

Chiller Plant Efficiency Assessment with Recommendation

Statement of Work (Draft)

- I. **CONTRACT TITLE:** Chiller Plant Efficiency Assessment with Recommendations
- II. **BACKGROUND:** The Chilled Water Plant includes Chillers, Cooling Towers, Pumps, Water Treatment System, Johnson Controls Metasys Control System, meters, transducers and ancillary systems. This Assessment includes all systems of the chiller plant in its entirety, without exclusion. Within the scope of this Assessment the contractor will:
- A. Characterize condition of existing chilled water equipment.
 - B. Characterize existing operating profiles based on trending data.
 - C. Identify future load changes.
 - D. Characterize efficiency of existing and future equipment.
 - E. Create and perform customized software-based lifecycle analysis.
 - F. Quantify simple payback and lifecycle cost impacts for chiller plant Assessment recommend improvements
 - G. Prepare reports with corrective action recommendations that will be used as the basis for future Chiller Improvement projects.
 - H. The VA will make available previous VALB energy surveys and RetroCx documents (**prepared by DAV Energy Solutions and SAIC, both of San Diego**). In addition available record engineering construction documents may be reviewed by the Assessment Contractor on site at the VALBHS Engineering Service Drawing Library. Annual utility billings can also be made available to the Contractor.
- III. **SCOPE OF SERVICES:**
- A. The Contractor shall provide and be responsible for all labor, materials and all other services required to successfully complete this Assessment as herein specified. The Contractor shall perform due diligence to avoid potential physical damage to existing utilities and to note any damage/ deficiencies to existing utilities in the assessment. Any existing damage or deficiencies should be noted in the Final Reports.
 - B. Perform an efficiency Assessment of the Chiller Plant with the intent of:

1. **Identification:** Identifying system and/or component inefficiencies when weighed against system/component manufacturer nameplate ratings.
 2. **Recommendations:** Make recommendations for correcting deficiencies identified. Recommendations shall include a thorough narrative for correcting the deficiencies of which shall be used as the basis for a future Chiller Plant Efficiency Corrections contract. Recommendations shall include means and methods (commissioning documents) for future performance testing.
 - a) *Recommendations shall include equipment/materials catalog numbers and cut sheets*
 - b) *Recommendations shall also include generic description of equipment/materials with performance requirements and any restrictions or cautionary notes related to installation.*
 3. **Reporting:** Document findings in report form
 4. **Contractor shall secure the services of Johnson Controls in the accomplishment of this Assessment as required for all work associated with JCI Metasys system.**
 5. **As a Contract Option:** As a part of the Assessment cost include a separate line item to be present and oversee performance testing of subsequent corrections by a future contract executed to a contractor within 365-calendar days after the conclusion of this Assessment.
 6. **Site Visits:** Perform site visits as required to satisfy the intent of this Assessment.
 7. **Presentation Meeting:** When scheduled, participate in an Engineering Management Presentation Meeting.
- C. Duration of this Assessment shall be 365 calendar days.**
1. In any regards, the period of field assessment shall include peak period of chiller plant operation of which is between the months of July thru the end of November.
 2. Duration of Contract Option: Should the contact option to oversee performance testing be exercised, it shall be completed within 365-days after completion of the Assessment.

- a) In any regards, the period of option, if executed, shall include peak period of chiller plant operation of which is between the months of July thru the end of November.

IV. BASIC REQUIREMENTS OF ASSESSMENT:

A. **Trending:** During the Assessment field inspections, the Contractor shall use all means available to trend the plant, of which includes trending of the Johnson Controls Metasys system.

1. Contractor shall evaluate all aspects of the Metasys system as it relates to Chiller Plant, control, monitoring and reporting.
2. Trending shall not commence until all new essential meters, as required herein, are in place, functional and approved by the COR.

B. New Metering and Metasys Incorporation:

1. The Assessment Contractor shall install new water flow metering on Condenser Water Mains and on Chiller #4 (old 1995 vintage Chiller) so that the efficiency of each individual Cooling Tower and the old chiller can be trended and established. It must be noted that the Condenser water system lacks metering and without such new meters performance of each individual tower cannot be established. **This new metering requirement is essential for a successful Assessment.** A total of four meters shall be installed, one per 18", 20", 24" condenser water mains that make up the manifold and; on the 18" Chiller #4 condensor return line. All pipe sizes shall be verified in the field prior order of meters.
2. Flow devices shall be ultrasonic or magnetic technology and installed without shut-down of the water system and with mounting and configuration in strict accordance with manufacturer's recommendations. Meters shall read accurately from the factory. Validation of accuracy for newly installed meters shall be assured by the use of an independent portable meter and other COR approved means. Assessment contractor shall demonstrate accuracy testing in the presence of the COR. Meters shall be incorporated into the Metasys system and shall also include local field monitor that shall be mounted at approximately 60" AFF in a NEMA 3R enclosures. Flow meters shall be resistant to scale and fouling and shall be as offered by McCrometer Industry FPI Mag meter, Onicon meter or other approved equal. Install meters via hot-tap with weldolet. Submit meters for approval.

3. Chiller #4 (old Chiller) Temp Sensors: Install condenser water supply and return temperature transducers with local display and tied into Metasys. Temperature sensors shall use a bulb well and shall be installed without the need for hot water shut down. Temperature sensor shall have proper operating temperature. Provide proper hot tap weldolet. Temp sensor shall also have local display in NEMA 3R enclosure mounted at approximately 60" AFF. Temperature sensor shall be by McCometer, Onicon or approved equal. Via water testing port, demonstrate that the temperature sensors read accurately.
4. Flow and Temperature devices shall be easily removed for service and they shall have factory certified calibration and accurate within +/- 0.5% unless otherwise approved by COR. Clearances from turbulence or pipe turns shall be in strict conformance with manufacturer's recommendations. Coordination with the VA HVAC Shop is required.

C. **Metasys Improvements:** Perform an Assessment of the Metasystem and make recommendations for improved energy efficiency, accurate reporting and control, to include as a minimum:

1. Review of the existing Metasys DDC points list and recommend new points needed to implement continuous efficiency commissioning of the chiller plant.
2. Monitoring and tracking of relevant electrical parameters for all major energy and water utilization equipment (e.g. Chillers, Towers, Motors, Make-Up Water). Incorporate new and/or existing substation metering and feeders.
3. Automatic calculations of energy use parameters such as MMBTU, Tonnage.
4. Temperature and Flow Data
5. Field equipment set-back times and reset controls for winter/summer scheduling and Day Time / Night Time control implementation of such equipment.
6. Evaluation of existing Metasys central plant gages, transducers, meters, orifice plates, **flow** nozzles, venturi tubes and averaging pitot tubes for confirming accuracy in reporting and control.
7. Verify proper implementation of valves and their proper operation.
8. Review and establish the efficiency of all existing major equipment and compare against nameplate ratings and manufacture efficiency specifications.
9. Metasys trending software efficiency and effectiveness and methods of improvement.
10. Metasys hardware, storage, and network capabilities.
11. Effectiveness of VALB use of the BAS and how effectiveness can be improved to maintain plant efficiency.

12. Operation and Maintenance review
 13. Other items as identified by the Contractor.
 14. Plant Optimization, inclusive of sequence of operation, VSD, software, lead equipment, etc.
 15. Assess the concept of a pseudo common condenser water tower basin, complete with recommendations for drive and pump sizing and sequence of operation for control.
 16. Assess cooling tower fill and nozzle replacement and fan control to include physical assessment of cooling tower fans. It is the intent that Tower capacity to be increased to 1,500 Tons if possible or at a very minimum, return capacity of Towers to their manufacturer's 1,100 Ton ratings.
 17. Assess the water treatment system. Within the duration of this contract secure water quality via water quality testing company for the Condenser Water, Chilled Water and make-up water, once per quarter at random times (a total of 12-test). Water quality test will include as a minimum:
 - a) PH, TDS, TSD, Conductivity, Hardness, Biocide Levels, Alkalinity, Chlorides, Sulfates and Silica and others are recommended by the Assessment Contractor.
 - b) Assess Water treatment injection systems
 - c) *Review of Sand Filter System to include nozzles and performance*
 18. Economic Calculations: Perform simple payback and simple life cycle cost analysis economic calculations based upon findings
- D. Provide Schedule as indicated below.

V. **ASSESSMENT REPORT REQUIREMENTS**

- A. **Report Format.** The Contractor shall prepare and submit draft and final reports to the Contract Contracting Officer and Contracting Officer's Representative (COR) via electronic (e-mail, FTP site) format. The Contractor shall also submit 2 sets of electronic files in original and .pdf formats on CDs to the COR.
- B. **All reports shall be:**
1. In the final prescribed format as determined by the COR.
 2. Reflect resolution of all COR comments
 3. Be written in layman's language with limited technical terminology

4. Provide definitions and explanations of all technical terminology
5. Include a glossary of terms or explanations
6. Contain all contract numbers, date prepared, logo of the company, address, telephone number, and other pertinent information
7. Be signed by the Contractor personnel who prepared the Report

C. Report Outline. The Draft and Final FS Reports shall include (but not limited to) the following headings and sections, in any order.

1. Executive summary
2. Introduction
3. Existing conditions (including campus layout, plant, utility interconnections, project site map showing all surrounding including important features, roadway, etc.
4. Concept Sketches and Diagram as required to provide COR with full comprehension and understanding of recommendations
5. Alternatives when available – and documentation as to why a particular option is recommended.
6. Technical feasibility
7. Economic feasibility
8. Applicable federal, state, utility and local incentives with program expiration dates, program renewal, and other requirements (Coordinate with Southern California Edison, Griselda Rodrigues at phone number (714) 514-3106), and other interested utility providers.
 - a) It must be noted that is project is influenced by the SCE Healthcare Energy Efficiency Program (HEEP) administered by Southern California Edison (SCE)
9. M&V Plans – To include a plant wide testing and performance plan, with objectives and markers.
10. Safety Issues and Criteria
11. Permit Requirements. The report should address necessary permits anticipated and identify any long lead permit requirements that may affect schedule (e.g. Long Beach Municipal Fire Department regulations) and SCAQMD rules.

12. Appendix - To include Metasys Trends and Trend Analysis as a minimum

D. COR Review of Reports.

E. Assessment Report Review: The COR will review all draft and final reports to verify completeness of the report and compliance with contract requirements. The reviews by the COR are not to be interpreted as resulting in an approval of the Contractor quality of the work toward meeting contract requirements but are intended to discover any information which can be brought to the Contractor's attention which might prevent errors in subsequent Chiller Plant Improvement contract(s) and misdirection of such. The Contractor shall remain completely responsible for completing the all reports in full compliance with the requirements of the contract.

1. Constructive and corrective comments generated during the COR review will be provided to the Contractor by the COR with a copy to the Contracting Officer (CO). The Contractor shall respond to the comments within the timeframes approved by the Contracting officer.
2. The Contractor shall respond to all report review comments in writing to the COR and CO, indicating one of the following: (1) Adoption and action taken, (2) Adoption with modifications and action taken, (3) Alternative resolution and action taken, or (4) Rejection.
3. In cases other than unqualified adoption, the Contractor shall provide a statement as to why the reviewer's comments and/or recommendations are inappropriate. Any disagreements will be referred to the CO for a final decision. Report review comments shall not relieve the Contractor from compliance with terms and conditions of this contract.

F. Report Acceptance. Government Acceptance (and for purpose of payment) occurs after the delivery of the Final Report by the Contractor and review by COR and resolution of comments of the Final Report. Acceptance will be made by the COR with a copy to the Contracting Officer.

G. Report Timeframe: In any event, both draft and final reports must be accepted by the Government within the duration of this Assessment contract, of which includes a 21-day review period of the draft report and 21-day review period of the final report by the COR and any report revisions to be made by the Assessment contractor

VI. SCHEDULE OF DELIVERABLES.

The total period of performance for the Assessment is 365-calendar days. The Contractor's proposed schedule will address the following deliverables:

SCHEDULE OF DELIVERABLES		
Task	Due	Responsible Party
Site Work Schedule	14 Calendar Days after Date of Award	Contractor

Site Visit Plan	30 Calendar Days after Date of Site Work Schedule	Contractor
Site Visit	14 Calendar Days after Site Visit Plan	Contractor
Essential Metering Installation	Completed 45 calendar after Site Visit	Contractor
Metasys Trending	Trend of Plant begins Immediately after Essential Metering Installation is Completed and Trending will Continue through completion of this Assessment	Contractor
Draft Assessment Report(s) and Economic Analysis	To be completed NLT January 15, 2017 with Assessment period including Plant Peak Load Periods (July 1 st through November 30 th)	Contractor
VA Review and Comments	21 Calendar Days after receipt of Draft Assessment Report	COR
Final Site Assessment Report(s) with Economic Calculations	30 Calendar Days after receipt of VA Review of Draft Assessment Report.	Contractor
Contractor Presentation of Final Assessment Report to Engineering Management	30 Calendar Days after VA receipt of Final Assessment Report	Contractor
VA Acceptance or Comment on Final Report	If required, due 21 Calendar Days after Final Report is Submitted	COR and CO
Option Execution for Subsequent Contract Commissioning	To be executed within 6-months of VA Acceptance of Final Report – If Authorized by Engineering Management and Contracting Officer.	Contracting Officer and Engineering

All submittals shall be binder bound hardcopies and in electronic format in native and .pdf formats.

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