issue.
- Switchgear in the Student Union was replaced earlier this year.

Next Step: 360 Energy Engineers have been working with Barton staff to produce design specifications, production prints, and equipment recommendations for each of the projects. We expect this work to be completed late November. 360 Energy Engineers will put the projects out for bid in December. The College will then need to determine which projects (if any) to move forward with.

- If the College decides to move forward with any of the projects, the fees for 360 Energy Engineers will be incorporated into the project.
- If approved, 360 Energy Engineers would oversee the project until it is completed.
- If the College determines that the projects will not be completed, a fee of \$28,000 will be paid to 360 Energy Engineers for their services.

These projects will in no way eliminate all the issues with our aging infrastructure. We have piping systems, valves, controls, coils, concrete, etc. that are approaching 50 years old and are in need of repair/replacement. Since we rely on a central plant to provide all of our HVAC for the campus, all of the main distribution pipes in the main tunnels have been repaired and tested in the last two years. This will be an ongoing process.