

March 13, 2014

State of Washington  
Department of Enterprise Services  
Olympia, WA

**ATTENTION: JIM HAYES**

**SUBJECT: INVESTMENT GRADE AUDIT PROPOSAL:  
CAPITAL CAMPUS CENTRAL CHILLED WATER & STEAM SYSTEMS - PHASE II  
DEVELOPMENT OF PRELIMINARY THERMAL (DISTRICT) ENERGY GOALS**

Dear Mr. Hayes:

University Mechanical Contractors, Inc. (UMC), in association with FVB Energy, is pleased to provide the following proposal to the Washington State Department of Enterprise Services (DES). The focus of this proposal is to perform an Investment Grade Audit (IGA) for upgrades to the Capital Campus CHW System distribution and pumping equipment and the Steam System production equipment and distribution system; as well as to provide assistance with the planning effort for the campus Thermal (District) Energy Master Plan. All work associated with this effort will be developed in coordination with the State of Washington's Energy Services Performance Contracting (ESPC) program.

**STATEMENT OF UNDERSTANDING & OBJECTIVES:**

The purpose of the proposed IGA is to develop a detailed engineering study that will identify the scope of work, schedule, construction plan and financial basis for the execution of an Energy Savings Performance Contract. This IGA will also provide a turn-key implementation proposal that includes all associated guaranteed cost and savings.

The State of Washington has specific goals and development criteria that UMC will work to incorporate into this audit. These goals are defined as follows:

**Overall Financial and Operational Goals**

- Reduce the overall energy, water and operational costs for the Capital Campus Central Plant and connected buildings
- Reduce carbon emissions in line with State carbon emission reduction mandates
- Review and facilitate the utilization of potential funding sources that may be available (including but not limited to capital funds, utility incentives, energy/operational savings and other state or federal grants as applicable)
- Planned payback criteria will be developed based on project measures that will meet a simple payback of 15 years or a 20 year IRR of 5% (including but not limited to incentives, grants, utility savings, operational savings & capital replacement dollars). This payback/IRR analysis will exclude the cost of the IGA development associated with the steam safety analysis and the Thermal (District) Energy Master Planning effort.

#### CHW System Goals:

- Upgrade the CHW pumping and distribution infrastructure. This will include the following priorities:
  - Resolution of CHW distribution issues related to comfort, capacity, and energy performance in customer buildings and/or the CHW plant.
  - Assess the performance and operation of the plant bypass as it relates to pressure control, return water blending, minimum evaporator flow, and chilled water production capacity
  - Analyze the opportunity to modify the distribution system (including both CHW & CW) to full variable flow and consider hydraulically remote location(s) for differential pressure control of pump speed
  - Review control strategy, set points, and resets of leaving air temperature at air handlers to minimize demand for reheat at minimum air flow.
- Implement operational changes and energy based re-commissioning at plant and building level
- Assess opportunities for connection to additional buildings (as appropriate) to facilitate the retirement of other less efficient chillers within the limits of the available chilled water production capacity
- Review preservation of production capacity to serve the campus chilled water load at peak with an outage of the largest chiller (N+1 redundancy)
- Integrate short term upgrades into overall long term vision

#### Steam System Goals:

- Identify operational and safety issues.
  - Assess and document the operational and safety issues of the steam production and distribution system
  - Assess and document infrastructure improvement goals; including equipment that has reached the end of its useful life and needs to be scheduled for replacement.
  - Prioritize issues, make recommendations for resolution and develop schedule to implement these recommendations
  - Develop and implement post resolution service/maintenance requirements and ongoing monitoring plan
- Develop Plan to improve system efficiency
  - Identify off-hour and off-season heating and domestic water loads served by the central steam system. Analyze central plant off-season shut down options and provide financial analysis and implementation plan to achieve these annual efficiency improvements.
  - Review and analyze additional energy conservation measures applicable for the steam production and distribution system
  - Review energy based re-commissioning opportunities in steam production plant and distribution system
- Integrate short term upgrades into overall long term vision

#### Thermal (District) Energy Master Plan Goals:

- Support DES in the development of a Thermal (District) Energy Master Plan focus in anticipation of the upcoming 10 year Master Planning process
- Analyze opportunities for the Capital Campus to expand and integrate the CHW and Steam Systems into an efficient, financially viable District Energy enterprise.
  - Review Campus Heating/Cooling Load
  - Identify current baseline operation & equipment/system efficiencies
  - Assess current thermal energy demand and energy use
  - Review master plan to assess projected campus growth
  - Evaluate system generation & distribution losses
  - Evaluate expected system diversity to determine plant and distribution sizing
  - Prepare projection of future demand and energy use
- Review Applicable Technologies to Serve Projected Heating/Cooling Load
- Review distribution system upgrades, modifications and revisions to best serve long term needs of plant
- Develop Preliminary ROM (rough order of magnitude) Comparison of Total Cost of Ownership for select options based on a 20 & 30 year IRR model.

The following facilities that will be included as part of this audit.

- Central CHW Plant (Powerhouse)
- Buildings connected to central CHW and steam systems
- Campus buildings that could be considered for future connection to CHW & steam systems
- Campus buildings that could be considered for future connection to the Thermal (District) Energy System

**ACTIONS TO BE PERFORMED:** UMC's Energy Services Group, with assistance from FVB Energy, will complete the following actions associated with the development of the Investment Grade Audit.

#### ***Utility Usage Analysis (UUA) & Utility Balance***

- Utilize utility balance performed as part of Phase I IGA for plant utility usage
- Collect and analyze 3 years of historical utility usage (electrical, natural gas, fuel oil, water/sewer and other utilities as applicable) for individual buildings that are currently served by the CHW plant
- Collect and analyze pumping distribution system trends
- Collect and analyze pumping system trends for individual tertiary loops located in each facility served by the central CHW plant
- Establish an energy baseline balanced with historical utility usage

#### ***Detailed Site Assessment and Energy Audit***

- Perform a detailed audit of the facility infrastructure; including all systems that directly or indirectly affect the usage of energy (electricity, natural gas, fuel oil, etc) or water/wastewater
- Collect and analyze past studies, trends, drawings, plans and other information that provide insight into the operation of the plant
- Analyze and understand current and future planned campus plans that will affect the plant load. These include campus master plan, upcoming construction/remodels, other energy conservation retrofit's and facility occupancy/use changes.

- Measure and monitor the energy usage of select equipment to quantify actual operating parameters. This will be done through a combination of stand-alone measurement devices and trend loggers (provided by UMC), as well as utilization of trending options on the existing Building Automation System currently serving the facility.
- Interview facility/plant operating and engineering staff to understand & prioritize the following
  - Equipment issues or deficiencies that need to be resolved
  - Gain an understanding of past and current operation
  - Solicit infrastructure upgrade/modification recommendations
- Survey occupants to understand comfort issues or concerns
- Review facility design documents, specifications and O&M manuals
- Analyze, identify & recommend energy conservation measures that meet the project goals
- Identify available grants, utility incentives and other funding sources as applicable. Coordinate with the grant providers & local utilities to obtain these funds to help pay for the proposed project.
- Coordinate with facility personnel and staff to prevent disruptions to work schedules during audit and implementation

### ***Turn-key Construction Proposal***

- Develop and provide a guaranteed implementation cost and associated guaranteed energy savings
- Provide detailed project scope
- Identify proposed system/equipment selections, preliminary design, schematic drawings and control sequences for upgrades
- Develop a detailed project schedule that identifies the timeline and steps required to implement the project
- Identify maintenance requirements for the proposed equipment upgrades
- Identify and prioritize steam safety concerns and develop a plan to address these items
- Coordinate options for financing of the project (through the state local loan program or 3<sup>rd</sup> party low interest financing) as appropriate and as requested by owner
- Provide a report that is clear and concise and can accurately be used to further develop or implement the project and make informed financial decisions
- Project future capital and operating cost associated with chilled water pumping and distribution
- Project future capital and operating cost of steam production and distribution
- Provide a clear analysis and financial assessment of the preliminary Thermal (District) Energy options

### **PROJECT ASSUMPTIONS:**

In developing the IGA, UMC assumes the following information will be provided as required.

- Access to facilities and equipment for site assessment
- 3 years of historical utility usage (electrical, natural gas, fuel oil, water/sewer, chemicals and other utilities as applicable)
- As-built design documents
- Asbestos assessment reports as available
- Access to facility, HVAC systems & control systems
- Construction drawings, specifications & O&M manuals

**TIMELINE:**

The following timeline is based on UMC receiving a signed IGA proposal by March 21<sup>st</sup>, 2014:

- Investment Grade Audit: April – July 2014
- Proposal Delivery: August 2014
- Anticipated Construction Period: September 2014– March 2015

**AUDIT FEE:** The fee to develop an Investment Grade Audit will be **One Hundred Sixty Five Dollars (\$165,000)**. All fees assessed will be included in the final turn-key ESPC implementation costs. If the DES decides not to move forward with these projects, then the fee will be paid directly to UMC at that time.

We look forward to working with the Washington State Department of Enterprise Services on developing this important project for the state Capital Campus. If you have any questions or concerns please contact me at (206-368-6974).

Sincerely,



Scott Locke, PE, Leed AP  
Manager, Energy Services  
University Mechanical Contractors, Inc.