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December 06, 2013

Glen R. Sullivan, P.E.
Director of Public Works, Nueces County
901 Leopard Street #103
Corpus Christi, Texas 78401

Subject: Third Party Engineering Review of JCI Utility Assessment Report for Nueces County Phase 2 - Energy Savings Performance Contract

Dear Mr. Sullivan:

We have reviewed the subject Utility Assessment Report and the following are our comments:

1. The project scope of work appears to be consistent with facility energy projects implemented for these types of facilities.
2. The project supports the technical and operational interests of Nueces County.
3. The total costs for project implementation appear to be reasonable and consistent with these types of projects.
4. The calculated simple paybacks are in line with industry practices for facility energy projects.
5. The methods used to calculate energy savings are reasonable and accurate.
6. The methods provided for M&V follow the required International Performance Measurement and Verification Protocol (IPMVP).
7. The project and review of this report is in accordance with the Texas Local Government Code 302, as further elaborated under Section II.G.
8. Guaranteed annual savings will be equal to or greater than the total annual cost of project for each year during the life of contract as indicated.
9. The UAR documents current energy and water consumption and the water and energy savings that will be a direct result of this project.
10. Overall, the energy and water savings calculated for this project appear to be conservative for these types of projects.

Respectfully,

Al Garza, PE, CEM
Vice President – MEP & Energy Divisions



Site Visit Report

Date(s) of Visit: 25-26 November 2013

Facilities Visited: Nueces County Courthouse, Main Jail, McKenzie Jail Annex, Juvenile Detention Facility

I. Site Visit

During the site visit of the noted facilities proposed to be retrofitted with energy and conservation features, JCI Utility Cost Reduction Measures (UCRM) were reviewed:

UCRM 1: Power Factor Correction – McKenzie Jail Annex

This UCRM will include the installation of new power factor correction capacitors (load banks) for the main existing electric meter serving the McKenzie Jail Annex to correct to 0.95 pF.

COMMENTS: In concurrence with proposed UCRM deployment and economic/cost saving analysis. Appendix A.3 Power Factor Correction UCRM# 1 (pg. 89) gives detailed analysis of penalties incurred over a twelve month period.

OBSERVATIONS: Did not physically view location during site visit as capacitor bank installation is very straight forward. The electrical contractor shall install these banks in a location that best suits the operation and where it will not cause obstruction with other plant systems, ideally near the main transformer vault. By installing the load banks, the penalties would be eliminated.

UCRM 2: Lighting Improvements - McKenzie Jail Annex, Juvenile Detention Center

This UCRM will include new light fixtures and lighting retrofits in areas identified in the facility. Lighting occupancy sensors will also be installed in selected areas to help reduce burn time.

COMMENTS: In concurrence with proposed UCRM deployment and economic/cost saving analysis. UAR states that post retrofit light levels readings will be taken. Illuminating Engineering Society (IES) standards for area types should be included as validation and that appropriate lighting levels are met.

OBSERVATIONS: Spot checked random fixtures though out facilities involved. Existing conditions as per report were verified. Majority of retrofit involves going from 4 lamp 32w troffer type fixture to a either a 2 lamp 32w replacement fixture or retrofitted fixture that uses a high reflectance insert to change the photometric characteristics to a 2 lamp 32w arrangement. Do not have lighting codes used in appendices lighting tables, so the assumption is being made that while the number of lamps per fixture is being reduced, Spectrally Enhanced Lighting (SEL) with correlated color temperature of 5000K are being used to provide higher perceived visual acuity at lower fixture wattages. This retrofit should result in noticeable energy savings.

UCRM 3: AHU Replacements - Courthouse and Jail Facility (Old Jail)

This UCRM will replace 7 air handlers serving the Courthouse jail facility. The air handlers will be changed from a constant volume (CV) dual duct system to a variable air volume (VAV) system. It includes major air handling unit upgrades and the installation of 36 new VAV boxes throughout the facility

COMMENTS: In concurrence with proposed UCRM deployment and economic/cost saving analysis. Although no energy (kWh) and demand (kW) savings are specified for this UCRM, reduced consumption will occur. Changing the air delivery system from constant volume to variable air volume will deliver air efficiently as well as improved comfort. Most air delivery system fans are over designed by 40 - 60 percent to insure required air exchanges occur even in the event of dirty filters, leaks in ductwork etc. It would be advantageous to include Lexan lock boxes over space sensors to insure desired settings/set-points are maintained. If wireless sensors are to be used, it is imperative that communication between receiver and transmitter is tested for seamless operation.

OBSERVATIONS: Point of concern brought up by staff is to insure that JCI controls these units properly since they also serve a smoke exhaust system in the event of a fire. All smoke is exhausted into mechanical room via powered return fans and then evacuated through dampers to outside. The report indicates that there will be an isolated network for the smoke removal system. Testing will validate smoke removal sequencing.

UCRM 4: DDC Control Upgrades & Central Plant Optimization - McKenzie Jail Annex, Juvenile Detention Center, and Courthouse/Jail facilities.

This UCRM will optimize the existing control systems for the McKenzie Jail Annex, Juvenile Detention Center, and Courthouse/Jail facilities.

This UCRM will replace the existing controls at the Courthouse and Jail facilities Central Plant with new "state of the art" Building Automation System (BAS) and optimize its operation. As part of this UCRM, all facility retrofit systems proposed will include existing control systems to be upgraded and integrated into the new Metasys Extended Architecture. This will include interactive mechanical system and floor plan graphics that will allow the end user to easily review, modulate and troubleshoot problem areas as they receive alarms and or trouble events. Maintenance staff can then respond in an efficient manner to correct system issues. Energy management programming logic will provide the proper sequencing to maximize energy saving opportunities.

COMMENTS: In concurrence with proposed UCRM deployment and economic/cost saving analysis. Appendix A.4 DDC Upgrades and Central Plant Optimization Calculations UCRM# 4 and 6 (pgs.90-102) give detailed analysis of savings as well as eQUEST modeling.

OBSERVATIONS: It would be advantageous to the customer (Nueces County) to have an additional laptop computer included as a BAS workstation or client. This would allow for technicians to direct connect (hardwire) to either BAS control panels or field modules which would prove valuable as a diagnostic field tool. In review/inspection of the central plant for courthouse/main jail complex, it was noted that additional savings may be available through the replacement of existing steam traps (Figure 4-1) on

heating plant. It was noted by maintenance personnel that they were indeed aged and problematic. One unit had a mop bucket underneath to collect potential leaks.



Figure 4-1

UCRM 5 Water Conservation – McKenzie Jail Annex, Juvenile Detention Center

This improvement measure includes water conservation retrofits. This UCRM will include the installation of low flow plumbing fixtures and multiple electronic control devices in the Jail areas.

COMMENTS: In concurrence with proposed UCRM deployment and economic/cost saving analysis. Appendix A shows a detailed analysis of projected water and kWh savings through the use of low flow fixtures. The analysis is comprehensive and serves as a good representation of what can be expected as part of this retrofit.

OBSERVATIONS: The proposed water conservation retrofits will prove to efficiently manage one of the collective high water consumers within the facilities.

UCRM 6 Cooling Tower Rebuild – McKenzie Jail Annex

This UCRM will refurbish two (2) existing single cell, cross flow cooling towers located on the roof of the McKenzie Jail Annex central plant.

COMMENTS: In concurrence with proposed UCRM deployment and economic/cost saving analysis. As a general note, the simple payback period for this UCRM is greater than the useful life of the system being proposed.

OBSERVATIONS: Reviewed/Inspected towers and specific replacement/retrofits to occur, tower performance and efficiency will be greatly enhanced through this UCRM. It was noted that the condenser water 3 way valve (Figure 6-2) for chiller 2 was constantly “hunting” through full stroke. It would be beneficial to either replace existing chilled water return water temperature sensor and recalibrate or consider inclusion on BAS scope of work to correct valve operation malfunction. Additionally, consideration should be given to the replacement of the existing condenser water pump motors (Figure 6-1) and would yield an additional \$477 annual savings based on Motor Master Software analysis with a payback of 5 years or less.



Figure 6-1



Figure 6-2

UCRM 7 Domestic Water Pump Replacements – Courthouse and Jail Facility

This UCRM will replace two (2) existing 25 horsepower (HP) pumps which supply domestic water to the facility. The existing pumps are in very poor condition and past their useful life.

COMMENTS: In concurrence with proposed UCRM deployment and economic/cost saving analysis

OBSERVATIONS: Inspection of pumps indicated conditions as stated in Utility Assessment Report are valid. Replacing these pumps would realize better performance and energy savings.

II. Additional Comments on Utility Assessment Report

A. EXECUTIVE SUMMARY

- a. The Executive Summary shows a detailed and concise representation of the systems being proposed with the expected cost, energy and water savings.

B. BASE YEAR ENERGY CONSUMPTION & COSTS

- a. Historical data based on real meter readings, no additional comments.

C. METERING INFORMATION

- a. No additional comments.

D. UTILITY RATE SCHEDULE ANALYSIS

- a. An explanation of particular rate schedule(s) would be beneficial. Specifically any rate steps per kWh; this would affect annual average cost; typically under this structure, the more kWh consumed, the lower the unit cost. Another cost factor would be any ratchet clause for demand (kW). Under this type of rate, the customer is charged a percentage (typically 80%) of peak demand set during cooling months. By lowering demand through UCRM's, that peak will be lowered resulting in a lower non summer month demand charge. Though this may be a detailed explanation, it would enhance the savings explanation.

E. FACILITY INFORMATION

- a. No additional comments

F. TECHNICAL ANALYSIS

- a. UCRM 6 Cooling Tower Rebuild: Would it be more economical to replace towers as opposed to a rebuild? What is the current age/condition of basins and structure? In a corrosive environment it may be more practical to replace, as it appears payback is secondary to need.

- b. UCRM 4 DDC Control Upgrades & Central Plant Optimization - Assuming DDC interactive floor plan graphics will include zonal conditions (i.e. Temperature) and will allow user to click through these graphics that will take them to systems serving zones and back to the plant. The idea here is that the end user should be able to “drill” through the graphics to allow the access to all systems being served or tied to the automation system from zones systems back to the central plant.

G. PROJECT FINANCIAL ANALYSIS

- a. The financial analysis is in compliance with Texas Local Government Code 302 Version and meets requirements for Energy Savings Performance Contracts. Cash flow analysis shows flat capital avoidance costs over the duration of the contract and is likely conservative resulting in higher savings for Nueces County.

H. APPENDICES

- a. Appendix A
 - i. Appendix A.1 Lighting Upgrades UCRM# 2
 - 1. Table of JCI Lighting Codes would be informational and helpful, but not required for this review.
 - ii. Appendix A.2 Water Conservation UCRM# 5
 - 1. Upon review, no additional comments
 - iii. Appendix A.3 Power Factor Correction UCRM# 1
 - 1. Upon review, no additional comments
 - iv. Appendix A.4 DDC Upgrades and Central Plant Optimization Calculations UCRM# 4 and 6
 - 1. Upon review, no additional comments

- b. Appendix B
 - i. Measurement and Verification Plan
 - 1. All methodologies and prescribed calculations in accordance with IPMVP 2012. Each M&V option for each UCRM is thoroughly discussed in Appendix B. No additional comments.