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Performance Services

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CONTRACT

TFC Contract No. 16-130-000
Project No. 15-030-0802

ENERGY PERFORMANCE CONTRACT

BETWEEN

THE TEXAS FACILITIES COMMISSION

AND

PERFORMANCE SERVICES OF TEXAS, INC.

ENERGY PERFORMANCE CONTRACT

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THE TEXAS FACILITIES COMMISSION

AND

PERFORMANCE SERVICES OF TEXAS, INC.

The Texas Facilities Commission (hereinafter referred to as "TFC" or the "Owner," as defined herein), a state agency located at 1711 San Jacinto Boulevard, Austin, Texas 78701, and Performance Services of Texas, Inc. (hereinafter referred to as "ESCO," as defined herein), located at 3010 LBJ Freeway, Suite 1200, Dallas, Texas 75234, enter into the following agreement for utility cost reduction measures (hereinafter referred to as the "Contract") pursuant to Tex. Gov't Code Ann. § 2166.406 (West 2016), to be effective as of the Effective Date (as defined below). Nothing in this Contract shall be interpreted or construed to make ESCO a third-party beneficiary hereunder.

I. DEFINITIONS.

1.1. Definitions. Unless specifically provided otherwise herein, all words and phrases in this Contract in initial caps shall have the meanings set out in this Section 1.1. In the event of any conflict between the definitions in the *2015 Uniform General Conditions* (hereinafter referred to as "UGC"), the *Supplementary General Conditions*, and the *Special Conditions*, a digital copy of each of which is incorporated herein by reference for all purposes in portable document format ("PDF") on the CD-R attached hereto and labeled "PERFORMANCE SERVICES OF TEXAS, INC. (ESCO), EXHIBITS – TFC Contract No. 16-130-000" (the "CD"), and named therein as "Exhibit A," "Exhibit B," and "Exhibit C," respectively, or in any other document that is referenced herein and incorporated for all purposes, and the definitions in this Contract, the definitions used in this Contract shall control to the extent of the conflict.

1.1.1. *Actual Savings* is defined as the sum of the total savings realized using the procedures defined in the Sample Periodic Savings Report incorporated herein for all purposes as "Exhibit J" plus all adjustments and non-measured savings.

1.1.2. *Annual Savings Guarantee* is the amount of energy savings guaranteed by ESCO for a twelve (12) month period beginning on the Savings Guarantee Commencement Date and any subsequent twelve (12) month anniversary thereafter.

1.1.3. *Application for Final Payment* has the same meaning as defined in UGC, Section 1.3.

1.1.4. *Baseline Schedule* has the same meaning as defined in UGC, Section 1.6.

1.1.5. *Bid Bond* has the same meaning as Security Bond, which is defined in UGC.

Subsection 5.1.2.

1.1.6. *Building(s)* means the Brown-Heatly Building at 4900 North Lamar, the Central Services Building at 1711 San Jacinto Boulevard, the Thomas J. Rusk Building at 208 East 10th Street, and the William P. Hobby Complex at 333 Guadalupe Street, all in Austin, Texas.

1.1.7. *CAD* means AutoCAD DWG format unless specifically provided otherwise herein.

1.1.8. *Certificate of Final Completion* has the same meaning as defined in UGC, Section 1.7.

1.1.9. *Certificate of Substantial Completion* means the certificate signed by ESCO and TFC establishing the date of Substantial Completion and identifying responsibilities for security and maintenance as set out in UGC, Paragraph 12.1.1.2.

1.1.10. *Change Order* has the same meaning as defined in UGC, Section 1.9.

1.1.11. *Communication Protocol* means the communication and tracking procedures to be utilized for interaction and reporting between TFC, ESCO, and Subcontractors.

1.1.12. *Consideration* means the funds and any and all other forms of valid, legal consideration as discussed in Article V of this Contract.

1.1.13. *Construction Documents* has the same meaning as defined in UGC, Section 1.17 that in TFC's sole opinion are in satisfactory quality and detail.

1.1.14. *Construction and Utility Cost Reduction Services* means the construction and design services to be provided to TFC by ESCO with respect to Utility Cost Reduction Measures, as defined in Section 1.1.75 below, as specified in Section 3.3 of the UGC and as further specified in this Contract.

1.1.15. *Contract Documents* means those documents identified in Article III of this Contract.

1.1.16. *Contract Sum* has the same meaning as defined in UGC, Section 1.14.

1.1.17. *Contract Time* has the same meaning as defined UGC, Section 1.15.

1.1.18. *Deliverables* means the construction services, which are specified to be delivered by ESCO pursuant to the terms of this Contract.

1.1.19. *Drawings* has the same meaning as defined in UGC, Section 1.22.

1.1.20. *Effective Date* means the date that the last signature of a party is affixed hereto.

1.1.21. *Energy Savings* means the reduction in use of water, sewer, natural gas, and electricity realized to TFC based on the baseline energy usage before the scope of work performed

in this contract versus the measured energy usage after the scope of work has been performed for the equivalent season and period of time.

1.1.22. *EPMCS* means electronic project management control system.

1.1.23. *ESCO* has the same meaning as "Contractor" as defined in UGC, Section 1.16.

1.1.24. *Excess Savings* is the amount of Actual Savings achieved above the amount in the Performance Guarantee to date including any savings achieved during construction.

1.1.25. *Final Completion* has the same meaning as defined in UGC, Section 1.23.

1.1.26. *Final Inspection* means the same process and procedure as is described in UGC, Subsection 12.1.2.

1.1.27. *Final Inspection Deadline* means the date that is thirty (30) days after the Substantial Completion Inspection, and by which date TFC must conduct a Final Inspection.

1.1.28. *Final Payment* has the same meaning as defined in UGC, Section 1.24.

1.1.29. *Governmental Authorities* means the city, the county, any municipal utility district or similar taxing authority in which the Project is located, the State of Texas, the Federal Emergency Management Agency, the United States Army Corps of Engineers, the Environmental Protection Agency, the Texas Commission on Environmental Quality, and any other governmental or quasi-governmental agency or authority having jurisdiction over any development or construction activities on the Project or ESCO.

1.1.30. *Guaranteed Savings* means an amount of money that TFC is guaranteed to save in the form of reduced expenditures and rebates on utility bills.

1.1.31. *Guarantee Year* is the twelve (12) month period beginning on the Savings Guarantee Commencement Date and each subsequent twelve (12) month anniversary thereafter.

1.1.32. *Implementation Contract* means those portions of this Contract that refer to the Project.

1.1.33. *Interagency Agreement* means the financing arrangement that TFC will utilize to pay the Contract Sum and shall be in the form of funds administered by the State Energy Conservation Office (hereinafter referred to as "SECO").

1.1.34. *Laws and Regulations* means any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders including those governing labor, equal employment opportunity, safety, and environmental protection, including but not limited to, all applicable requirements of Title III of the Americans with Disabilities Act and the Texas Architectural Barriers Act and the Texas Accessibility Standards found in Texas Government Code, Chapter 469, of any and all Governmental Authorities.

1.1.35. *M&V Consultant* means the third-party engineer with whom TFC has entered into a professional services agreement for the Project to review the Utility Cost Reduction Measures and the measurement and verification of savings.

1.1.36. *MEP Systems* mean mechanical, electrical, and plumbing systems.

1.1.37. *Notice to Proceed* or *NTP* means the written notice to be issued to ESCO by TFC, which shall inform ESCO of, among other things, the date to begin commencement of Work and the date anticipated for Substantial Completion.

1.1.38. *Open Items List* means a list of work activities, punchlist items, changes or other issues that are not expected by Owner and ESCO to be complete prior to Substantial Completion.

1.1.39. *Operational Savings* means an amount of actual savings achieved through reduced power factor charges, Austin Energy guaranteed rebates, Austin Energy load cooperative incentives and avoided costs of materials, greater than the Energy Savings defined in 1.1.21.

1.1.40. *Owner* or *TFC* means and includes the State of Texas, the Texas Facilities Commission, and any other agency of the State of Texas acting through the Texas Facilities Commission in connection with this Contract.

1.1.41. *PAR* means the progress assessment report in such form as is prescribed by TFC and which has the same meaning as defined in UGC, Section 1.31.

1.1.42. *Pay Application* has the same meaning as "Application for Payment" as is defined in UGC, Section 1.2 and discussed in UGC, Subsection 10.2.2.

1.1.43. *Performance Guarantee* is the sum of the Annual Savings Guarantee for each year of the guarantee term as set forth in the Performance Guarantee Agreement, incorporated herein for all purposes as "Exhibit I," or unless terminated earlier in accordance with the Contract Documents.

1.1.44. *Performance Period* is defined as the period beginning on the Savings Guarantee Commencement Date and extending through the time period as defined in the Performance Guarantee.

1.1.45. *Person* means an individual, firm, partnership, corporation, association and any other legally recognized entity.

1.1.46. *Post-Final Inspection Punchlist* means the punchlist of items that TFC will deliver to ESCO that sets out any part of the Work that was not corrected or completed in accordance with the Contract Documents as of the Final Inspection.

1.1.47. *Post-Final Inspection Punchlist Deadline* means the date that is a fixed number of days after the date of the Final Inspection, and by which date TFC shall deliver any Post-Final Inspection Punchlist to ESCO.

1.1.48. *Pre-Construction Tasks* means the mobilization and pre-construction services to be provided to TFC as part of the pre-construction phase of the Project as described in Article II below.

1.1.49. *Pre-Construction Tasks Deadline* means the date that is twenty-one (21) days after delivery of a Notice to Proceed, and by which date ESCO shall complete all Pre-Construction Tasks.

1.1.50. *Pre-Final Inspection Punchlist* means the list of final punchlist items as defined in UGC, Paragraph 12.1.1.2 that TFC will deliver to ESCO along with a Certificate of Substantial Completion.

1.1.51. *Pre-Final Inspection Punchlist Deadline* means the date that is a fixed number of days after the date of the Substantial Completion Inspection, and by which date TFC shall deliver a Pre-Final Inspection Punchlist to ESCO.

1.1.52. *Project* means the scope of work, as set forth in Article II, Section 2.1 of this Contract.

1.1.53. *Project Manager* means the individual designated by ESCO, and who must be approved by TFC, as the contact person with specific authority to properly supervise and direct the duties and responsibilities of ESCO, on behalf of ESCO, pursuant to the terms and conditions of this Contract, and who shall have decision-making authority to bind ESCO with respect to the construction services and the Project.

1.1.54. *Punchlist* means, except as may be specifically provided otherwise below, a list of items of Work to be finished, remaining Work to be performed, or Work that does not meet quality or quantity requirements as required in the Contract Documents.

1.1.55. *Record Documents* has the same meaning as defined in UGC, Section 1.34.

1.1.56. *RFI* means a request for information as defined in UGC, Section 1.35.

1.1.57. *RFI Response* means a written clarification, instruction, and/or interpretation, including, but not necessarily limited to, an architect's supplemental instructions issued in response to an RFI, which response must be consistent with the intent of the Construction Documents.

1.1.58. *Sample(s)* has the same meaning as defined in UGC, Section 1.36.

1.1.59. *Savings Guarantee Commencement Date* means the first day of the first utility billing period following the month in which ESCO delivers to TFC the project warranty letter.

1.1.60. *Schedule of Values* has the same meaning as defined in UGC, Section 1.37.

1.1.61. *Scope of Services* means the construction services as set out in Section 2.2, below.

1.1.62. *Security bond* has the same meaning as described in UGC, Section 5.1 and Subsection 5.1.2, and shall be in the form of an approved surety bond, cash or other immediately available funds.

1.1.63. *Shop Drawings* means all drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for ESCO and submitted by ESCO to illustrate some portion of the Work.

1.1.64. *Site* means lands or areas indicated in the Contract Documents as being furnished by TFC upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by TFC which are designated for the use of ESCO.

1.1.65. *Special Conditions* has the same meaning as defined in UGC, Section 1.40.

1.1.66. *Specifications* has the same meaning as defined in UGC, Section 1.41.

1.1.67. *Subcontract* means any agreement between ESCO and a Subcontractor.

1.1.68. *Subcontractor* means a Person, including a supplier that enters into an agreement with ESCO to perform any part of the construction services.

1.1.69. *Substantial Completion* has the same meaning as defined in UGC, Section 1.44.

1.1.70. *Substantial Completion Inspection* means the process and procedure described in UGC, Subsection 12.1.1.

1.1.71. *Substantial Completion Inspection Deadline* means the date that is a fixed number of days after proper written notification is delivered to TFC by ESCO that ESCO has fully satisfied the requirements of UGC, Subsection 12.1.1, and by which TFC must conduct a Substantial Completion Inspection.

1.1.72. *TFC Project Manager* means the individual designated by TFC as the Owner's designated representative with the direct responsibility to properly supervise the design and construction of the project, as defined in Section 2.1 below, and the services being provided pursuant to this Contract on behalf of TFC, including, but not limited to: (i) serving as the point of contact between TFC and the Using Agency (if any); and (ii) supervising TFC's review and approval of the construction services.

1.1.73. *Unilateral Change Order* or *ULCO* has the same meaning as defined in UGC, Section 1.47.

1.1.74. *Using Agency* has the same meaning as defined in Texas Government Code, Section 2166.001(10) (West 2016).

1.1.75. *Utility Cost Reduction Measures* or *UCRM* means those items that are identified in the Utility Assessment Report, incorporated herein for all purposes as "Exhibit E."

1.1.76. *Wage Rate Notifications* means the wage rate notifications described in UGC, Subsection 2.2.1.

1.1.77. *Work* has the same meaning as defined in UGC, Section 1.48 unless specifically provided otherwise herein, and includes all furniture, fixtures, appliances, and other improvements made at, or incorporated into, the Work.

1.1.78. *Work Progress Schedule* has the same meaning as defined in UGC, Section 1.49 that sets out the critical path and deadlines for completion of discrete portions of the progress of construction of the Project beginning with the pre-construction phase and ending with final and unconditional acceptance by TFC.

II. DESCRIPTION OF PROJECT AND SCOPE OF SERVICES.

2.1. Description of Project. The Project for which ESCO agrees to provide Construction and Utility Cost Reduction Services as defined in Article II and Exhibit E, the Utility Assessment Report, and is generally described as Utility Cost Reduction Measures for the Brown-Heatly Building at 4900 North Lamar, the Central Services Building at 1711 San Jacinto Boulevard, the Thomas J. Rusk Building at 208 East 10th Street and the William P. Hobby Complex at 333 Guadalupe Street, all in Austin, Texas. ESCO shall provide all materials, equipment, labor, and supervisory activities necessary to complete the construction for this Project.

2.2. Scope of Services. ESCO agrees to timely deliver the Construction and Utility Cost Reduction Services described in this Contract. In the event of any material conflict between the duties and responsibilities of ESCO as set out in the UGC, any Supplementary General Conditions, any Special Conditions, or in any other Contract Documents, and as set out in this Contract, the duties and responsibilities set out in this Contract shall control to the extent of any such material conflict.

2.2.1. Pre-Construction Phase. Upon receipt of a Notice to Proceed, ESCO shall commence, and soon as reasonably practicable, but in no event later than the Pre-Construction Tasks Deadline, timely complete the following Pre-Construction Tasks for the Project:

2.2.1.1. consult with staff of TFC and any representatives of the Using Agency as may be directed by TFC, and become thoroughly familiar with: (i) the Site; and (ii) any and all relevant and existing Site and facilities studies;

2.2.1.2. attend a pre-construction conference between TFC, and any other representatives as deemed appropriate by TFC, before any Work at the Site is commenced, at such time and location as may be determined by TFC. The Communication Protocol, initial Work Progress Schedule, procedures for handling Shop Drawings and other submittals, processing Pay Applications, maintaining required records, designation of Project Manager, and any other subject as may be determined by TFC to be appropriate, shall be the subject of said conference;

2.2.1.3. reaffirm the assignment and identity of ESCO's Project Manager;

2.2.1.4. if requested by TFC, assign appropriate ESCO staff to receive instruction regarding the use of EPMCS to be utilized by TFC;

2.2.1.5. prepare, for TFC's review and acceptance, a procurement schedule for items that must be ordered well in advance of commencement of construction; ESCO shall timely expedite and coordinate the ordering and delivery of products and materials that must be ordered well in advance of commencement of construction;

2.2.1.6. prepare a safety plan as specified in UGC, Section 7.1, and deliver same to TFC for review and approval;

2.2.1.7. designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be, at a minimum, the prevention of accidents and the maintenance and supervision of said safety plan; and

2.2.1.8. prepare, deliver, and periodically update as specified herein, the Initial Work Progress Schedule.

2.2.1.8.1. When acceptable to TFC, this initial Work Progress Schedule shall become the Baseline Schedule for comparison to actual conditions throughout the Contract duration.

2.2.1.8.2. ESCO shall update the Work Progress Schedule as per the provisions of UGC, Subsection 9.3.2. All updated Work Progress Schedules shall include (i) the components of the Work; (ii) times of commencement and completion required of each Subcontractor; (iii) ordering and delivery of products, including those that must be ordered well in advance of construction; (iv) a clear delineation of the critical path; and (v) the occupancy requirements of TFC.

2.2.1.8.3. On a monthly basis, or as otherwise agreed in writing by TFC, ESCO shall submit written progress reports to TFC, showing percentages of completion and other information

2.2.2. Construction Phase. ESCO shall timely deliver to TFC the construction services for the Project as follows:

2.2.2.1. Adhere to the Work Progress Schedule established in accordance with the terms and conditions of this Contract, as it may be amended from time to time.

2.2.2.2. Requirements for the safety or protection of building occupants, workers, the Work or property at the Site or adjacent thereto, shall be accommodated when coordinating with TFC the work schedules for performance of this contract. ESCO shall not permit the performance of Work on any other day or time than previously agreed to without TFC's prior written consent, which consent shall not be unreasonably withheld.

2.2.2.3. All requests for clarification of information provided in the Contract Documents or for direction concerning information necessary in order to perform the Work must be copied to the TFC Project Manager.

2.2.2.4. On a monthly basis, or as otherwise agreed in writing by TFC, submit written progress reports to TFC, reporting ESCO's assessment of percentages of completion and other information required by TFC.

2.2.2.5. Unless and until instructed otherwise in writing by TFC, ESCO shall also prepare a daily log containing: (i) a statement of which days since the previous monthly report are claimed by ESCO to be subject to Force Majeure portions of the Work in progress; (ii) number of workers on site; (iii) identification of all equipment on site; (iv) problems that might affect progress of the work; and (v) all accidents, injuries, and any other information that may be requested by TFC from time-to-time, and upload said daily log into EPMCS as directed by TFC, by the end of each next business day.

2.2.2.6. During the progress of the Work, ESCO shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris must be in compliance with all applicable Laws and Regulations.

2.2.2.7 ESCO shall plan for and develop the schedule to accommodate necessary inspections and testing of electrical systems. ESCO is strictly prohibited from: (i) de-energizing or otherwise deactivating; or (ii) energizing or otherwise activating, any electrical systems or equipment at the Site without a minimum of twenty-four (24) hour advance notice to, and written approval of, TFC. Any provision in the Contract Documents to the contrary notwithstanding, TFC reserves the right to deny and/or revoke ESCO's authority to energize or otherwise activate any electrical systems or equipment at the Site. ESCO will not be entitled to receive additional compensation for any such denial or revocation.

2.2.2.8. Prior to Substantial Completion of the Work, ESCO shall clean the Site and the Work and make it ready for utilization by TFC. At the Substantial Completion of the Work, ESCO shall store and secure all tools, appliances, construction equipment and machinery, and surplus materials necessary to allow for beneficial occupancy by the end user, and shall restore all property not designated for alteration by the Contract Documents to original condition.

2.2.2.9. Confine all construction operations within the limits of construction indicated on the Drawings or otherwise agreed to in writing by TFC, and use due care in placing construction tools, equipment, materials, and supplies so as to cause the least possible damage to property and interference with traffic. If additional easements for its operations are needed, ESCO is solely responsible for acquisition and maintenance of the easement.

2.2.2.10. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable supplier, except as otherwise may be provided in the Contract Documents.

2.2.2.11. In order for an Application for Final Payment to be considered complete and subject to review and approval, ESCO must submit to TFC a Final Payment Punchlist in such form as prescribed by TFC, jointly executed by ESCO and TFC. No approval of an Application for Final Payment is valid and enforceable unless and until the foregoing

requirement is fully satisfied.

2.2.2.12. ESCO must achieve substantial completion within the period of time specified in the proposal as accepted by TFC, and which shall be stated in the NTP.

2.2.2.12.1. At such time that ESCO considers the entire Work or a portion thereof Substantially Complete, ESCO must notify TFC in writing that said Work will be ready for a Substantial Completion Inspection on a specific date.

2.2.2.12.1.1. ESCO shall include with the foregoing notice a Punchlist that sets out, among other things that may be requested by TFC, the following: (i) a list of those portions of the Work that are to be the subject of the Substantial Completion Inspection; and (ii) the Open Items List, which must include the date for scheduled completion and/or correction for each item of Work contained therein.

2.2.2.12.1.2. The delivery of the foregoing notice by ESCO shall constitute ESCO's certification that it has, in fact, inspected each and every portion of the Work that is to be the subject of the Substantial Completion Inspection and that they are completed in conformity with the Contract Documents.

2.2.2.12.2. No later than ten (10) days prior to the date of the Substantial Completion Inspection, ESCO must deliver to TFC a copy of ESCO's marked-up Record Documents and a preliminary copy of each instructional manual, maintenance and operating manual, parts catalog, wiring diagrams, spare parts, specified written warranties, and like publications or parts for all installed equipment, systems, and like items as described in the Contract Documents for the Work that is the subject of the Substantial Completion Inspection.

2.2.2.12.3. Subject to the provisions of UGC, Subsection 12.1.1, and no later than the Substantial Completion Inspection Deadline, TFC shall conduct a Substantial Completion Inspection to determine whether said portion of the Work has achieved Substantial Completion.

2.2.2.12.3.1. In the event TFC determines that the Work, or any portion thereof, has not been performed or completed in accordance with the Contract Documents, and no later than the Pre-Final Inspection Punchlist Deadline, TFC shall prepare and deliver to ESCO a Pre-Final Inspection Punchlist.

2.2.2.12.3.2. In the event any fees, and/or other direct and/or consequential damages are charged to, or incurred by, TFC by reason of ESCO's failure to timely correct and/or complete the items that are the subject of the Substantial Completion Inspection, ESCO shall be liable to TFC for such fees and/or damages for which TFC may issue a ULCO and deduct those costs from the Final Payment.

2.2.2.12.4. ESCO shall achieve substantial completion within the time frame that ESCO and TFC mutually agree upon prior to issuance of the NTP and the timeframe shall begin on the date documented in the NTP.

2.2.2.13. Subject to the provisions of UGC, Subsection 12.1.2, and no

later than the Final Inspection Deadline, and prior to requesting a Final Inspection, ESCO must complete and/or correct all Work specified in the Pre-Final Punchlist.

2.2.2.13.1. Issuance of a Certificate of Substantial Completion is a condition precedent to ESCO's right to issue notice that the Work will be ready for Final Inspection.

2.2.2.13.2. By requesting a Final Inspection, ESCO thereby certifies that it has, in fact, inspected each and every portion of the Work that is set out in the Pre-Final Punchlist, and that they are completed in conformity with the Contract Documents.

2.2.2.13.3. No later than the Final Inspection Deadline, TFC shall conduct a Final Inspection, to determine whether all of the items set out in the Pre-Final Punchlist have been fully completed in accordance with the Contract Documents.

2.2.2.13.4. In the event TFC determines that any of the Pre-Final Inspection Punchlist items have not been corrected or completed in accordance with the Contract Documents, TFC shall prepare and deliver to ESCO, no later than the Post-Final Inspection Punchlist Deadline, a Post-Final Inspection Punchlist.

2.2.2.13.5. No later than ten (10) days after receipt of the Post-Final Inspection Punchlist, and prior to submitting a request for Final Payment, ESCO must complete and/or correct all Work specified in the Post-Final Inspection Punchlist.

2.2.2.13.6. In the event any fees and/or other consequential damages are charged to, or incurred by, TFC by reason of ESCO's failure to timely correct and/or complete the items that are the subject of the Final Inspection, ESCO shall be liable to TFC for such fees and/or damages.

2.2.2.13.7. At final completion, ESCO shall remove all tools, appliances, construction equipment and machinery, and surplus materials from the Site.

2.2.2.14. In order for an Application for Final Payment to be considered complete and subject to review and approval, ESCO must deliver to TFC:

2.2.2.14.1. a fully completed and executed Final Payment Checklist in such form as is prescribed by TFC;

2.2.2.14.2. all test reports; and

2.2.2.14.3. all Close-out Documents.

2.2.2.14.3.1. No approval of an Application for Final Payment is valid and enforceable unless and until the foregoing requirements are fully satisfied.

2.2.2.14.3.2. Issuance of a Certificate of Final Completion is a condition precedent to ESCO's right to receive Final Payment.

2.2.3. ESCO Services During All Phases. ESCO shall timely deliver to TFC the following services, as applicable, during all phases for which ESCO is obligated to provide construction services:

2.2.3.1. participate in all explanatory presentations as may be requested by TFC;

2.2.3.2. critically review and closely scrutinize all documents submitted by all Subcontractors, suppliers, and all other third-parties;

2.2.3.3. thoroughly review and closely scrutinize the performance, constructability, schedules, and costs of all of its Subcontractors and suppliers;

2.2.3.4. critically review and evaluate Subcontractor's proposed means, methods, schedule, and costs as relevant to each Subcontractor's discipline;

2.2.3.5. maintain work progress and products consistent with the schedules;

2.2.3.6. promptly communicate with pertinent parties, including topics regarding information needs and responses to needs of other parties;

2.2.3.7. actively participate in all meetings and/or teleconferences to bring the full measure of ESCO's collective experience, expertise and recommendations to the Project as it pertains to the overall Project or to a specific discipline including, but not limited to, matters concerning the proposed site use and improvements, selection of materials, and building systems and equipment;

2.2.3.8. ensure that each Subcontractor includes thorough examinations of all documents they author, for accuracy, intended completeness, and constructability as their standard of care for the Project;

2.2.3.9. ensure that its Project Manager, and any other representative of ESCO whose presence is requested by TFC, attend all meetings and participate in all conference calls that are scheduled by TFC; and

2.2.3.10. cooperate with any third party or commissioning agent that may be engaged by TFC.

2.2.4. TFC Approvals. Any provisions in this Contract to the contrary notwithstanding, all consents and/or approvals by TFC shall be in its sole and absolute discretion, and must be in writing.

2.2.4.1. No changes to: (i) the scope of the construction services; or (ii) the Consideration, shall be valid or enforceable unless evidenced by a fully executed written amendment to this Contract.

2.2.4.2. To the extent that TFC approval is required to authorize incurring any costs, such approval must be acquired prior to incurring any such costs.

2.2.4.3. ESCO is not authorized to commence providing any construction services to TFC or any Using Agency with respect to the Project unless and until an appropriate Notice to Proceed is delivered by TFC.

2.2.4.4. TFC, including by and through the TFC Project Manager, reserves the right, if deemed appropriate by TFC in its sole discretion, to extend any of the deadlines set out in this Contract.

2.2.4.5. TFC hereby reserves the right, if deemed appropriate by TFC in its sole discretion, to conduct reviews of inspections during the course of design and construction of the Project. However, ESCO shall not be relieved of any of its obligations arising pursuant to this Contract.

2.2.4.6. No inspections of the Project conducted by TFC during the course of construction, either singularly or in the aggregate, shall reduce the level or extent of ESCO's responsibilities arising pursuant to this Contract. Neither the approval and/or final acceptance of the Project or any Deliverables, the payment of any Pay Application, or the issuance of any Certificates of Final or Substantial Completion by TFC shall constitute, nor be deemed, a release of ESCO's obligation to perform and timely deliver the construction services in a manner consistent with: (i) that degree of care and skill ordinarily exercised by members of the same profession currently practicing under similar circumstances; and (ii) as required by the Contract Documents.

III. CONTRACT DOCUMENTS.

3.1. Contract Documents. In performing its design and construction services for the Project, ESCO shall be bound by, and comply with, the following Contract Documents:

3.1.1. UGC. The UGC.

3.1.2. Supplementary General Conditions. The Supplementary General Conditions.

3.1.3. Special Conditions. The Special Conditions to the UGC.

3.1.4. ESCO's Response to RFQ. Any additional services or provisions depicted in ESCO's Response to Request For Qualifications ("RFQ") No. 303-6-00006, a digital copy of which is incorporated herein by reference for all purposes in PDF on the CD and labeled therein as "Exhibit D," to the extent any warranties, representations, and/or promises of additional services are made therein, and only to that extent.

3.1.5. Utility Assessment Report. The Utility Assessment Report, Exhibit E, prepared by ESCO and approved by TFC.

3.1.6. Improvement List. The Improvement List developed by ESCO and approved by TFC, incorporated herein for all purposes as "Exhibit F."

3.1.7. Specifications. Any Specifications or Drawings prepared by ESCO, and any addenda issued with any request for proposal ("RFP") issued to subcontractors, incorporated herein for all purposes as "Exhibit G."

3.1.8. Measurement and Verification Plan. The Measurement and Verification Plan prepared by ESCO and approved by TFC that measures and verifies the savings for each UCRM, incorporated herein for all purposes as "Exhibit H."

3.1.9. Performance Guarantee Agreement. The Performance Guarantee Agreement prepared by ESCO and approved by TFC, Exhibit I.

3.1.10. Sample Periodic Savings Report. A sample of the Periodic Savings Report in the format approved by TFC, Exhibit J.

3.1.11. Certification Regarding Wage Rate Notifications. Exhibit K.

3.1.12 List of Project Manager and Subcontractors. A list of who will be assigned as Project Manager and Subcontractors, Exhibit L.

3.1.13 Criminal Background Check Criteria. Exhibit M.

3.1.14 HUB Subcontracting Plan form. Exhibit N

3.1.15 HUB Subcontracting Plan PAR Form. Exhibit O.

3.1.16. Tier 1 Product and Manufacturer's List. Exhibit P. Prepared by ESCO and approved by TFC.

3.1.17. Schedule of Values Proposed Payment Schedule. Exhibit Q. Prepared by ESCO and approved by TFC.

3.1.18. Required Checklists and Certifications. Exhibit R. Approved by TFC.

3.1.19. Payment and Performance Bonds [SAMPLE]. Exhibit S. Prepared by TFC and approved by ESCO.

IV. TERM, SUSPENSION, AND TERMINATION.

4.1. Contract Term. This Contract shall be effective as of the Effective Date and shall terminate on August 31, 2026, unless extended by the parties by amendment to this Contract or terminated earlier, as provided below.

4.2. Suspension of Work.

4.2.1. For Cause. TFC may suspend all or any part of the Work, for cause, without prior notice, as more specifically provided in UGC, Section 14.1.

4.2.2. For Convenience. TFC may suspend all or any part of the Work for the convenience of TFC for a period of up to thirty (30) days, without breach of this Contract, upon seven (7) days written notice, as more specifically provided in UGC, Section 14.2.

4.2.3. Suspension of Work. Upon receipt of a Notice of Suspension pursuant to this Section 4.2, ESCO shall, subject to the provisions of UGC, Sections 14.1 and 14.2, immediately stop all Work.

4.3. Termination.

4.3.1. For Cause. Upon written notice to ESCO and its surety, TFC may, without prejudice to any right or remedy, terminate this Contract and take possession of the Site and of all materials, equipment, tools, construction equipment, and machinery thereon owned by ESCO under any of the following circumstances, each one of which shall be considered a material breach of this Contract:

4.3.1.1. Failure or refusal, except during complete or partial suspensions of work authorized under the Contract, to supply enough properly skilled workmen or proper materials;

4.3.1.2. A violation, whether discovered or asserted before or after the Effective Date, of any Laws and/or Regulations of any Governing Authority;

4.3.1.3. The failure of ESCO to timely deliver the services set out herein or timely complete the Project in accordance with the Contract Documents;

4.3.1.4. Failure to timely remedy defective work;

4.3.1.5. Failure to pay Subcontractors, laborers, and material suppliers pursuant to Texas Government Code, Chapter 2251 (West 2016);

4.3.1.6. Creating endangerment to the safety of employees, Subcontractors, or any other members of the public or of the Work;

4.3.1.7. Failure to timely obtain and deliver, or maintain any required bonds or any required proof of insurance, pursuant to the Contract Documents;

4.3.1.8. The falsity of any material statement, warranty or representation when given or made by ESCO to TFC, whether in this Contract, in ESCO's response to the RFP, or otherwise, or any such statement, warranty or representation becoming materially false at any time during the term of this Contract, or any fraud committed by ESCO or its members, officers, agents, or principals in connection with the procurement of this Contract or the delivery of the Construction Management Services;

4.3.1.9. ESCO (i) makes an assignment for the benefit of creditors; (ii) files a voluntary proceeding seeking protection from creditors under any bankruptcy or other law; (iii) is the subject of an involuntary proceeding under any bankruptcy or other similar law and such proceeding is not dismissed within sixty (60) days; or (iv) makes any admission of its inability to

pay its debts generally as they become due;

4.3.1.10. The appointment of a trustee, receiver, or liquidator for ESCO;

4.3.1.11. The use of or otherwise incorporating an item of material or equipment into the Project that is not specified by the Drawings or Specifications, or otherwise approved pursuant to the procedures set out in the Requirements for Substitutions and Equivalents; and

4.3.1.12. Failure to timely comply with any other requirements of the Contract Documents.

4.3.1.13. Upon receipt of a Notice of Termination pursuant to this subsection, ESCO shall immediately stop all Work, and shall continue to cease Work activities, unless and until TFC and ESCO agree on the method and means of satisfying UGC, Subsection 14.3.4.

4.3.2. Termination for Convenience of Owner. TFC may terminate this Contract for any reason and at any time during the performance of the Work as more particularly provided in UGC, Section 14.5. Upon receipt of a Notice of Termination pursuant to this subsection, ESCO shall immediately: (i) stop all Work; and (ii) comply with the provisions of UGC, Subsection 14.5.2.

V. CONSIDERATION.

5.1. Contract Value. The initial value of this contract shall be Three Million Eight Hundred Eighty Thousand and No/100 Dollars ($3,880,000.00). Upon approval and execution of a SECO Interagency Agreement, the value of this contract shall consist of three components:

5.1.1. Utility Assessment Report Sum. Utility Assessment Report ("UAR") for a contract sum of One Hundred Five Thousand and No/100 Dollars ($105,000.00). TFC is not obligated to compensate ESCO until a SECO Interagency Agreement is awarded and executed.

5.1.2. Scope of Utility Cost Reduction Measures Sum. Scope of Utility Cost Reduction Measures for a contract sum of Three Million Six Hundred Thousand and No/100 Dollars ($3,600,000.00).

5.1.3. Measurement and Verification Sum. Measurement and Verification for a contract sum of Two Hundred Eighty Thousand and No/100 Dollars ($280,000.00). TFC may stop Measurement and Verification payments at any time during the Contract Term.

5.2. Payment of the Contract Sum. The Contract Sum shall be paid in accordance with Article 10 of the UGC, subject to any Supplementary General Conditions or Special Conditions or as provided below.

5.2.1. Initial Pay Application. At least twenty-one (21) days prior to the submission of the initial Pay Application, the Schedule of Values must be submitted and approved by TFC, as per UGC, Subsection 10.1.1

5.2.2. Subsequent Pay Applications. In addition to the requirements of UGC, Article 10, each Pay Application must also include the following additional documentation:

5.2.2.1. the Certification Regarding Wage Rate Notification, the form of which is incorporated herein by reference for all purposes as "Exhibit K," wherein ESCO shall certify that, among other things, it is in full compliance with UGC, Section 2.2, Wage Rates;

5.2.2.2. an updated Work Progress Schedule, including the executive summary and all required schedule reports, including any time Change Orders, as per UGC, Paragraphs 8.3.1.3 and 10.2.1.2;

5.2.2.3. a PAR monthly compliance report, as per UGC, Paragraphs 4.2.5.1 and 10.2.1.3;

5.2.2.4. all test results and reports from all Subcontractors and/or otherwise under ESCO's possession or subject to ESCO's control;

5.2.2.5. a duly executed Conditional Waiver and Release on Progress Payment from each Subcontractor that complies with Texas Property Code Section 53.284(b) (West 2014 & Supp. 2015); and

5.2.2.6. any other information or documents as may be requested by TFC.

5.2.3. Payment Application Certifications. Each submission of a Payment Application shall also constitute ESCO's certification that:

5.2.3.1. ESCO has updated all expired insurance policies as required by UGC, Section 5.2;

5.2.3.2. ESCO has updated all the Record Documents, as per UGC, Subsection 6.2.3;

5.2.3.3. ESCO has updated all the Submittal Register, as per UGC, Paragraph 8.3.1.2; and

5.2.3.4. the sums contained in the Payment Application that represent amounts owed to Subcontractors and/or suppliers are, in fact, due and owing to said Subcontractors and/or suppliers, without any deductions or offsets.

5.2.4 Prompt Payment. All payments shall be governed as follows:

5.2.4.1. ESCO shall be paid in accordance with Chapter 2251 of the Texas Government Code (West 2016), also known as the "Prompt Payment Act" and the provisions set out in Article 10 of the UGC, subject to any Special Conditions.

5.2.4.2. For all services rendered, ESCO's payment to Subcontractors is due within ten (10) days after receipt of payment from TFC and, when appropriate, in the sole discretion of TFC, TFC may issue joint checks to ESCO and Subcontractor(s).

5.3. Initial Year. For the initial one (1) year beginning at the Savings Guarantee Commencement Date, TFC shall receive the services as described in the Measurement and Verification Plan, Exhibit H. Thereafter, the Measurement and Verification Plan shall automatically renew for a period of one (1) year, whereby TFC can maintain the current service or upgrade the level of service as provided for in Exhibit H.

5.4. Final Payment. Final payment shall not become due until ESCO has delivered to TFC a complete release of all liens arising out of this Contract covering all labor, materials, and equipment for which a lien could be filed, or a bond satisfactory to TFC to indemnify TFC against such lien.

5.5. SECO Funding. The contract sum and any amendments thereto shall be paid for from an approved SECO Interagency Agreement. The agreement to the Consideration for this contract and any adjustments thereto are subject to the review and approval of those amounts to be funded by SECO and/or their third party reviewer. In accordance with Tex. Gov't Code §2166.406(f-1), TFC may not use money borrowed from this state to pay the provider of energy or water conservation measures under this Agreement.

5.6. Periodic Partial and Final Payment. Periodic partial payments and final payment of this contract sum are subject to the review and approval of SECO or their third party reviewer as they relate to their assessment of the value, stage of completion and efficacy of the energy cost reduction measures as executed by ESCO.

VI. ACKNOWLEDGEMENTS, COVENANTS, AND AGREEMENTS.

6.1. Acknowledgements, Covenants, and Agreements of TFC. TFC acknowledges, covenants, and agrees as follows:

6.1.1. TFC Deliverables to ESCO. TFC shall have provided ESCO with a copy of, or reasonable access to, the following information and documentation regarding the Project:

6.1.1.1. The UGC.

6.1.1.2. Any Supplementary General Conditions.

6.1.1.3. Any Special Conditions.

6.1.1.4. Sample copies of the following:

6.1.1.4.1. bond forms;

6.1.1.4.2. construction payment voucher; and

6.1.1.4.3. time change order form.

6.1.1.5. HUB Subcontracting Plan forms and instructions.

6.1.1.6. Minimum wage rates.

6.1.1.7. The PAR.

6.1.1.8. The communication protocol, which includes the communication and tracking procedure to be utilized for interaction and reporting for the Project.

6.1.2. TFC Services to ESCO. TFC shall timely provide, or cause to be provided, to ESCO the following services for the Project:

6.1.2.1. assuming satisfactory completion of all criminal background checks, assist ESCO in obtaining such access to the Project Site as is reasonably necessary to enable ESCO to provide the construction services;

6.1.2.2. designate the TFC Project Manager who will manage the construction of the Project and the services being provided pursuant to this Contract and the other Contract Documents; and

6.1.2.3. provide intermediate reviews of the work product of ESCO as necessary to allow ESCO to proceed with delivery of the construction services in a timely manner.

6.1.2.4. TFC shall provide ordinary and customary maintenance of TFC's existing equipment and systems that are related to UCRM implemented by ESCO, take reasonable measures to protect and maintain new equipment and systems installed by ESCO and promptly report any known damage or failures of new equipment or systems installed by ESCO to ESCO.

6.1.3. TFC Information. Information under TFC's control shall be furnished by TFC with reasonable promptness as requested by ESCO.

6.1.4. Written Notification. TFC shall notify ESCO in writing of any or all uses or restrictions in usage of all areas of TFC's facility.

6.2. Acknowledgements, Covenants, and Agreements of ESCO. ESCO acknowledges, covenants, and agrees as follows:

6.2.1. Timely Delivery of Conforming Services. ESCO will, subject to Force Majeure events, as defined in Article XII below, timely provide the construction services and construct the Project in conformity with, and as specified in, this Contract, the UGC, the Supplementary General Conditions, any Special Conditions, and the other Construction Documents.

6.2.2. Risk of Loss. Apart from weather delays, errors, omissions or other misrepresentations of the work scope or existing conditions in the construction documents and/or concealed unforeseen conditions, ESCO shall bear all losses, if any, resulting on account of the amount and character of the Work, or because the conditions under which the Work must be done

are different from what were estimated or anticipated by ESCO, or because of weather, floods, elements or other causes.

6.2.3. Limitation of Authority. ESCO agrees that the TFC Project Manager shall not have any express or implied authority to vary or otherwise amend the terms and conditions of this Contract in any way, or waive strict compliance with the terms and conditions of this Contract, any deviation from which must be evidenced by the TFC Project Manager in writing.

6.2.4. Cooperation. All Project managers, employees, and associated Subcontractors shall cooperate with and assist each other and all other ESCOs and design professionals retained by TFC.

6.2.5. Identification of Project Manager and All Subcontractors. The Project Manager identified in the initial List of Project Manager and Subcontractors, incorporated herein by reference for all purposes as "Exhibit L," will supervise the efforts of ESCO to timely provide TFC with the construction services.

6.2.5.1. The Project Manager must be committed to the Project on a full-time basis meaning that it is ESCO's intent that a Project Manager will be assigned to ensure that the work is completed in a timely manner and will work the hours necessary to complete the project. TFC reserves the right to approve the appointment of the Project Manager and to demand that the Project Manager, and any of ESCO's employees or Subcontractors, be removed and replaced if, in the sole opinion of TFC, their performance on this Project or any other Projects, is and/or was not adequate or their continued involvement with the Project will, is, or has become, detrimental to the timely and successful completion of the Project, including but not limited to, for such reasons as: (i) any past or present violation of any statute, rule, regulation or ordinance of any city, county, the State of Texas, or the United States, or any other Laws and Regulations; (ii) TFC's reasonable belief that failure to obtain an acceptable criminal background check will occur; (iii) prior unsatisfactory performance on other TFC projects; and (v) any other like reasons.

6.2.5.2. The Project Manager and Subcontractors identified in Exhibit L shall not be removed or replaced by ESCO, nor shall any other Subcontractors be engaged by ESCO, unless prior written consent is obtained from TFC, which consent shall not be unreasonably withheld, conditioned, or delayed.

6.2.6. Texas Construction Fund Trust Act. All payments to ESCO shall be subject to the provisions of the Texas Construction Fund Trust Act, Tex. Prop. Code Ann. §162.001, et seq.

6.2.7. Buy Texas and Tier One Products. If ESCO is authorized to make purchases under this Contract, ESCO certifies that ESCO will buy Texas products, services, and materials when available at a comparable price and in a comparable period of time pursuant to Texas Government Code, Chapter 2155. Furthermore, ESCO will use UL listed, LED Products supplied by established and reputable manufacturers with a 10 year or longer proven track records in the USA. ESCO will use products from the attached list, the Tier 1 Product and Manufacturer's List incorporated herein for all purposes as "Exhibit P." In the event that a product, fixture or other equipment needed to complete a section or sections of a the project is not available to be used from Exhibit P, ESCO must provide TFC a written explanation of why the product, fixture, or equipment

is unable to be procured from the vendors listed in Exhibit P, and ESCO must receive written approval from TFC for the substitute item or items to be used. TFC will provide written approval on substitution requests in a reasonable amount of time and will not unreasonably withhold consent.

6.2.8. No Assumption. No approvals or acceptances by, or on behalf of, TFC shall be deemed to be an assumption of any responsibility by TFC for any defect, error or omission in said Deliverables or Construction Management Services.

6.2.9 Debts or Delinquencies Owed to the State. Any payment due under this Contract may be withheld and applied toward payment of any debt that is owed to the State of Texas including, but not limited to, delinquent taxes and child support pursuant to Texas Government Code, Section 403.055.

6.2.10. General and Criminal Background Checks.

6.2.10.1 ESCO represents and warrants that ESCO and ESCO's employees have not been convicted of a felony criminal offense, or of a crime involving moral turpitude, or that, if such a conviction has occurred, ESCO has fully advised TFC as to the facts and circumstances surrounding the conviction.

6.2.10.2. All of ESCO's employees and Subcontractors that will perform any work on-site at a state-owned property shall be subject to a criminal background check. Any expense associated with such criminal background check shall be borne by ESCO.

6.2.10.2.1. All criminal background check forms for all of ESCO's employees and Subcontractors that will initially commence any work on-site must be fully completed and submitted to TFC within fifteen (15) days of the date of the appropriate notice of award, and the process thereafter must be diligently pursued by ESCO.

6.2.10.2.2. All criminal background checks must be completed before any employee or Subcontractor performs any services at the Site.

6.2.10.2.3. All criminal background checks must be accomplished by the Texas Department of Public Safety (hereinafter referred to as "DPS"), which includes fingerprint processing by an independent third-party company selected by DPS. Upon receipt of the fingerprints of ESCO's employees and/or Subcontractors, DPS, or TFC, will adjudicate the results of the criminal background searches in accordance with the criteria set forth in the Criminal Background Check Criteria and Information, a digital copy of which is incorporated herein by reference for all purposes in .pdf format on the CD, and named therein as "Exhibit M." ESCO's or Subcontractor's failure to timely secure criminal background check clearance shall not be considered a legitimate delay in the Work Progress Schedule.

6.2.11 Equal Opportunity. ESCO shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, or national origin. ESCO shall take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, sex, religion, age, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or

transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. ESCO shall post in conspicuous places, available to employees or applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination subsection. ESCO shall include the above provisions in all Subcontracts pertaining to Work.

6.2.12. No Advertising. ESCO shall not advertise that it is doing business with TFC or use this Contract as any sort of marketing or sales tool without the prior written consent of TFC.

6.2.13. No Warranties by TFC. **ESCO ACKNOWLEDGES THAT ANY AND ALL TESTS, MAPS, REPORTS, AND DRAWINGS IN THE POSSESSION OF TFC THAT REFLECT OR DEPICT SITE BOUNDARIES, RECORDED EASEMENTS, TOPOGRAPHY, AND UTILITY LOCATIONS WERE PREPARED SOLELY FOR TFC'S BENEFIT AND FOR INFORMATION ONLY PURPOSES, AND THAT ESCO SHALL HAVE NO RIGHT TO RELY UPON SUCH AND THAT ANY RELIANCE THEREON SHALL BE AT ESCO'S OWN RISK.**

6.2.14. Encountering Different Conditions. Apart from weather delays, errors, omissions or other misrepresentations of the work scope or existing conditions in the construction documents and/or concealed unforeseen conditions, ESCO agrees that it shall make no claims for damages, additional compensation or extension of time against TFC because of encountering actual conditions in the course of the Work which vary or differ from conditions or information contained in the Contract Documents.

6.2.15. Sequencing of Construction. TFC reserves the right to: (i) direct the Construction Phase to commence prior to completion of the Pre-Construction Phase, in which case the phases will proceed concurrently; or (ii) to complete the Project in phases.

6.2.16. Warranties and Guarantees. All warranties and guarantees required by the Specifications shall expressly run to the benefit of TFC. If required by TFC , ESCO shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment. In addition to any warranties in this contract, ESCO warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by ESCO or any of ESCO's subcontractors or supplier at any tier. The warranty shall be for the period of 2 years. ESCO's warranty with respect to work repaired or replaced will run for 2 years from the date of repair or replace. The Owner shall notify ESCO, in writing, within a reasonable time after the discovery of any failure, defect, or damage. If ESCO fails to remedy any failure, defect or damage within a reasonable time after receipt of notice, the Owner shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at ESCO's expense.

6.2.17. Unless otherwise provided in the Contract Documents, ESCO shall secure and pay for the building permit and other permits, licenses and inspections necessary for proper execution and completion of the Work.

6.2.18. ESCO shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the Work.

6.2.19. ESCO shall keep the premises and surrounding areas free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, ESCO shall remove from and about Project waste materials, rubbish, ESCO'S tools, equipment, machinery and surplus material.

6.2.20. ESCO shall provide Owner access to the Work in preparation and progress wherever located.

6.2.21. ESCO shall pay all royalties and license fees, shall defend suits or claims for infringement of patent rights, and shall hold Owner harmless from loss on account thereof.

6.2.22. Subcontracts.

6.2.22.1. A Subcontractor is a person or entity who has a direct contract with ESCO to perform a portion of the Work at the site.

6.2.22.2. Unless otherwise stated in the Contract Documents or the bidding requirements ESCO, if requested in writing by Owner, shall furnish in writing to Owner the names of the Subcontractors to whom ESCO plans to award Work. Contracts between ESCO and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to ESCO by the terms of the Contract Documents, and to assume all the obligations and responsibilities which ESCO, by the Contract Documents, assumes toward TFC, and (2) allow to the Subcontractor the benefit of all rights, remedies and redress afforded to ESCO by these Contract Documents.

VII. WARRANTIES AND REPRESENTATION BY ESCO.

7.1 Warranties and Representations by ESCO. ESCO hereby makes the following warranties, representations and certifications, all of which are true, accurate and complete at the time of the Effective Date and throughout the term of the Contract, and which shall be true, accurate and complete with respect to each Deliverable. All representations and warranties discussed below shall survive the expiration or termination of this Contract.

7.1.1. Compliance with All Laws. ESCO shall procure and maintain for the duration of this Contract any state, county, city, or federal license, authorization, insurance, waiver, permit, qualification or certification required by statute, ordinance, law, or regulation to be held by ESCO to provide the goods or services required by this Contract. ESCO agrees to be responsible for payment of any such government obligation not paid by its Subcontractors during the performance of this contract. ESCO agrees to pay all taxes, assessments, fees, premiums, permits, and licenses required by law. As part of its delivery of the Construction Management Services, and apart from responsibility for the compliance of the design with all applicable codes and regulations, ESCO shall make itself familiar with and at all times give all notices required by, and shall observe and comply with, all Laws and Regulations of all Governmental Authorities that in any manner affect performance under this Contract.

7.1.1.1. Neither ESCO, nor any firm, corporation, partnership, or institution represented by ESCO, or anyone acting for them has: (i) violated the antitrust laws of the State of Texas under Texas Business & Commerce Code, Chapter 15 or the Federal antitrust

laws, or (ii) communicated directly or indirectly its response to the Request for Proposals for this Project to any competitor or any other person engaged in such line of business during the procurement process for this Contract.

7.1.1.2. TFC reserves the right, in its sole discretion, to unilaterally amend this Contract throughout its term to incorporate any modifications necessary to address TFC's or ESCO's required compliance with all Laws and Regulations. The parties shall mutually agree to reasonable adjustments to the Contract Sum and to the Contract Time with respect to any such modifications.

7.1.1.3. ESCO has determined what licenses, patents and permits are required under the Contract and will have acquired all such licenses, patents and permits prior to commencement of construction.

7.1.1.4. Neither ESCO nor any firm, corporation, partnership, or institution represented by ESCO, or anyone acting for such firm, corporation or institution has: (i) violated the antitrust laws of the State of Texas under Texas Business & Commerce Code, Chapter 15 or the Federal antitrust laws; or (ii) communicated directly or indirectly its response to the RFP to any competitor or any other person engaged in such line of business during the procurement process for this Contract.

7.1.2. Responses to RFQ. All statements, representations and certifications contained in, or otherwise set out in, ESCO's response(s) to the RFQ for this Project were true and correct when made, and shall remain true and correct throughout the term of this Contract.

7.1.3. Immigration Reform. The Immigration Reform and Control Act of 1986, as amended, the Immigration Act of 1990, and the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, require that all employees provide proof of identity and employment eligibility before they can work in the United States. TFC is committed to complying with all applicable immigration laws of the United States and requires compliance by its contractors and subcontractors. TSP shall not place any employee of TSP at a worksite, nor shall TSP permit any employees, nor any employee of its subcontractor to perform any work on behalf of, or for the benefit of, TFC without first ensuring said employee's authorization to lawfully work in the United States.

7.1.4. Proficiency in Systems. ESCO is proficient in the use of CAD systems and EPMCS utilized by TFC.

7.1.5. Warranty of Deliverables. All Deliverables shall be: (i) completed and delivered in a timely manner and in a manner consistent with that degree of care and skill ordinarily exercised by members of the same profession currently practicing under similar circumstances; (ii) conform to or exceed the specifications set forth in the Contract Documents; and (iii) be fit for ordinary use, of good quality, and with no material defects. ESCO Warrants that all equipment installed as a part of this agreement is new, will be materially free from defects in materials and workmanship, will be installed properly in good workmanlike manner and will function properly. ESCO further warrants that equipment will be installed properly so that all manufacturer's warranties will be valid after ESCO completes the scope of their work under the contract. ESCO shall notify TFC whenever defects in equipment parts or performance occur which give rise to

such rights and remedies and those rights and remedies are exercised by ESCO.

7.1.5.1. Where a Shop Drawing or Sample is required by the Contract Documents or the Submittal Register, any related Work performed prior to TFC's review and approval of the pertinent submittal will be at the sole expense and responsibility of ESCO.

7.1.5.2. Any provisions in the UGC to the contrary notwithstanding, including, but not necessarily limited to Section 13.2, the creation of ESCO's general two (2) year warranty shall not be construed to constitute a waiver of ESCO's obligation to correct, or otherwise be responsible for, any latent defects beyond the above-mentioned two (2) year corrective period.

7.1.5.3. Any provision in the UGC to the contrary notwithstanding, no warranty periods shall commence unless and until a Certificate of Substantial Completion has been issued for the corresponding Work or portion thereof.

7.1.6. Warranty of Improvements. Any provisions herein to the contrary notwithstanding, ESCO expressly warrants that all improvements, including workmanship and materials incorporated into the Project, shall be free from defects.

7.1.7. Eligibility. The individual or business entity named in this Contract is not ineligible to receive the specified Contract and acknowledges that this Contract may be terminated and payment withheld if this certification is inaccurate pursuant to Texas Government Code, Section 2155.004(b).

7.1.8. Family Code Disclosure of Ownership. Pursuant to the requirements of the Texas Family Code, Section 231.006, regarding delinquent child support, the individual or business entity named in this Contract is not ineligible to receive payment under this Contract and, if applicable, ESCO has provided, prior to its execution of this Contract, the name and social security number of each such person (sole proprietors, firm owners, partners, or shareholders) holding at least twenty five percent (25%) ownership of the business entity entering into this Contract. ESCO acknowledges that this Contract may be terminated and payment may be withheld if this certification is inaccurate.

7.1.9. Deceptive Trade Practices Act; Unfair Business Practices Disclosures. ESCO represents and warrants that it has not been found liable of Deceptive Trade Practices Act violations under Chapter 17 of the Texas Business and Commerce Code or of any unfair business practice in any administrative hearing or court suit. ESCO further certifies that it has no officers who have served as officers of other entities who have been found liable of Deceptive Trade Practices violations or of any unfair business practices in an administrative hearing or court suit. In the event that allegations of Deceptive Trade Practices violations under Chapter 17 of the Texas Business and Commerce Code or of any unfair business practices against either ESCO or any of ESCO's officers have occurred or are currently pending in an administrative proceeding or in a lawsuit filed with any court, then ESCO has disclosed all such matters to TFC and provided a brief description of each allegation, information regarding the administrative body or court before which the matter is pending, and the current status of the matter.

7.1.10. Disclosure of Former State Executives. Pursuant to Texas Government Code, Section 669.003 relating to contracting with an executive of a state agency, no Person who, in the

past four (4) years served as an executive of TFC or any other state agency was involved with or has any interest in this Contract or any Contract resulting from this Contract. If ESCO employs or has used the services of a former executive head of TFC or any other state agency, then ESCO has provided the name of the former executive, the name of the state agency, the date of separation from the state agency, the position held with ESCO, and the date of employment with ESCO.

7.1.11. Financial Interests/Gifts. Neither ESCO nor any of its principals, officers, directors, employees, other agents, or relatives within the second degree of consanguinity or affinity have given, offered to give, nor intends to give at any time hereafter, any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor, or service to a public servant in connection with this Contract pursuant to Texas Government Code, Sections 572.051, 2255.001 and Texas Penal Code, Section 36.09.

7.1.12. Prior Employment. ESCO knows of no officer or employee of TFC, nor any relative within the second degree of consanguinity or affinity of an officer or employee of TFC, that has a financial interest in ESCO's firm or corporation. ESCO further certifies that no partner, corporation, or unincorporated association that employs, retains or contracts with, or which may employ, retain, or contract with any of the above, has a financial interest in any entity with which ESCO will be dealing on behalf of TFC pursuant to Texas Government Code, Chapter 573 and Section 2254.032. Furthermore, ESCO certifies and agrees that if it employs any former employee of TFC, such employee will perform no work in connection with this Contract during the twelve (12) month period immediately following the employee's last date of employment at TFC.

7.1.13. Affirmation as to Submittals. Upon submittal to TFC of any documentation or data that was created or modified by ESCO, including but not limited to Drawings, Specifications, and the Budget, all representations contained therein shall be true and accurate as to each such creation or modification.

7.1.14. Site Inspection. ESCO has had an opportunity to examine, and has carefully examined, all of the Contract Documents including, but not limited to, the Drawings and the Specifications, and has fully acquainted itself with the Scope of Work, design, availability of materials, existing facilities, obstructions, and all other conditions pertaining to the Work, the site of the Work and its surroundings; that it has made all investigations essential to a full understanding of the difficulties which may be encountered in performing the Work; and that anything in any of the Contract Documents or in any representations, statements or information made or furnished by TFC or its representatives notwithstanding, ESCO will regardless of any such conditions pertaining to the Work, the site of the Work or its surroundings, apart from errors, omission and concealed unforeseen conditions, complete the Work for the compensation stated in this Contract, and pursuant to the extent of ESCO's liability under this Contract, assume full and complete responsibility for any such conditions pertaining to the Work, the site of the Work or its surroundings, and all risks in connection therewith.

VIII. STATE FUNDING.

8.1. State Funding. This Contract shall not be construed as creating any debt on behalf of the State of Texas and/or TFC in violation of Tex. Const. art. III, § 49. In compliance with Tex. Const. art. VIII, § 6, it is understood that all obligations of TFC hereunder are subject to the availability of state funds. If such funds are not appropriated or become unavailable, this Contract may be

terminated. In that event, the parties shall be discharged from further obligations, subject to the equitable settlement of their respective interests accrued up to the date of termination. Furthermore, any damages due under this Contract should not exceed the amount of funds appropriated for payment under this Contract, but not yet paid to ESCO, for the fiscal year Budget in existence at the time of the breach.

IX. COPYRIGHTS AND TRADEMARKS.

9.1 Copyrights. ESCO agrees that all Deliverables provided pursuant to this Contract are subject to the rights of TFC in effect on the date of execution of this Contract. These rights include the right to use, duplicate and disclose such subject matter and data, in whole or in part, in any manner for alterations, additions, remodels or maintenance; and to have others do so including production of Deliverables in response to a public information request pursuant to Texas Government Code, Chapter 552. If the Deliverables produced by ESCO are subject to copyright protection, ESCO hereby grants to TFC a royalty-free, nonexclusive, and irrevocable license to reproduce, publish, and use such and to authorize others to do so. ESCO shall include appropriate provisions to achieve the purpose of this condition in all Subcontracts entered into that produce Information subject to copyright protection.

9.1.1 Disclaimers. All such Deliverables furnished by ESCO pursuant to this Contract shall be considered instruments of its services in respect to the Project. It is understood that ESCO does not represent such Deliverables to be suitable for reuse on any other study or for any other purpose(s). If TFC verifies or adapts ESCO's Deliverables for TFC's use on another study, ESCO shall be compensated for redesign or new design, bidding, and construction administration services.

9.1.2. Delivery to TFC. ESCO shall promptly provide copies of the Deliverables to TFC upon completion, termination, or cancellation of this Contract for any reason, including all copies of the Deliverables in any form or medium specified by TFC in this Contract, whether written, digital, or electronic.

9.2 No Use of Name or Trademark. ESCO agrees not to make any written use of or reference to TFC's name or registered or unregistered trademarks for any marketing, public relations, advertising, display or other business purpose or make any use of TFC's facilities for any activity related to the express business purposes and interests of TFC pursuant to this Contract, without the prior written consent of TFC, which consent may be withheld or granted in TFC's sole discretion.

X. RECORDS, AUDIT, PROPRIETARY INFORMATION AND PUBLIC DISCLOSURE.

10.1. Books and Records. ESCO shall keep and maintain under generally accepted accounting principles full, true and complete records, as are necessary to fully disclose to TFC or the United States Government, or their authorized representatives, upon audits or reviews, sufficient information to determine compliance with the terms and conditions of this Contract and all state and federal regulations and statutes.

10.2. Inspections and Audits. ESCO agrees that all relevant records related to this Contract or any work product under this Contract, including practices of its Subcontractors, shall be subject,

at any reasonable time, to inspection, examination, review, audit, and copying at any office or location of ESCO where such records may be found, with or without notice by the Texas State Auditor's Office ("SAO"), the contracting agency or its contracted examiners, or the Office of the Texas Attorney General, and with regard to any federal funding, the relevant federal agency, the Comptroller General, the General Accounting Office, the Office of the Inspector General, or any of their authorized representatives. All Subcontracts shall reflect the requirements of this section. In addition, pursuant to Texas Government Code, Section 2262.003, the SAO may conduct an audit or investigation of any entity receiving funds under this Contract, including direct payments to ESCO and indirect payments under a Subcontract to this Contract; acceptance of such monies acts as acceptance of SAO authority, under legislative audit committee direction, to audit and investigate related to those funds and the entity subject to the audit or investigation must provide SAO with access to any information SAO considers relevant to the scope of the audit or investigation. ESCO will fully disclose all costs of materials and labor purchased and subcontracted and a list of hourly rates and position descriptions for labor or services provided by ESCO upon TFC's request. ESCO will maintain cost accounting records on authorized work performed under actual costs for labor and material, or other basis requiring accounting records. ESCO will afford TFC access to these records. Costs will be evaluated through price analysis to compare costs with reasonable criteria such as established catalog and market prices or historical prices.

10.3. Records Retention. All records relevant to this Contract shall be retained for a minimum of four (4) years. This retention period runs from the date of payment for the relevant goods or services by TFC, or from the date of termination of the Contract, whichever is later. Retention time shall be extended when an audit is scheduled or in progress for a period reasonably necessary to complete an audit and/or to complete any administrative proceeding or litigation which may ensue.

10.4. Confidentiality Provisions Applicable to ESCO.

10.4.1. Protection of Confidential Information. ESCO hereby acknowledges, understands and agrees: (i) that in the course of conducting its due diligence regarding the provision of Construction Management Services to TFC, certain Confidential Information (as defined below) will be disclosed to ESCO; and (ii) that whether developed by TFC or others employed by or associated with TFC, all Confidential Information is, and shall remain, the exclusive and confidential property of TFC, and shall be at all times regarded, treated and protected as such by ESCO in accordance with this Contract. Failure to mark any information "Confidential" shall not affect the confidential nature of such information.

10.4.2. Definition of Confidential Information. "Confidential Information" shall mean all information, whether or not originated by TFC, which is used in, or a part of, TFC's business and operations and is: (i) proprietary to, about, or created by TFC; (ii) gives TFC some competitive advantage or the opportunity of obtaining such advantage or the disclosure of which could be detrimental to the interests of TFC; (iii) designated as "Confidential Information" by TFC, or from all the relevant circumstances should reasonably be assumed by ESCO to be confidential and proprietary to TFC; or (iv) not generally known by ESCO. Such Confidential Information includes, but is not limited to, the following types of information and other information of a similar nature (whether or not reduced to writing or designated as confidential):

10.4.2.1. work product resulting from, or related to, work, projects, or

services performed or to be performed by TFC for ESCO and/or for actual and potential Using Agencies that are related to the business and/or operations of TFC, including but not limited to, methods, processes, procedures, analysis, techniques, and audits used in connection therewith;

10.4.2.2. computer software of any type or form in any stage of actual or anticipated research and development, including, but not limited to, programs and program modules, routines and subroutines, processes, algorithms, design concepts, design specifications, (design notes, annotations, documentation, flowcharts, coding sheets, and the like), source code, object code and load modules, programming, program patches, and system designs;

10.4.2.3. information relating to TFC's proprietary rights prior to any public disclosure thereof, including but not limited to, the nature of the proprietary rights, production data, technical and engineering data, test data and test results, the status and details of research and development of products and services, and information regarding acquiring, protecting, enforcing and licensing proprietary rights (including patents, copyrights and trade secrets);

10.4.2.4. internal personnel and financial information, vendor names and other vendor information (including vendor characteristics, services, and agreements), customer lists and contacts, business plan(s), purchasing and internal cost information, internal services and operational manuals, pricing, marketing, and all other manner and methods of conducting TFC's business;

10.4.2.5. marketing and development plans, price and cost data, price and fee amounts, pricing and billing policies, quoting procedures, marketing techniques and methods of obtaining business, forecasts and forecast assumptions and volumes, and future plans and potential strategies of TFC which have been or are being discussed;

10.4.2.6. any information obtained from TFC regarding its pursuit or negotiation of agreements with any potential "Contracting Person" regarding a potential "Qualifying Project" as those terms are defined in Chapter 2267 of the Texas Government Code, including, but not necessarily limited to, the names of the Contracting Person, including their representatives, (collectively, "Business Customers"); the parties to and substance of any agreements between TFC and said Business Customers; services and data provided, or to be provided, by or to said Business Customers; and the type, quantity and specifications of products and services purchased, leased, licensed or received, or to be purchased, leased, licensed or received, by Business Customers; and

10.4.3. Exclusions. "Confidential Information" shall not include information that: (i) is or becomes available to the public generally, other than as a result of disclosure by ESCO in breach of the terms of this Contract; (ii) becomes available to ESCO from a source (other than TFC) which source is not, to the best of ESCO's knowledge, subject to any legally binding obligation to keep the same confidential; or (iii) has been independently acquired or developed by ESCO.

10.4.4. Covenants. As a consequence of ESCO's acquisition or anticipated acquisition of Confidential Information, ESCO will occupy a position of trust and confidence to TFC with respect to TFC's affairs and business. In view of the foregoing and of the mutual

consideration to be provided to each party, ESCO agrees that it is reasonable and necessary that it make the following covenants:

10.4.4.1. No Disclosure. Both during and forever after the performance of its due diligence investigation, ESCO will not disclose Confidential Information to any Person or entity other than as necessary in carrying out its duties on behalf of TFC and/or due diligence investigation, without first obtaining TFC's prior, written consent, and ESCO will take all reasonable precautions to prevent inadvertent disclosure of such Confidential Information. This prohibition against ESCO's disclosure of Confidential Information includes, but is not limited to, disclosing the fact that any similarity exists between the Confidential Information and information independently developed by another Person or entity, and ESCO understands that such similarity does not excuse ESCO from abiding by its covenant or other obligations pursuant to this Contract.

10.4.4.2. No Use, Copying, or Transfer. Both during and after the conduct of its due diligence investigation, ESCO will not use, copy, or transfer Confidential Information other than as necessary in carrying out its duties on behalf of TFC and/or due diligence investigation, without first obtaining prior written consent of TFC, and will take all reasonable precautions to prevent inadvertent use, copying, or transfer of such Confidential Information. This prohibition against ESCO's use, copying, or transfer of Confidential Information includes, but is not limited to, selling, licensing or otherwise exploiting, directly or indirectly, any products or services (including software in any form) that embody or are derived from Confidential Information.

10.4.4.3. No Use of Name or Trademark. ESCO agrees not to make any written use of or reference to TFC's name or registered or unregistered trademarks (or any names under which TFC conducts business or operations) for any marketing, public relations, advertising, display or other business purpose or make any use of TFC's facilities for any activity related to the express business purposes and interests of TFC pursuant to this Contract, without the prior written consent of TFC, which consent may be withheld or granted in TFC's sole and absolute discretion.

10.4.4.4. Non-Circumvention. ESCO agrees not to utilize, either directly or indirectly, any Confidential Information in order to facilitate or create direct business relationships with Business Customers of TFC.

10.5. Confidentiality Provisions Applicable to TFC. Subject to the provisions of Section 10.6 below, TFC shall keep confidential all information, in whatever form, produced, prepared, or observed by ESCO to the extent that such information is: (i) confidential by law; (ii) marked or designated "confidential," or words to that effect, in a font size no smaller than 14 point, by ESCO; or (iii) information that TFC is otherwise required to keep confidential by this Contract.

10.6. Public Records: Notwithstanding any provisions of this Contract to the contrary, ESCO understands that TFC will comply with the Texas Public Information Act, Texas Government Code, Chapter 552 as interpreted by judicial opinions and opinions of the Attorney General of the State of Texas. If contacted by TFC, ESCO will cooperate with TFC in the production of documents responsive to the request. ESCO agrees to provide the documents responsive to the request in the format specified by TFC. ESCO may request that TFC seek an opinion from the Attorney General of the State of Texas. However, TFC will not honor ESCO's request for an

opinion if the request is not based upon a reasonable interpretation of the Texas Public Information Act. Additionally, ESCO will notify TFC's General Counsel within twenty-four (24) hours of receipt of any third-party requests for information that was provided by the State of Texas for use in performing the Contract. This Contract and all data and other information generated or otherwise obtained in its performance may be subject to the Texas Public Information Act. ESCO agrees to maintain the confidentiality of information received from the State of Texas during the performance of this Contract, including information which discloses confidential personal information particularly, but not limited to, social security numbers. Furthermore, ESCO is required to make any information created or exchanged with the State pursuant to this Contract, and not otherwise excepted from disclosure under the Texas Public Information Act, available in a format that is accessible by the public at no additional charge to the State.

10.7. Electronic and Information Resources Accessibility Standards, as required by Title 1 of the Texas Administrative Code, Chapter 213 (APPLICABLE TO STATE AGENCY AND INSTITUTION OF HIGHER EDUCATION PURCHASES ONLY). Effective September 1, 2006, all State agencies and institutions of higher education shall procure products which comply with the State of Texas Accessibility requirements for Electronic and Information Resources specified in 1 Texas Administrative Code, Chapter 213 when such products are available in the commercial marketplace or when such products are developed in response to a procurement solicitation. If applicable, ESCO shall provide DIR with the URL to its Voluntary Product Accessibility Template (VPAT) for reviewing compliance with the State of Texas Accessibility requirements (based on the Federal standards established under Section 508 of the Rehabilitation Act), or indicate that the product/service accessibility information is available from the General Services Administration "Buy Accessible Wizard" (http://www.buyaccessible.gov). ESCOs not listed with the "Buy Accessible Wizard" or supplying a URL to their VPAT must provide DIR with a report that addresses the same accessibility criteria in substantively the same format. Additional information regarding the "Buy Accessible Wizard" or obtaining a copy of the VPAT is located at http://www.section508.gov/.

XI. BONDS AND INSURANCE.

11.1. Bonds. For all phases of the Project, ESCO shall timely obtain and deliver to TFC the bonds required by Section 5.1 of the UGC for each such phase, provided however, the provisions of Paragraph 5.1.3.1 of the UGC to the contrary notwithstanding, ESCO shall have obtained and delivered the Bid Bond contemporaneously with submission of ESCO's response to an RFP or other TFC solicitation process.

11.2. Insurance Requirements. ESCO shall timely obtain and maintain insurance in the following types and amounts for the duration of this Contract (unless specifically provided otherwise herein), and must timely comply with the following additional insurance requirements:

11.2.1. Amounts and Types of Insurance Coverages. The amounts and types of required insurance coverages are as follows:

11.2.1.1. Workers' Compensation and Employers' Liability Coverage. ESCO hereby certifies, pursuant to Texas Labor Code, Section 406.096(a), that ESCO provides or will provide at, or prior to, execution of the Guaranteed Maximum Price Amendment, Workers' Compensation and Employers' Liability insurance for employees employed on this public project

with limits of not less than: (i) $1,000,000 each accident; (ii) $1,000,000 disease each employee; and (iii) $1,000,000 disease policy limit.

11.2.1.1.1. Coverage must meet the statutory requirements of Texas Labor Code, Section 401.011(44).

11.2.1.1.2. As per Tex. Lab. Code §406.096(b), ESCO shall require each Subcontractor to certify in writing to ESCO that said Subcontractor provides workers' compensation and employers' liability insurance for all of Subcontractor's employees employed on this public project. ESCO shall forward said certifications to TFC within ten (10) days of the Effective Date of the Contract.

11.2.1.1.3. The policy must include Other States Endorsement to include the State of Texas if ESCO's business is domiciled outside the State of Texas.

11.2.1.2. Commercial General Liability. Commercial general liability insurance coverage including premises; operations; blanket contractual liability coverage assumed under the Contract and all contracts relative to the Project, including Independent ESCO's liability pursuant to unamended ISO (also known as "Insurance Services Office, Inc."), or its equivalent; products and completed operations; and extended to include explosion, collapse, and underground hazards, with a combined single limit of $1,000,000 per occurrence and a general aggregate of $2,000,000.

11.2.1.2.1. The general aggregate shall apply on a per Project basis.

11.2.1.3. Business Automobile Liability Insurance. Business automobile liability coverage for all owned, non-owned, and hired vehicles with a minimum combined single limit of $1,000,000 per occurrence for bodily injury and property damage. Alternate acceptable limits are $1,000,000 bodily injury per person, $1,000,000 bodily injury per occurrence, and at least $1,000,000 property damage liability per accident.

11.2.1.3.1 No aggregate shall be permitted.

11.2.1.3.2. Such insurance must include coverage for loading and unloading hazards.

11.2.1.4. All-Risk Builder's Risk Insurance. ESCO shall obtain and maintain All-Risk Builder's Risk Insurance, or all-risk installation floater for those instances in which the Project involves solely the installation of material and/or equipment.

11.2.1.4.1. Coverage shall be all-risk, including, but not limited to, fire, extended coverage, vandalism and malicious mischief, theft and, if applicable, flood, earth movement and named storm.

11.2.1.4.2. Builder's risk and installation floater limits shall be equal to one hundred percent (100%) of the Contract Sum.

11.2.1.4.3. For renovation projects or projects that involve portions of Work contained within an existing structure, the policy must also include coverage in the additional sum of $1,000,000. Existing Property and TFC-furnished equipment, if any, specified by TFC.

11.2.1.4.3.1. For purposes herein, "Existing Property" means existing buildings or structures, [OPTIONAL] as well as, all personal property contained therein. "Existing Property" does not include personal property owned or operated by CMR or any Subcontractors.

11.2.1.4.4. For TFC-furnished equipment or materials that will be in care, custody or control of ESCO, ESCO shall be responsible for any and all damages and losses thereto.

11.2.1.4.5. The policy must be written jointly in the names of TFC and ESCO. Subcontractors must be named as additional insureds.

11.2.1.4.6. The policy shall have endorsements as follows:

11.2.1.4.6.1. this insurance shall be specific as to coverage and not contributing insurance with any permanent insurance maintained on the property;

11.2.1.4.6.2. this insurance shall not contain an occupancy clause suspending or reducing coverage should Owner partially occupy the Site and before the parties have determined Substantial Completion; and

11.2.1.4.6.3. loss, if any, shall be adjusted with and made payable to TFC as trustee for the insureds as their interests may appear. TFC shall be named as loss payee.

11.2.1.4.6.4. Valuation of any loss for the renovation and any existing property (exclusive of building and existing structures) shall be at replacement cost.

11.2.1.4.7. Policy shall remain in effect until Substantial Completion is achieved as to all phases of the Project.

11.2.1.5. <u>Umbrella Liability Insurance.</u> Umbrella liability insurance for a period not to expire or terminate prior to the expiration of all warranty periods, insuring ESCO for an amount of not less than One Million and No/100 Dollars ($1,000,000.00), which provides coverage at least as broad as, and applies in excess and follows form of, the primary liability coverages required hereinabove. The policy shall provide "drop down" coverage where underlying primary insurance coverage limits are exhausted or otherwise unavailable or inadequate to cover a loss.

11.2.2. <u>General Requirements for All Insurance.</u> The following provisions shall

apply to all insurance requirements:

11.2.2.1. Deductibles and Self-Insured Retentions. ESCO shall be responsible for all deductibles and self-insured retentions, if any, stated in policies. All deductibles and self-insured retentions shall be disclosed on the certificates of insurance.

11.2.2.2. Occurrence Policies. Unless specifically provided otherwise herein, all policies must be written on an occurrence basis.

11.2.2.3. Claims–Made Policies. if coverage is underwritten on a claims-made basis, the retroactive date for the policy and all renewals shall be coincident with the Effective Date of this Contract and the certificate of insurance shall state that the coverage is claims-made and the retroactive date. Any premiums for this extended reporting period shall be paid by ESCO.

11.2.2.4. Additional Policy Requirements. In the event the primary insurance policy does not so provide, ESCO shall obtain and maintain endorsements as to each deficient policy, or provide such other document(s) as may be approved in advance by TFC, that satisfy all of the following requirements:

11.2.2.4.1. naming "**Texas Facilities Commission, P.O. Box 13047, Austin, Texas 78711, its officials, directors, employees, representatives, and volunteers,**" as additional insureds, provided however, this requirement does not apply to workers' compensation insurance;

11.2.2.4.2. the policy, or such other document(s) as may be acceptable to TFC, must obligate the insurer, or a third-party acceptable to TFC, notify the Texas Facilities Commission, Attn: Carol Palermo, CISR, Insurance Analyst, P.O. Box 13047, Austin, Texas 78711, of any: (i) non-renewal; (ii) cancellations; or (iii) material changes, in writing, as soon as is reasonably possible prior to any such non-renewal, cancellation or change;

11.2.2.4.2.1. "Material Change" means any of the following changes to the policy during the term of the Policy:

11.2.2.4.2.1.1. a change in the policy period;

11.2.2.4.2.1.2. a material revision to, or removal of, a coverage section;

11.2.2.4.2.1.3. a reduction of the amount of limits of insurance, provided such reduction is not the result of payment of damages, medical expenses, or claim expenses; or

11.2.2.4.2.1.4. an increase of the amount of any self- insured retentions; and

11.2.2.4.3. as to those policies wherein TFC is an additional

insured, said insurance coverages must be primary and non-contributing with respect to insurance or self-insurance carried by TFC, if any; and

11.2.2.4.4. the policy must provide a waiver of subrogation rights to TFC for the workers' compensation, employers' liability, commercial general liability, and business automobile liability policies.

11.2.2.5. No Commencement of Work. ESCO shall not, nor allow any Subcontractor(s) to commence Work until the proof of satisfaction of the insurance requirements has been received and approved by TFC. However, any approval of the insurance requirements by TFC shall not relieve or reduce the liability of ESCO hereunder.

11.2.2.6. Qualifications of Insurer. All insurance must be written by a company licensed to do business in the State of Texas at the time the policy and any renewals are issued, and must be written by a company with an A.M. Best rating of A- or better.

11.2.3. No Cancellation or Lapse. ESCO shall not cause or permit any required insurance to cancel or lapse prior to the expiration of all warranty periods, provided however, policy duration for builder's risk (or as applicable, an installation floater) is not governed by this provision.

11.2.4. Notice of Erosion. ESCO shall provide TFC thirty (30) days written notice of erosion of any aggregate limits below the minimum amounts required by the Contract.

11.2.5. Right to Review. TFC reserves the right to review the insurance requirements of Article XII during the effective period of the Contract and to make reasonable adjustments to insurance coverage and their limits when deemed necessary and prudent by TFC based upon changes in statutory law, court decisions or the claims history of the industry and/or of ESCO, provided however, such modifications must be commercially available to ESCO. TFC shall make an equitable adjustment to the Contract Sum for any additional cost resulting therefrom.

11.2.6. Losses Paid by ESCO. Actual losses not covered by insurance as required by this Contract shall be paid by ESCO.

11.2.7. Failure to Obtain or Maintain. Failure to timely obtain and maintain the insurance coverages as required under this Contract may subject ESCO to, among other remedies, the following:

11.2.7.1. disqualification from eligibility to participate in any other or future projects with TFC;

11.2.7.2. suspension of Work for cause pursuant to UGC, Article 14;

11.2.7.3. in the event ESCO fails to timely renew or pay any of the renewal premiums for any expiring policies, TFC shall have the right (but not the obligation) to: (i) make such payments; and/or (ii) acquire replacement coverage, and set off the amount(s) or costs thereof against the next payment(s) coming due to ESCO under the Contract or under any other contract between TFC and ESCO; and/or

11.2.7.4. TFC may withhold of any payments due to ESCO from this Project or any other TFC project until satisfaction is achieved.

11.2.8. TFC a Third-Party Beneficiary. It is hereby acknowledged and agreed that TFC is a third-party beneficiary of any agreement(s) between ESCO and any and all Persons who procure, or cause to be procured, the above-described insurance coverages, and all renewals thereof, for the Project.

XII. MISCELLANEOUS.

12.1. Indemnification. **TO THE FULLEST EXTENT PERMITTED BY LAW, ESCO SHALL INDEMNIFY AND HOLD HARMLESS TFC AND THE STATE OF TEXAS, THEIR AGENTS, OFFICIALS, DIRECTORS, EMPLOYEES, REPRESENTATIVES, AND VOLUNTEERS, FROM ALL LIABILITY AND DAMAGES FOR ANY AND ALL INJURIES OR DAMAGES SUSTAINED BY ANY PERSON OR PROPERTY TO THE EXTENT CAUSED BY ANY NEGLIGENCE IN THE PERFORMANCE OF THE SERVICES REFERENCED HEREIN AND FROM ANY CLAIMS OR AMOUNTS ARISING OR RECOVERABLE UNDER BOTH FEDERAL AND STATE WORKERS COMPENSATION LAWS, TEXAS TORT CLAIMS ACT (CHAPTER 101, TEX. CIVIL PRACTICE AND REMEDIES CODE), OR ANY OTHER SUCH LAWS. ESCO SHALL FURTHER SO INDEMNIFY AND BE RESPONSIBLE FOR ALL CLAIMS, DEMANDS, CAUSES OF ACTION, INJURIES, DAMAGES, LOSSES, COSTS, ATTORNEY'S FEES AND EXPENSES (INCLUDING EXPERT'S AND ATTORNEY'S FEES AND EXPENSES AT ALL LEVELS OF PROCEEDINGS), TO THE EXTENT CAUSED BY ANY NEGLIGENT ACT, OMISSION OR MISCONDUCT OF ESCO, ESCO'S AGENTS OR EMPLOYEES, IN THE MANNER OR METHOD OF EXECUTION OF THE SERVICES HEREIN TO BE PERFORMED; OR FROM FAILURE TO PROPERLY PERFORM THE SERVICES TO THE REQUIRED STANDARD STATED HEREIN; OR FROM DEFECTIVE PRODUCT OR SERVICES; OR FROM BREACH OF ANY REPRESENTATION OR WARRANTY HEREIN. THESE REQUIREMENTS SHALL SURVIVE THE TERM OF THIS CONTRACT UNTIL ALL CLAIMS HAVE BEEN SETTLED OR RESOLVED AND SUITABLE EVIDENCE TO THAT EFFECT HAS BEEN FURNISHED TO TFC.**

12.1.1. Notice to TFC. In the event ESCO becomes aware of any claim that may be subject to the above-described indemnification, ESCO shall notify TFC of such claim within five (5) business days of becoming aware.

12.1.2. Settlement Authority. No settlement of any such claim shall be made by ESCO without TFC's prior written approval.

12.2. Historically Underutilized Businesses ("HUB"). In accordance with state law, it is TFC's policy to assist HUBs, whether minority or women-owned, whenever possible, to participate in providing goods and services to the agency. TFC encourages those parties with whom it contracts for the provision of goods and services to adhere to this same philosophy in selecting Subcontractors to assist in fulfilling ESCO's obligations with TFC. If ESCO subcontracts with others for some or all of the services to be performed under this Contract, ESCO shall comply with

all HUB requirements pursuant to Chapter 2161 of the Texas Government Code. ESCO shall submit a *HUB Subcontracting Plan*, the form of which is incorporated herein by reference for all purposes as "Exhibit N." ESCO shall provide the Internal Procurement Division of TFC with pertinent details of any participation by a HUB in fulfilling the duties and obligations arising hereunder on the *HUB Subcontracting Plan PAR*, the form of which is incorporated herein by reference for all purposes as "Exhibit O." PARs shall be submitted monthly with each invoice and are a condition of payment.

12.3. Relationship of the Parties. ESCO is associated with TFC only for the purposes and to the extent specified in this Contract, and with respect to performance of the contracted services pursuant to this Contract, ESCO is and shall be an independent ESCO. Subject only to the terms of this Contract, ESCO shall have the sole right to supervise, manage, operate, control, and direct performance of the details incident to its duties under this Contract. TFC has no right or obligation to control the methods and means of performing the Work except as to the obligation to ensure compliance with the Contract Documents. The divisions and sections of the Specifications and the identifications of any Drawings shall not control ESCO in dividing the Work among Subcontractors or delineating the Work to be performed by any specific trade. Nothing contained in this Contract shall be deemed or construed to create a partnership or joint venture, to create relationships of an employer-employee or principal-agent, or to otherwise create any liability for TFC whatsoever with respect to the indebtedness, liabilities, and obligations of ESCO or any other party. ESCO shall be solely responsible for, and TFC shall have no obligation with respect to the following:

12.3.1. withholding of income taxes, FICA, or any other taxes or fees;

12.3.2. industrial or workers' compensation insurance coverage;

12.3.3. participation in any group insurance plans available to employees of the State of Texas;

12.3.4. participation or contributions by the State to the State Employees Retirement System;

12.3.5. accumulation of vacation leave or sick leave; or

12.3.6. unemployment compensation coverage provided by the State.

12.4. No Assignment & Subcontracts. ESCO shall neither assign, transfer, nor delegate any rights, obligations, or duties under this Contract without the prior written consent of TFC. Notwithstanding the foregoing, it is mutually understood and agreed that ESCO may subcontract with third parties for some or all of the Construction Management Services to be performed. In any approved Subcontracts, ESCO shall legally bind such Subcontractor to perform and make such Subcontractor subject to all the duties, requirements, and obligations of ESCO specified herein. Nothing herein shall be construed to relieve ESCO of the responsibility for ensuring that the goods delivered and/or the services rendered by ESCO and/or any of its Subcontractors comply with all the terms and provisions of this Contract. ESCO will provide written notification to TFC of any such Subcontractor performing work under this Contract, including the name and taxpayer identification number of Subcontractor, the task(s) being performed, and the number of

Subcontractor employees expected to work on the task.

12.5. Drug Free Work Place. ESCO, ESCO's employees and Subcontractors shall comply with the applicable provisions of the Drug-Free Work Place Act of 1988 (Public Law No. 100-690, Title V, Subtitle D; 41 U.S.C. 701 et seq.) and maintain a drug-free work environment, and the final rule, government-wide requirements for drug-free work place (grants), issued by the Office of Management and Budget and the Department of Defense (32 CFR Part 280, Subpart F) to implement the provisions of the Drug-Free Work Place Act of 1988 is incorporated by reference and ESCO, ESCO's employees, and Subcontractors shall comply with the relevant provisions thereof, including any amendments to the final rule that may hereafter be issued.

12.6 Notices. All notices, demands and requests required in this Contract shall be in writing and shall be deemed to have been properly delivered and received: (i) three (3) business days after deposit in a regularly maintained receptacle for the United States mail, certified mail, return receipt requested and postage prepaid; or (ii) one (1) business day after deposit with Federal Express or comparable overnight delivery system for overnight delivery with all costs prepaid. All notices, demands and requests hereunder shall be addressed as follows:

If to TFC: Texas Facilities Commission
Attention: Legal Services Division
1711 San Jacinto Blvd., Suite 400
Austin, Texas 78701

With a Copy to: Texas Facilities Commission
Attention: John S. Raff, Deputy Executive Director
1711 San Jacinto Blvd., Suite 400
Austin, Texas 78701

If to ESCO: Performance Services of Texas
Attention: Doug Kirkley
3010 LBJ Freeway
Suite 1200
Dallas, Texas 75234

Either party hereto may change its address by giving the other party written notice thereof at least five (5) business days in advance of the Effective Date for such new address.

12.7. Governing Law and Venue. This Contract and the rights and obligations of the parties hereto shall be governed by, and construed according to, the laws of the State of Texas, exclusive of conflicts of law provisions. Venue of any suit brought pursuant to this Contract shall be in a court of competent jurisdiction in Travis County, Texas. ESCO hereby irrevocably waives any objection, including any objection to personal jurisdiction or the laying of venue or based on the grounds of *forum non conveniens*, which it may now or hereafter have to the bringing of, or responding to, any action or proceeding in such jurisdiction with respect to this Contract or any document related hereto.

12.8. Proper Authority. The parties hereto represent and warrant that the Person executing this Contract on behalf of each party has full power and authority to enter into this Contract. ESCO

acknowledges that this Contract is effective for the period of time specified in the Contract. Any services performed by ESCO before this Contract is effective or after it ceases to be effective are performed at the sole risk of ESCO.

12.9. Force Majeure. Any delays in or failure of performance by either party, except in respect of the obligation for payments under this Contract, shall not constitute default hereunder if and to the extent such delays or failure of performance are caused solely by occurrence(s) beyond the reasonable control of the party affected, and which by the exercise of due diligence such Party is unable to prevent (hereinafter referred to as "Force Majeure") including acts of God or the public enemy, sabotage, war, mobilization, revolution, civil unrest, riots, strikes, lockouts, fires, accidents breakdowns, or floods, earthquakes, hurricanes, or any other natural disaster or governmental actions.

12.9.1. In any such event, the party claiming Force Majeure shall notify the other party of the Force Majeure event in writing within forty-eight (48) hours of the commencement of the Force Majeure event, and within forty-eight (48) hours of the termination of the Force Majeure event. In the event said party fails to timely provide either of the above-described notices, such failure shall constitute, without further notice or action, a waiver of the right to claim Force Majeure for such event.

12.9.2. If possible, the notice shall set forth the extent and duration thereof.

12.9.3. The party claiming Force Majeure shall exercise due diligence to prevent, eliminate or overcome such Force Majeure event where it is possible to do so and resume performance at the earliest possible date. However, if nonperformance continues for more than thirty (30) days, TFC may terminate this Contract immediately upon written notification to ESCO. Changes in the schedule or in the design or scope of the Project as a result of any Force Majeure which affect the cost of ESCO's services under this Contract require a written amendment to this Contract.

12.10. Dispute Resolution. Subject to Texas Government Code, Section 2260.002, the dispute resolution process provided for in Chapter 2260 of the Texas Government Code shall be used by the parties to attempt to resolve all disputes arising under this Contract. In accordance with Texas Civil Practice & Remedies Code, Section 114.005, the parties agree claims encompassed by Texas Government Code, Section 2260.002(3) and Texas Civil Practice & Remedies Code, Section 114.002 shall be governed by the following dispute resolution process:

12.10.1. Claims for Breach of Contract and Counterclaims.

12.10.1.1. ESCO may make a claim against TFC for breach of a contract between TFC and ESCO. TFC may assert a counterclaim against ESCO.

12.10.1.2. ESCO must provide written notice to TFC of a claim for breach of contract not later than one hundred eighty (180) days after the date of the event giving rise to the claim.

12.10.1.3. The notice must state with particularity:

12.10.1.3.1. the nature of the alleged breach;

12.10.1.3.2. the amount ESCO seeks as damages; and

12.10.1.3.3. the legal theory of recovery.

12.10.1.4. TFC must assert, in a writing delivered to ESCO, any counterclaim not later than the 60th day after the date of notice of a claim under Section 12.10.1.2.

12.10.1.5. Damages.

12.10.1.5.1. The total amount of money recoverable on a claim for breach of contract under this Section 12.10 may not, after deducting the amount specified in Section 12.10.5.2 below, exceed an amount equal to the sum of:

12.10.1.5.1.1 the balance due and owing on the contract price;

12.10.1.5.1.2 the amount or fair market value of orders or requests for additional work made by a unit of state government to the extent that the orders or requests for additional work were actually performed; and

12.10.1.5.1.3 any delay or labor-related expense incurred by ESCO as a result of an action of or a failure to act by the unit of state government or a party acting under the supervision or control of the unit of state government.

12.10.1.5.2. Any amount owed the unit of state government for work not performed under a contract or in substantial compliance with its terms shall be deducted from the amount in Section 12.10.1.5.1.

12.10.1.5.3. Any award of damages under this Contract may not include:

12.10.1.5.3.1. consequential or similar damages, except delays or labor-related expenses described by Section 12.10.1.5.1.3;

12.10.1.5.3.2. exemplary damages;

12.10.1.5.3.3. any damages based on an unjust enrichment theory;

12.10.1.5.3.4. attorney's fees; or

12.10.1.5.3.5. home office overhead.

12.10.2. Negotiation.

12.10.2.1. TFC's General Counsel shall examine the claim and any

counterclaim and negotiate ESCO in an effort to resolve them. The negotiation must begin no later than one hundred twenty (120) days after the date the claim is received.

12.10.2.2. TFC's administrative rules located at Title 1, Part 5, Section 111.31 of the Texas Administrative Code apply to this Contract and govern the negotiation of any dispute arising from this Contract.

12.10.2.3. In the event negotiation results in the resolution of some disputed issues by agreement or in a settlement, the parties shall reduce the settlement to writing, and each party shall sign the settlement. A partial settlement or resolution of a claim does not waive a party's rights as to the parts of the claim that are not resolved.

12.10.3. Mediation.

12.10.3.1 Before the one hundred twentieth (120th) day after the date the claim is filed with TFC and before the expiration of any extension of time mutually agreed upon, the parties may agree to mediate a claim made under this Contract.

12.10.3.2. TFC's administrative rules located at Title 1, Part 5, Section 111.31 of the Texas Administrative Code apply to this Contract and govern the mediation of any dispute arising from this Contract.

12.10.4. Adjudication.

12.10.4.1. On or after the two hundred seventieth (270th) day following the date the claim is filed with TFC, unless the parties agree in writing to an extension of time, ESCO may adjudicate any claim in accordance with and to the extent permitted under Texas Civil Practice and Remedies Code, Chapter 114 or Texas Government Code, Chapter 2260.

12.10.5. Payment of Claims.

12.10.5.1. In accordance with Texas Civil Practice and Remedies Code, Section 114.011, TFC may pay a claim resolved under this Section 12.10 only from money appropriated to it for payment of contract claims or for payment of the contract that is the subject of the claim. If money previously appropriated for payment of contract claims or payment of the contract is insufficient to pay the claim or settlement, the balance of the claim may be paid only from money appropriated by the legislature for payment of the claim.

12.10.5.2. Chapter 304 of the Texas Finance Code applies to a judgment awarded to a claimant except that the applicable rate of interest may not exceed six (6) percent.

12.10.5.3. Consistent with Section 114.011, property owned by the state or any unit of state government is not subject to seizure, attachment, garnishment, or any other creditors' remedy to satisfy a judgment on a breach of contract claim.

12.10.6. Representation of TFC. The attorney general shall defend TFC in any proceeding or adjudication conducted in conjunction with a claim brought under this Section 12.10.

12.10. Legal Construction and Severability. In the event any one or more of the provisions contained in this Contract shall for any reason be held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision herein, and this Contract shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein. Furthermore, in lieu of each such illegal, invalid, or unenforceable provision there shall be substituted a provision as similar in terms to such illegal, invalid, or unenforceable provision as may be possible and be legal, valid, and enforceable.

12.11. Multiple Counterparts. This Contract may be executed in any number of counterparts, each of which shall be an original, and each such counterpart shall together constitute but one and the same agreement.

12.12. Binding Effect. This Contract shall be binding upon and shall inure to the benefit of the parties hereto, their representatives, successors and assigns.

12.13. Limitation on Authority and No Other Obligations. ESCO shall have no authority to act for or on behalf of TFC or the State of Texas except as expressly provided for in this Contract; no other authority, power, or use is granted or implied. ESCO may not incur any debts, obligations, expenses, or liabilities of any kind on behalf of TFC or the State of Texas.

12.14. No Waiver of Sovereign Immunity. Nothing in the Contract shall be construed as a waiver of sovereign immunity; nor constitute or be construed as a waiver of any of the privileges, rights, defenses, remedies, or immunities available to the State of Texas, TFC or the Using Agency. The failure to enforce, or any delay in the enforcement, of any privileges, rights, defenses, remedies, or immunities available to the State of Texas under the Contract or under applicable law shall not constitute a waiver of such privileges, rights, defenses, remedies, or immunities or be considered as a basis for estoppel.

12.15. No Implied Waiver. The failure of a party to insist at any time upon the strict performance of any covenant or agreement or to exercise any option, right, power, or remedy contained in this Contract shall not be construed as a waiver or a relinquishment thereof for the future.

12.16. No Third-Party Beneficiaries. This Contract is made solely and specifically among and for the benefit of the parties named herein and the Using Agency, and their respective successors and assigns, and no other Person shall have any right, interest, or claims hereunder or be entitled to any benefits pursuant to or on account of this Contract as a third-party beneficiary or otherwise.

12.17. Further Assurances. ESCO shall take such actions and execute such other and additional documents as are reasonably necessary or desirable in order to carry out the purposes and intent of this Contract.

12.18. No Presumptions for Ambiguities. Each party hereby represents and warrants that although the initial draft of this Contract may have been prepared by one party, both parties have been given the opportunity to review this Contract with counsel of their choice, and have made additions, revisions, and amendments hereto. Therefore, each party hereby covenants and agrees that they are co-drafters of this Contract such that any ambiguities cannot be construed against any

party.

12.19. Time is of the Essence. Time is of the essence with respect to this Contract; *provided however*, in the event that any of the deadlines set forth herein end on a Saturday, Sunday, or federal legal holiday, such deadline shall automatically be extended to the next day which is not a Saturday, Sunday, or federal legal holiday.

12.20. Work Made for Hire. All Work shall constitute the exclusive property of TFC. All right, title and interest in and to said Work shall automatically and without further notice or action vest in TFC upon creation and shall be deemed to be a work for hire and made in the course of the services rendered pursuant to this Contract. To the extent that title to any such Work may not, by operation of law, vest in TFC, or such Work may not be considered a work made for hire, all rights, title and interest therein are hereby irrevocably and unconditionally assigned to TFC. TFC shall also have the right to obtain and to hold in its name any and all patents, copyrights, registrations or such other protection as may be appropriate to the subject matter, and any extensions and renewals thereof. ESCO must give TFC and/or the State of Texas, as well as any person designated by TFC and/or the State of Texas, all assistance reasonably necessary to effectuate the intent of this section and to perfect the rights and interests defined herein without any charge or expense to TFC beyond those amounts payable to ESCO for the services rendered under this Contract.

12.21. Schedule of Exhibits. The following shall be the exhibits to this Contract, which are contained on the CD and are hereby incorporated herein by reference:

12.21.1. Exhibit A. UGC.

12.21.2. Exhibit B. Supplementary General Conditions.

12.21.3. Exhibit C. Special Conditions.

12.21.4. Exhibit D. ESCO's Response to RFQ No. 303-6-00006.

12.21.5. Exhibit E. Utility Assessment Report.

12.21.6. Exhibit F. Improvement List.

12.21.7. Exhibit G. Specifications.

12.21.8. Exhibit H. Measurement and Verification Plan.

12.21.9. Exhibit I. Performance Guarantee Agreement.

12.21.10. Exhibit J. Sample Periodic Savings Report.

12.21.11. Exhibit K. Certification Regarding Wage Rate Notifications.

12.21.12. Exhibit L. List of Project Manager and Subcontractors.

12.21.13. Exhibit M. Criminal Background Check Criteria and Information.

12.21.14. Exhibit N. HUB Subcontracting Plan form.

12.21.15. Exhibit O. HUB Subcontracting Plan PAR form.

12.21.16. Exhibit P. Tier 1 Product and Manufacturer's List.

12.21.17. Exhibit Q. Schedule of Values Proposed Payment Schedule.

12.21.18. Exhibit R. Required Checklists and Certifications.

12.21.19. Exhibit S. Payment and Performance Bonds [SAMPLE].

12.22. Entire Agreement and Modification. This Contract and its integrated attachment(s) constitute the entire agreement of the parties and such are intended as a complete and exclusive statement of the promises, representations, negotiations, discussions, and other agreements that may have been made in connection with the subject matter hereof. Unless an integrated attachment to this Contract specifically displays a mutual intent to amend a particular part of this Contract, general conflicts in language between any such attachment and this Contract shall be construed consistently with the terms of this Contract. Unless otherwise expressly authorized by the terms of this Contract, no modification, renewal, extension, or amendment to this Contract shall be binding upon the parties unless the same is in writing and signed by the respective parties hereto. **THERE ARE NO OTHER ORAL OR WRITTEN AGREEMENTS BETWEEN THE PARTIES HERETO OR OTHER THIRD PARTY RELATING TO THE SUBJECT TRANSACTION.**

TEXAS FACILITIES COMMISSION	**PERFORMANCE SERVICES OF TEXAS, INC.**
By: _____	By: _____
Harvey Hilderbran	Timothy P. Thoman
Executive Director	President and Founder
Date of Execution: 12-19-16	Date of Execution: 12-16-16

G.C. _____

Dir. _____

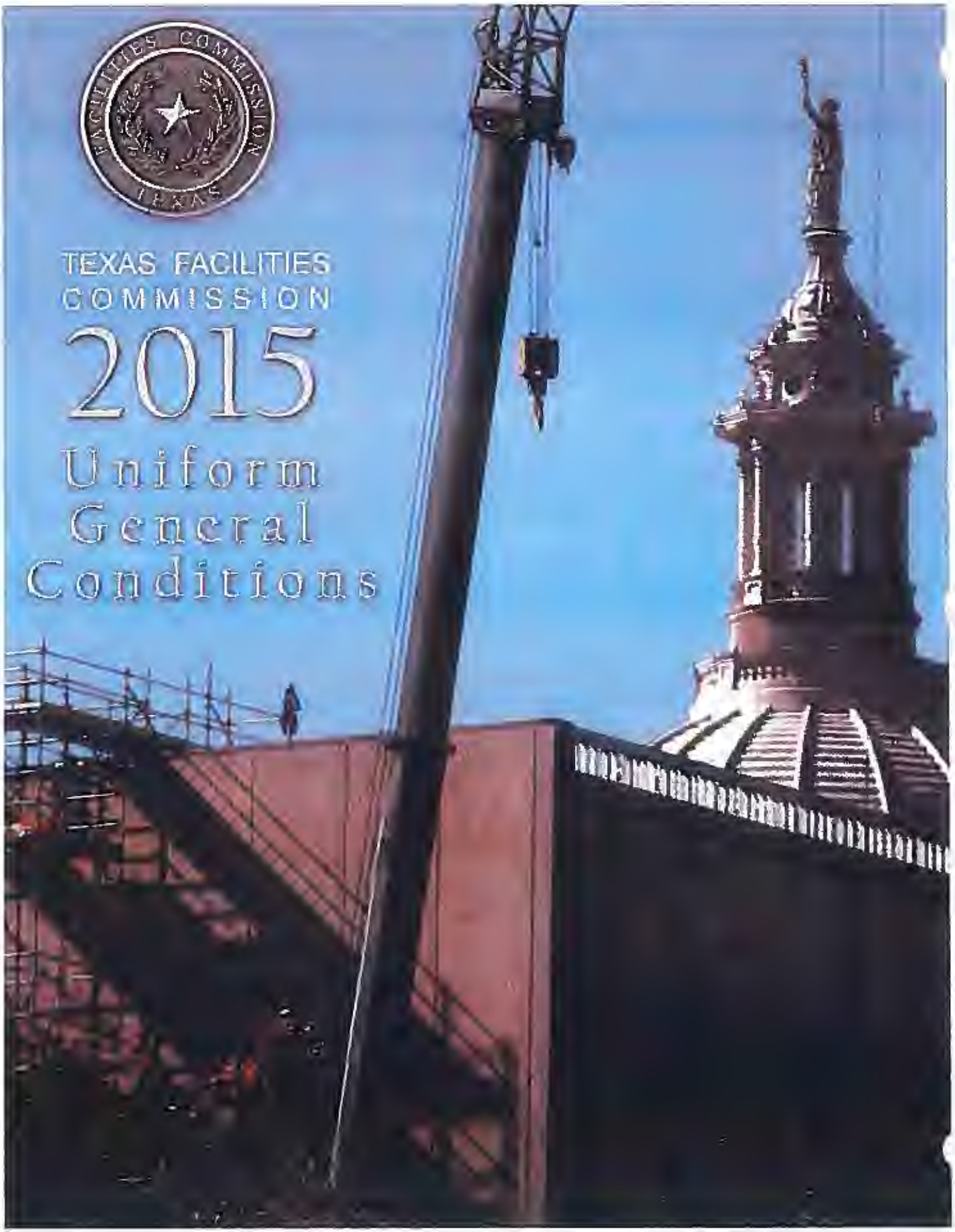
D.E.D. _____

EXHIBIT A

Exhibit A-UGC

TEXAS FACILITIES COMMISSION

2015 Uniform General Conditions



Uniform General Conditions for Construction Contracts

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Article 1. Definitions

Unless the context clearly requires another meaning, the following terms have the meaning assigned herein.

1.1 *Addendum/Addenda* means formally issued written or graphic modifications and/or interpretations of the Construction Documents that may add to, delete from, clarify or correct the description and/or scope of the Work. Addenda are issued during the bidding phase of the project.

1.2 *Application for Payment* means Contractor's monthly partial invoice for payment that includes any portion of the Work that has been completed for which an invoice has not been submitted and performed in accordance with the requirements of the Contract Documents. The Application for Payment accurately reflects the progress of the Work, is itemized based on the Schedule of Values, bears the notarized signature of Contractor, and shall not include subcontracted items for which Contractor does not intend to pay.

1.3 *Application for Final Payment* means Contractor's final invoice for payment that includes any portion of the Work that has been completed for which an invoice has not been submitted, amounts owing to adjustments to the final Contract Sum resulting from approved change orders, and release of remaining Contractor's retainage.

1.4 *Architect/Engineer (A/E)* means a person registered as an architect pursuant to Tex. Occ. Code Ann., Ch. 1051, as a landscape architect pursuant to Tex. Occ. Code Ann., Ch. 1052, a person licensed as a professional engineer pursuant Tex. Occ. Code Ann., Ch. 1001, and/or a firm employed by Owner or Design-Build Contractor to provide professional architectural or engineering services and to exercise overall responsibility for the design of a Project or a significant portion thereof, and to perform the contract administration responsibilities set forth in the Contract.

1.5 *Authority Having Jurisdiction* means a federal, state, local, or other regional department, or an individual such as a fire marshal, building official, electrical inspector, utility provider or other individual having statutory authority.

1.6 *Baseline Schedule* means the initial time schedule prepared by Contractor for Owner's information and acceptance that conveys Contractor's and Subcontractors' activities (including coordination and review activities required in the Contract Documents to be performed by A/E and ODR), durations, and sequence of work related to the entire Project to the extent required by the Contract Documents. The schedule clearly demonstrates the critical path of activities, durations and necessary predecessor conditions that drive the end date of the schedule. The Baseline Schedule shall not exceed the time limit current under the Contract Documents.

1.7 *Certificate of Final Completion* means the certificate issued by A/E that documents, to the best of A/E's knowledge and understanding, Contractor's completion of all

Contractor's Punchlist items and pre-final Punchlist items, final cleanup and Contractor's provision of Record Documents, operations and maintenance manuals, and all other closeout documents required by the Contract Documents.

1.8 *Certificate of Substantial Completion* means the certificate executed by the A/E, ODR and Contractor that documents to the best of A/E's and ODR's knowledge and understanding, Contractor's sufficient completion of the work in accordance with the Contract, so as to be operational and fit for the use intended.

1.9 *Change Order* means a written modification of the Contract between Owner and Contractor, signed by Owner, Contractor, and A/E.

1.10 *Close-out Documents* mean the product brochures, submittals, product/equipment maintenance and operations instructions, manuals, and other documents/warranties, record documents, affidavit of payment, release of lien and claim, and as may be further defined, identified, and required by the Contract Documents.

1.11 *Contract* means the entire agreement between Owner and Contractor, including all of the Contract Documents.

1.12 *Contract Date* is the date when the agreement between Owner and Contractor becomes effective.

1.13 *Contract Documents* mean those documents identified as a component of the agreement (Contract) between Owner and Contractor. These may include, but are not limited to, Drawings; Specifications; General, Supplementary General, and Special Conditions; and all pre-bid and/or pre-proposal addenda.

1.14 *Contract Sum* means the total compensation payable to Contractor for completion of the Work in accordance with the terms of the Contract.

1.15 *Contract Time* means the period between the start date identified in the Notice to Proceed with construction and the Substantial Completion date identified in the Notice to Proceed or as subsequently amended by a Change Order.

1.16 *Contractor* means the individual, corporation, limited liability company, partnership, firm, or other entity contracted to perform the Work, regardless of the type of construction contract used, so that the term as used herein includes a Construction Manager-at-Risk or a Design-Build firm as well as a general or prime Contractor. The Contract Documents refer to Contractor as if singular in number.

1.17 *Construction Documents* mean the Drawings, Specifications, and other documents issued to build the Project. Construction Documents become part of the Contract Documents when listed in the Contract or any Change Order.

1.18 *Construction Manager-at-Risk*, in accordance with Tex. Gov't Code, Ch. 2166, means a sole proprietorship, partnership, corporation, or other legal entity that assumes the risk for construction, rehabilitation, alteration, or repair of a facility at the

contracted price as a general contractor and provides consultation to Owner regarding construction during and after the design of the facility.

1.19 *Date of Commencement* means the date designated in the Notice to Proceed for Contractor to commence the Work.

1.20 *Day* means a calendar day unless otherwise specifically stipulated.

1.21 *Design-Build* means a project delivery method in which the detailed design and subsequent construction is provided through a single contract with a Design-Build firm; a team, partnership, or legal entity that includes design professionals and a builder. The Design-Build Project delivery shall be implemented in accordance with Tex. Gov't Code § 2166.2531.

1.22 *Drawings* mean that product of A/E which graphically depicts the Work.

1.23 *Final Completion* means the date determined and certified by A/E and Owner on which the Work is fully and satisfactorily complete in accordance with the Contract.

1.24 *Final Payment* means the last and final monetary compensation made to Contractor for any portion of the Work that has been completed and accepted for which payment has not been made, amounts owing to adjustments to the final Contract Sum resulting from approved change orders, and release of Contractor's retainage.

1.25 *Historically Underutilized Business (HUB)* pursuant to Tex. Gov't Code, Ch. 2161, means a business that is at least 51% owned by an Asian Pacific American, a Black American, a Hispanic American, a Native American and/or an American Woman; is an entity with its principal place of business in Texas; and has an owner residing in Texas with proportionate interest that actively participates in the control, operations, and management of the entity's affairs.

1.26 *Notice to Proceed* means written document informing Contractor of the dates beginning Work and the dates anticipated for Substantial Completion.

1.27 *Open Item List* means a list of work activities, Punchlist items, changes or other issues that are not expected by Owner and Contractor to be complete prior to Substantial Completion.

1.28 *Owner* means the State of Texas, and any agency of the State of Texas, acting through the responsible entity of the State of Texas identified in the Contract as Owner.

1.29 *Owner's Designated Representative (ODR)* means the individual assigned by Owner to act on its behalf and to undertake certain activities as specifically outlined in the Contract. ODR is the only party authorized to direct changes to the scope, cost, or time of the Contract.

1.30 *Project* means all activities necessary for realization of the Work. This includes design, contract award(s), execution of the Work itself, and fulfillment of all Contract and warranty obligations.

1.31 *Progress Assessment Report (PAR)* means the monthly compliance report to Owner verifying compliance with the HUB subcontracting plan (HSP).

1.32 *Proposed Change Order (PCO)* means a document that informs Contractor of a proposed change in the Work and appropriately describes or otherwise documents such change including Contractor's response of pricing for the proposed change.

1.33 *Punchlist* means a list of items of Work to be completed or corrected by Contractor after Substantial Completion. Punchlists indicate items to be finished, remaining Work to be performed, or Work that does not meet quality or quantity requirements as required in the Contract Documents.

1.34 *Record Documents* mean the drawing set, Specifications, and other materials maintained by Contractor that documents all addenda, Architect's Supplemental Instructions, Change Orders and postings and markings that record the as-constructed conditions of the Work and all changes made during construction.

1.35 *Request for Information (RFI)* means a written request by Contractor directed to A/E or ODR for a clarification of the information provided in the Contract Documents or for direction concerning information necessary to perform the Work that may be omitted from the Contract Documents.

1.36 *Samples* mean representative physical examples of materials, equipment, or workmanship used to confirm compliance with requirements and/or to establish standards for use in execution of the Work.

1.37 *Schedule of Values* means the detailed breakdown of the cost of the materials, labor, and equipment necessary to accomplish the Work as described in the Contract Documents, submitted by Contractor for approval by Owner and A/E.

1.38 *Shop Drawings* mean the drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data prepared by Contractor or its agents which detail a portion of the Work.

1.39 *Site* means the geographical area of the location of the Work.

1.40 *Special Conditions* mean the documents containing terms and conditions which may be unique to the Project. Special Conditions are a part of the Contract Documents and have precedence over the Uniform General Conditions and Supplementary General Conditions.

1.41 *Specifications* mean the written product of A/E that establishes the quality and/or performance of products utilized in the Work and processes to be used, including testing and verification for producing the Work.

1.42 *Subcontractor* means a business entity that enters into an agreement with Contractor to perform part of the Work or to provide services, materials, or equipment for use in the Work.

1.43 *Submittal Register* means a list provided by Contractor of all items to be furnished for review and approval by A/E and Owner and as identified in the Contract Documents including anticipated sequence and submittal dates.

1.44 *Substantial Completion* means the date determined and certified by Contractor, A/E, and Owner when the Work, or a designated portion thereof, is sufficiently complete, in accordance with the Contract, so as to be operational and fit for the use intended.

1.45 *Supplementary General Conditions* mean procedures and requirements that modify the Uniform General Conditions. Supplementary General Conditions, when used, have precedence over the Uniform General Conditions.

1.46 *Unit Price Work* means the Work, or a portion of the Work, paid for based on incremental units of measurement.

1.47 *Unilateral Change Order (ULCO)* means a Change Order issued by Owner without the complete agreement of Contractor, as to cost and/or time.

1.48 *Work* means the administration, procurement, materials, equipment, construction and all services necessary for Contractor, and/or its agents, to fulfill Contractor's obligations under the Contract.

1.49 *Work Progress Schedule* means the continually updated time schedule prepared and monitored by Contractor that accurately indicates all necessary appropriate revisions as required by the conditions of the Work and the Project while maintaining a concise comparison to the Baseline Schedule.

Article 2. Wage Rates and Other Laws Governing Construction

2.1 Environmental Regulations. Contractor shall conduct activities in compliance with applicable laws and regulations and other requirements of the Contract relating to the environment and its protection at all times. Unless otherwise specifically determined, Owner is responsible for obtaining and maintaining permits related to stormwater run-off. Contractor shall conduct operations consistent with stormwater run-off permit conditions. Contractor is responsible for all items it brings to the Site, including hazardous materials, and all such items brought to the Site by its Subcontractors and suppliers, or by other entities subject to direction of Contractor. Contractor shall not incorporate hazardous materials into the Work without prior approval of Owner, and shall provide an affidavit attesting to such in association with request for Substantial Completion inspection.

2.2 Wage Rates. Contractor shall not pay less than the wage scale of the various classes of labor as shown on the prevailing wage schedule provided by Owner in the bid or proposal specifications. The specified wage rates are minimum rates only. Owner is

not bound to pay any claims for additional compensation made by any Contractor because the Contractor pays wages in excess of the applicable minimum rate contained in the Contract. The prevailing wage schedule is not a representation that qualified labor adequate to perform the Work is available locally at the prevailing wage rates.

2.2.1 Notification to Workers. Contractor shall post the prevailing wage schedule in a place conspicuous to all workers on the Project Site When requested by Owner, Contractor shall furnish evidence of compliance with the Texas Prevailing Wage Law and the addresses of all workers.

2.2.1.1 Pursuant to Tex. Gov't Code § 2258.024, Contractor shall keep, on site, true and accurate records showing the name and occupation of each worker employed by the Contractor or subcontractors and the actual per diem wages paid to each worker. The record shall be open to inspection by the ODR and their agents at all reasonable hours for the duration of the contract.

2.2.1.2 With each application for progress payment, Contractor shall make available upon request certified payroll records, including from subcontractors of any tier level, on Form WH-347 as promulgated by the U.S. Department of Labor, as may be revised from time to time and in unlocked and unprotected Excel format, along with copies of any and all Contract Documents between Contractor and any Subcontractors. Pursuant to Tex. Penal Code §§ 37.02 and 37.10, Employees of Contractor and subcontractors, including all tier levels, shall be subject to prosecution for submitting certified payroll records that contain materially false information.

2.2.1.3 The prevailing wage schedule is determined by Owner in compliance with Tex. Gov't Code, Ch. 2258. Should Contractor at any time become aware that a particular skill or trade not reflected on Owner's prevailing wage schedule will be or is being employed in the Work, whether by Contractor or by Subcontractor, Contractor shall promptly inform ODR of the proposed wage to be paid for the skill along with a justification for same and ODR shall promptly concur with or reject the proposed wage and classification.

2.2.1.4 Contractor is responsible for determining the most appropriate wage for a particular skill in relation to similar skills or trades identified on the prevailing wage schedule. In no case, shall any worker be paid less than the wage indicated for laborers.

2.2.1.5 Pursuant to Tex. Labor Code § 214.008, Misclassification of Workers; Penalty. The Owner requires Contractor and all subcontractors properly classify individuals as Employees or Independent Contractors.

2.2.2 Penalty for Violation. Contractor, and any Subcontractor, will pay to the State a penalty of sixty dollars ($60) for each worker employed for each day, or portion thereof, that the worker is paid less than the wage rates stipulated in the prevailing wage schedule

2.2.3 Complaints of Violations.

2.2.3.1 Owner's Determination of Good Cause. Upon receipt of information concerning a violation, Owner will conduct an investigation in accordance with Tex. Gov't Code, Ch. 2258 and make an initial determination as to whether good cause exists that a violation occurred. Upon making a good cause finding, Owner will retain the full amounts claimed by the claimant or claimants as the difference between wages paid and wages due under the prevailing wage schedule and any supplements thereto, together with the applicable penalties in accordance with Tex. Gov't Code § 2258.023, such amounts being subtracted from successive progress payments pending a final decision on the violation.

2.2.3.2 No Extension of Time. If Owner's determination proves valid that good cause existed to believe a violation had occurred, Contractor is not entitled to an extension of time for any delay arising directly or indirectly from the arbitration procedures.

2.2.3.3 Cooperation with Owner's Investigation. Contractor shall cooperate with Owner during any investigations hereunder. Such cooperation shall include, but not necessarily be limited to, timely providing the information and/or documentation requested by Owner, which may include certified payroll records on Form WH-347 as promulgated by the U.S. Department of Labor, as may be revised from time to time and in unlocked and unprotected Excel format; and copies of any and all Contract Documents between Contractor and any Subcontractors.

2.2.3.4 Notification to Owner. In the event Contractor or Subcontractor elect to appeal an initial determination made pursuant to Paragraph 2.2.3.1, the Contractor and/or Subcontractor, as applicable, shall deliver notice thereof to Owner.

2.3 Venue for Suits. The venue for any suit arising from the Contract will be in a court of competent jurisdiction in Travis County, Texas, or as may otherwise be designated in the Supplementary General Conditions.

2.4 Licensing of Trades. Contractor shall comply with all applicable provisions of State law related to license requirements for skilled tradesmen, contractors, suppliers and or laborers, as necessary to accomplish the Work. In the event Contractor, or one of its Subcontractors, loses its license during the term of performance of the Contract, Contractor shall promptly hire or contract with a licensed provider of the service at no additional cost to Owner.

2.5 Royalties, Patents, and Copyrights. Contractor shall pay all royalties and license fees, defend suits or claims for infringement of copyrights and patent rights, and shall hold Owner harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by Owner or A/E. However, if Contractor has reason to believe that the required design, process, or product is an infringement of a copyright or a patent, Contractor shall be responsible for such loss unless such information is promptly furnished to A/E.

2.6 State Sales and Use Taxes. Owner qualifies for exemption from certain State and local sales and use taxes pursuant to the provisions of Tex. Tax Code, Ch. 151. Upon request from Contractor, Owner shall furnish evidence of tax exempt status. Contractor may claim exemption from payment of certain applicable State taxes by complying with such procedures as prescribed by the State Comptroller of Public Accounts. Owner acknowledges not all items qualify for exemption. Owner is not obligated to reimburse Contractor for taxes paid on items that qualify for tax exemption.

Article 3. General Responsibilities of Owner and Contractor

3.1 Owner's General Responsibilities. Owner is the entity identified as such in the Contract and referred to throughout the Contract Documents as if singular in number.

3.1.1 Preconstruction Conference. Prior to, or concurrent with, the issuance of Notice to Proceed with construction, a conference will be convened for attendance by Owner, Contractor, A/E and appropriate Subcontractors. The purpose of the conference is to establish a working understanding among the parties as to the Work, the operational conditions at the Project Site, and general administration of the Project. Topics include communications, schedules, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, maintaining required records and all other matters of importance to the administration of the Project and effective communications between the Project team members.

3.1.2 Owner's Designated Representative. Prior to the start of construction, Owner will identify Owner's Designated Representative (ODR), who has the express authority to act and bind Owner to the extent and for the purposes described in the various Articles of the Contract, including responsibilities for general administration of the Contract.

3.1.2.1 Unless otherwise specifically defined elsewhere in the Contract Documents, ODR is the single point of contact between Owner and Contractor. Notice to ODR, unless otherwise noted, constitutes notice to Owner under the Contract.

3.1.2.2 All directives on behalf of Owner will be conveyed to Contractor and A/E by ODR in writing.

3.1.2.3 Owner will furnish or cause to be furnished, free of charge, the number of complete sets of the Drawings, Specifications, and addenda as provided in the Supplementary General Conditions or Special Conditions.

3.1.2.4 The ODR will establish the protocol for planning, scheduling and documenting progress meetings with provisions for absence of various project team members that have a key role in these duties.

3.1.3 Owner Supplied Materials and Information.

3.1.3.1 Owner will furnish to Contractor those surveys describing the physical characteristics, legal description, limitations of the Site, Site utility locations, and other information used in the preparation of the Contract Documents.

3.1.3.2 Owner will provide information, equipment, or services under Owner's control to Contractor with reasonable promptness.

3.1.4 Availability of Lands. Owner will furnish, as indicated in the Contract, all required rights to use the lands upon which the Work occurs. This includes rights-of-way and easements for access and such other lands that are designated for use by Contractor. Contractor shall comply with all Owner identified encumbrances or restrictions specifically related to use of lands so furnished. Owner will obtain and pay for easements for permanent structures or permanent changes in existing facilities.

3.1.5 Limitation on Owner's Duties.

3.1.5.1 Owner will not supervise, direct, control or have authority over or be responsible for Contractor's means, methods, technologies, sequences or procedures of construction or the safety precautions and programs incident thereto. Owner is not responsible for any failure of Contractor to comply with laws and regulations applicable to the Work. Owner is not responsible for the failure of Contractor to perform or furnish the Work in accordance with the Contract Documents. Except as provided in Section 2.5, Owner is not responsible for the acts or omissions of Contractor, or any of its Subcontractors, suppliers or of any other person or organization performing or furnishing any of the Work on behalf of Contractor.

3.1.5.2 Owner will not take any action in contravention of a design decision made by A/E in preparation of the Contract Documents, when such actions are in conflict with statutes under which A/E is licensed for the protection of the public health and safety.

3.2 Role of Architect/Engineer. Unless specified otherwise in the Contract between Owner and Contractor, A/E shall provide general administration services for Owner during the construction phase of the project. Written correspondence, requests for information, and Shop Drawings/submittals shall be directed to A/E for action. A/E has the authority to act on behalf of Owner to the extent provided in the Contract Documents, unless otherwise modified by written instrument, which will be furnished to Contractor by ODR, upon request.

3.2.1 Site Visits.

3.2.1.1 A/E will make visits to the Site at intervals as provided in the A/E's Contract with Owner, to observe the progress and the quality of the various aspects of Contractor's executed Work and report findings to Owner.

3.2.1.2 A/E has the authority to interpret Contract Documents and inspect the Work for compliance and conformance with the Contract. Except as referenced in Paragraph 3.1.5.2, Owner retains the sole authority to accept or reject Work and issue direction for correction, removal, or replacement of Work.

3.2.2 Clarifications and Interpretations. It may be determined that clarifications or interpretations of the Contract Documents are necessary. Upon direction by ODR, such clarifications or interpretations will be provided by A/E consistent with the intent of the Contract Documents. A/E will issue these clarifications with reasonable promptness to Contractor as A/E's supplemental instruction ("ASI") or similar instrument. If Contractor believes that such clarification or interpretation justifies an adjustment in the Contract Sum or the Contract Time, Contractor shall so notify Owner in accordance with the provisions of Article 11.

3.2.3 Limitations on Architect/Engineer Authority. A/E is not responsible for:

3.2.3.1 Contractor's means, methods, techniques, sequences, procedures, safety, or programs incident to the Project, nor will A/E supervise, direct, control or have authority over the same;

3.2.3.2 The failure of Contractor to comply with laws and regulations applicable to the furnishing or performing the Work;

3.2.3.3 Contractor's failure to perform or furnish the Work in accordance with the Contract Documents; or

3.2.3.4 Acts or omissions of Contractor, or of any other person or organization performing or furnishing any of the Work.

3.3 Contractor's General Responsibilities. Contractor is solely responsible for implementing the Work in full compliance with all applicable laws and the Contract Documents and shall supervise and direct the Work using the best skill and attention

to assure that each element of the Work conforms to the Contract requirements. Contractor is solely responsible for all construction means, methods, techniques, safety, sequences, coordination, procedures and protection of the installed work as part of the contract until substantial completion of the project. Contractor remains responsible for the care and protection of materials and Work in the areas where punch list items are completed until Final Completion.

3.3.1 Project Administration. Contractor shall provide Project administration for all Subcontractors, vendors, suppliers, and others involved in implementing the Work and shall coordinate administration efforts with those of A/E and ODR in accordance with these general conditions and other provisions of the Contract, and as outlined in the preconstruction conference. Contractor's Project Administration includes periodic daily reporting on weather, work progress, labor, materials, equipment, obstructions to prosecution of the work, accidents and injuries in accordance with the Contract and transmitted no less frequently than on a weekly basis.

3.3.2 Contractor's Management Personnel. Contractor shall employ a competent person or persons who will be present at the Project Site during the progress of the Work to supervise or oversee the work. The competent persons are subject to the approval of ODR. Contractor shall not change approved staff during the course of the project without the written approval of ODR unless the staff member leaves the employment of Contractor. Contractor shall provide additional quality control, safety and other staff as stated in the Supplementary General Conditions.

3.3.3 Labor. Contractor shall provide competent, suitably qualified personnel to survey, lay-out, and construct the Work as required by the Contract Documents and maintain good discipline and order at the Site at all times.

3.3.4 Services, Materials, and Equipment. Unless otherwise specified, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities, incidentals, and services necessary for the construction, performance, testing, start-up, inspection and completion of the Work.

3.3.5 Contractor General Responsibility. For Owner furnished equipment or material that will be in the care, custody, and control of Contractor, Contractor is responsible for damage or loss. Owner shall deliver to Contractor a complete list and respective values of such materials or equipment and make an equitable adjustment to the contract amount for any increase in cost of Builder's Risk insurance.

3.3.6 Non-Compliant Work. Should A/E and/or ODR identify Work as non-compliant with the Contract Documents, A/E and/or ODR shall communicate the finding to Contractor, and Contractor shall correct such Work at no additional cost to the Owner. The approval of Work by either A/E or

ODR does not relieve Contractor from the obligation to comply with all requirements of the Contract Documents.

3.3.7 Subcontractors. Contractor shall not employ any Subcontractor, supplier or other person or organization, whether initially or as a substitute, against whom Owner shall have reasonable objection. Owner will communicate such objections in writing within ten (10) days of receipt of Contractor's intent to use such Subcontractor, supplier, or other person or organization. Contractor is not required to employ any Subcontractor, supplier or other person or organization to furnish any of the work to whom Contractor has reasonable objection. Contractor shall not substitute Subcontractors without the acceptance of Owner. Pursuant to Tex. Gov't Code § 2269.256(b), if the Contractor reviews, evaluates and recommends that the Owner accept a bid or proposal from a Subcontractor but the Owner requires another bid or proposal to be accepted, Owner shall compensate the Contractor by a change in price, time or guaranteed maximum cost for any additional cost or risk the Contractor will incur because of Owner's requirement to select another bid or proposal rather than the one recommended.

3.3.7.1 All Subcontracts and supply contracts shall be consistent with and bind the Subcontractors and suppliers to the terms and conditions of the Contract Documents including provisions of the Contract between Contractor and Owner.

3.3.7.2 Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor. Require all Subcontractors, suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with Owner only through Contractor. Contractor shall furnish to Owner a copy, at Owner's request, of each first-tier subcontract promptly after its execution. Contractor agrees that Owner has no obligation to review or approve the content of such contracts and that providing Owner such copies in no way relieves Contractor of any of the terms and conditions of the Contract, including, without limitation, any provisions of the Contract which require the Subcontractor to be bound to Contractor in the same manner in which Contractor is bound to Owner.

3.3.8 Continuing the Work. Contractor shall carry on the Work and adhere to the progress schedule during all disputes, disagreements, or alternative resolution processes with Owner. Contractor shall not delay or postpone any Work because of pending unresolved disputes, disagreements or alternative resolution processes, except as Owner and Contractor may agree in writing.

3.3.9 Cleaning. Contractor shall at all times, keep the Site and the Work clean and free from accumulation of waste materials or rubbish caused by the construction activities under the Contract. Contractor shall ensure that the entire Project is thoroughly cleaned prior to requesting Substantial Completion inspection and, again, upon completion of the Project prior to the final inspection.

3.3.10 Acts and Omissions of Contractor, its Subcontractors, and Employees. Contractor shall be responsible for acts and omissions of his employees and all its Subcontractors, their agents and employees. Owner may, in writing, require Contractor to remove from the Project any of Contractor's or its Subcontractor's employees whom ODR finds to be careless, incompetent, unsafe, uncooperative, disruptive, or otherwise objectionable.

3.3.11 Acts or Omissions. Contractor shall indemnify and hold harmless the State of Texas and Customers, AND/OR THEIR OFFICERS, AGENTS, EMPLOYEES, REPRESENTATIVES, CONTRACTORS, ASSIGNEES, AND/OR DESIGNEES FROM ANY AND ALL LIABILITY, ACTIONS, CLAIMS, DEMANDS, OR SUITS, AND ALL RELATED COSTS, ATTORNEY FEES, AND EXPENSES arising out of, or resulting from any acts or omissions of Contractor or its agents, employees, subcontractors, Order Fulfillers, or suppliers of subcontractors in the execution or performance of the Contract and any Purchase Orders issued under the Contract. THE DEFENSE SHALL BE COORDINATED BY CONTRACTOR WITH THE OFFICE OF THE ATTORNEY GENERAL WHEN TEXAS STATE AGENCIES ARE NAMED DEFENDANTS IN ANY LAWSUIT AND CONTRACTOR MAY NOT AGREE TO ANY SETTLEMENT WITHOUT FIRST OBTAINING THE CONCURRENCE FROM THE OFFICE OF THE ATTORNEY GENERAL. CONTRACTOR AND OWNER AGREE TO FURNISH TIMELY WRITTEN NOTICE TO EACH OTHER OF ANY SUCH CLAIM.

3.3.12 Infringements.

3.3.12.1 Contractor shall indemnify and hold harmless the State of Texas and Customers, AND/OR THEIR EMPLOYEES, AGENTS, REPRESENTATIVES, CONTRACTORS, ASSIGNEES, AND/OR DESIGNEES from any and all third party claims involving infringement of United States patents, copyrights, trade and service marks, and any other intellectual or intangible property rights in connection with the PERFORMANCES OR ACTIONS OF CONTRACTOR PURSUANT TO THIS CONTRACT. CONTRACTOR AND THE CUSTOMER AGREE TO FURNISH TIMELY WRITTEN NOTICE TO EACH OTHER OF ANY SUCH CLAIM. CONTRACTOR SHALL BE LIABLE TO PAY ALL COSTS OF DEFENSE INCLUDING ATTORNEYS' FEES. THE DEFENSE SHALL BE COORDINATED BY CONTRACTOR WITH THE OFFICE OF THE ATTORNEY GENERAL WHEN TEXAS STATE AGENCIES ARE NAMED DEFENDANTS IN

ANY LAWSUIT AND CONTRACTOR MAY NOT AGREE TO ANY SETTLEMENT WITHOUT FIRST OBTAINING THE CONCURRENCE FROM THE OFFICE OF THE ATTORNEY GENERAL.

3.3.12.2 Contractor shall have no liability under this section if the alleged infringement is caused in whole or in part by: (i) use of the product or service for a purpose or in a manner for which the product or service was not designed, (ii) any modification made to the product without Contractor's written approval, (iii) any modifications made to the product by Contractor pursuant to Customer's specific instructions, (iv) any intellectual property right owned by or licensed to Customer, or (v) any use of the product or service by Customer that is not in conformity with the terms of any applicable license agreement.

3.3.12.3 If Contractor becomes aware of an actual or potential claim, or Customer provides Contractor with notice of an actual or potential claim, Contractor may (or in the case of an injunction against Customer, shall), at Contractor's sole option and expense: (i) procure for the Customer the right to continue to use the affected portion of the product or service, or (ii) modify or replace the affected portion of the product or service with functionally equivalent or superior product or service so that Customer's use is non-infringing.

3.3.12.4 Taxes/Workers' Compensation/Unemployment Insurance–Including Indemnity.

3.3.12.4.1 CONTRACTOR AGREES AND ACKNOWLEDGES THAT DURING THE EXISTENCE OF THIS CONTRACT, CONTRACTOR SHALL BE ENTIRELY RESPONSIBLE FOR THE LIABILITY AND PAYMENT OF CONTRACTOR'S AND CONTRACTOR'S EMPLOYEES' TAXES OF WHATEVER KIND ARISING OUT OF THE PERFORMANCES IN THIS CONTRACT. CONTRACTOR AGREES TO COMPLY WITH ALL STATE AND FEDERAL LAWS APPLICABLE TO ANY SUCH PERSONS, INCLUDING LAWS REGARDING WAGES, TAXES, INSURANCE, AND WORKERS' COMPENSATION. THE CUSTOMER AND/OR THE STATE SHALL NOT BE LIABLE TO CONTRACTOR, ITS EMPLOYEES, AGENTS, OR OTHERS FOR THE PAYMENT OF TAXES OR THE PROVISION OF UNEMPLOYMENT INSURANCE AND/OR WORKERS' COMPENSATION OR ANY BENEFIT

AVAILABLE TO A STATE EMPLOYEE OR EMPLOYEE OF ANOTHER GOVERNMENTAL ENTITY CUSTOMER.

3.3.12.4.1 CONTRACTOR AGREES TO INDEMNIFY AND HOLD HARMLESS OWNER, THE STATE OF TEXAS AND/OR THEIR EMPLOYEES, AGENTS, REPRESENTATIVES, CONTRACTORS, AND/OR ASSIGNEES FROM ANY AND ALL LIABILITY, ACTIONS, CLAIMS, DEMANDS, OR SUITS, AND ALL RELATED COSTS, ATTORNEYS' FEES, AND EXPENSES, RELATING TO TAX LIABILITY, UNEMPLOYMENT INSURANCE AND/OR WORKERS' COMPENSATION IN ITS PERFORMANCE UNDER THIS CONTRACT. CONTRACTOR SHALL BE LIABLE TO PAY ALL COSTS OF DEFENSE INCLUDING ATTORNEYS' FEES. THE DEFENSE SHALL BE COORDINATED BY CONTRACTOR WITH THE OFFICE OF THE ATTORNEY GENERAL WHEN TEXAS STATE AGENCIES ARE NAMED DEFENDANTS IN ANY LAWSUIT AND VENDOR MAY NOT AGREE TO ANY SETTLEMENT WITHOUT FIRST OBTAINING THE CONCURRENCE FROM THE OFFICE OF THE ATTORNEY GENERAL. CONTRACTOR AND OWNER AGREE TO FURNISH TIMELY WRITTEN NOTICE TO EACH OTHER OF ANY SUCH CLAIM.

3.3.12.5 The provisions of this indemnification are solely for the benefit of the parties hereto and not intended to create or grant any rights, contractual or otherwise, to any other person or entity.

3.3.12.6 Contractor shall promptly advise Owner in writing of any claim or demand against Owner or against Contractor which involves Owner and known to Contractor and related to or arising out of Contractor's activities under this Contract.

3.3.13 Ancillary Areas. Operate and maintain operations and associated storage areas at the site of the Work in accordance with the following:

3.3.13.1 Confine all Contractor operations, including storage of materials and employee parking upon the Site of Work, to areas designated by Owner.

3.3.13.2 Contractor may erect, at its own expense, temporary buildings that will remain its property. Remove such buildings and associated utility service lines upon completion of the Work, unless Contractor requests and Owner provides written consent that it may abandon such buildings and utilities in place.

3.3.13.3 Use only established roadways or construct and use such temporary roadways as may be authorized by Owner. Do not allow load limits of vehicles to exceed the limits prescribed by appropriate regulations or law. Provide protection to road surfaces, curbs, sidewalks, trees, shrubbery, sprinkler systems, drainage structures and other like existing improvements to prevent damage and repair any damage thereto at the expense of Contractor.

3.3.13.4 Owner may restrict Contractor's entry to the Site to specifically assigned entrances and routes.

3.3.14 Separate Contracts. Owner reserves the right to award other contracts in connection with other portions of the Project under these same or substantially similar contract conditions, including those portions related to insurance and waiver of subrogation. Owner reserves the right to perform operations related to the Project with Owner's own forces.

3.3.15 Under a system of separate contracts, the conditions described herein continue to apply except as may be amended by change order.

3.3.16 Contractor shall cooperate with other contractors or forces employed on the Project by Owner, including providing access to Site and Project information as requested.

3.3.17 Owner shall be reimbursed by Contractor for costs incurred by Owner which are payable to a separate contractor because of delays, improperly timed activities, or defective construction by Contractor. Owner will equitably adjust the Contract by Change Order for costs incurred by Contractor because of delays, improperly timed activities, damage to the Work or defective construction by a separate contractor.

Article 4. Historically Underutilized Business (HUB) Subcontracting Plan

4.1 General Description. The purpose of the Historically Underutilized Business (HUB) program is to promote equal business opportunities for economically disadvantaged persons (as defined by Tex. Gov't Code, Ch. 2161) to contract with the State of Texas in accordance with the goals specified in the State of Texas Disparity Study. The HUB program annual procurement utilization goals are defined in 34 T.A.C. § 20.13(b).

4.1.1 State agencies are required by statute to make a good faith effort to assist HUBs in participating in contract awards issued by the State. 34 T.A.C. §

20.13(b) outlines the State's policy to encourage the utilization of HUBs in State contracting opportunities through race, ethnic and gender neutral means.

4.1.2 A Contractor who contracts with the State in an amount of $100,000 or greater is required to make a good faith effort to award subcontracts to HUBs in accordance with 34 T.A.C. § 20.14(a)(2)(A) by submitting a HUB subcontracting plan within twenty-four (24) hours after the bid or response is due and complying with the HUB subcontracting plan after it is accepted by Owner and during the term of the Contract.

4.2 Compliance with Approved HUB Subcontracting Plan. Contractor, having been awarded this Contract in part by complying with the HUB program statute and rules, hereby covenants to continue to comply with the HUB program as follows:

4.2.1 Prior to adding or substituting a Subcontractor, promptly notify Owner in the event a change is required for any reason to the accepted HUB subcontracting plan.

4.2.2 Conduct the good-faith effort activities required and provide Owner with necessary documentation to justify approval of a change to the approved HUB subcontracting plan.

4.2.3 Cooperate in the execution of a Change Order or such other approval of the change in the HUB subcontracting plans as Contractor and Owner may agree to.

4.2.4 Maintain and make available to Owner upon request business records documenting compliance with the accepted HUB subcontracting plan.

4.2.5 Upon receipt of payment for performance of Work, submit to Owner a compliance report, in the format required by Owner that demonstrates Contractor's performance of the HUB subcontracting plan.

4.2.5.1 Progress Assessment Report (PAR): monthly compliance reports to Owner (contracting agency), verifying their compliance with the HUB subcontracting plan, including the use/expenditures they have made to Subcontractors. (The PAR is available in the Index Forms Library on the Facilities Design & Construction page of the Texas Facilities Commission website.

4.2.6 Promptly and accurately explain and provide supplemental information to Owner to assist in Owner's investigation of Contractor's good-faith effort to fulfill the HUB subcontracting plan and the requirements under 34 T.A.C. § 20.14(a)(1).

4.3 Failure to Demonstrate Good-Faith Effort. Upon a determination by Owner that Contractor has failed to demonstrate a good-faith effort to fulfill the HUB subcontracting plan or any Contract covenant detailed above, Owner may, in addition to all other remedies available to it, report the failure to perform to the Comptroller of

Public Accounts, Texas Procurement and Support Services Division, Historically Underutilized Business Program and may bar Contractor from future contracting opportunities with Owner.

Article 5. Bonds and Insurance

5.1 Construction Bonds. Contractor is required to tender to Owner, prior to commencing the Work, performance and payment bonds, as required by Tex. Gov't Code, Ch. 2253. On Construction Manager-at-Risk and Design-Build Projects the Owner shall require a security bond, as described in Subsection 5.1.2 below.

5.1.1 Bond Requirements. Each bond shall be executed by a corporate surety or sureties authorized to do business in the State of Texas and acceptable to Owner on Owner's form, and in compliance with the relevant provisions of the Texas Insurance Code. If any bond is for more than ten (10) percent of the surety's capital and surplus, Owner may require certification that the company has reinsured the excess portion with one or more reinsurers authorized to do business in the State. A reinsurer may not reinsure for more than ten (10) percent of its capital and surplus. If a surety upon a bond loses its authority to do business in the State, Contractor shall, within thirty (30) days after such loss, furnish a replacement bond at no added cost to Owner.

5.1.1.1 A Performance bond is required if the Contract Sum is in excess of $100,000. The performance bond is solely for the protection of Owner. The performance bond is to be for the Contract Sum to guarantee the faithful performance of the Work in accordance with the Contract Documents. The form of the bond shall be approved by the Office of the Attorney General of Texas. The performance bond shall be effective through Contractor's warranty period.

5.1.1.2 A Payment bond is required if the Contract price is in excess of $25,000. The payment bond is to be for the Contract Sum and is payable to Owner solely for the protection and use of payment bond beneficiaries. The form of the bond shall be approved by the Office of the Attorney General of Texas.

5.1.2 Security Bond. The security bond provides protection to Owner if Contractor presents an acceptable guaranteed maximum price ("GMP") to Owner and 1) fails to execute the GMP; or 2) fails to deliver the required payment and performance bonds within the time period stated below.

5.1.3 When Bonds Are Due.

5.1.3.1 Security bonds are due within ten (10) days of signing a Construction Manager-at-Risk or Design-Build Contract.

5.1.3.2 Payment and performance bonds are due within ten (10) days of Contractor's receipt of a fully executed GMP on a Construction Manager-at-Risk project or the Contract Sum for a Design-Build project, or within ten (10) days of Contractor's receipt of a fully executed Contract on competitively bid or competitive sealed proposal projects.

5.1.4 Power of Attorney. Each bond shall be accompanied by a valid power of attorney (issued by the surety company and attached, signed and sealed with the corporate embossed seal, to the bond) authorizing the attorney-in-fact who signs the bond to commit the company to the terms of the bond, and stating any limit in the amount for which the attorney can issue a single bond.

5.1.5 Bond Indemnification. The process of requiring and accepting bonds and making claims there under shall be conducted in compliance with Tex. Gov't Code, Ch. 2253. IF FOR ANY REASON A STATUTORY PAYMENT OR PERFORMANCE BOND IS NOT HONORED BY THE SURETY, CONTRACTOR SHALL FULLY INDEMNIFY AND HOLD OWNER HARMLESS OF AND FROM ANY COSTS, LOSSES, OBLIGATIONS OR LIABILITIES IT INCURS AS A RESULT.

5.1.6 Furnishing Bond Information. Owner shall furnish certified copies of the payment bond and the related Contract to any qualified person seeking copies who complies with Tex. Gov't Code § 2253.026.

5.1.7 Claims on Payment Bonds. Claims on payment bonds must be sent directly to Contractor and his surety in accordance with Tex. Gov't Code § 2253.041. All payment bond claimants are cautioned that no lien exists on the funds unpaid to Contractor on such Contract, and that reliance on notices sent to Owner may result in loss of their rights against Contractor and/or his surety. Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no such responsibility because of any representation by any agent or employee.

5.1.8 Payment Claims when Payment Bond not Required. The rights of Subcontractors regarding payment are governed by Tex. Prop. Code §§ 53.231 – 53.239 when the value of the Contract between Owner and Contractor is less than $25,000.00. These provisions set out the requirements for filing a valid lien on funds unpaid to Contractor as of the time of filing the claim, actions necessary to release the lien and satisfaction of such claim.

5.1.9 Sureties. A surety shall be listed on the US Department of the Treasury's Listing of Approved Sureties maintained by the Bureau of Financial Management Service (FMS), www.fms.treas.gov/c570, stating companies holding Certificates of Authority as acceptable sureties on Federal bonds and acceptable reinsuring companies (FMS Circular 570).

5.2 Insurance Requirements. Contractor shall carry insurance in the types and amounts indicated in this Article for the duration of the Contract. The insurance shall be evidenced by delivery to Owner of certificates of insurance executed by the insurer or its authorized agent stating coverages, limits, expiration dates and compliance with all applicable required provisions. Upon request, Owner, and/or its agents, shall be entitled to receive without expense, copies of the policies and all endorsements. Contractor shall update all expired policies prior to submission for monthly payment. Failure to update policies shall be reason for withholding of payment until renewal is provided to Owner

5.2.1 Contractor shall provide and maintain all insurance coverage with the minimum amounts described below until the end of the warranty period unless otherwise stated in Supplementary General Conditions or Special Conditions. Failure to maintain insurance coverage, as required, is grounds for suspension of Work for cause pursuant to Article 14.

5.2.2 Contractor shall deliver to Owner true and complete copies of certificates and corresponding policy endorsements prior to the issuance of any Notice to Proceed.

5.2.3 Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

5.2.4 The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.2.5 The insurance coverage and limits established herein shall not be interpreted as any representation or warranty that the insurance coverage and limits necessarily will be adequate to protect Contractor.

5.2.6 Coverage shall be written on an occurrence basis by companies authorized and admitted to do business in the State of Texas and rated A or better by A.M. Best Company or similar rating company or otherwise acceptable to Owner.

5.2.2.1 Insurance Coverage Required.

5.2.2.1.1 Workers' Compensation. Insurance with limits as required by the Texas Workers' Compensation Act, with the policy endorsed to provide a waiver of subrogation in favor of Owner, employer's liability insurance of not less than:

$1,000,000 each accident;

$1,000,000 disease each employee; and

$1,000,000 disease policy limit.

5.2.2.1.2 Commercial General Liability Insurance, including premises, operations, independent contractor's liability, products and completed operations and contractual liability, covering, but not limited to, the liability assumed under the indemnification provisions of this Contract, fully insuring Contractor's liability for bodily injury (including death) and property damage with a minimum limit of:

$1,000,000 per occurrence;

$2,000,000 general aggregate;

$5,000 Medical Expense each person;

$1,000,000 Personal Injury and Advertising Liability;

$2,000,000 products and completed operations aggregate;

$50,000 Damage to Premises Rented to You; and

Coverage shall be on an "occurrence" basis.

The policy shall include coverage extended to apply to completed operations and explosion, collapse, and underground hazards. The policy shall include endorsement CG2503 Amendment of Aggregate Limits of Insurance (per Project) or its equivalent.

If the Work involves any activities within fifty (50) feet of any railroad, railroad protective insurance as may be required by the affected railroad, written for not less than the limits required by such railroad.

5.2.2.1.3 Asbestos Abatement Liability Insurance, including coverage for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos containing materials. *This requirement applies if the Work or the Project includes asbestos containing materials.

The combined single limit for bodily injury and property damage will be a minimum of $1,000,000 per occurrence.

*Specific requirement for claims-made form: Required period of coverage will be determined by the following formula: continuous coverage for life of the Contract, plus one (1) year (to provide coverage for the warranty period), and an extended discovery period for a minimum of five (5) years which shall begin at the end of the warranty period.

Employer's liability limits for asbestos abatement will be:

$500,000 each accident;

$500,000 disease each employee; and

$500,000 disease policy limit

If this Contract is for asbestos abatement only, the Special Form builder's risk or Special Form installation floater (e) is not required.

5.2.2.1.4 Comprehensive Automobile Liability Insurance, covering owned, hired, and non-owned vehicles, with a minimum combined single limit for bodily injury (including death) and property damage of $1,000,000 per accident. No aggregate shall be permitted for this type of coverage.

Such insurance is to include coverage for loading and unloading hazards.

5.2.2.1.5 Special Form Builder's Risk Insurance, if applicable (or Special Form installation floater for instances in which the project involves solely the installation of material and/or equipment). Coverage shall be Special Form, including, but not limited to, fire, extended coverage, vandalism and malicious mischief, theft and, if applicable, flood, earth movement and named storm. Builder's risk and installation floater limits shall be equal to 100 percent of the Contract Sum plus, if any, existing property and Owner-furnished equipment specified by Owner. The policy shall be written jointly in the names of Owner and Contractor. Subcontractors shall be named as additional insureds. The policy shall have endorsements as follows:

5.2.2.1.5.1 This insurance shall be specific as to coverage and not contributing insurance with any permanent insurance maintained on the property.

5.2.2.1.5.2 This insurance shall not contain an occupancy clause suspending or reducing coverage should Owner partially occupy the Site and before the parties have determined Substantial Completion.

5.2.2.1.5.3 Loss, if any, shall be adjusted with and made payable to Owner as trustee for the insureds as their interests may appear. Owner shall be named as loss payee.

5.2.2.1.5.4 For renovation projects or projects that involve portions of Work contained within an existing structure, refer to Supplementary General and Special Conditions for possible additional builder's risk insurance requirements.

5.2.2.1.5.5 For Owner furnished equipment or materials that will be in care, custody or control of Contractor, Contractor will be responsible for damage and loss.

5.2.2.1.5.6 For those properties located within a Tier 1 or 2 windstorm area, named storm coverage must be provided with limits specified by Owner.

5.2.2.1.5.7 For those properties located in flood prone areas, flood insurance coverage must be provided with limits specified by Owner.

5.2.2.1.5.8 Builder's risk insurance policy shall remain in effect until Substantial Completion.

5.2.2.1.6 "Umbrella" Liability Insurance. Contractor shall obtain, pay for and maintain umbrella liability insurance during the Contract term, insuring Contractor for an amount of not less than amount specified in the Supplementary General Conditions or Special Conditions that provides coverage at least as broad as and applies in excess and follows form of the primary liability coverages required hereinabove. The policy shall provide "drop down" coverage where underlying primary insurance coverage limits are insufficient or exhausted.

5.2.3 Policies must include the following clauses, as applicable:

5.2.3.1 This insurance shall not be canceled, materially changed, or non-renewed except after thirty (30) days written notice has been given to Owner.

5.2.3.2 It is agreed that Contractor's insurance shall be deemed primary with respect to any insurance or self insurance carried by Owner for liability arising out of operations under the Contract with Owner.

5.2.3.3 Owner, its officials, directors, employees, representatives, and volunteers are added as additional insureds as respects operations and activities of, or on behalf of the named insured performed under Contract with Owner. The additional insured status must cover completed operations as well. This is not applicable to workers' compensation policies.

5.2.3.4 A waiver of subrogation in favor of Owner shall be provided in all policies.

5.2.4 Without limiting any of the other obligations or liabilities of Contractor, Contractor shall require each Subcontractor performing work under the Contract, at Subcontractor's own expense, to maintain during the term of the Contract, the same stipulated minimum insurance including the required provisions and additional policy conditions as shown above. As an alternative, Contractor may include its Subcontractors as additional insureds on its own coverage as prescribed under these requirements. Contractor's certificate of insurance shall note in such event that Subcontractors are included as additional insureds and that Contractor agrees to provide workers' compensation for Subcontractors and their employees. Contractor shall obtain and monitor the certificates of insurance from each Subcontractor in order to assure compliance with the insurance requirements. Contractor must retain the certificates of insurance for the duration of the Contract plus five (5) years and shall have the responsibility of enforcing these insurance requirements among its Subcontractors. Owner shall be entitled, upon request and without expense, to receive copies of these certificates.

5.2.5 Workers' compensation insurance coverage must be provided for all workers at all tier levels and meet the statutory requirements of Tex. Lab. Code § 401.011(44) and specific to construction projects for public entities as required by Tex. Lab. Code § 406.096.

Article 6. Construction Documents, Coordination Documents, and Record Documents

6.1 Drawings and Specifications.

6.1.1 Copies Furnished. Contractor will be furnished, free of charge, the number of complete sets of the Drawings, Specifications, and Addenda as provided in the Supplementary General Conditions or Special Conditions. Additional complete sets of Drawings and Specifications, if requested, will be furnished at reproduction cost to the entity requesting such additional sets. Electronic copies of such documents will be provided to Contractor without charge.

6.1.2 Ownership of Drawings and Specifications. All Drawings, Specifications and copies thereof furnished by A/E are to remain A/E's property. These documents are not to be used on any other project, and with the exception of the Contract record set and electronic versions needed for Warranty operations, are to be returned to the A/E, upon request, following completion of the Work.

6.1.3 Interrelation of Documents. The Contract Documents as referenced in the Contract between Owner and Contractor are complimentary, and what is required by one shall be as binding as if required by all.

6.1.4 Resolution of Conflicts in Documents. Where conflicts may exist within the Contract Documents, the documents shall govern in the following order: (a) Change Orders, addenda, and written amendments to the Contract; (b) the Contract; (c) Drawings; (d) Specifications (but Specifications shall control over Drawings as to quality of materials and workmanship); and (e) other Contract Documents. Among categories of documents having the same order of precedence, the term or provision that includes the latest date shall control and more specific requirements shall govern over general requirements. Contractor shall notify A/E and ODR for resolution of the issue prior to executing the Work in question.

6.1.5 Contractor's Duty to Review Contract Documents. In order to facilitate its responsibilities for completion of the Work in accordance with and as reasonably inferable from the Contract Documents, prior to commencing the Work, Contractor shall examine and compare the Contract Documents, information furnished by Owner, relevant field measurements made by Contractor and any visible or reasonably anticipated conditions at the Site affecting the Work. This duty extends throughout the construction phase prior to commencing each particular work activity and/or system installation.

6.1.6 Discrepancies and Omissions in Drawings and Specifications.

6.1.6.1 Promptly report to ODR and to A/E the discovery of any apparent error, omission or inconsistency in the Contract Documents prior to execution of the Work.

6.1.6.2 It is recognized that Contractor is not acting in the capacity of a licensed design professional, unless it is performing as a Design-Build firm.

6.1.6.3 It is further recognized that Contractor's examination of Contract Documents is to facilitate construction and does not create an affirmative responsibility to detect errors, omissions or inconsistencies or to ascertain compliance with applicable laws, building codes or regulations, unless it is performing as a Design-Build firm or a Construction Manager-at-Risk.

6.1.6.4 When performing as a Design-Build firm, Contractor has sole responsibility for discrepancies, errors, and omissions in the Drawings and Specifications.

6.1.6.5 When performing as a Construction Manager-at-Risk, Contractor has a shared responsibility with A/E for discovery and resolution of discrepancies, errors, and omissions in the Contract Documents. In such case, Contractor's responsibility pertains to review, coordination, and recommendation of resolution strategies within budget constraints.

6.1.6.6 Contractor has no liability for errors, omissions, or inconsistencies unless Contractor knowingly failed to report a recognized problem to Owner or the Work is executed under a Design-Build or Construction Manager-at-Risk Contract as outlined above. Should Contractor fail to perform the examination and reporting obligations of these provisions, Contractor is responsible for avoidable costs and direct and/or consequential damages.

6.2 Requirements for Record Documents. Contractor shall:

6.2.1 Maintain at the Site one copy of all Drawings, Specifications, addenda, approved submittals, Contract modifications, and all Project correspondence. Keep current and maintain Drawings and Specifications in good order with postings and markings to record actual conditions of Work and show and reference all changes made during construction. Provide Owner and A/E access to these documents.

6.2.2 Maintain the Record Documents including Drawings, Specifications and other materials which reflect the actual field conditions and representations of the Work performed, whether it be directed by addendum, Change Order or otherwise. Make available all records prescribed herein for reference and examination by Owner and its representatives and agents.

6.2.3 Update the Record Documents at least monthly prior to submission of periodic partial pay estimates. Failure to maintain current Record Documents constitutes cause for denial of a progress payment otherwise due.

6.2.4 Prior to requesting Substantial Completion inspection Contractor shall furnish a copy of its marked-up Record Documents and a preliminary copy of each instructional manual, maintenance and operating manual, parts catalog, wiring diagrams, spare parts, specified written warranties and like publications, or parts for all installed equipment, systems, and like items and as described in the Contract Documents. (Unexecuted samples of the aforementioned documentation may be reviewed by ODR when the absence of substantial completion transactions preclude execution; however, Contractor remains obligated to provide fully executed copies of such materials prior to final payment.)

6.2.5 Once determined acceptable by ODR with input from A/E, provide one (1) reproducible copy and one (1) electronic media copy of all Record Documents, unless otherwise required by the Supplementary General Conditions or Special Conditions.

6.2.6 Contractor shall be responsible for updating the Record Documents for all Contractor initiated documents and changes to the Contract Documents due to coordination and actual field conditions, including RFIs.

6.2.7 A/E shall be responsible for updating the Record Documents for any addenda, Change Orders, A/E supplemental instructions and any other alterations to the Contract Documents generated by A/E or Owner.

Article 7. Construction Safety

7.1 General. It is the duty and responsibility of Contractor and all of its Subcontractors to be familiar with, enforce and comply with all requirements of Public Law No. 91-596, 29 U.S.C. § 651 et. seq., the Occupational Safety and Health Act of 1970, (OSHA) and all amendments thereto. Contractor shall prepare a safety plan specific to the Project and submit it to ODR and A/E prior to commencing Work. In addition, Contractor and all of its Subcontractors shall comply with all applicable laws and regulations of any public body having jurisdiction for safety of persons or property to protect them from damage, injury or loss and erect and maintain all necessary safeguards for such safety and protection.

7.2 Notices. Contractor shall provide notices as follows:

7.2.1 Notify owners of adjacent property including those that own or operate utility services and/or underground facilities, and utility owners, when prosecution of the Work may affect them or their facilities, and cooperate with them in the protection, removal, relocation and replacement, and access to their facilities and/or utilities.

7.2.2 Coordinate the exchange of material safety data sheets (MSDSs) or other hazard communication information required to be made available to or exchanged between or among employers at the site in connection with laws and regulations. Maintain a complete file of MSDSs for all materials in use on site throughout the construction phase and make such file available to Owner and its agents as requested.

7.3 Emergencies. In any emergency affecting the safety of persons or property, Contractor shall act to minimize, mitigate, and prevent threatened damage, injury or loss.

7.3.1 Have authorized agents of Contractor respond immediately upon call at any time of day or night when circumstances warrant the presence of Contractor to protect the Work or adjacent property from damage or to take such action pertaining to the Work as may be necessary to provide for the safety of the public.

7.3.2 Give ODR and A/E prompt notice of all such events.

7.3.3 If Contractor believes that any changes in the Work or variations from Contract Documents have been caused by its emergency response, promptly notify Owner within seventy-two (72) hours of the emergency response event.

7.3.4 Should Contractor fail to respond, Owner is authorized to direct other forces to take action as necessary and Owner may deduct any cost of remedial action from funds otherwise due Contractor.

7.4 Injuries. In the event of an incident or accident involving outside medical care for an individual on or near the Work, Contractor shall notify ODR and other parties as may be directed promptly, but no later than twenty-four (24) hours after Contractor learns that an event required medical care.

7.4.1 Record the location of the event and the circumstances surrounding it, by using photography or other means, and gather witness statements and other documentation which describes the event.

7.4.2 Supply ODR and A/E with an incident report no later than thirty-six (36) hours after the occurrence of the event. In the event of a catastrophic incident (one (1) fatality or three (3) workers hospitalized), barricade and leave intact the scene of the incident until all investigations are complete. A full set of incident investigation documents, including facts, finding of cause, and remedial plans shall be provided within one (1) week after occurrence, unless otherwise directed by legal counsel. Contractor shall provide ODR with

written notification within one week of such catastrophic event if legal counsel delays submission of full report.

7.5 Environmental Safety. Upon encountering any previously unknown potentially hazardous material, or other materials potentially contaminated by hazardous material, Contractor shall immediately stop work activities impacted by the discovery, secure the affected area, and notify ODR immediately.

7.5.1 Bind all Subcontractors to the same duty.

7.5.2 Upon receiving such notice, ODR will promptly engage qualified experts to make such investigations and conduct such tests as may be reasonably necessary to determine the existence or extent of any environmental hazard. Upon completion of this investigation, ODR will issue a written report to Contractor identifying the material(s) found and indicate any necessary steps to be taken to treat, handle, transport or dispose of the material

7.5.3 Owner may hire third-party Contractors to perform any or all such steps.

7.5.4 Should compliance with ODR's instructions result in an increase in Contractor's cost of performance, or delay the Work, Owner will make an equitable adjustment to the Contract Sum and/or the time of completion, and modify the Contract in writing accordingly.

7.6 Trenching Plan. When the project requires excavation which either exceeds a depth of four (4) feet, or results in any worker's upper body being positioned below grade level, Contractor is required to submit a trenching plan to ODR prior to commencing trenching operations unless an engineered plan is part of the Contract Documents. The plan is required to be prepared and sealed by a professional engineer registered in the State of Texas, and hired or employed by Contractor or Subcontractor to perform the work. Said engineer cannot be anyone who is otherwise either directly or indirectly engaged on this project.

Article 8. Quality Control

8.1 Materials & Workmanship. Contractor shall execute Work in a good and workmanlike matter in accordance with the Contract Documents. Contractor shall develop and provide a quality control plan specific to this Project and acceptable to Owner. Where Contract Documents do not specify quality standards, complete and construct all Work in compliance with generally accepted construction industry standards. Unless otherwise specified, incorporate all new materials and equipment into the Work under the Contract.

8.2 Testing.

8.2.1 Owner is responsible for coordinating and paying for routine and special tests required to confirm compliance with quality and performance requirements, except as stated below or otherwise required by the Contract Documents. Contractor shall provide the following testing:

8.2.1.1 Any test of basic material or fabricated equipment included as part of a submittal for a required item in order to establish compliance with the Contract Documents.

8.2.1.2 Any test of basic material or fabricated equipment offered as a substitute for a specified item on which a test may be required in order to establish compliance with the Contract Documents.

8.2.1.3 Preliminary, start-up, pre-functional and operational testing of building equipment and systems as necessary to confirm operational compliance with requirements of the Contract Documents.

8.2.1.4 All subsequent tests on original or replaced materials conducted as a result of prior testing failure.

8.2.2 All testing shall be performed in accordance with standard test procedures by an accredited laboratory, or special consultant as appropriate, acceptable to Owner. Results of all tests shall be provided promptly to ODR, A/E, and Contractor.

8.2.3 Non-Compliance (Test Results). Should any of the tests indicate that a material and/or system does not comply with the Contract requirements, the burden of proof remains with Contractor, subject to:

8.2.3.1 Contractor selection and submission of the laboratory for Owner acceptance.

8.2.3.2 Acceptance by Owner of the quality and nature of tests.

8.2.3.3 All tests taken in the presence of A/E and/or ODR, or their representatives.

8.2.3.4 If tests confirm that the material/systems comply with Contract Documents, Owner will pay the cost of the test.

8.2.3.5 If tests reveal noncompliance, Contractor will pay those laboratory fees and costs of that particular test and all future tests, of that failing Work, necessary to eventually confirm compliance with Contract Documents.

8.2.3.6 Proof of noncompliance with the Contract Documents will make Contractor liable for any corrective action which ODR determines appropriate, including complete removal and replacement of non-compliant work or material.

8.2.4 Notice of Testing. Contractor shall give ODR and A/E timely notice of its readiness and the date arranged so ODR and A/E may observe such inspection, testing, or approval.

8.2.5 Test Samples. Contractor is responsible for providing Samples of sufficient size for test purposes and for coordinating such tests with their Work Progress Schedule to avoid delay.

8.2.6 Covering Up Work. If Contractor covers up any Work without providing Owner an opportunity to inspect, Contractor shall, if requested by ODR, uncover and recover the work at Contractor's expense.

8.3 Submitals.

8.3.1 Contractor's Submittals. Contractor shall submit with reasonable promptness consistent with the Project schedule and in orderly sequence all Shop Drawings, Samples, or other information required by the Contract Documents, or subsequently required by Change Order. Prior to submitting, Contractor shall review each submittal for general compliance with Contract Documents and approve submittals for review by A/E and Owner by an approval stamp affixed to each copy. Submittal data presented without Contractor's stamp will be returned without review or comment, and any delay resulting from failure is Contractor's responsibility.

8.3.1.1 Contractor shall within twenty-one (21) days of the effective date of the Notice To Proceed with construction, submit to ODR and A/E, a submittal schedule/register, organized by specification section, listing all items to be furnished for review and approval by A/E and Owner. The list shall include Shop Drawings, manufacturer's literature, certificates of compliance, materials Samples, materials colors, guarantees, and all other items identified throughout the Specifications.

8.3.1.2 Contractor shall indicate the type of item, Contract requirements reference, and Contractor's scheduled dates for submitting the item along with the requested dates for approval answers from A/E and Owner. The submittal register shall indicate the projected dates for procurement of all included items and shall be updated at least monthly with actual approval and procurement dates. Contractor's Submittal Register must be reasonable in terms of the review time for complex submittals. Contractor's submittal schedule must be consistent with the Work Progress Schedule and identify critical submittals. Show and allow a minimum of fifteen (15) calendar days duration after receipt by A/E and ODR for review and approval. If resubmittal required, allow a minimum of an additional fifteen (15) calendar days for review. Submit the updated Submittal Register with each request for progress payment. Owner may establish routine review procedures and schedules for submittals at the preconstruction conference and/or elsewhere in the Contract Documents. If Contractor fails to update and provide the Submittal Register as required, Owner may, after seven (7) days notice to Contractor withhold a reasonable sum of money that would otherwise be due Contractor.

8.3.1.3 Contractor shall coordinate the Submittal Register with the Work Progress Schedule. Do not schedule Work requiring a submittal to begin prior to scheduling review and approval of the related submittal. Revise and/or update both schedules monthly to ensure consistency and current project data. Provide to ODR the updated Submittal Register and schedule with each application for progress payment. Refer to requirements for the Work Progress Schedule for inclusion of procurement activities therein. Regardless, the Submittal Register shall identify dates submitted and returned and shall be used to confirm status and disposition of particular items submitted, including approval or other action taken and other information not conveniently tracked through the Work Progress Schedule.

8.3.1.4 By submitting Shop Drawings, Samples or other required information, Contractor represents that it has determined and verified all applicable field measurements, field construction criteria, materials, catalog numbers and similar data to the extent possible from existing conditions and design information provided by A/E prior to fabrication; and has checked and coordinated each Shop Drawing and Sample with the requirements of the Work and the Contract Documents.

8.3.2 Review of Submittals. A/E and ODR review is only for conformance with the design concept and the information provided in the Contract Documents. Responses to submittals will be in writing. The approval of a separate item does not indicate approval of an assembly in which the item functions. The approval of a submittal does not relieve Contractor of responsibility for any deviation from the requirements of the Contract unless Contractor informs A/E and ODR of such deviation in a clear, conspicuous, and written manner on the submittal transmittal and at the time of submission, and obtains Owner's written specific approval of the particular deviation.

8.3.3 Correction and Resubmission. Contractor shall make any corrections required to a submittal and resubmit the required number of corrected copies promptly so as to avoid delay, until submittal approval. Direct attention in writing to A/E and ODR, when applicable, to any new revisions other than the corrections requested on previous submissions.

8.3.4 Limits on Shop Drawing Review. Contractor shall not commence any Work requiring a submittal until review of the submittal under Subsection 8.3.2. Construct all such work in accordance with reviewed submittals. Comments incorporated as part of the review in Subsection 8.3.2 of Shop Drawings and Samples is not authorization to Contractor to perform extra work or changed work unless authorized through a Change Order. A/E's and ODR's review, if any, does not relieve Contractor from responsibility for defects in the Work resulting from errors or omissions of any kind on the submittal, regardless of any approval action. A/E or ODR shall not make formal changes to the Contract Documents via the submittal process. Changes

to the Construction Documents shall be accomplished via Section 3.2.2 and Article 11 Changes.

8.3.5 No Substitutions Without Approval. ODR and A/E may receive and consider Contractor's request for substitution when Contractor agrees to reimburse Owner for review costs and satisfies the requirements of this section. If Contractor does not satisfy these conditions, ODR and A/E will return the request without action except to record noncompliance with these requirements. Owner will not consider the request if Contractor cannot provide the product or method because of failure to pursue the Work promptly or coordinate activities properly. Contractor's request for a substitution may be considered by ODR and A/E when:

8.3.5.1 The Contract Documents do not require extensive revisions; and

8.3.5.2 Proposed changes are in keeping with the general intent of the Contract Documents and the design intent of A/E and do not result in an increase in cost to Owner; and

8.3.5.3 The request is timely, fully documented, properly submitted and one or more of the following apply:

8.3.5.3.1 Contractor cannot provide the specified product, assembly or method of construction within the Contract Time;

8.3.5.3.2 The request directly relates to an "or-equal" clause or similar language in the Contract Documents;

8.3.5.3.3 The request directly relates to a "product design standard" or "performance standard" clause in the Contract Documents;

8.3.5.3.4 The requested substitution offers Owner a substantial advantage in cost, time, energy conservation or other considerations, after deducting additional responsibilities Owner must assume;

8.3.5.3.5 The specified product or method of construction cannot receive necessary approval by an authority having jurisdiction, and ODR can approve the requested substitution;

8.3.5.3.6 Contractor cannot provide the specified product, assembly or method of construction in a manner that is compatible with other materials and where Contractor certifies that the substitution will overcome the incompatibility;

8.3.5.3.7 Contractor cannot coordinate the specified product, assembly or method of construction with other materials and where Contractor certifies they can coordinate the proposed substitution; or

8.3.5.3.8 The specified product, assembly or method of construction cannot provide a warranty required by the Contract Documents and where Contractor certifies that the proposed substitution provides the required warranty.

8.3.5.3.9 The manufacture of the specified product has been removed from production due to cancellation or obsolescence.

8.3.6 Unauthorized Substitutions at Contractor's Risk. Contractor is financially responsible for any additional costs or delays resulting from unauthorized substitution of materials, equipment or fixtures other than those specified. Contractor shall reimburse Owner for any increased design or contract administration costs resulting from such unauthorized substitutions.

8.4 Field Mock-up.

8.4.1 Mock-ups shall be constructed prior to commencement of a specified scope of work to confirm acceptable workmanship.

8.4.1.1 As a minimum, field mock-ups shall be constructed for roofing systems, exterior veneer / finish systems, glazing systems, and any other Work requiring a mock-up as identified throughout the Contract Documents. Mock-ups for systems not part of the Project scope shall not be required.

8.4.1.2 Mock-ups may be incorporated into the Work if allowed by the Contract Documents and if acceptable to ODR. If mock-ups are freestanding, they shall remain in place until otherwise directed by Owner.

8.4.1.3 Contractor shall include field mock-ups in their Work Progress Schedule and shall notify ODR and A/E of readiness for review sufficiently in advance to coordinate review without delay.

8.5 Inspection During Construction.

8.5.1 Contractor shall provide sufficient, safe, and proper facilities, including equipment as necessary for safe access, at all reasonable times for observation and/or inspection of the Work by Owner and its agents. "Reasonable times" of inspection allow for sufficient monitoring of the quality of materials and installation without substantially impeding the progress of the Work.

8.5.2 Contractor shall not cover up any Work with finishing materials or other building components prior to providing Owner and its agents an opportunity to perform an inspection of the Work.

8.5.2.1 Should corrections of the Work be required for approval, Contractor shall not cover-up corrected Work until Owner indicates approval.

8.5.2.2 Contractor shall provide notification of at least five (5) working days or otherwise as mutually agreed, to ODR of the anticipated need for a cover-up inspection. Should ODR fail to make the necessary inspection within the agreed period, Contractor may proceed with cover-up Work, but is not relieved of responsibility for Work to comply with requirements of the Contract Documents.

Article 9. Construction Schedules

9.1 Contract Time: **TIME IS AN ESSENTIAL ELEMENT OF THE CONTRACT.** The Contract Time is the time between the dates indicated in the Notice to Proceed for commencement of the Work and for achieving Substantial Completion. The Contract Time can be modified only by Change Order. Failure to achieve Substantial Completion within the Contract Time as otherwise agreed to in writing will cause damage to Owner and may subject Contractor to liquidated damages as provided in the Contract Documents. If Contractor fails to achieve Final Completion within thirty (30) calendar days after Substantial Completion or a mutually agreed upon longer period of time between Contractor and Owner, Contractor shall be responsible for Owner's additional inspection, project management, and maintenance cost to the extent caused by Contractor's failure to achieve Final Completion.

9.2 Notice to Proceed. Owner will issue a Notice to Proceed which shall state the dates for beginning Work and for achieving Substantial Completion of the Work.

9.3 Work Progress Schedule. Refer to Supplementary General Conditions or Special Conditions for additional schedule requirements. Unless indicated otherwise in those documents, Contractor shall submit their initial Work Progress Schedule for the Work in relation to the entire Project not later than twenty-one (21) days after the effective date of the Notice to Proceed to ODR and A/E. Unless otherwise indicated in the Contract Documents, the Work Progress Schedule shall be computerized Critical Path Method (CPM) with fully editable logic. This initial schedule shall indicate the dates for starting and completing the various aspects required to complete the Work, including mobilization, procurement, installation, testing, inspection, delivery of Close-out Documents and acceptance of all the Work of the Contract. When acceptable to Owner, the initially accepted schedule shall be the Baseline Schedule for comparison to actual conditions throughout the Contract duration.

9.3.1 Schedule Requirements. Contractor shall submit electronic and paper copy of the initial Work Progress Schedule reflecting accurate and reliable representations of the planned progress of the Work, the Work to date if any, and of Contractor's actual plans for its completion. Contractor shall organize

and provide adequate detail so the schedule is capable of measuring and forecasting the effect of delaying events on completed and uncompleted activities.

9.3.1.1 Contractor shall resubmit initial schedule as required to address review comments from A/E and ODR until such schedule is accepted as the Baseline Schedule.

9.3.1.2 Submittal of a schedule, schedule revision or schedule update constitutes Contractor's representation to Owner of the accurate depiction of all progress to date and that Contractor will follow the schedule as submitted in performing the Work.

9.3.2 Schedule Updates. Contractor shall update the Work Progress Schedule and the Submittal Register monthly, as a minimum, to reflect progress to date and current plans for completing the Work, while maintaining original schedule as Baseline Schedule and submit paper and electronic copies of the update to A/E and ODR as directed, but as a minimum with each request for payment. Owner has no duty to make progress payments unless accompanied by the updated Work Progress Schedule Show the anticipated date of completion reflecting all extensions of time granted through Change Order as of the date of the update. Contractor may revise the Work Progress Schedule when in Contractor's judgment it becomes necessary for the management of the Work. Contractor shall identify all proposed changes to schedule logic to Owner and to A/E via an executive summary accompanying the updated schedule for review prior to final implementation of revisions into a revised Baseline Schedule. Schedule changes that materially impact Owner's operations shall be communicated promptly to ODR and shall not be incorporated into the revised Baseline Schedule without ODR's consent.

9.3.3 The Work Progress Schedule is for Contractor's use in managing the Work and submittal of the schedule, and successive updates or revisions, is for the information of Owner and to demonstrate that Contractor has complied with requirements for planning the Work. Owner's acceptance of a schedule, schedule update or revision constitutes Owner's agreement to coordinate its own activities with Contractor's activities as shown on the schedule.

9.3.3.1 Acceptance of the Work Progress Schedule, or update and/or revision thereto does not indicate any approval of Contractor's proposed sequences and duration.

9.3.3.2 Acceptance of a Work Progress Schedule update or revision indicating early or late completion does not constitute Owner's consent, alter the terms of the Contract, or waive either Contractor's responsibility for timely completion or Owner's right to damages for Contractor's failure to do so.

9.3.3.3 Contractor's scheduled dates for completion of any activity or the entire Work do not constitute a change in terms of the Contract.

Change Orders are the only method of modifying the Substantial Completion Date(s) and Contract Time.

9.4 Ownership of Float. Unless indicated otherwise in the Contract Documents, Contractor shall develop its schedule, pricing, and execution plan to provide a minimum of ten (10) percent total float at acceptance of the Baseline Schedule. Float time contained in the Work Progress Schedule is not for the exclusive benefit of Contractor or Owner, but belongs to the Project and may be consumed by either party as needed on a first-used basis.

9.5 Completion of Work. Contractor is accountable for completing the Work within the Contract Time stated in the Contract, or as otherwise amended by Change Order.

9.5.1 If, in the judgment of Owner, the work is behind schedule and the rate of placement of work is inadequate to regain scheduled progress to insure timely completion of the entire work or a separable portion thereof, Contractor, when so informed by Owner, shall immediately take action to increase the rate of work placement by:

9.5.1.1 An increase in working forces.

9.5.1.2 An increase in equipment or tools.

9.5.1.3 An increase in hours of work or number of shifts.

9.5.1.4 Expedite delivery of materials.

9.5.1.5 Other action proposed if acceptable to Owner.

9.5.2 Within ten (10) days after such notice from ODR, Contractor shall notify ODR in writing of the specific measures taken and/or planned to increase the rate of progress. Contactor shall include an estimate as to the date of scheduled progress recovery and an updated Work Progress Schedule illustrating Contractor's plan for achieving timely completion of the Project. Should ODR deem the plan of action inadequate, Contractor shall take additional steps or make adjustments as necessary to its plan of action until it meets with ODR's approval.

9.6 Modification of the Contract Time.

9.6.1 Delays and extension of time as hereinafter described are valid only if executed in accordance with provisions set forth in Article 11.

9.6.2 When a delay defined herein as excusable prevents Contractor from completing the Work within the Contract Time, Contractor is entitled to an extension of time. Owner will make an equitable adjustment and extend the number of days lost because of excusable delay or Weather Days, as measured by Contractor's progress schedule. All extensions of time will be granted in calendar days. In no event, however, will an extension of time be granted for

delays that merely extend the duration of non-critical activities, or which only consume float without delaying the project Substantial Completion date(s).

9.6.2.1 A "Weather Day" is a day on which Contractor's current schedule indicates Work is to be done, and on which inclement weather and/or related site conditions prevent Contractor from performing seven (7) continuous hours of Work on the critical path between the hours of 7:00 a.m. and 6:00 p.m. Weather days are excusable delays. When weather conditions at the site prevent work from proceeding, Contractor shall immediately notify ODR for confirmation of the conditions. At the end of each calendar month, submit to ODR and A/E a list of Weather Days occurring in that month along with documentation of the impact on critical activities. Based on confirmation by ODR, any time extension granted will be issued by Change Order. If Contractor and Owner cannot agree on the time extension, Owner may issue a UTCO for fair and reasonable time extension.

9.6.2.2 Excusable Delay. Contractor is entitled to an equitable adjustment of the Contract Time, issued via change order, for delays caused by the following:

9.6.2.2.1 Errors, omissions and imperfections in design, which A/E corrects by means of changes in the Drawings and Specifications.

9.6.2.2.2 Unanticipated physical conditions at the Site, which A/E corrects by means of changes to the Drawings and Specifications or for which ODR directs changes in the Work identified in the Contract Documents.

9.6.2.2.3 Failure of Owner to have secured property, right-of-way or easements necessary for Work to begin or progress.

9.6.2.2.4 Changes in the Work that effect activities identified in Contractor's schedule as "critical" to completion of the entire Work, if such changes are ordered by ODR or recommended by A/E and ordered by ODR.

9.6.2.2.5 Suspension of Work for unexpected natural events, Force Majeure (sometimes called "acts of God"), civil unrest, strikes or other events which are not within the reasonable control of Contractor.

9.6.2.2.6 Suspension of Work for convenience of ODR, which prevents Contractor from completing the Work within the Contract Time.

9.6.2.2.7 Administrative delays caused by activities or approval requirements related to an Authority Having Jurisdiction.

9.6.3 Contractor's relief in the event of such delays is the time impact to the critical path as determined by analysis of Contractor's schedule. In the event that Contractor incurs additional direct costs because of the excusable delays other than described in Subparagraph 9.6.2.2.4 and within the reasonable control of Owner, the Contract price and Contract Time are to be equitably adjusted by Owner pursuant to the provisions of Article 11.

9.7 No Damages for Delay. Contractor has no claim for monetary damages for delay or hindrances to the work from any cause, including without limitation any act or omission of Owner.

9.8 Concurrent Delay. When the completion of the Work is simultaneously delayed by an excusable delay and a delay arising from a cause not designated as excusable, Contractor may not be entitled to a time extension for the period of concurrent delay.

9.9 Other Time Extension Requests. Time extensions requested in association with changes to the Work directed or requested by Owner shall be included with Contractor's proposed costs for such change. Time extensions requested for inclement weather are covered by Paragraph 9.6.2.1 above. If Contractor believes that the completion of the Work is delayed by a circumstance other than for changes directed to the Work or weather, they shall give ODR written notice, stating the nature of the delay and the activities potentially affected, within five (5) days after the onset of the event or circumstance giving rise to the excusable delay. Contractor shall provide sufficient written evidence to document the delay. In the case of a continuing cause of delay, only one claim is necessary. State claims for extensions of time in numbers of whole or half days.

9.9.1 Within ten (10) days after the cessation of the delay, Contractor shall formalize its request for extension of time in writing to include a full analysis of the schedule impact of the delay and substantiation of the excusable nature of the delay. All changes to the Contract Time or made as a result of such claims is by Change Order, as set forth in Article 11.

9.9.2 No extension of time releases Contractor or the Surety furnishing a performance or payment bond from any obligations under the Contract or such a bond. Those obligations remain in full force until the discharge of the Contract.

9.9.3 Contents of Time Extension Requests. Contractor shall provide with each Time Extension Request a quantitative demonstration of the impact of the delay on project completion time, based on the Work Progress Schedule. Contractor shall include with Time Extension Requests a reasonably detailed narrative setting forth:

9.9.3.1 The nature of the delay and its cause: the basis of Contractor's claim of entitlement to a time extension.

9.9.3.2 Documentation of the actual impacts of the claimed delay on the critical path indicated in Contractor's Work Progress Schedule, and any concurrent delays.

9.9.3.3 Description and documentation of steps taken by Contractor to mitigate the effect of the claimed delay, including, when appropriate, the modification of the Work Progress Schedule.

9.9.4 Owner's Response. Owner will respond to the Time Extension Request by providing to Contractor written notice of the number of days granted, if any, and giving its reason if this number differs from the number of days requested by Contractor.

9.9.4.1 Owner will not grant time extensions for delays that do not affect the Contract Substantial Completion date.

9.9.4.2 Owner will respond to each properly submitted Time Extension Request within fifteen (15) days following receipt. If Owner cannot reasonably make a determination about Contractor's entitlement to a time extension within that time, Owner will notify Contractor in writing. Unless otherwise agreed by Contractor, Owner has no more than fifteen (15) additional days to prepare a final response. If Owner fails to respond within forty-five (45) days from the date the Time Extension Request is received, Contractor is entitled to a time extension in the amount requested.

9.10 Failure to Complete Work Within the Contract Time. **TIME IS AN ESSENTIAL ELEMENT OF THE CONTRACT.** Contractor's failure to substantially complete the Work within the Contract Time or to achieve Substantial Completion as required will cause damage to Owner. These damages shall be liquidated by agreement of Contractor and Owner, in the amount per day as set forth in the Contract Documents.

9.11 Liquidated Damages. Owner may collect liquidated damages due from Contractor directly or indirectly by reducing the Contract Sum in the amount of liquidated damages stated in the Supplementary General Conditions or Special Conditions.

Article 10. Payments

10.1 Schedule of Values. Contractor shall submit to ODR and A/E for acceptance a Schedule of Values accurately itemizing material and labor for the various classifications of the Work based on the organization of the specification sections and of sufficient detail acceptable to ODR. The accepted Schedule of Values will be the basis for the progress payments under the Contract.

10.1.1 No progress payments will be made prior to receipt and acceptance of the Schedule of Values, provided in such detail as required by ODR, and submitted not less than twenty-one (21) days prior to the first request for payment. The Schedule of Values shall follow the order of trade divisions of the Specifications and include itemized costs for general conditions, costs for preparing close out documents, fees, contingencies, and Owner cash allowances, if applicable, so that the sum of the items will equal the Contract price. As appropriate, assign each item labor and/or material values, the subtotal thereof equaling the value of the work in place when complete.

10.1.1.1 Owner requires that the Work items be inclusive of the cost of the Work items only. Any contract markups for overhead and profit, general conditions, etc., shall be contained within separate line items for those specific purposes which shall be divided into at least two(2) lines, one (1) for labor and one (1) for materials

10.1.2 Contractor shall retain a copy of all worksheets used in preparation of its bid or proposal, supported by a notarized statement that the worksheets are true and complete copies of the documents used to prepare the bid or proposal. Make the worksheets available to ODR at the time of Contract execution. Thereafter Contractor shall grant Owner during normal business hours access to said copy of worksheets at any time during the period commencing upon execution of the Contract and ending one year after final payment.

10.2 Progress Payments. Contractor will receive periodic progress payments for Work performed, materials in place, suitably stored on Site, or as otherwise agreed to by Owner and Contractor. Payment is not due until receipt by ODR or his designee of a correct and complete Pay Application in electronic and/or hard copy format as set forth in Supplementary General Conditions, Special Conditions, and certified by A/E. Progress payments are made provisionally and do not constitute acceptance of work not in accordance with the Contract Documents. Owner will not process progress payment applications for Change Order Work until all parties execute the Change Order.

10.2.1 Preliminary Pay Worksheet. Once each month that a progress payment is to be requested, the Contractor shall submit to A/E and ODR a complete, clean copy of a preliminary pay worksheet or preliminary pay application, to include the following:

10.2.1.1 Contractor's estimate of the amount of Work performed, labor furnished and materials incorporated into the Work, using the established Schedule of Values;

10.2.1.2 An updated Work Progress Schedule including the executive summary and all required schedule reports;

10.2.1.3 HUB subcontracting plan Progress Assessment Report as required in Paragraph 4.2.5.1;

10.2.1.4 Such additional documentation as Owner may require as set forth in the Supplementary General Conditions or elsewhere in the Contract Documents; and

10.2.1.5 Construction payment affidavit.

10.2.2 Contractor's Application for Payment. As soon as practicable, but in no event later than seven (7) days after receipt of the preliminary pay worksheet, A/E and ODR will meet with Contractor to review the preliminary pay worksheet and to observe the condition of the Work. Based on this review, ODR and A/E may require modifications to the preliminary pay worksheet prior to the submittal of an Application for Payment, and will promptly notify Contractor of revisions necessary for approval. As soon as practicable, Contractor shall submit its Application for Payment on the appropriate and completed form, reflecting the required modifications to the Schedule of Values required by A/E and/or ODR. Attach all additional documentation required by ODR and/or A/E, as well as an affidavit affirming that all payrolls, bills for labor, materials, equipment, subcontracted work and other indebtedness connected with Contractor's Application for Payment are paid or will be paid within the time specified in Tex. Gov't Code, Ch. 2251. No Application for Payment is complete unless it fully reflects all required modifications, and attaches all required documentation including Contractor's affidavit.

10.2.3 Certification by Architect/Engineer. Within five (5) days or earlier following A/E's receipt of Contractor's formal Application for Payment, A/E will review the Application for Payment for completeness, and forward it to ODR. A/E will certify that the application is complete and payable, or that it is incomplete, stating in particular what is missing. If the Application for Payment is incomplete, Contractor shall make the required corrections and resubmit the Application for Payment for processing.

10.3 Owner's Duty to Pay. Owner has no duty to pay the Contractor except on receipt by ODR of: 1) a complete Application for Payment certified by A/E, 2) Contractor's updated Work Progress Schedule; and 3) confirmation that Contractor's record documentation at the Site is kept current.

10.3.1 Payment for stored materials and/or equipment confirmed by Owner and A/E to be on-site or otherwise properly stored is limited to eighty-five (85) percent of the invoice price or eighty-five (85) percent of the scheduled value for the materials or equipment, whichever is less.

10.3.2 Retainage. Owner will withhold from each progress payment, as retainage, five (5) percent of the total earned amount, the amount authorized by law, or as otherwise set forth in the Supplementary General Conditions or Special Conditions. Retainage is managed in conformance with Tex. Gov't Code, Ch. 2252, Subch. B.

10.3.2.1 Contractor shall provide written consent of its surety for any request for reduction or release of retainage.

10.3.2.2 At least sixty-five (65) percent of the Contract, or such other discrete Work phase as set forth in Subsection 12.1.6 or Work package delineated in the Contract Documents, must be completed before Owner can consider a retainage reduction or release.

10.3.2.3 Contractor shall not withhold retainage from their Subcontractors and suppliers in amounts that are any percentage greater than that withheld in its Contract with Owner under this subsection, unless otherwise acceptable to Owner.

10.3.3 Price Reduction to Cover Loss. Owner may reduce any Application for Payment, prior to payment to the extent necessary to protect Owner from loss on account of actions of Contractor including, but not limited to, the following:

10.3.3.1 Defective or Incomplete Work not remedied;

10.3.3.2 Damage to Work of a separate Contractor;

10.3.3.3 Failure to maintain scheduled progress or reasonable evidence that the Work will not be completed within the Contract Time;

10.3.3.4 Persistent failure to carry out the Work in accordance with the Contract Documents;

10.3.3.5 Reasonable evidence that the Work cannot be completed for the unpaid portion of the Contract Sum;

10.3.3.6 Assessment of fines for violations of prevailing wage rate law; or

10.3.3.7 Failure to include the appropriate amount of retainage for that periodic progress payment.

10.3.4 Title to all material and Work covered by progress payments transfers to Owner upon payment.

10.3.4.1 Transfer of title to Owner does not relieve Contractor and its Subcontractors of the sole responsibility for the care and protection of materials and Work upon which payments have been made until substantial completion, responsibility for the care and protection of materials and Work in areas where punch list items are completed until final completion or the restoration of any damaged Work, or waive the right of Owner to require the fulfillment of all the terms of the Contract.

10.4 Progress Payments. Progress payments to Contractor do not release Contractor or its surety from any obligations under the Contract.

10.4.1 Upon Owner's request, Contractor shall furnish manifest proof of the status of Subcontractor's accounts in a form acceptable to Owner.

10.4.2 Pay estimate certificates must be signed by a corporate officer or a representative duly authorized by Contractor.

10.4.3 Provide copies of bills of lading, invoices, delivery receipts or other evidence of the location and value of such materials in requesting payment for materials.

10.4.4 For purposes of Tex. Gov't Code § 2251.021(b)(2), the date the performance of service is complete is the date when ODR approves the Application for Payment.

10.5 Off-Site Storage. With prior approval by Owner and in the event Contractor elects to store materials at an off-site location, abide by the following conditions, unless otherwise agreed to in writing by Owner.

10.5.1 Store materials in a commercial warehouse meeting the criteria stated below.

10.5.2 Provide insurance coverage adequate not only to cover materials while in storage, but also in transit from the off-site storage areas to the Project Site. Copies of duly authenticated certificates of insurance, made out to insure the State agency which is signatory to the Contract, must be filed with Owner's representative.

10.5.3 Inspection by Owner's representative is allowed at any time. Owner's inspectors must be satisfied with the security, control, maintenance, and preservation measures.

10.5.4 Materials for this Project are physically separated and marked for the Project in a sectioned-off area. Only materials which have been approved through the submittal process are to be considered for payment.

10.5.5 Owner reserves the right to reject materials at any time prior to final acceptance of the complete Contract if they do not meet Contract requirements regardless of any previous progress payment made.

10.5.6 With each monthly payment estimate, submit a report to ODR and A/E listing the quantities of materials already paid for and still stored in the off-site location.

10.5.7 Make warehouse records, receipts and invoices available to Owner's representatives, upon request, to verify the quantities and their disposition.

10.5.8 In the event of Contract termination or default by Contractor, the items in storage off-site, upon which payment has been made, will be promptly turned over to Owner or Owner's agents at a location near the jobsite as directed by ODR. The full provisions of performance and payment bonds on this Project cover the materials off-site in every respect as though they were stored on the Project Site.

10.6 Time for Payment by Contractor Pursuant to Tex. Gov't Code § 2251.022

10.6.1 Contractor who receives a payment from a governmental entity shall pay Subcontractor the appropriate share of the payment not later than the tenth (10th) day after the date Contractor receives the payment.

10.6.2 The appropriate share is overdue on the eleventh (11th) day after the date Contractor receives the payment.

Article 11. Changes

11.1 Change Orders. A Change Order issued after execution of the Contract is a written order to Contractor, signed by ODR, Contractor, and A/E, authorizing a change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time can only be changed by Change Order. A Change Order signed by Contractor indicates his agreement therewith, including the adjustment in the Contract Sum and/or the Contract Time. ODR may issue a written authorization for Contractor to proceed with Work of a Change Order in advance of final execution by all parties in accordance with Section 11.9.

11.1.1 Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, and the Contract Sum and the Contract Time will be adjusted accordingly. All such changes in the Work shall be authorized by Change Order or ULCO, and shall be performed under the applicable conditions of the Contract Documents. If such changes cause an increase or decrease in Contractor's cost of, or time required for, performance of the Contract, an equitable adjustment shall be made and confirmed in writing in a Change Order or a ULCO.

11.1.2 It is recognized by the parties hereto and agreed by them that the Specifications and Drawings may not be complete or free from errors, omissions and imperfections or that they may require changes or additions in order for the Work to be completed to the satisfaction of Owner and that, accordingly, it is the express intention of the parties, notwithstanding any other provisions in this Contract, that any errors, omissions or imperfections in such Specifications and Drawings, or any changes in or additions to same or to the Work ordered by Owner and any resulting delays in the Work or increases in Contractor's costs and expenses arising out of such errors, shall not constitute or give rise to any claim, demand or cause of action of any nature whatsoever in favor of Contractor, whether for breach of Contract, or otherwise; provided, however, that Owner shall be liable to Contractor for the

sum stated to be due Contractor in any Change Order approved and signed by both parties, it being agreed hereby that such sum, together with any extension of time contained in said Change Order, shall constitute full compensation to Contractor for all costs, expenses and damages to Contractor, as permitted under Tex. Gov't Code, Ch. 2260.

11.1.3 Procedures for administration of Change Orders shall be established by Owner and stated in Supplementary General Conditions, Special Conditions, or elsewhere in the Contract Documents.

11.1.4 No verbal order, verbal statement, or verbal direction of Owner or his duly appointed representative shall be treated as a change under this article or entitle Contractor to an adjustment.

11.1.5 Contractor agrees that Owner or any of its duly authorized representatives shall have access and the right to examine any directly pertinent books, documents, papers, and records of Contractor. Further, Contractor agrees to include in all its subcontracts a provision to the effect that Subcontractor agrees that Owner or any of its duly authorized representatives shall have access to and the right to examine any directly pertinent books, documents, papers and records of such Subcontractor relating to any claim arising from the Contract, whether or not the Subcontractor is a party to the claim. The period of access and examination described herein which relates to appeals under the Disputes article of the Contract, litigation, or the settlement of claims arising out of the performance of the Contract shall continue until final disposition of such claims, appeals or litigation.

11.2 Unit Prices. If unit prices are stated in the Contract Documents or subsequently agreed upon, and if the quantities originally contemplated are so changed in a Proposed Change Order that application of the agreed unit prices to the quantities of work proposed will cause substantial inequity to Owner or Contractor, the applicable unit prices shall be equitably adjusted as provided in the Supplementary General Conditions or Special Conditions or as agreed to by the parties and incorporated into a Change Order.

11.3 Claims for Additional Costs.

11.3.1 If Contractor wishes to make a claim for an increase in the Contract Sum not related to a requested change, they shall give Owner and A/E written notice thereof within twenty-one (21) days after the occurrence of the event giving rise to such claim, but, in any case before proceeding to execute the Work considered to be additional cost or time, except in an emergency endangering life or property in which case Contractor shall act in accordance with Subsection 7.2.1. No such claim shall be valid unless so made. If Owner and Contractor cannot agree on the amount of the adjustment in the Contract Sum, it shall be determined as set forth under Article 15. Any change in the Contract Sum resulting from such claim shall be authorized by a Change Order or a ULCO.

11.3.2 If Contractor claims that additional cost is involved because of, but not limited to, 1) any written interpretation of the Contract Documents, 2) any order by Owner to stop the Work pursuant to Article 14 where Contractor was not at fault, or 3) any written order for a minor change in the Work issued pursuant to Section 11.4, Contractor shall make such claim as provided in Subsection 11.3.1.

11.3.3 Should Contractor or his Subcontractors fail to call attention of A/E to discrepancies or omissions in the Contract Documents, but claim additional costs for corrective Work after Contract award, Owner may assume intent to circumvent competitive bidding for necessary corrective Work. In such case, Owner may choose to let a separate Contract for the corrective Work, or issue a ULCO to require performance by Contractor. Claims for time extensions or for extra cost resulting from delayed notice of patent Contract Document discrepancies or omissions will not be considered by Owner.

11.4 Minor Changes. A/E with concurrence of ODR, will have authority to order minor changes in the Work not involving an adjustment in the Contract Sum or an extension of the Contract Time. Such changes shall be effected by written order which Contractor shall carry out promptly and record on as-built record documents.

11.5 Concealed Site Conditions. Contractor is responsible for visiting the Site and being familiar with local conditions such as the location, accessibility, and general character of the Site and/or building. If, in the performance of the Contract, subsurface, latent, or concealed conditions at the Site are found to be materially different from the information included in the Contract Documents, or if unknown conditions of an unusual nature are disclosed differing materially from the conditions usually inherent in Work of the character shown and specified, ODR and A/E shall be notified in writing of such conditions before they are further disturbed or subsequent related work proceeds. Upon such notice, or upon his own observation of such conditions, A/E, with the approval of ODR, will promptly make such changes in the Drawings and Specifications as they deem necessary to conform to the different conditions, and any increase or decrease in the cost of the Work, or in the time within which the Work is to be completed, resulting from such changes will be adjusted by Change Order, subject to the prior approval of ODR.

11.6 Extension of Time. All changes to the Contract Time shall be made as a consequence of requests as required under Section 9.6, and as documented by Change Order as provided under Section 11.1.

11.7 Administration of Change Order Requests. All changes in the Contract shall be administered in accordance with procedures approved by Owner, and when required, make use of such electronic information management system(s) as Owner may employ.

11.7.1 Routine changes in the construction Contract shall be formally initiated by A/E by means of a PCO form detailing requirements of the proposed change for pricing by Contractor. This action may be preceded by communications

between Contractor, A/E and ODR concerning the need and nature of the change, but such communications shall not constitute a basis for beginning the proposed Work by Contractor. Except for emergency conditions described below, approval of Contractor's cost proposal by A/E and ODR will be required for authorization to proceed with the Work being changed. Owner will not be responsible for the cost of Work changed without prior approval and Contractor may be required to remove Work so installed.

11.7.2 All proposed costs for change order Work must be supported by itemized accounting of material, equipment and associated itemized installation costs in sufficient detail, following the outline and organization of the establish Schedule of Values, to permit analysis by A/E and ODR using current estimating guides and/or practices. Photocopies of Subcontractor and vendor proposals shall be furnished unless specifically waived by ODR. Contractor shall provide written response to a change request within twenty-one (21) days of receipt.

11.7.3 Any unexpected circumstance which necessitates an immediate change in order to avoid a delay in progress of the Work may be expedited by verbal communication and authorization between Contractor and Owner, with written confirmation following within twenty-four (24) hours. A limited scope not-to-exceed estimate of cost and time will be requested prior to authorizing Work to proceed. Should the estimate be impractical for any reason, ODR may authorize the use of detailed cost records of such work to establish and confirm the actual costs and time for documentation in a formal Change Order.

11.7.4 Emergency changes to save life or property may be initiated by Contractor alone (see Section 7.3) with the claimed cost and/or time of such work to be fully documented as to necessity and detail of the reported costs and/or time.

11.7.5 The method of incorporating approved Change Orders into the parameters of the accepted Schedule of Values must be coordinated and administered in a manner acceptable to ODR.

11.8 Pricing Change Order Work. The amounts that Contractor and/or its Subcontractor adds to a Change Order for profit and overhead will also be considered by Owner before approval is given. The amounts established hereinafter are the maximums that are acceptable to Owner.

11.8.1 For Work performed by its forces, Contractor will be allowed their actual costs for materials, the total amount of wages (including benefits) paid for labor, plus the total cost of State and Federal payroll taxes and of worker's compensation and comprehensive general liability insurance, plus additional bond and builders risk insurance cost if the change results in an increase in the premium paid by Contractor. To the total of the above costs, Contractor will be allowed to add a percentage as noted below to cover overhead and profit combined. Allowable percentages for overhead and profit on any specific change shall not exceed fifteen (15) percent for the first $10,000 of

value for self-performed work or portion thereof, ten (10) percent for the second $10,000 of value for self-performed work or portion thereof and seven and a half (7.5) percent for any value of the self-performed work that exceeds $20,000.

11.8.2 For subcontracted Work each affected Subcontractor shall figure its costs, overhead and profit as described above for Contractor's Work. all Subcontractor costs shall be combined, and to that total Subcontractor cost Contractor will be allowed to add a maximum mark-up of ten (10) percent for the first $10,000 of subcontracted Work value or portion thereof, seven and half (7.5) percent for the second $10,000 of subcontracted Work value or portion thereof, and five (5) percent for any value of the subcontracted Work exceeding $20,000.

11.8.3 On changes involving both additions and deletions, percentages for overhead and profit will be allowed only on the net addition. Owner does not accept and will not pay for additional Contract cost identified as indirect or consequential damages.

11.8.4 For Contracts based on a Guaranteed Maximum Price (GMP), the Construction Manager-at-Risk or Design Builder shall NOT be entitled to a percentage mark-up on any Change Order Work unless the Change Order increases the Guaranteed Maximum Price.

11.9 Unilateral Change Order (ULCO). Owner may issue a written ULCO directing a change in the Work prior to reaching agreement with Contractor on the adjustment, if any, in the Contract price and/or the Contract Time.

11.9.1 Owner and Contractor shall negotiate for appropriate adjustments, as applicable, to the Contract Sum or the Contract Time arising out of a ULCO. As the changed Work is performed, Contractor shall submit its costs for such Work with its Application for Payment beginning with the next Application for Payment within thirty (30) days of the issuance of the ULCO. The Parties reserve their rights as to the disputed amount, subject to Article 15.

11.10 Final Resolution of Changes. Upon execution of a Change Order and /or a ULCO by Owner, Contractor and A/E, all costs and time issues regarding that change are final and not subject to additive adjustments.

Article 12. Project Completion and Acceptance

12.1 Closing Inspections.

12.1.1 Substantial Completion Inspection. When Contractor considers the entire Work or part thereof Substantially Complete, it shall notify ODR in writing that the Work will be ready for Substantial Completion inspection on a specific date. Contractor shall include with this notice Contractor's Punchlist to indicate that it has previously inspected all the Work associated with the request for inspection, noting items it has corrected and included all remaining

work items with date scheduled for completion or correction prior to final inspection. The failure to include any items on this list does not alter the responsibility of Contractor to complete all Work in accordance with the Contract Documents. If any of the items on this list prevents the Project from being used as intended, Contractor shall not request a Substantial Completion Inspection. Owner and its representatives will review the list of items and schedule the requested inspection, or inform Contractor in writing that such an inspection is premature because the Work is not sufficiently advanced or conditions are not as represented on Contractor's list.

12.1.1.1 Prior to the Substantial Completion inspection, Contractor shall furnish a copy of its marked-up Record Documents and a preliminary copy of each instructional manual, maintenance and operating manual, parts catalog, wiring diagrams, spare parts, specified written warranties, and like publications or parts for all installed equipment, systems, and like items as described in the Contract Documents. Delivery of these items is a prerequisite for requesting the Substantial Completion inspection.

12.1.1.2 On the date requested by Contractor, or as mutually agreed upon pending the status of the Open Items List, A/E, ODR, Contractor, and other Owner representatives as determined by Owner will jointly attend the Substantial Completion inspection, which shall be conducted by ODR or their delegate. If ODR determines that the Work is Substantially Complete, ODR will issue a Certificate of Substantial Completion to be signed by A/E, Owner, and Contractor establishing the date of Substantial Completion and identifying responsibilities for security, maintenance, insurance and utilities. A/E will provide with this certificate a consolidated list of Punchlist items (the pre-final Punchlist including all items noted by the various inspecting parties) for completion prior to final inspection. This list may include items in addition to those on Contractor's Punchlist, which the inspection team deems necessary to correct or complete prior to final inspection. The failure to include any items on this list does not alter the responsibility of Contractor to complete all Work in accordance with the Contract Documents. If Owner occupies the Project upon determination of Substantial Completion, Contractor shall complete all corrective Work at the convenience of Owner, without disruption to Owner's use of the Project for its intended purposes.

12.1.2 <u>Final Inspection.</u> Contractor shall complete the list of items identified on the pre-final Punchlist prior to requesting a final inspection. Unless otherwise specified, or otherwise agreed in writing by the parties as documented on the Certificate of Substantial Completion, Contractor shall complete and/or correct all Work within thirty (30) days of the Substantial Completion date. Upon completion of the pre-final Punchlist work, Contractor shall give written notice to ODR and A/E that the Work will be ready for final inspection on a specific date. Contractor shall accompany this notice

with a copy of the updated pre-final Punchlist indicating resolution of all items. On the date specified or as soon thereafter as is practicable, ODR, A/E and Contractor will inspect the Work. A/E will submit to Contractor a final Punchlist of open items that the inspection team requires corrected or completed before final acceptance of the Work.

12.1.2.1 Correct or complete all items on the final Punchlist before requesting Final Payment. Unless otherwise agreed to in writing by the parties, complete this work within seven (7) days of receiving the final Punchlist. Upon completion of the final Punchlist, notify A/E and ODR in writing stating the disposition of each final Punchlist item. A/E, Owner, and Contractor shall promptly inspect the completed items. When the final Punchlist is complete, and the Contract is fully satisfied according to the Contract Documents ODR will issue a certificate establishing the date of Final Completion. Completion of all Work is a condition precedent to Contractor's right to receive Final Payment.

12.1.3 Annotation. Any Certificate issued under this Article may be annotated to indicate that it is not applicable to specified portions of the Work, or that it is subject to any limitation as determined by Owner.

12.1.4 Purpose of Inspection. Inspection is for determining the completion of the Work, and does not relieve Contractor of its overall responsibility for completing the Work in a good and competent fashion, in compliance with the Contract. Work accepted with incomplete Punchlist items or failure of Owner or other parties to identify Work that does not comply with the Contract Documents or is defective in operation or workmanship does not constitute a waiver of Owner's rights under the Contract or relieve Contractor of its responsibility for performance or warranties.

12.1.5 Additional Inspections.

12.1.5.1 If Owner's inspection team determines that the Work is not substantially complete at the Substantial Completion inspection, ODR or A/E will give Contractor written notice listing cause(s) of the rejection. Contractor will set a time for completion of incomplete or defective work acceptable to ODR. Contractor shall complete or correct all work so designated prior to requesting a second Substantial Completion inspection.

12.1.5.2 If Owner's inspection team determines that the Work is not complete at the final inspection, ODR or A/E will give Contractor written notice listing the cause(s) of the rejection. Contractor will set a time for completion of incomplete or defective work acceptable to ODR. Contractor shall complete or correct all Work so designated prior to again requesting a final inspection.

12.1.5.3 The Contract contemplates three (3) comprehensive inspections: the Substantial Completion inspection, the Final Completion inspection, and the inspection of completed final Punchlist items. The cost to Owner of additional inspections resulting from the Work not being ready for one or more of these inspections is the responsibility of Contractor. Owner may issue a UCO deducting these costs from Final Payment. Upon Contractor's written request, Owner will furnish documentation of any costs so deducted. Work added to the Contract by Change Order after Substantial Completion inspection is not corrective Work for purposes of determining timely completion, or assessing the cost of additional inspections.

12.1.6 Phased Completion. The Contract may provide, or Project conditions may warrant, as determined by ODR, that designated elements or parts of the Work be completed in phases. Where phased completion is required or specifically agreed to by the parties, the provisions of the Contract related to closing inspections, occupancy, and acceptance apply independently to each designated element or part of the Work. For all other purposes, unless otherwise agreed by the parties in writing, Substantial Completion of the Work as a whole is the date on which the last element or part of the Work completed receives a Substantial Completion certificate.

Final Completion of the Work as a whole is the date on which the last element or part of the Work completed receives a Final Completion certificate.

12.2 Owner's Right of Occupancy. Owner may occupy or use all or any portion of the Work following Substantial Completion, or at any earlier stage of completion. Should Owner wish to use or occupy the Work, or part thereof, prior to Substantial Completion, ODR will notify Contractor in writing and identify responsibilities for security, maintenance, insurance and utilities. Work performed on the premises by third parties on Owner's behalf does not constitute occupation or use of the Work by Owner for purposes of this Article. All Work performed by Contractor after occupancy, whether in part or in whole, shall be at the convenience of Owner so as to not disrupt Owner's use of, or access to occupied areas of the Project.

12.3 Acceptance and Payment

12.3.1 Request for Final Payment. Following the certified completion of all work, including all final Punchlist items, cleanup, and the delivery of record documents, Contractor shall submit a certified Application for Final Payment and include all sums held as retainage and forward to A/E and ODR for review and approval.

12.3.2 Final Payment Documentation. Contractor shall submit, prior to or with the Application for Final Payment, final copies of all close out documents, maintenance and operating instructions, guarantees and warranties, certificates, Record Documents and all other items required by the Contract.

Contractor shall submit evidence of return of access keys and cards, evidence of delivery to Owner of attic stock, spare parts, and other specified materials. Contractor shall submit consent of surety to Final Payment form and an affidavit that all payrolls, bills for materials and equipment, subcontracted work and other indebtedness connected with the Work, except as specifically noted, are paid, will be paid, after payment from Owner or otherwise satisfied within the period of time required by Tex. Gov't Code, Ch. 2251. Contractor shall furnish documentation establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of claims and liens arising out of the Contract. Contractor may not subsequently submit a claim on behalf of Subcontractor or vendor unless Contractor's affidavit notes that claim as an exception.

12.3.3 Architect/Engineer Approval. A/E will review a submitted Application for Final Payment promptly but in no event later than ten (10) days after its receipt. Prior to the expiration of this deadline, A/E will either: 1) return the Application for Final Payment to Contractor with corrections for action and resubmission; or 2) accept it, note their approval, and send to Owner.

12.3.4 Offsets and Deductions. Owner may deduct from the Final Payment all sums due from Contractor. If the Certificate of Final Completion notes any Work remaining, incomplete, or defects not remedied, Owner may deduct the cost of remedying such deficiencies from the Final Payment. On such deductions, Owner will identify each deduction, the amount, and the explanation of the deduction on or by the twenty-first (21st) day after Owner's receipt of an approved Application for Final Payment. Such offsets and deductions shall be incorporated via a final Change Order, including a ULCO as may be applicable.

12.3.5 Final Payment Due. Final Payment is due and payable by Owner, subject to all allowable offsets and deductions, on the thirtieth (30th) day following Owner's approval of the Application for Payment. If Contractor disputes any amount deducted by Owner, Contractor shall give notice of the dispute on or before the thirtieth (30th) day following receipt of Final Payment. Failure to do so will bar any subsequent claim for payment of amounts deducted.

12.3.6 Effect of Final Payment. Final Payment constitutes a waiver of all claims by Owner, relating to the condition of the Work except those arising from:

12.3.6.1 Faulty or defective Work appearing after Substantial Completion (latent defects);

12.3.6.2 Failure of the Work to comply with the requirements of the Contract Documents;

12.3.6.3 Terms of any warranties required by the Contract, or implied by law; or

12.3.6.4 Claims arising from personal injury or property damage to third parties.

12.3.7 Waiver of Claims. Final payment constitutes a waiver of all claims and liens by Contractor except those specifically identified in writing and submitted to ODR prior to the application for Final Payment.

12.3.8 Effect on Warranty. Regardless of approval and issuance of Final Payment, the Contract is not deemed fully performed by Contractor and closed until the expiration of all warranty periods. Issuance of Final Payment does not alter Contractor's contractual obligations during the warranty period.

Article 13. Warranty and Guarantee

13.1 Contractor's General Warranty and Guarantee. Contractor warrants to Owner that all Work is executed in accordance with the Contract, complete in all parts and in accordance with approved practices and customs, and of the required finish and workmanship. Contractor further warrants that unless otherwise specified, all materials and equipment incorporated in the Work under the Contract are new. Owner may, at its option, agree in writing to waive any failure of the Work to conform to the Contract, and to accept a reduction in the Contract price for the cost of repair or diminution in value of the Work by reason of such defect. Absent such a written agreement, Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute and is not waived by any inspection or observation by Owner, A/E or others, by making any progress payment or final payment, by the use or occupancy of the Work or any portion thereof by Owner, at any time, or by any repair or correction of such defect made by Owner.

13.2 Warranty Period. Except as may be otherwise specified or agreed, Contractor shall repair all defects in materials, equipment, or workmanship appearing within one year from the date of Substantial Completion of the Work. If Substantial Completion occurs by phase, then the warranty period for that particular Work begins on the date of such occurrence, or as otherwise stipulated on the Certificate of Substantial Completion for the particular Work.

13.3 Limits on Warranty. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

13.3.1 Modification or improper maintenance or operation by persons other than Contractor, Subcontractors, or any other individual or entity for whom Contractor is not responsible, unless Owner is compelled to undertake maintenance or operation due to the neglect of Contractor.

13.3.2 Normal wear and tear under normal usage after acceptance of the Work by Owner.

13.4 Events Not Affecting Warranty. Contractor's obligation to perform and complete the Work in a good and workmanlike manner in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of defective Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

13.4.1 Observations by Owner and/or A/E;

13.4.2 Recommendation to pay any progress or final payment by A/E;

13.4.3 The issuance of a certificate of Substantial Completion or any payment by Owner to Contractor under the Contract Documents;

13.4.4 Use or occupancy of the Work or any part thereof by Owner;

13.4.5 Any acceptance by Owner or any failure to do so;

13.4.6 Any review of a Shop Drawing or sample submittal; or

13.4.7 Any inspection, test or approval by others.

13.5 Separate Warranties. If a particular piece of equipment or component of the Work for which the Contract requires a separate warranty is placed in continuous service before Substantial Completion, the warranty period for that equipment or component will not begin until Substantial Completion, regardless of any warranty agreements in place between suppliers and/or Subcontractors and Contractor. ODR will certify the date of service commencement in the Substantial Completion certificate.

13.5.1 In addition to Contractor's warranty and duty to repair, Contractor expressly assumes all warranty obligations required under the Contract for specific building components, systems and equipment.

13.5.2 Contractor may satisfy any such obligation by obtaining and assigning to Owner a complying warranty from a manufacturer, supplier, or Subcontractor. Where an assigned warranty is tendered and accepted by Owner which does not fully comply with the requirements of the Contract, Contractor remains liable to Owner on all elements of the required warranty not provided by the assigned warranty.

13.6 Correction of Defects. Upon receipt of written notice from Owner, or any agent of Owner designated as responsible for management of the warranty period, of the discovery of a defect, Contractor shall promptly remedy the defect(s), and provide written notice to Owner and designated agent indicating action taken. In case of emergency where delay would cause serious risk of loss or damage to Owner, or if Contractor fails to remedy within thirty (30) days, or within another period agreed to in writing, Owner may correct the defect and be reimbursed the cost of remedying the defect from Contractor or its surety.

13.7 Certification of No Asbestos Containing Materials or Work. Contractor shall ensure compliance with the Asbestos Hazard Emergency Response Act (AHERA-40 C.F.R § 763-99(7)) from all Subcontractors and materials suppliers, and shall provide a notarized certification to Owner that all equipment and materials used in fulfillment of their Contract responsibilities are non-Asbestos Containing Building Materials (ACBM). This certification must be provided no later than Contractor's application for Final Payment.

Article 14. Suspension and Termination

14.1 Suspension of Work for Cause. Owner may, at any time without prior notice, suspend all or any part of the Work, if after reasonable observation and/or investigation, Owner determines it is necessary to do so to prevent or correct any condition of the Work, which constitutes an immediate safety hazard, or which may reasonably be expected to impair the integrity, usefulness or longevity of the Work when completed.

14.1.1 Owner will give Contractor a written notice of suspension for cause, setting forth the reason for the suspension and identifying the Work suspended. Upon receipt of such notice, Contractor shall immediately stop the Work so identified. As soon as practicable following the issuance of such a notice, Owner will initiate and complete a further investigation of the circumstances giving rise to the suspension, and issue a written determination of the findings.

14.1.2 If it is confirmed that the cause was within the control of Contractor, Contractor will not be entitled to an extension of time or any compensation for delay resulting from the suspension. If the cause is determined not to have been within the control of Contractor, and the suspension has prevented Contractor from completing the Work within the Contract Time, the suspension is an excusable delay and a time extension will be granted through a Change Order.

14.1.3 Suspension of Work under this provision will be no longer than is reasonably necessary to remedy the conditions giving rise to the suspension.

14.2 Suspension of Work for Owner's Convenience. Upon seven (7) days written notice to Contractor, Owner may at any time without breach of the Contract suspend all or any portion of the Work for a period of up to thirty (30) days for its own convenience. Owner will give Contractor a written notice of suspension for convenience, which sets forth the number of suspension days for which the Work, or any portion of it, and the date on which the suspension of Work will cease. When such a suspension prevents Contractor from completing the Work within the Contract Time, it is an excusable delay. A notice of suspension for convenience may be modified by Owner at any time on seven (7) days written notice to Contractor. If Owner suspends the Work for its convenience for more than sixty (60) consecutive days, Contractor may elect to terminate the Contract pursuant to the provisions of the Contract.

14.3 Termination by Owner for Cause.

14.3.1 Upon written notice to Contractor and its surety, Owner may, without prejudice to any right or remedy, terminate the Contract and take possession of the Site and of all materials, equipment, tools, construction equipment, and machinery thereon owned by Contractor under any of the following circumstances:

14.3.1.1 Persistent or repeated failure or refusal, except during complete or partial suspensions of work authorized under the Contract, to supply enough properly skilled workmen or proper materials;

14.3.1.2 Persistent disregard of laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, including ODR;

14.3.1.3 Persistent failure to prosecute the Work in accordance with the Contract, and to ensure its completion within the time, or any approved extension thereof, specified in the Contract;

14.3.1.4 Failure to remedy defective work condemned by ODR;

14.3.1.5 Failure to pay Subcontractors, laborers, and material suppliers pursuant to Tex. Gov't Code, Ch. 2251;

14.3.1.6 Persistent endangerment to the safety of labor or of the Work;

14.3.1.7 Failure to supply or maintain statutory bonds or to maintain required insurance, pursuant to the Contract;

14.3.1.8 Any material breach of the Contract; or

14.3.1.9 Contractor's insolvency, bankruptcy, or demonstrated financial inability to perform the Work.

14.3.2 Failure by Owner to exercise the right to terminate in any instance is not a waiver of the right to do so in any other instance.

14.3.3 Should Owner decide to terminate the Contract under the provisions of Section 14.3, it will provide to Contractor and its surety thirty (30) days prior written notice.

14.3.4 Should Contractor or its surety, after having received notice of termination, demonstrate to the satisfaction of Owner that Contractor or its surety are proceeding to correct such default with diligence and promptness, upon which the notice of termination was based, the notice of termination may be rescinded in writing by Owner. If so rescinded, the Work may continue without an extension of time.

14.3.5 If Contractor or its surety fails, after written notice from Owner to commence and continue correction of such default with diligence and promptness to the satisfaction of Owner within thirty (30) days following receipt of notice, Owner may arrange for completion of the Work and deduct the cost of completion from the unpaid Contract Sum.

14.3.5.1 This amount includes the cost of additional Owner costs such as A/E services, other consultants, and contract administration.

14.3.5.2 Owner will make no further payment to Contractor or its surety unless the costs to complete the Work are less than the Contract balance, then the difference shall be paid to Contractor or its surety. If such costs exceed the unpaid balance, Contractor or its surety will pay the difference to Owner.

14.3.5.3 This obligation for payment survives the termination of the Contract.

14.3.5.4 Owner reserves the right in termination for cause to take assignment of all the Contracts between Contractor and its Subcontractors, vendors, and suppliers. ODR will promptly notify Contractor of the contracts Owner elects to assume. Upon receipt of such notice, Contractor shall promptly take all steps necessary to effect such assignment.

14.4 Conversion to Termination for Convenience. In the event that any termination of Contractor for cause under Section 14.3 is later determined to have been improper, the termination shall automatically convert to a termination for convenience under Section 14.5 and Contractor's recovery for termination shall be strictly limited to the payments allowable under Section 14.5.

14.5 Termination for Convenience of Owner. Owner reserves the right, without breach, to terminate the Contract prior to, or during the performance of the Work, for any reason. Upon such an occurrence, the following shall apply:

14.5.1 Owner will immediately notify Contractor and A/E in writing, specifying the reason for and the effective date of the Contract termination. Such notice may also contain instructions necessary for the protection, storage or decommissioning of incomplete work or systems, and for safety.

14.5.2 Upon receipt of the notice of termination, Contractor shall immediately proceed with the following obligations, regardless of any delay in determining or adjusting any amounts due at that point in the Contract:

14.5.2.1 Stop all work.

14.5.2.2 Place no further subcontracts or orders for materials or services.

14.5.2.3 Terminate all subcontracts for convenience.

14.5.2.4 Cancel all materials and equipment orders as applicable.

14.5.2.5 Take action that is necessary to protect and preserve all property related to the Contract which is in the possession of Contractor.

14.5.3 When the Contract is terminated for Owner's convenience, Contractor may recover from Owner payment for all Work executed. Contractor may not claim lost profits on other work or lost business opportunities.

14.6 Termination By Contractor. If the Work is stopped for a period of ninety (90) days under an order of any court or other public authority having jurisdiction, or as a result of an act of government, such as a declaration of a national emergency making materials unavailable, through no act or fault of Contractor or Subcontractor or their agents or employees or any other persons performing any of the Work under a contract with Contractor, then Contractor may, upon thirty (30) additional days written notice to ODR, terminate the Contract and recover from Owner payment for all Work executed, but not lost profits on other work or lost business opportunities. If the cause of the Work stoppage is removed prior to the end of the thirty (30) day notice period, Contractor may not terminate the Contract.

14.7 Settlement on Termination. When the Contract is terminated for any reason, at any time prior to one hundred eighty (180) days after the effective date of termination, Contractor shall submit a final termination settlement proposal to Owner based upon recoverable costs as provided under the Contract. If Contractor fails to submit the proposal within the time allowed, Owner may determine the amount due to Contractor because of the termination and pay the determined amount to Contractor.

Article 15. Dispute Resolution

15.1 Unresolved Contractor Disputes. The dispute resolution process provided for in Tex. Gov't Code, Ch. 2260 or Tex. Civ. Prac. & Rem. Code, Ch. 114, shall be used by Contractor to attempt to resolve any claim for breach of Contract made by Contractor that is not resolved under procedures described throughout the Uniform General Conditions, Supplementary Conditions, or Special Conditions of the Contract.

15.2 Alternative Dispute Resolution Process. Owner may establish a dispute resolution process to be utilized in advance of that outlined in Tex. Gov't Code, Ch. 2260 or Tex. Civ. Prac. & Rem. Code, Ch. 114.

15.3 Nothing herein shall hinder, prevent, or be construed as a waiver of Owner's right to seek redress on any disputed matter in a court of competent jurisdiction.

15.4 Nothing herein shall waive or be construed as a waiver of the State's sovereign immunity.

Article 16. Miscellaneous

16.1 Supplementary General and Special Conditions. When the Work contemplated by Owner is of such a character that the foregoing Uniform General Conditions of the Contract cannot adequately cover necessary and additional contractual relationships, the Contract may include Supplementary General and Special Conditions as described below:

16.1.1 Supplementary General Conditions may describe the standard procedures and requirements of contract administration followed by a contracting agency of the State. Supplementary General Conditions may expand upon matters covered by the Uniform General Conditions, where necessary, provided the expansion does not weaken the character or intent of the Uniform General Conditions. Supplementary General Conditions are of such a character that it is to be anticipated that a contracting agency of the State will normally use the same, or similar, conditions to supplement each of its several projects.

16.1.2 Special Conditions shall relate to a particular Project and be unique to that Project but shall not weaken the character or intent of the Uniform General Conditions.

16.2 Federally Funded Projects. On Federally funded projects, Owner may waive, suspend or modify any Article in these Uniform General Conditions which conflicts with any Federal statue, rule, regulation or procedure, where such waiver, suspension or modification is essential to receipt by Owner of such Federal funds for the Project. In the case of any Project wholly financed by Federal funds, any standards required by the enabling Federal statute, or any Federal rules, regulations or procedures adopted pursuant thereto, shall be controlling.

16.3 Internet-based Project Management Systems. At its option, Owner may administer its design and construction management through an Internet-based management system. In such cases, Contractor shall conduct communication through this media and perform all Project related functions utilizing this database system. This includes correspondence, submittals, Requests for Information, vouchers or payment requests and processing, amendment, Change Orders and other administrative activities.

16.3.1 Accessibility and Administration.

16.3.1.1 When used, Owner will make the software accessible via the Internet to all Project team members.

16.3.1.2 Owner shall administer the software.

16.3.2 Training. When used, Owner shall provide training to the Project team members.

16.4 Administrative Inspections and Audits. Contractor agrees that all relevant records related to this Contract or any work product under this Contract, including practices of its Subcontractors, shall be subject, at any reasonable time, to inspection, examination, review, audit, and copying at any office or location of Contractor where such records

may be found, with or without notice by the Texas State Auditor's Office ("SAO"), the contracting agency or its contracted examiners, or the Office of the Texas Attorney General, and with regard to any federal funding, the relevant federal agency, the Comptroller General, the General Accounting Office, the Office of the Inspector General, or any of their authorized representatives. All Subcontracts shall reflect the requirements of this section. In addition, pursuant to Tex. Gov't Code§ 2262.003 the SAO may conduct an audit or investigation of any entity receiving funds under this Contract, including direct payments to Contractor and indirect payments under a Subcontract to this Contract; acceptance of such monies acts as acceptance of SAO authority, under legislative audit committee direction, to audit and investigate related to those funds and the entity subject to the audit or investigation must provide SAO with access to any information SAO considers relevant to the scope of the audit or investigation.

End of Uniform General Conditions

EXHIBIT B

Exhibit B – Supplemental General Conditions

SUPPLEMENTARY GENERAL CONDITIONS TO THE STATE OF TEXAS 2010 EDITION OF THE UNIFORM GENERAL CONDITIONS FOR CONSTRUCTION CONTRACTS

The following Supplementary General Conditions amend and/or supplement the 2010 Edition of the Uniform General Conditions for Construction Contracts.

Article 1. Definitions

Article 1 is supplemented to add the following new subsection:

1.44.1 *Wage Rate Notification* means the written notification described in Subsection 2.2.1.

Article 2. Wage Rates and Other Laws Governing Construction

2.2 Wage Rates.

2.2.3 Complaints of Violations.

Subsection 2.2.3 is supplemented to add the following new paragraphs:

2.2.3.3 Cooperation with Owner's Investigation. Contractor shall cooperate with Owner during any investigations hereunder. Such cooperation shall include, but not necessarily be limited to, timely providing the information and/or documentation requested by Owner, which may include certified payroll records on Form WH-347 as promulgated by the U.S. Department of Labor, as may be revised from time to time and in unlocked and unprotected Excel format; copies of Wage Rate Notifications; and copies of any and all Contract Documents between Contractor and any Subcontractors.

2.2.3.4 Notification to Owner. In the event Contractor or Subcontractor elect to appeal an initial determination made pursuant to paragraph 2.2.3.1, the Contractor and/or Subcontractor, as applicable, shall deliver notice thereof to Owner.

Article 3. General Responsibilities of Owner and Contractor

3.2 Role of Architect/Engineer.

Section 3.2 is supplemented to add the following new subsection:

3.2.9 Progress Meetings and Minutes. A/E shall prepare the agenda and conduct meetings with Owner and Contractor to discuss such matters as procedures, progress, coordination, scheduling, and status of the Work on a regular basis as determined by Owner. Contractor shall cooperate with A/E whose responsibility is the preparation

of meeting minutes for distribution to Contractor and Owner. In the absence of A/E at such meetings, Contractor shall be responsible for preparing and distributing minutes to Owner and A/E. If, in the opinion of Owner, it is feasible for A/E to conduct the meeting via telecommunication, A/E shall conduct the meeting and prepare and distribute the minutes to Owner and Contractor. A/E shall solicit input for the meeting agenda from Contractor and Owner a minimum of forty-eight (48) hours before a meeting and distribute the agenda a minimum of thirty-six (36) hours before a meeting and distribute the minutes, reports, and other similar documentation within one week of the respective work or event, unless directed otherwise by Owner.

3.3 Contractor's General Responsibilities.

3.3.2 Contractor's Management Personnel.

Subsection 3.3.2 is supplemented to add the following new paragraph:

3.3.2.1 Contractor shall implement its existing quality control and safety plan for the Project, and shall use such standard of care as a contractor of ordinary prudence would exercise in the same or similar circumstances.

Article 5. Bonds and Insurance

5.2 Insurance Requirements.

Subsection 5.2.4 is supplemented to add the following new paragraphs:

5.2.4.1 Contractor shall deliver to Owner true and complete copies of the certificates prior to the issuance of any Notice to Proceed.

5.2.4.2 Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

5.2.4.3 The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.2.4.4 The insurance coverage and limits established in the Uniform General Conditions, Supplementary General Conditions, or Special Conditions shall not be interpreted as any representation or warranty that the insurance coverage and limits necessarily will be adequate to protect Contractor.

Article 9. Construction Schedules

9.3 Work Progress Schedule.

Paragraph 9.3.1.1 is supplemented to add the following sentence at the end of the paragraph:

> In the event the Baseline Schedule, or any revisions thereto, reflect a Substantial Completion date that will occur sooner than the Final Completion date as set forth in the Contract Documents, or other similar agreement, the period of time between the Substantial Completion date and the Final Completion date shall be considered the "float."

9.6 Modification of the Contract Time.

Subsection 9.6.2 is supplemented to add the following sentence at the end of the paragraph:

Provided, however, all float must be consumed by approved excusable delays to the critical path before any extension of time can be granted.

End of Supplementary General Conditions

EXHIBIT C

Exhibit C – Special Conditions

SPECIAL CONDITIONS
TO THE STATE OF TEXAS 2015 EDITION OF THE UNIFORM GENERAL CONDITIONS FOR CONSTRUCTION CONTRACTS

The following Special Conditions amend and/or supplement the 2015 edition of the Uniform General Conditions for Construction Contracts, and any Supplementary General Conditions, as follows:

Article 3. General Responsibilities of Owner and Contractor

Subsection 3.3.3. [Labor] is supplemented so as to add the following Paragraph:

3.3.3.1. General and Criminal Background Checks.

3.3.3.1.1. By submitting a response to an RFQ or an RFP, Contractor thereby represents and warrants that Contractor and Contractor's employees have not been convicted of a felony criminal offense, or of a crime involving moral turpitude, or that, if such a conviction has occurred, Contractor has fully advised TFC as to the facts and circumstances surrounding the conviction(s).

3.3.3.1.2. All of Contractor's employees and Subcontractors that will perform any work on-site at a state-owned property shall be subject to a criminal background check. Any expense associated with such criminal background check shall be borne by Contractor.

3.3.3.1.2.1. All criminal background check forms for all of Contractor's employees and Subcontractors that will initially commence any work on-site must be fully completed and submitted to TFC within fifteen (15) days of the date of the Notice of Award, and the process thereafter must be diligently pursued by Contractor.

3.3.3.1.2.2. The process must be satisfactorily completed for every employee and Subcontractor before they perform services at the Site.

3.3.3.1.2.3. All criminal background checks must be accomplished through the Texas Department of Public Safety ("DPS"), which includes fingerprint processing by an independent third-party company selected by DPS. Upon receipt of the fingerprints of Contractor's employees and/or Subcontractors, DPS, or TFC, will adjudicate the results of the criminal background searches in accordance with the criteria set forth in the Criminal Background Check Criteria and Information packet that will be provided to Contractor. Contractor' or Subcontractor's failure to timely secure criminal background check clearance shall not be considered a legitimate delay in the project schedule.

Article 5. Bonds and Insurance

Section 5.2 Insurance Requirements is amended to read in its entirety as follows:

5.2. Insurance Requirements. Contractor shall carry insurance in the types and amounts indicated in this Article, and for the specific durations set out below. The Insurance shall be evidenced by delivery to Owner of certificates of insurance executed by the insurer or its authorized agent, utilizing the current version of the ACORD form(s), stating coverages, limits, expiration dates and compliance with all applicable required provisions as soon as reasonably practicable, but in no event later than fifteen (15) days after the date of the notice of award. Contractor shall also deliver to Owner, and/or its agents, as soon as reasonably practicable, but in no event later than thirty (30) days after the date of the notice of award, at Contractor's sole expense, full and complete copies of all the policies with all declaration pages and endorsements. Contractor shall update all expired policies prior to submission for monthly payment. Failure to timely satisfy the requirements of Section 5.2 shall be reason for withholding of payment until compliance is achieved.

5.2.2.1.5. Special Form Builder's Risk Insurance.

Clause 5.2.2.1.5.4 is supplemented to add the following paragraph:

> For renovation projects or projects that involve portions of Work contained within an existing building or structure, valuation of any loss for the renovation and existing property (exclusive of building and existing structures) shall be at replacement cost.

Clause 5.2.2.1.5.6 is supplemented to add the following paragraph:

> [Windstorm Area] The amount of coverage required for named storms is _____ and No/100 Dollars ($_____).

Clause 5.2.2.1.5.7 is supplemented so as to add the following paragraph:

> [Flood Prone Area] The amount of coverage required for flood insurance is _____ and No/100 Dollars ($_____).

Clause 5.2.2.1.5.8 is amended to read in its entirety as follows:

> 5.2.2.1.5.8. Builder's risk insurance policy shall remain in full force and effect until Substantial Completion is achieved as to all phases of the Project.

The following subparagraphs of Section 5.2.2.1.5 are amended to read in their entirety as follows:

> 5.2.2.1.5.9 For purposes of this subparagraph, "existing property" means existing buildings or structures, as well as, all personal property contained therein. "Existing property" does not include personal property belonging to Contractor or any Subcontractors.
>
> 5.2.2.1.5.10 The policy limits for existing property shall be no less than One Million and No/100 Dollars ($1,000,000.00), which policy limits are in addition to the policy limit that is equal to the Contract Sum.

5.2.2.1.6 "Umbrella" Liability Insurance.

Subparagraph 5.2.2.1.6 is amended so as to read in its entirety as follows:

5.2.2.1.6. "Umbrella" Liability Insurance. Contractor shall obtain, pay for and maintain umbrella liability insurance for a period not to expire or terminate prior to the expiration of all warranty periods, insuring Contractor for an amount of not less than amount specified in the Supplementary General Conditions or Special Conditions that provides coverage at least as broad as and applies in excess and follows form of the primary liability coverages required hereinabove. The policy shall provide "drop down" coverage where underlying primary insurance coverage limits are exhausted or otherwise unavailable or inadequate to cover a loss. The amount of coverage required for umbrella liability insurance is One Million and No/100 Dollars ($1,000,000.00).

Subsection 5.2.3 is amended to read in its entirety as follows:

5.2.3. Additional Policy Requirements. Any provisions herein to the contrary notwithstanding, in the event that the primary insurance policy does not so provide, Contractor shall obtain endorsements thereto and deliver a true copy thereof to TFC, as to each affected policy:

5.2.3.1 naming the "Texas Facilities Commission, P.O. Box 13047, Austin, Texas 78711, its officials, directors, employees, representatives, and volunteers" as additional insureds (except workers' compensation). The additional insured status must cover completed operations;

5.2.3.2 obligating the insurance company to notify the Texas Facilities Commission, P.O. Box 13047, Austin, Texas 78711, of any non-renewal, cancellations, or material changes at least thirty (30) days prior to change or cancellation, except in the case of cancellation for non-payment of premiums, the notification must be at least ten (10) days prior to cancellation;.

5.2.3.2.1. "Material Change" means any of the following changes to the Policy:

5.2.3.2.1.1. a change in the Policy period;

5.2.3.2.1.2. an addition or removal of any Named Insured or Insured specifically identified by name in the Policy;

5.2.3.2.1.3. an addition or removal of a coverage section;

5.2.3.2.1.4. an increase or reduction of the amount of limits of insurance, provided such reduction is not the result of payment of damages, medical expenses, or claim expenses; or

5.2.3.2.1.5. an increase or reduction of the amount of deductibles, provided such reduction is not the result of payment of damages, medical expenses, claim expenses or loss;

5.2.3.3 establishing that as to those policies wherein TFC is an additional insured, said insurance coverages must be primary and non-contributing; and

5.2.3.4 providing a waiver of subrogation rights to TFC for the workers' compensation, employers' liability, commercial general liability, and business automobile liability policies.

5.2.3.5. Contractor shall deliver to TFC replacement certificates not less than thirty (30) days prior to the expiration of any such insurance. If, however, Contractor fails to pay any of the renewal premiums for the expiring policies, TFC shall have the right (but not the obligation) to make such payments and set off the amount thereof against the next payment coming due to Contractor under the Contract.

Section 5.2 is amended so as to add the following subsection:

5.2.6. Failure to satisfy the requirements of Section 5.2 may subject Contractor to disqualification from eligibility to participate in any other or future projects with TFC.

End of Special Conditions

EXHIBIT D

Exhibit D - ESCO's RFQ Response

Performance Services

Statement of Qualifications

RFQ #303-6-00006
for

Energy Savings Performance Contracting

Project #15-020-0802

August 28, 2015
3:00 PM CT

SUBMITTED TO:
Texas Facilities Commission
Central Services Building
4th Floor Receptionist
ATTN: John Goodrich
1711 San Jacinto Blvd.
Austin, TX 78701

SUBMITTED BY:
Performance Services, Inc.

Performance
Services

August 28, 2015

Attn: John Goodrich
Central Services Building
P.O. Box 13047
Austin, Texas 78711-3047

RE: RFQ #303-6-00006

Dear Mr. Goodrich,

Performance Services of Texas, Inc. (PSI) is pleased to submit our response to the Request for Qualifications (RFQ) for Texas Facilities Commission (TFC) Energy Savings Performance Contracting, dated 7/30/2015. As you will see in our response, PSI offers many attributes that make us the best value selection to deliver a best in class performance contract to the Texas Facilities Commission. Some of the attributes are as follow:

- ✓ **Vendor Neutral equipment specifications**
  -We are independent and not captive to any particular manufacturer
- ✓ **Controls Integrator and Programmer**
  -We are expert at migrating various manufacturers from different eras into a single platform and have internal capability to program multiple control systems
- ✓ **Complete project pricing transparency**
  -We provide our internal pricing spreadsheets to clients for review and approval
- ✓ **HUB participation**
  -80% of subcontractors are Texas HUBs
  -45% HUB subcontractor participation as a total of estimated UAR contract value
  -50% of our Texas based team are current and experienced TFC HUB vendors
- ✓ **State of Texas Mentor/Protégé application participation**
  -Protégé already identified and Mentor application pending

In addition to PSI expertise of **product independence, transparent pricing** and **control integration** PSI believes we have developed the most responsive and relevant team as listed below:

- **Austin-based HUB Subcontractor, Blue Ocean Energy,**
- **Dallas-based Protégé HUB Subcontractor, PDI Green Technology,**
- **Dallas/ Ft. Worth-based HUB Subcontractor DFW Consulting,**
- **San Antonio-based HUB Subcontractor, Lackey de Carvajal Cx,**
- **Austin-based Alan Plummer Associates, Inc.**

Our Texas-based Team is committed to deliver the most cost effective, transparent project for the benefit of TFC. This project will also set the standard for future projects for State Agencies and other public entities across the State of Texas.

3010 LBJ Freeway, #1200
Dallas, Texas 75234
www.performanceservices.com

Performance
Services

PSI by the Numbers

- *$640 million in projects value*
- *400+ buildings*
- *270+ projects*
- *35 repeat customers in last 3 years with multiple phases*
- *17 year history of excellence*
- *1 focus, to create high performing buildings with 100% customer satisfaction*

Establishing a standardized Energy Savings Performance Contract ***process*** will provide vendor neutral equipment specifications, complete pricing transparency and enable other state agencies and municipalities to improve building systems and equipment while also reducing energy and water consumption in a manner that is consistent, transparent, efficient and cost effective. The standards set with this TFC RFQ will facilitate the adoption of successful performance contracts statewide while ensuring compliance to State of Texas procurement guidelines.

Sincerely,

Doug Kirkley
Business Development Manager
Performance Services of Texas, Inc.
3010 LBJ Freeway
Suite 1200
Dallas, Texas 75234

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ATTACHMENT I
RFQ CHECKLIST

Checklist for RFQ #303-6-00006
Title: Energy Savings Performance Contracting
Opening Date: 8/28/2015 at 3:00 PM

Vendor Name and Address

Performance Services, Inc.
3010 LBJ Freeway, #1200
Dallas, TX 75234

Contact: Doug Kirkley
TX Taxpayer VIN#:
Office#: 214.272.6963
Mobile#: 940.230.4833
Email: dkirkley@performanceservices.com

Attended Pre-Submittal Conference: __Yes___

1. Submit one (1) original and three (3) copies of submittal ___x___

Submittal Content:

- Company Information ___x___
- Relevant Experience and Qualifications ___x___
- Sub-consultants Experience and Qualifications ___x___
- Methodology ___x___
- Quality Assurance / Quality Control ___x___
- Litigation History Statement ___x___
- Attachment A, HUB Subcontracting Plan ___x___
- Attachment B, Execution of Submittal ___x___
- Attachment C, ESCO Questionnaire Form ___x___
- Copy of TBPE or TBAE Certificate of Registration ___n/a___
- Acknowledgement of Addenda ___x___

2. Submit one (1) PDF copy on a CD ___x___

3.2.1. Company Information

3.2.1.1. Performance Services is an integrated design and delivery energy services company that specializes in constructing and renovating government, healthcare and education facilities to deliver optimal environments through both the Guaranteed Energy Savings and Design-Build procurement methods. Innovative solar photovoltaic systems and water conservation are integral to the energy services portfolio. The company has designed and delivered high performance buildings with performance guarantees since 1998 and is an Energy Star® partner with more than 80 certified buildings. To learn more, visit www.performanceservices.com.

Performance Services has a highly qualified staff of professionals, including energy and design engineers, registered architects, project managers, control technicians, performance assurance engineers, and business development professionals. Our in-house team of architects, engineers and control technicians has the experience to successfully collaborate with your team of professionals to deliver high quality, low total cost solutions that meet the needs and expectations of TFC.

A critical component to our success is our dedication to customer satisfaction. PSI has included customer references and contact information for ALL of our projects. We have a proven track record of meeting our customer's needs with exceptional performance guarantees.

Our Energy Star portfolio has a number of renewable energy projects including geo-thermal solutions, photovoltaic parking lot lighting and photovoltaic roof solutions, solar domestic hot water heaters and wind turbines.

3.2.1.2. Timothy P. Thoman, President and Founder

3.2.1.3. Performance Services physical and mailing address in Texas.
3010 LBJ Freeway, #1200
Dallas, TX 75234

3.2.1.4. Central Texas Office
2707 Overview
Round Rock, Texas 78681

Corporate Headquarters
4670 Haven Point Boulevard, Suite 200
Indianapolis, IN 46280

Other office locations in IL, MO, KY, and WI

3.2.1.5. Doug Kirkley, Business Development Manager

3.2.1.6. Office: 214.272.6963; Mobile: 940.230.4833; dkirkley@performanceservices.com

3.2.1.7. State of Texas certificate of filing - 802039079; Fed Tax ID 35-2047928

3.2.2. Relevant Experience & Qualifications

3.2.2.1.1. Attachment C, ESCO Questionnaire Form is included with this response

3.2.2.1.2. 3.2.2.1.2.1. Performance Services can demonstrate our relevant UCRM experience on the recently completed Texas project for Bell County as well as multiple other recently completed projects. The Bell County project included:

- A complete building conversion to high efficiency LED lighting
- Replacement of a pneumatic/electric building automation system with a full DDC, native BACnet building automation system
- Replaced entire obsolete central plant with a new, high efficiency modular central plant that includes magnetic bearing chillers and variable flow pumping
- Converted all air handling units from constant volume to variable air volume
- Sealed building envelope
- Power conditioning – Addressed harmonics, power factor and electrical surges

3.2.2.1.2.2. Performance services, Inc. is a full service ESCO that has implemented 270+ projects valued at more than $640 million in the company's 17 year history. We have helped building owners achieve the Energy Star qualifying score at 60 buildings to date. More than 35 of our customers are repeat customers for which we have completed multiple projects due to high customer satisfaction.

Services provided on typical projects include preliminary audits, investment grade audits, financing support, engineering, project management, controls programming with four-season optimization, construction, commissioning, training, warranty support, measurement & verification.

3.2.2.1.2.3. Performance Services works diligently to properly balance guaranteed savings as a percentage of projected savings. To date, Performance Services has never missed a project guarantee on any of our 270+ projects. A complete project savings summary is included at the end of this section.

During the pre-proposal meeting, Performance Services noticed that renewable energy, specifically photovoltaics, should have a relatively short simple payback and help to isolate TFC from future Austin Energy electric rate increases. Given the long life and relatively short payback of photovoltaics, they should easily fit within a SECO LoanSTAR funded project based on the current Austin Energy incentives. Prior to recommending this UCRM as part of the PUA, Performance Services will need to evaluate existing roof conditions and electrical switchgear.

3.2.2.1.3. **Project: City-County Building's Deep Energy Retrofit**

Contact: Ron Reinking, Indianapolis Building Authority (317) 327-4343
Contract Amount: $7,865,479
Term of Contract: 15 years
Savings Guarantee: $699,007
Description of Improvements:

The City-County Building is a 50-year old downtown landmark constructed at a time when energy efficiency and green technology wasn't a top priority. Given the cost of maintaining the building, the Mayor of Indianapolis, Office of Sustainability and the Indianapolis Marion County Building Authority worked with the nationally recognized Rocky Mountain Institute to lead a design charrette with local business leaders and engineers. Subsequent to a request for guaranteed energy savings proposal, Performance Services was selected to create and implement a "deep energy retrofit" design and project at no cost to taxpayers. Under the direction of Ron Reinking, the Building Authority has overseen a number of energy related improvements over the years, but nothing as comprehensive as this project, which utilizes a holistic approach and includes measurable results. The "Greening of the City-County Building" initiative serves to demonstrate City leadership in sustainable practices. The building achieved the ENERGY STAR label in October 2012.

Project Scope

- Central plant heat recovery systems
- Exhaust air energy recovery system
- Conversion of heating and cooling systems from constant to variable flow
- Building control systems expansion
- Lighting occupancy sensors install

RENEWABLE ENERGY FEATURES:

- Geothermal system to support building heating and cooling
- Solar thermal and photovoltaic to supplement domestic hot water heating
- Solar Photovoltaic and wind powered LED plaza lights
- Photovoltaic powered LED bus shelter integrated with the new cultural trail
- Lobby Dashboard Display of Project Highlights and Building Performance

Building achieved the Energy Star in 2012

Project: Bell County Expo, Belton, TX

Contact: Mr. Joe Latteo, Business Manager (254) 933-5365
Contract Amount: $3,989,822
Term of Contract: 9 months, 5 year warranty
Utility Incentives Secured: $90,000
Ongoing Annual Maintenance Savings: $25,200/year
Annual Energy Consumption Reduction: 1,300,000 kwh/year, approx. 50%
Description of Improvements:

The Bell County EXPO Center is a 6,600 seat multi-purpose arena in Belton, TX, located along the I-35 corridor between Dallas and Austin. With a major expansion planned for the near

future, facility management identified infrastructure issues that needed immediate attention. Performance Services is working in partnership with Heat Transfer Solutions, Inc. on repair and replacement upgrades to address both infrastructure and energy efficiency improvements.

Project Scope

- Replacement of metal halide, fluorescent and incandescent lighting with high efficiency LED lighting.
- Installation of power conditioning equipment that will provide surge suppression and power factor correction. It will also filter out excess harmonics that waste electrical energy and cause unnecessary heat buildup.
- Installation of weather stripping on building doors.
- Replacement of the existing central plant with a high efficiency modular central plant.
- Conversion of constant volume air handling to variable air volume in order to modulate air delivery to match EXPO conditioning load.
- Replace missing and damaged hot water and chilled water pipe insulation at air handling units.
- Lower the total system pressure drop within the air handling units by installing high capacity, low pressure, drop pleated air filters.
- Install a direct digital control, open protocol building automation system to control HVAC systems. This project includes eliminating the existing pneumatic control system. This will result in optimized control and scheduling of HVAC equipment.

Project: Perennial Washington Street, LLC

Contact: Maxwell Miller, Property Manager (317) 905-5146
Contract Amount: $1,919,785
Term of Contract: 10 years
Savings Guarantee: $362,293
Description of Improvements:

In 2009, the building at 130 E. Washington Street consumed $711,968 in annual utility costs. Property managers subsequently pursued a matching OED state grant to reduce electricity, steam, and chilled water utility consumption and improve tenant comfort.

"Performance Services proposed and implemented dramatic improvements to reduce utility costs by 51 percent while increasing energy efficiency of the building, enhancing tenant comfort and improving building control. All the folks we met along the way at Performance Services have been consummate professionals and great people to work with. I can't tell you how many times we said thank goodness we have a quality partner like Performance Services." – Max Miller, Partner, Perennial Washington Street, LLC

Project Scope

- Installed new, vendor independent digital controls platform
- Configured new controls to minimize need for reheat

- New digital controls to monitor systems and spaces and send alerts
- Converted air systems to variable air volume
- Installed digital controls on chilled water system
- Installed a heat recovery chiller to use lower cost electricity and to provide cooling and heating and save energy
- Awarded the ENERGY STAR in 2012, evidence of a high performance building

Project: City of Indianapolis – 14 Buildings

Contact: Ron Reinking, Indianapolis Building Authority (317) 327-4343
Contract Amount: $7,135,313
Term of Contract: 15 years
Savings Guarantee: $569,797
Description of Improvements:

The City of Indianapolis Department of Public Works issued a request for proposals for a guaranteed energy project in 2009. From a field of 12 competitors, Performance Services was ultimately selected to identify, design and implement energy conservation measures in 14 buildings. The Marion County Building Authority has overseen a number of energy related improvements over the years, but nothing as comprehensive as this project, which utilizes a holistic approach and includes measurable results. The energy conservation initiatives will serve to demonstrate leadership in sustainable practices and help to achieve the goal of substantial energy savings for Marion County taxpayers.

Project Scope

- Central plant heat recovery systems
- Exhaust air energy recovery systems
- Conversion of dual duct air handling systems from constant to variable flow
- Conversion of chilled water / hot water systems from constant to variable flow
- Expansion and optimization of building control systems
- Lighting occupancy and light harvesting sensors installed

Project: Perry Township MSD (12 buildings)

Contact: Mike Bagley, Chief Financial Officer
Contract Amount: $14,357,951
Term of Contract: 10 years
Savings Guarantee: $92,367; Operational savings $1,752,627
Description of Improvements:

MSD Perry Township's renovation project was a challenging renovation with a short two month summer construction schedule. Project coordination and communication were crucial to completing the project before students returned to school.

"Throughout this project, I felt that Performance Services truly acted as a partner with not only the Owner, but with each member of the construction team. Jason Christensen, our project manager, coordinated all required field changes as they were discovered so that the design intent was upheld while ensuring that our construction schedule was never compromised. The cooperation and collaboration that Performance Services brought to the

cable every day was greatly appreciated. This positive atmosphere resulted in a truly enjoyable project experience for everyone involved, a successful end result, and a very satisfied Owner." – Franklin D. Giles, PhD Superintendent for Operations

Project Scope

- Total Separate Additions: 2
- Total Added Classrooms: 17
- Total Renovated Classrooms: 333
- Speed of Delivery: 8 months
- Safety: No incidents reported
- PROJECT OVERVIEW
- MAJOR MECHANICAL EQUIPMENT
- Boilers: 19
- Chillers: 3
- Pumps: 23
- Ventilation Units: 300
- Linear feet of fin tube radiation: 1,300
- Air handler cutovers: 86

Completed on budget with No Change Orders or additional cost

3.2.2.1.4. In the following section of this response, Performance Services is providing relevant experience and qualifications of subconsultants listed on the Attachment A, HUB Subcontracting Plan. Specifically, information is provided for those performing 15% or more of the project.

Although we have no formal work experience with these subconsultants, we have been qualifying and developing a long term strategic plans with these companies over the last two months.

3.2.2.2. Minimum Qualifications

3.2.2.2.1. Performance Services, Inc. has a Certificate of Authority to do business in Texas. A copy of this certificate is included in this section of the submittal.

3.2.2.2.2. Primary Texas Office
3010 LBJ Freeway, Suite 1200
Dallas, TX 75234

Central Texas Office
2707 Overview
Round Rock, Texas 78681

1.2.2.2.3. Performance Services has successfully implemented 270+ projects valued at more than $640 million in the company's 17 year history. We have helped building owners achieve the Energy Star qualifying score at 80 buildings to date. More than 35 of our customers are repeat customers for which we have completed multiple projects due to high customer satisfaction.

Our company offers an integrated design and delivery approach, including engineering design, project management, controls programming with four-season optimization, and performance assurance. Our areas of experience include key and additional UCRMs as described by TFC for this project. PSI understands the key UCRMs to include high efficiency LED lighting, non-proprietary building controls, controls integration, and water conservation.

For additional information see our ESCO Questionaire form.

§ 2.2.2.4. Relevant company experience is included above. Key individual experience follows:

Doug Kirkley

Doug has been developing successful Performance Contracts for the last 20+ years across the United States and for the last 10 years in Texas and the adjacent states. Doug was a founding Board member and current sponsor member of SPEER, Southcentral Partnership for Energy Efficiency as a Resource. Doug has worked with SECO for many years and was a member of the Energy Services Coalition, sponsored by SECO. Doug is responsible for developing many high profile projects in Texas including:

- Baylor University Medical Center in Dallas, a $10M comprehensive project including lighting retrofit, 10,000 ton hour ice storage system
- All Saints Medical Center in Fort Worth, a $5M comprehensive project including lighting retrofits, controls and central plant remodel
- Baylor University project, a $15M comprehensive campus wide lighting retrofit, controls and mechanical solutions

David Temming

Bell County EXPO: $4M project that was developed in an accelerated time frame that included UCRMs such as: Complete conversion to LED lighting; New central plant; Variable air volume conversions; New building controls; Sealing of building envelope; Power conditioning.

City of Dallas: $5M project that was developed in an accelerated time frame and that included UCRMs such as: LED lighting; Continuous Commissioning; New building controls; Integration of building controls; Mechanical system upgrades; Solar system repair and optimization; Power conditioning. SECO LoanSTAR project funding

University of Texas-Austin: $11M project that was developed and implemented in an accelerated time frame and that included a campus wide lighting upgrade including an LED lighting demonstration project.

Mineral Wells ISD: $1.2M project that was developed and implemented in an accelerated

time frame. This project consisted of replacing approximately 120 package rooftop units with new, high efficiency package rooftop units equipped with economizers. The project was fully funded by the Cool Schools SECO grant.

Greg Mizell

Greg has managed projects in Texas and Australia for the past 15 years. While with Siemens in Austin, Greg managed several projects within Texas Facilities Commission buildings including building automation retrofits in the Thomas Jefferson Rusk Building, Stephen F. Austin Building, William B. Travis Building, EO Thompson Building, James Earl Rudder Building, William P. Clements Building, John H. Winters, and the TCEQ Complex in North Austin. While managing projects in these buildings, Greg worked closely with the TFC Facilities Engineering Department and occupants in each building to ensure minimal interruptions during the retrofit and maintenance related projects. Greg has experience building and managing project teams for multidiscipline projects within construction and building services.

A complete customer reference list is included in this section of the response.

3.2.2.2.5 Resumes of key personnel for this project are included in this section of the response.

3.2.2.2.6 A project organization chart is provided in this section of the response.

3.2.2.2.7 Performance Services has no negative state client agencies, regulatory agencies, or TFC references. Our company takes great pride in customer satisfaction and provides a reference for every project. A complete customer reference list is included in this response.

3.2.2.2.8 Performance Services' is responding as an ESCO, not an engineering firm. Therefore the TBPE Certificate of Registration is not required.

3.2.2.2.10 Performance Services' is responding as an ESCO, not an architectural firm. Therefore the TBAE Certificate of Registration is not required.

Corporations Section
P.O. Box 13697
Austin, Texas 78711-3697

Nandita Berry
Secretary of State

Office of the Secretary of State

CERTIFICATE OF FILING
OF

Performance Services, Inc.
File Number: 802039079

The undersigned, as Secretary of State of Texas, hereby certifies that an Application for Registration for the above named Foreign For-Profit Corporation to transact business in this State has been received in this office and has been found to conform to the applicable provisions of law.

ACCORDINGLY, the undersigned, as Secretary of State, and by virtue of the authority vested in the secretary by law, hereby issues this certificate evidencing the authority of the entity to transact business in this State from and after the effective date shown below for the purpose or purposes set forth in the application under the name of

Performance Services of Texas, Inc.

The issuance of this certificate does not authorize the use of a name in this state in violation of the rights of another under the federal Trademark Act of 1946, the Texas trademark law, the Assumed Business or Professional Name Act, or the common law.

Dated: 08/04/2014

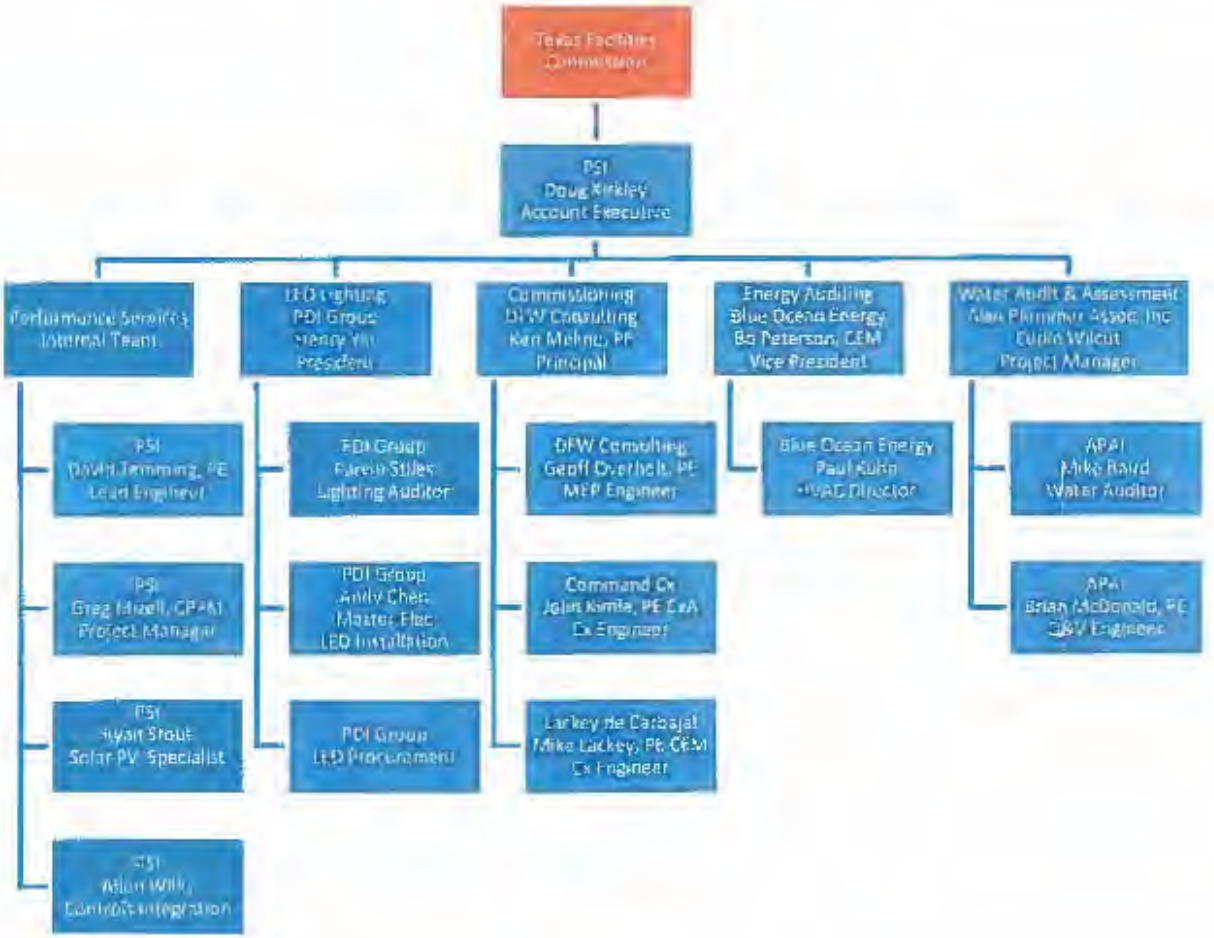
Effective: 08/04/2014

Nandita Berry

Nandita Berry
Secretary of State

3.2.2.2.6 Organizational Chart
Texas Facilities Commission, RFQ #303-6-00006
Energy Savings and Performance Contracting

Performance Services UAR Project Team



Performance Services

Performance Services

Tim Thoman
President

Integrated Design and Delivery
Design-Build
Guaranteed Energy Savings

Performance Services, Inc.

- Indiana Public Schools- 200+ projects
- Leading qualified provider of Design-Build and guaranteed savings projects
- Indiana Private Schools
- Indiana Health Care Facilities
- Illinois Public Schools Project
- Universities

1991-1998: Siemens

- Indiana Public Schools- 27 projects

1988-1991: Johnson Controls, Inc.

- Ohio Public Schools- 8 projects

Biography

Tim Thoman earned his engineering degree from Purdue University in 1986 and upon graduation accepted a position at Johnson Controls in Ohio. There he learned the HVAC and temperature control industry. Tim implemented eight successful guaranteed savings projects in Ohio before returning home to Indianapolis in 1991.

Joining Siemens, Tim implemented 27 guaranteed energy savings contracts with Indiana schools and was named "Professional of the Year" five times before deciding to strike out on his own. With a vision for offering customers superior quality at a lower cost, Tim founded Performance Services in 1998 and has grown the company to a staff of 75 employees.

Performance Services' value proposition is guaranteeing high performance buildings with optimal environments. The company also provides renewable energy solutions, including wind power and geothermal technology. Committed to energy conservation and sustainable practices, the company is a proven design builder and the leading qualified provider of guaranteed energy savings projects and ENERGY STAR® rated K-12 public schools in Indiana, with regional offices in Illinois and Wisconsin. Performance Services measures, verifies and reports the energy use for more than 15 million square feet in its portfolio and provides annual reports to customers on their energy efficiency and greenhouse gas reduction objectives.

Since the company's founding in 1998, Performance Services has been greatly blessed with loyal customers, excellent employees and steady growth. Tim is hopeful that by continuing to put customers first and by hiring and retaining great talent, the company will continue to thrive. Performance Services is a Best Places to Work employer in Indiana.

Education

MS Business Administration, Baldwin Wallace College 1990
BS in Mechanical Engineering, Purdue University 1986

Associations

Indiana Association of School Business Officials
Facilities Conference certification course presentation
Indiana Association of School Boards – service member
Heart Reach Carmel – Board of Directors

Performance Services

Scott Morris

Vice President of Operations

Integrated Design and Delivery
Design Build
Guaranteed Energy Savings

Performance Services, Inc.

- South Adams K-8th grade (2009) - $22M, 149,678 sq. ft.
- Noblesville Schools (2010) - $33M, 391,379 sq. ft. and 2013 Referendum project $34M
- Beech Grove City Schools (2012) - $1.9M, 10,091 sq. ft.
- Shenandoah Schools (2013) - $1.9M
- North Posey Schools $6M (2015)
- Community Wind Projects
- Responsible for the management of projects and service contracts

1991 - 2006: Siemens Building Technologies

- Sr. Director National Operations
- Responsible for development and implementation of standardized project management, risk management and performance tracking methodologies for all installation projects in the U.S. Special focus on strategic projects.
- Appointed as U.S. coordinator to the worldwide Siemens project management initiative in 2005.

1983 - 1990 Johnson Controls, Inc.

- Application Engineer

Biography

With thirty years of experience in the construction industry including a position as Director of National Operations for a fortune 100 company, Scott received an invitation by Performance Services in 2006 to join the team as VP of Operations. Scott came to the company with a desire to be "closer to the customer and jobsites" and a need to spend less time traveling and more time with his family. Scott's greatest strength is assembling, organizing and working with teams to successively execute projects. Scott has been instrumental in helping PSI execute and deliver more than $130M in design-build new construction and major renovation projects.

When not at work, Scott enjoys spending time with his family, gardening and sports fishing.

Education

Electrical Engineering Technology, ITT Tech. Institute 1983

Associations

Design Build Institute of America (DBIA) Member
Project Management Institute

Performance Services

Doug Kirkley

Business Development Manager

Integrated Design and Delivery
Design Build
Guaranteed Energy Savings

Project Experience

- Bell County Expo, TX; $3.9M
- City of Lawton, OK; $13M project
- City of Dallas, TX; $5M project
- Baylor Medical Center, Dallas, TX; $10M project
- All Saints Medical Center-Ft Worth, TX; $5M project
- Baylor University; $15M project

Biography

Doug has lived in Dallas, Texas for more than 30 years while enjoying a successful career in the performance contracting field working for national energy companies. During this time, Doug has focused on energy conservation projects for higher education, healthcare and state and local government customers.

Recognizing the value proposition of Performance Services, Doug joined the company to utilize his expertise and knowledge to develop comprehensive performance contracting solutions for Texas and Arkansas customers.

When not at work, Doug enjoys golf and spending quality time with his family, including traveling.

Education

Bachelor of Science, Engineering Technology / Industrial Distribution – Texas A&M University

Associations

Arkansas Advanced Energy Association Member
Clean Air Through Energy Efficiency (CATEE) Member
Property Assessed Clean Energy Council Member
South Central Partnership for Energy Efficiency as a Resource (SPEER) Former Board Member

Confidential and Proprietary

Performance Services

David Temming, P.E.
Lead Engineer

Integrated Design and Delivery (Guaranteed Energy Savings)

Key Project Experience (PSI and previous employers)

- Bell County EXPO, TX: $3.9M
- University of Texas at Austin – Five project phases
- City of Dallas, TX – Multiple projects
- Mineral Wells ISD
- Abilene Christian University
- University of Texas-Pan American
- City of Fullerton, CA
- California Prisons
- KU Medical Center

Biography

David Temming joined Performance Services in May 2014 because of the company's core principals, high integrity and strong leadership. David brought with him a wealth of project experience which servers him in his role as Lead Engineer in Texas. He is a registered professional engineer in Texas, Kansas, Arizona and California. David enjoys the challenge of developing projects that achieving cost effective energy and water savings and/or power generation while also improving site environmental conditions while reducing future operational costs.

David's responsibilities include leading the preliminary and investment grade energy audit development team. Duties under his direction include analyzing utility usages, performing energy audits of schools, universities, government and healthcare; and identifying and analyzing utility conservation measures. David also has experience project management, construction cost estimates and calculating energy savings for heating, ventilation, air conditioning, controls, renewable energy, water, building envelope and lighting measures.

In his free time, David enjoys playing various sports, exercise, racing, reading, spending quality time with his family, and being on the road looking for new adventures.

Education

Bachelor of Science, Electrical Engineering – University of Missouri-Columbia
IESNA Lighting Design – Beginning, Intermediate and Advance Lighting Principals; Roadway lighting design; Outdoor lighting design.

HVAC System Design – University of Missouri-Kansas City

Associations

Eta Kappa Nu Honor Society.
Association of Energy Engineers (CEM – in-active)

Performance
Services

Greg A. Mizell, CPPM
Senior Project Manager

Integrated Design and Delivery
Design Build

Key Project Experience

- Bell County Expo, TX: $3.9M
- Texas Facilities Commission Building Automation System Renovation (Austin)
- Dell Children's Medical Center of Central Texas Building Automation System (Austin)
- Scott & White University Medical Center (Round Rock, TX)
- Round Rock Medical Center Bed Tower Expansion & Renovation (Round Rock)
- St. David's Phase IV Expansion (Austin)
- Queensland Health – Robina Hospital Expansion Building Automation System (Robina, Qld) 2009-2013
- AMP Capital Investors – Coronation Drive Building Automation System Upgrades (Brisbane, Qld) 2010-11

2013-2014: Siemens Ltd, Infrastructure and Cities
Senior Project Manager

2009-2013: Siemens Ltd, Industry Sector
Operations Manager
Senior Project Team Leader
Project Manager

2004-2009: Siemens Building Technologies
Operations Supervisor
Project Engineer

Biography

Greg joined Performance Services in January of 2015 bringing with him more than 15 years of experience in technical and commercial project management, including design development, resource and cost plans for bid submissions, scope management, quality management, contract negotiations and review, project timelines, and revenue forecasts. Greg has a proven record of managing projects to deliver on budget and on time with high customer satisfaction. He has consistent project success in accurate forecasting, effective trade scheduling and resource management.

Education

BS in Mechanical Engineering, Texas A&M University 1999
Certified Practicing Project Manager (CPPM)
Member Australian Institute of Project Management (AIPM)
Certified Energy Manager (CEM) certification not current
Engineer in Training (EIT) passed FE exam 10/99

Professional Registration

LEED Green Associate

Association

Australian Institute of Project Management (AIPM)

Performance
Services

Ryan Stout
National Solar Manager

Integrated Design and Delivery
Leader Team
Conventional Energy Services

2015-Present: Performance Services, Inc.

2013-2015: Johnson Melloh Solutions, Business Development/Project Manager

- Design/Development: 34MW of solar projects
- Developed a detailed customer financial model spreadsheet to expedite sales process
- Incorporated new sales strategies, design tools & customer markets
- Designed/installed off-grid systems for use in third world countries

2010-2013: Nusun Solar, Owner

- Independently developed all aspects of first solar manufacturing plant in Indiana
- Developed extensive relationships with renewable energy suppliers, manufacturers, and educators
- Implemented a virtual vertical manufacturing partnership concept
- Achieved UL/CTL Quality Certifications

Highlights

Ryan Stout is a renewable energy professional focused on successfully adapting to the continuous advancements in the clean energy industry. Throughout his career, Stout has developed a vertically integrated portfolio of renewable energy companies specializing in the education, design, installation, maintenance and manufacturing of renewable energy solutions.

Stout is third generation energy professional, where he has managed everything from daily operations to new growth strategies in the solar industry. Stout started his career in the energy storage industry from 2001 to 2003, moving in to the renewable energy industry in 2008 where he started Greenworks Energy and managed 35 installations focusing on the small commercial and residential markets. In 2010 he became a managing member of Nusun Solar and developed a streamline solar panel manufacturing process for US manufactures to better compete with overseas manufacturing. In 2013 he moved to a Senior Sales and project management position where he designed and developed over 45 megawatts of solar projects including the Indianapolis International Airport, commercial, municipal and K-12 markets. He has a passion for solar development and a technical expertise in alternative power solutions.

Ryan serves as an activist for the advancement of solar energy, helping to change legislation and support the need for state and Federal incentives. Stout is a graduate of Indiana University, and resides in Indianapolis, Indiana with his wife and two small children.

Education

BS in Telecommunications/Business, Indiana University, 2001
NABCEP Off-Grid System Certification, Outback Power, 2014

Performance Services

Chris Rainey
Managing Engineer

Integrated Design and Delivery
Design Build
Guaranteed Energy Savings

Performance Services, Inc.
- 60+ projects

1985 - 2001: Siemens Building Technologies, Inc.
- 50 projects in multiple vertical markets

1980 - 1985: Rotz Engineers, Inc.

1978 - 1980: M & W, Inc.

1974 - 1978: Boyd/Sobieray & Associates, Inc.

Biography

Chris Rainey has worn several engineering hats during his 41-year career. Originally a business major when he entered college, Chris discovered his aptitude for engineering while working as an estimator/draftsman at a local school equipment company.

After 12 years of working and learning in a consulting engineering environment, along with returning to college, Chris joined Siemens to further his career as a controls engineer and serve in a variety of leadership roles.

In 2001, Tim Thoman called and invited Chris to join Performance Services. With a keen interest in continuing to grow, Chris took an informed leap of faith and joined the company. Reasons for being here include the Christian values, high integrity and strong leadership of this employee-based company as well as the opportunity to work in the education and healthcare market and serve the greater good.

Married to Debbie, his high school sweetheart, faith is very important to Chris and his family. In his leisure time, he enjoys a game of golf with friends.

Education

Mechanical Engineering Technology, Purdue University 1973
Construction Management, University of Wisconsin, 1992
Electrical Design, University of Wisconsin 1997
Cogeneration Technology, University of Wisconsin 1997
Wind Power Plant Design, University of Wisconsin 2008

Associations

American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.

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Performance
Services

Eddie Bohannon

Controls Group Manager

Integrated Design and Delivery
Design build
Guaranteed Energy Savings

Performance Services, Inc

- Performance Assurance Engineer and Controls Group Manager responsible for implementation and optimization of building automation systems at 50+ school corporations

1999 - 2004 Siemens Building Technologies

- Over 35 digital control installations working in various engineering roles including District Automation Specialist, Engineering Specialist, and Systems Specialist.

Biography

Eddie Bohannon joined Performance Services in 2004 to work with a dedicated team on multiple, vendor-independent control systems. Building automation system expertise includes: Alerton, Automated Logic, Distech, Johnson Controls, Siemens, Staefa, Trane and Tridium.

A veteran engineering specialist, Eddie enjoys leading teams in his position as Controls Group Manager to create solutions for PSI customers. Growing up on a farm, Eddie believes in a strong work ethic and the value of loyalty and hard work as a measure of success.

When not at work, Eddie spends quality time with his family and playing sports with his kids.

Education

Computer Network Systems Technologies, ITT Technical Institute 2001

Performance Services

Allen Willis

Sr. Performance Assurance Engineer

Integrated Design and Delivery
Guaranteed Energy Savings

Performance Services, Inc.
60+ projects serving as a Sr. Performance Assurance Engineer responsible for implementation and optimization of building automation systems for high performance

1983 - 2002 Siemens Building Technologies
100+ building automation projects, serving in a variety of roles from 1983 to 2002. Including:

- Project Manager
- Systems Specialist
- Engineering Specialist
- Service Ops supervisor
- District Auto. Specialist

Biography

Allen joined Performance Services in 2002 as a Senior Performance Assurance Engineer and is responsible for optimizing building automation systems for education, healthcare and government customers. Allen sees system optimization as a vital ingredient to the success of the company's performance guarantees. The process involves integrating the HVAC equipment and controls system to maximize efficiency of the equipment while maintaining a comfortable and optimal learning and/or working environment, thereby contributing to high performance building operations.

With a career dedicated to HVAC technology and building automation control systems prior to joining the company, Allen spent 20 years with Siemens Building Technologies and served in a variety of roles including performance engineering, project management, team leader, operations supervisor and engineering specialist.

Allen is well versed with multiple controls platforms including Alerton, Automated Logic, Distech, Johnson Controls, Siemens, Staefa, Trane and Tridium.

Education

Electrical Engineering Technology, IUPUI 1985
Laser Electro-Optics Technology, Vincennes University 1983
Tridium AX Certified
Tridium R2 Certified
Invensys System certified

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Performance
Services

Performance Services Customer List

	Project Name	City	State	Project Contact	Phone	Contract	Year	Work Performed
1	Aptakisic SD #102 (Ph 1)	Buffalo Grove	IL	Stacey Bachar, Asst. Supt.	847-353-5681	$429,867	2013	GESC
2	Aptakisic SD #102 (Ph 2)	Buffalo Grove	IL	Stacey Bachar, Asst. Supt.	847-353-5681	$443,885	2014	GESC
3	Aptakisic SD #102 (Ph 3)	Buffalo Grove	IL	Stacey Bachar, Asst. Supt.	847-353-5681	$114,751	2014	GESC
4	Arbor Park SD 145	Oak Forest	IL	Brian O'Keeffe, Business Mgr	708-687-8040	$310,500	Active	GESC
5	Ascension Ministry Services Center	Indianapolis	IN	Mark Wagner, Sr. Manager	317-334-8303	$124,132	Active	Healthcare
6	Ascension Ministry Services Center	Indianapolis	IN	Mark Wagner, Sr. Manager	317-334-8303	$22,000	Active	Healthcare
7	Attica Cons. School Corp (Ph 1)	Attica	IN	Jim Blankenship, Dir Facilities	765-762-7000	$1,696,133	2001	GESC
8	Attica Cons. School Corp (Ph 2)	Attica	IN	Jim Blankenship, Dir Facilities	765-762-7000	$3,650,320	2005	GESC
9	Attica Cons. School Corp (Ph 3)	Attica	IN	Jim Blankenship, Dir Facilities	765-762-7000	$1,900,000	2011	GESC
10	Avon Comm. School Corp (Ph 1)	Avon	IN	Brock Bowsher, Business Mgr. Mike Rawlinson, Dir Facilities	317-272-2920	$2,671,626	2000	GESC
11	Avon Comm. School Corp (Ph 2)	Avon	IN	Brock Bowsher, Business Mgr. Mike Rawlinson, Dir Facilities	317-272-2920	$3,529,694	2004	GESC
12	Avon Comm. School Corp (Ph 3)	Avon	IN	Brock Bowsher, Business Mgr. Mike Rawlinson, Dir Facilities	317-272-2920	$1,531,772	2012	GESC
13	Bartholomew Consolidated School Corp.	Columbus	IN	Dr. John Quick, Supt. Steve Forster, Operations	812-376-4220	Energy Leadership	2011	Energy Leadership
14	Batavia Public Schools	Batavia	IL	Pat Browne, Dir Facilities	630-937-8800	$145,000	2014	GESC
15	Beck's Hybrids	Atlanta	IN	Todd Marschand	317-984-3508	$1,700,000	2012	Design Build
16	Bedford N. Lawrence Schools	Bedford	IN	Steve Ritter, Dir Facilities	812-279-3521	$1,371,186	2003	GESC
17	Beech Grove City Schools	Beech Grove	IN	Dr. Paul Kaiser, Supt.	317-788-4481	$1,094,819	2010	GESC
18	Beech Grove City Schools (DB)	Beech Grove	IN	Dr. Paul Kaiser, Supt.	317-788-4481	$1,959,000	2012	Design Build
19	Beech Grove City Schools (Ph 2)	Beech Grove	IN	Dr. Paul Kaiser, Supt.	317-788-4481	$3,192,300	2014	GESC
20	Beech Grove South Grove Int. (Ph 3)	Beech Grove	IN	Dr. Paul Kaiser, Supt.	317-788-4481	$937,056	Active	GESC
21	Bell County Expo (Ph 1)	Belton	TX	Mr. Joe Latteo, Bus. Mgr.	254-933-5365	$3,989,822	Active	Municipal
22	Bloomfield School District	Bloomfield	IN	Dan Sichting, Supt.	812-384-4507	$1,832,740	2009	GESC
23	Bloomfield School District (Ph 2)	Bloomfield	IN	Dan Sichting, Supt.	812-384-4507	$1,607,000	2012	GESC
24	Bloomfield School District (Ph 3)	Bloomfield	IN	Dan Sichting, Supt.	812-384-4507	$1,412,000	2015	GESC
25	Bloomingdale Community Health Center	Bloomingdale	IN	Elizabeth Burrows, CEO	765-828-1003	$430,000	2013	Healthcare
26	Calumet College of St. Joseph	Whiting	IN	Gene Kessler, VP Facilities	219-473-7770	$14,200	2014	Higher Education
27	Calumet College of St. Joseph (Ph 2)	Whiting	IN	Gene Kessler, VP Facilities	219-473-7770	$500,000	Active	Higher Education
28	Carpentersville SD 300	Carpentersville	IL	David Ulm, Dir. Facilities	847-426-1300	$1,766,723	2014	GESC
29	Carpentersville SD 300 (Ph 2)	Carpentersville	IL	David Ulm, Dir. Facilities	847-426-1300	$1,299,429	2015	GESC
30	CCSD 93	Bloomingdale	IL	David Hill, Asst. Supt.	630-893-9393	$341,320	2014	GESC
31	CCSD 93 Phase 2	Bloomingdale	IL	David Hill, Asst. Supt.	630-893-9393	$683,135	Active	GESC
32	Center Grove Schools (Ph 1)	Greenwood	IN	Dr. Paul Gabriel, CFO	317-881-9326	$3,115,000	2001	GESC
33	Center Grove Schools (Ph 2)	Greenwood	IN	Dr. Paul Gabriel, CFO	317-881-9326	$3,695,393	2002	GESC
34	Center Grove Schools (Ph 3)	Greenwood	IN	Dr. Paul Gabriel, CFO	317-881-9326	$5,003,405	2006	GESC
35	Central Nine Career Center	Indianapolis	IN	John Showalter, Dir. Facilities	317-888-4401	$1,451,000	2010	GESC
36	City of Indianapolis	Indianapolis	IN	Ron Reinking, P.E.	317-327-4343	$15,412,609	2012	Municipal
37	Clark County Schools (Ph 1)	Winchester	KY	Paul Christy, Superintendent	859-744-4545	$1,320,000	Active	GESC
38	Clark-Pleasant Comm. Schools	Whiteland	IN	Steve Sonntag, Business Mgr.	317-535-7579	$850,000	2013	GESC
39	Clay Comm. Schools (Ph 1)	Knightsville	IN	Mike Howard, Dir. Facilities	812-443-4461	$2,486,149	2004	GESC
40	Clay Comm. Schools (Ph 2)	Knightsville	IN	Mike Howard, Dir. Facilities	812-443-4461	$2,108,608	2006	GESC
41	Clay Comm. Schools (Ph 3)	Knightsville	IN	Mike Howard, Dir. Facilities	812-443-4461	$2,770,000	Active	GESC
42	Clinton Prairie School Corp.	Frankfort	IN	Superintendent	765-659-1339	$4,562,139	2006	GESC
43	Clinton Public Library	Clinton	IN	Becky Cuffie, Supt.	765-832-8349	$400,000	Active	Municipal
44	Crawfordsville Comm. School Corp. (Ph 1)	Crawfordsville	IN	Scott Bowling, Supt.	765 362-2342	$1,975,000	2011	GESC
45	Crawfordsville Comm. School Corp. (Ph 2)	Crawfordsville	IN	Scott Bowling, Supt.	765-362-2342	$1,340,915	2011	GESC
46	Crystal Lake CCSD 47	Crystal Lake	IL	David Schuh, Dir. of Facilities	815-788-5061	$515,000	2015	GESC
47	Culver Community Schools	Culver	IN	Brad Schuldt, Supt.	574-842-3364	$2,000,000	2012	GESC
48	Culver Community Schools (Ph 2)	Culver	IN	Brad Schuldt, Supt.	574-842-3364	$1,667,468	2013	GESC
49	CUSD 64	Virginia	IL	Lynn Carter, Supt.	217-452-3085	$553,468	2009	GESC
50	Daleville Community Schools	Daleville	IN	Paul Garrison, Supt.	765-378-3329	$1,910,000	Active	GESC
51	Decatur Township, MSD of	Indianapolis	IN	Susan Adams, Dir. of Ops	317-856-5265	$4,629,637	2011	GESC
52	Earlham College GESC	Richmond	IN	Ian Smith, Dir. of Facilities	765-983-1678	$3,812,000	Active	GESC

Performance
Services

	Project Name	City	State	Project Contact	Phone	Contract	Year	Work Performed
53	East Porter County School Corporation	Kouts	IN	Rob Gardin, Supt.	219-766-2214	Energy Leadership	Active	Energy Leadership
54	East Porter County School Corporation	Kouts	IN	Lisa Rosinko, Business Mgr.	219-766-2214	$7,036,121	Active	GESC
55	Fort Wayne Community Schools	Fort Wayne	IN	Kathy Friend, CFO	260-467-2000	Energy Leadership	Active	Energy Leadership
56	Fort Wayne Community Schools	Fort Wayne	IN	Kathy Friend, CFO	260-467-2000	$535,331	2014	GESC
57	Fountain County Jail	Covington	IN	Bob Bass, Sheriff	765-793-2243	$904,991	2009	Municipal
58	Geneva CUSD 304	Geneva	IL	Scott May, Dir Facilities	630-463-3000	$1,019,500	2014	GESC
59	Glenbard Township HSD 87	Glen Ellyn	IL	Chris McClain, Asst. Supt.	630-469-9100	$25,628,599	Active	GESC
60	Goshen Community Schools (Ph 1)	Goshen	IN	Diane Woodworth, Supt.	574-533-8631	$2,301,505	2006	GESC
61	Goshen Community Schools (Ph 2)	Goshen	IN	Diane Woodworth, Supt.	574-533-8631	$480,000	2011	GESC
62	Goshen Community Schools (Ph 3)	Goshen	IN	Diane Woodworth, Supt.	574-533-8631	$1,500,000	2012	GESC
63	Grayslake School District 127 (Ph 1)	Grayslake	IL	Mike Zelek, Business Mgr.	847-986-3400	$1,025,925	2015	GESC
64	Grayslake School District 127 (Ph 2)	Grayslake	IL	Mike Zelek, Business Mgr.	847-986-3400	$1,593,895	Active	GESC
65	Greendale School District	Greendale	WI	Erin Green, Business Mgr.	414-423-2700	$3,970,720	2015	GESC
66	Greenfield-Central Schools (Ph 1)	Greenfield	IN	Tony Zurwell, Business Mgr.	317-462-4434	$2,263,501	2008	GESC
67	Greenfield-Central Schools (Ph 2)	Greenfield	IN	Tony Zurwell, Business Mgr.	317-462-4434	$2,263,501	2009	GESC
68	Greenfield-Central Schools (Ph 3)	Greenfield	IN	Tony Zurwell, Business Mgr.	317-462-4434	$1,592,396	2010	GESC
69	Greenfield-Central Schools (Ph 4)	Greenfield	IN	Tony Zurwell, Business Mgr.	317-462-4434	$2,300,000	2011	GESC
70	Greenfield-Central Schools (Ph 5)	Greenfield	IN	Tony Zurwell, Business Mgr.	317-462-4434	$2,377,302	2013	GESC
71	Hamilton Southeastern Schools	Indianapolis	IN	Harry Dalks, Dir. of Facilities	317-594-4100	$749,000	2012	GESC
72	Hamilton Southeastern Schools	Indianapolis	IN	Harry Dalks, Dir. of Facilities	317-594-4100	$3,600,000	2011	GESC
73	Harrison County Courthouse	Corydon	IN	J.R. Eckart, Commissioner	812-738-8241	$2,600,000	2004	Municipal
74	Homer CCSD	Homer Glen	IL	Kara Coglianese, Supt.	708-226-7600	$616,661	Active	GESC
75	Horseshoe Casino	Hammond	IN	John Houchin, Dir. Facilities	219-313-9730	$139,640	2013	GESC
76	Huntley Consolidated Sch. Dist.	Algonquin	IL	Doug Renkosik, Dir. of Facilities	847-659-6158	$1,349,500	2015	GESC
77	Indiana University Purdue University	Fort Wayne	IN	Jay Harris, Dir. Physical Plant	260-481-6832	$3,051,443	Active	Higher Education
78	Indiana University Purdue University	Fort Wayne	IN	Jay Harris, Dir. Physical Plant	260-481-6832	$45,000	2013	Higher Education
79	Indiana University Purdue University	Indianapolis	IN	John Kemman, M.E.	317-278-4868	$4,000,000	2013	Higher Education
80	IU Health, Methodist Hospital (Ph 1)	Indianapolis	IN	Chuck Fougnies, Dir. Fac/Eng	317-710-4970	$993,477	2014	Healthcare
81	IU Health, Methodist Hospital (Ph 2)	Indianapolis	IN	Chuck Fougnies, Dir. Fac/Eng	317-710-4970	$400,000	Active	Healthcare
82	IU Health, Methodist Hospital (Ph 3)	Indianapolis	IN	Chuck Fougnies, Dir. Fac/Eng	317-710-4970	$4,299,864	Active	Healthcare
83	Jennings Co. Schools	North Vernon	IN	Amber Fields, Business Mgr John Howard, Dir. Facilities	812-346-4483	Energy Leadership	Active	Energy Leadership
84	Jennings Co. Schools (Ph 1)	North Vernon	IN	Amber Fields, Business Mgr John Howard, Dir. Facilities	812-346-4483	$1,697,216	2000	GESC
85	Jennings Co. Schools (Ph 2)	North Vernon	IN	Amber Fields, Business Mgr John Howard, Dir. Facilities	812-346-4483	$910,225	2001	GESC
86	Jennings Co. Schools (Ph 3)	North Vernon	IN	Amber Fields, Business Mgr John Howard, Dir. Facilities	812-346-4483	$1,839,679	2006	GESC
87	Jennings Co. Schools (Ph 4)	North Vernon	IN	Amber Fields, Business Mgr John Howard, Dir. Facilities	812-346-4483	$507,350	2007	GESC
88	Jennings Co. Schools (Ph 5)	North Vernon	IN	Amber Fields, Business Mgr John Howard, Dir. Facilities	812-346-4483	$5,200,000	2014	GESC
89	Jennings Co. Schools (Ph 6)	North Vernon	IN	Amber Fields, Business Mgr John Howard, Dir. Facilities	812-346-4483	$884,586	Active	GESC
90	Jennings Co. Schools (Ph 7)	North Vernon	IN	Amber Fields, Business Mgr John Howard, Dir. Facilities	812-346-4483	$279,000	Active	GESC
91	Kenosha Unified SD (Ph 1)	Kenosha	WI	Pat Finnemore, Dir. Facilities	262-359-6300	$8,205,336	2014	GESC
92	Kenosha Unified SD (Ph 2)	Kenosha	WI	Pat Finnemore, Dir. Facilities	262-359-6300	$8,594,664	2015	GESC
93	Kildeer SD 96 (Ph 1)	Buffalo Grove	IL	Jon Hitcho, Asst. Supt.	847-459-4260	$386,530	2014	GESC
94	Kildeer SD 96 (Ph 2)	Buffalo Grove	IL	Jon Hitcho, Asst. Supt.	847-459-4260	$954,948	Active	GESC
95	Kildeer SD 96 (Ph 3)	Buffalo Grove	IL	Jon Hitcho, Asst. Supt.	847-459-4260	$2,054,504	Active	GESC
96	Lawrence Township, MSD (Ph 1)	Indianapolis	IN	Robin Phelps, Business Mgr. Rodger Smith, Dir. Facilities	317-423-8200	$397,803	2005	GESC
97	Lawrence Township, MSD (Ph 2)	Indianapolis	IN	Robin Phelps, Business Mgr. Rodger Smith, Dir. Facilities	317-423-8200	$1,839,679	2006	GESC
98	Lawrence Township, MSD (Ph 3)	Indianapolis	IN	Robin Phelps, Business Mgr. Rodger Smith, Dir. Facilities	317-423-8200	$8,600,000	2008	GESC

Performance Services

	Project Name	City	State	Project Contact	Phone	Contract	Year	Work Performed
99	Lawrence Township, MSD (Ph 4)	Indianapolis	IN	Robin Phelps, Business Mgr Rodger Smith, Dir. Facilities	317-423-8200	$1,700,000	2008	GESC
100	Lawrence Township, MSD (Ph 5)	Indianapolis	IN	Robin Phelps, Business Mgr. Rodger Smith, Dir. Facilities	317-423-8200	$1,868,347	2013	GESC
101	Lawrence Township, MSD (Ph 6)	Indianapolis	IN	Robin Phelps, Business Mgr. Rodger Smith, Dir. Facilities	317-423-8201	$834,238	Active	GESC
102	Lutheran Hospital	Fort Wayne	IN	Mark Anthony, Engineering	260-435-7589	$890,000	2014	Healthcare
103	Maercker School District 60	Westmont	IL	Dean Romano, Business Mgr.	630-515-4852	$723,000	2014	GESC
104	Marion Comm. School Corp. (Ph 1)	Marion	IN	Jim McWhirt, Business Mgr.	765-662-2546	$1,031,893	2001	GESC
105	Marion Comm. School Corp. (Ph 2)	Marion	IN	Jim McWhirt, Business Mgr.	765-662-2546	$945,000	2004	GESC
106	McHenry SD 15	McHenry	IL	Mark Bertolozzi, CFO	815-385-7210	$345,612	Active	GESC
107	Memorial Hospital of South Bend	South Bend	IN	Greg Aldrich, Facilities/Eng.	574-647-7038	$330,000	2013	Healthcare
108	Menomonee Falls School District	Menomonee Falls	WI	Rick Fachner, Mgr. Facilities & Ops	262-483-3566	$299,900	Active	GESC
109	Methodist Hospital Northlake	Gary	IN	Wright Alcorn, VP Ops.	219-885-5640	$786,696	Active	Healthcare
110	Michigan City Area Schools	Michigan City	IN	Dave Williamson, Dir. Facilities	219-873-2124	$533,024	2013	GESC
111	Mississinewa Comm. Schools	Gas City	IN	Michael Powell, Supt.	765-674-8528	$2,950,000	2006	GESC
112	Mississinewa Comm. Schools	Gas City	IN	Michael Powell, Supt.	765-674-8528	$3,628,860	2001	GESC
113	Monroe-Gregg School District	Mooresville	IN	Paul Kaiser, Former Supt.	317-758-4461	$1,530,459	2006	GESC
114	Mooresville CSC	Mooresville	IN	Brad Lindsay, Supt.	317-831-9205	$1,800,000	2011	GESC
115	Mooresville CSC	Mooresville	IN	Brad Lindsay, Supt.	317-831-9205	$1,200,000	2004	GESC
116	MSD S.W. Allen County (Ph 1)	Fort Wayne	IN	Jim Coplen, Business Mgr. Mike Lindsey, Former Dir. Fac	260-431-2010	$2,300,000	2008	GESC
117	MSD S.W. Allen County (Ph 2)	Fort Wayne	IN	Jim Coplen, Business Mgr. Mike Lindsey, Former Dir. Fac	260-431-2010	$1,350,000	2011	GESC
118	Muncie Community School Corp.	Muncie	IN	Tim Heller, Supt.	765-747-5211	Energy Leadership	Active	Energy Leadership
119	Muncie Community School Corp.	Muncie	IN	Tim Heller, Supt.	765-747-5211	$1,717,009	2001	GESC
120	New Albany-Floyd CSC (Ph 1)	New Albany	IN	Dr. Brad Snyder, Deputy Supt. Bill Wiseheart, Dir Facilities	812-949-4200	$1,764,792	2001	GESC
121	New Albany-Floyd CSC (Ph 2)	New Albany	IN	Dr. Brad Snyder, Deputy Supt. Bill Wiseheart, Dir Facilities	812-949-4200	$1,798,427	2002	GESC
122	New Albany-Floyd CSC (Ph 3)	New Albany	IN	Dr. Brad Snyder, Deputy Supt. Bill Wiseheart, Dir Facilities	812-949-4200	$3,840,864	2003	GESC
123	New Albany-Floyd CSC (Ph 4)	New Albany	IN	Dr. Brad Snyder, Deputy Supt. Bill Wiseheart, Dir Facilities	812-949-4200	$3,029,434	2004	GESC
124	New Berlin, School District of (Ph 1)	New Berlin	WI	Roger Dickson, CFO	262-789-6210	$8,100,000	2014	GESC
125	New Berlin, School District of (Ph 2)	New Berlin	WI	Roger Dickson, CFO	262-789-6210	$1,299,429	2015	GESC
126	New Durham, MSD of (Ph 2)	Westville	IN	Curtiss Sieleteleweler, Supt.	219-785-2239	$1,800,000	Active	GESC
127	New Durham, MSD of (Ph 1)	Westville	IN	Curtiss Sieleteleweler, Supt.	219-785-2239	$280,679	2013	GESC
128	New Prairie United School Corp. (Ph 2)	New Carlisle	IN	Greg Dudeck, Dir. Facilities	574-654-7273	$999,999	2013	GESC
129	New Prairie United School Corp. (Ph 2)	New Carlisle	IN	Greg Dudeck, Dir. Facilities	574-654-7273	$2,000,000	2014	GESC
130	New Prairie United School Corp. (Ph 3)	New Carlisle	IN	Greg Dudeck, Dir. Facilities	574-654-7272	$3,573,525	Active	GESC
131	New Berlin, School District of (Ph 3)	New Berlin	WI	Roger Dickson, CFO	262-789-6210	$903,000	Active	GESC
132	Nicolet High School District (Ph 1)	Milwaukee	WI	Brian Reiels, Dir. of Facilities	414-351-7546	$314,515	2013	GESC
133	Nicolet High School District (Ph 2)	Milwaukee	WI	Brian Reiels, Dir. of Facilities	414-351-7546	$3,667,743	2015	GESC
134	Noblesville Schools (Ph 1)	Noblesville	IN	Jeff Bragg, Dir. of Operations	317-773-3171	$1,800,000	2004	GESC
135	Noblesville Schools (Ph 2)	Noblesville	IN	Jeff Bragg, Dir. of Operations	317-773-3171	$2,557,379	2006	GESC
136	Noblesville Schools (Ph 3)	Noblesville	IN	Jeff Bragg, Dir. of Operations	317-773-3171	$3,111,635	2008	GESC
137	Noblesville Schools Ed. Svcs Center (DB)	Noblesville	IN	Jeff Bragg, Dir. of Operations	317-773-3171	$2,800,000	2013	Design Build
138	Noblesville Schools Facility Improve. (DB)	Noblesville	IN	Jeff Bragg, Dir. of Operations	317-773-3171	$36,522,191	2012	Design Build
139	Noblesville Schools MS/HS (DB)	Noblesville	IN	Jeff Bragg, Dir. of Operations	317-773-3171	$36,146,655	2014	Design Build
140	North Adams Comm. School Corp. (Ph 1)	Decatur	IN	Wylie Sirk, Supt.	260-724-7148	$4,896,097	2007	GESC
141	North Adams Comm. School Corp. (Ph 2)	Decatur	IN	Wylie Sirk, Supt.	260-724-7148	$345,000	2008	GESC
142	North Harrison Schools (Ph 1)	Ramsey	IN	Jeff Brown, Dir. Facilities	812-347-2407	$2,252,928	2008	GESC
143	North Harrison Schools (Ph 2)	Ramsey	IN	Jeff Brown, Dir. Facilities	812-347-2407	$936,184	2009	GESC
144	North Harrison Schools (Ph 3)	Ramsey	IN	Jeff Brown, Dir. Facilities	812-347-2407	$1,817,703	2011	GESC
145	North Miami Community Schools	Denver	IN	Cathy Egolf, Supt.	765-985-3891	$1,321,095	2013	GESC
146	North Miami Community Schools (Ph 2)	Denver	IN	Cathy Egolf, Supt.	765-985-3891	$700,000	Active	GESC
147	North Montgomery Comm. School Corp.	Crawfordsville	IN	Jim McBee, Business Mgr.	765-359-2112	$1,063,389	2011	GESC
148	North Montgomery Comm. School Corp.	Crawfordsville	IN	Jim McBee, Business Mgr.	765-359-2112	$561,821	2011	GESC
149	North Newton Phase 1 (Wind)	N. Newton Cty.	IN	Karen Zackha, Dir. of Finance	219-285-2228	$2,450,021	2012	GESC

Performance
Services

	Project Name	City	State	Project Contact	Phone	Contract	Year	Work Performed
150	North Newton School Corp	Morocco	IN	Karen Zackfia, Dir. of Finance	219-285-2228	Energy Leadership	Active	Energy Leadership
151	North Newton School Corp	Morocco	IN	Karen Zackfia, Dir. of Finance	219-285-2228	$1,299,721	2015	GESC
152	North Posey Jr./Sr. School (DB)	Poseyville	IN	Dr. Todd Camp, Supt.	812-874-2243	$1,766,667	Active	Design Build
153	North Posey North Elem (DB)	Poseyville	IN	Dr. Todd Camp, Supt.	812-874-2243	$1,766,667	Active	Design Build
154	North Posey South Terrace (DB)	Poseyville	IN	Dr. Todd Camp, Supt.	812-874-2243	$1,766,667	Active	Design Build
155	North Posey, M.S.D. of (GESC)	Poseyville	IN	Dr. Todd Camp, Supt.	812-874-2243	$2,800,000	Active	GESC
156	North Putnam School Corp	Bainbridge	IN	Murray Pride, Former Supt.	765-522-6218	$1,847,754	2004	GESC
157	North Vermillion Comm. Schools	Cayuga	IN	Michael Turner, Supt.	765-492-4093	$3,277,963	2004	GESC
158	North West Hendricks Schools	Lizton	IN	Leo Philbin, Supt.	317-994-4100	$397,722	2004	GESC
159	North White School Corp. (Ph 1)	Monon	IN	Nick Eccles, Supt.	219-253-6618	$3,318,096	2006	GESC
160	North White School Corp. (Ph 2)	Monon	IN	Nick Eccles, Supt.	219-253-6618	$1,751,400	2009	GESC
161	Northeast School Corp. (Ph 1)	Hymera	IN	Mark Baker, Supt.	812-383-5781	$1,950,000	2013	GESC
162	Northeast School Corp. (Ph 2)	Hymera	IN	Mark Baker, Supt.	812-383-5781	$1,722,000	2014	GESC
163	Northwestern School Corp. (Ph 1)	Kokomo	IN	Harold Seamon, Asst. Supt.	765-452-3060	$3,073,000	2009	GESC
164	Northwestern School Corp. (Ph 2)	Kokomo	IN	Harold Seamon, Asst. Supt.	765-452-3060	$1,955,000	2012	GESC
165	Northwestern School Corp. (Ph 3)	Kokomo	IN	Harold Seamon, Asst. Supt.	765-452-3060	$1,539,668	2014	GESC
166	Northwestern School Corp. (Wind)	Kokomo	IN	Harold Seamon, Asst. Supt.	765-452-3060	$2,462,320	2012	GESC
167	Oak Hill United School Corp.	Converse	IN	Joel Martin, Supt.	765-395-3341	$826,974	2001	GESC
168	OLMC Mathew Center	Carmel	IN	Glen Richie, Controller	317-846-1118	$22,500	2013	GESC
169	Orleans Comm. School Corp.	Orleans	IN	James Terrell, Supt.	812-865-2588	$391,000	1999	GESC
170	Our Lady of Mount Carmel (Ph 1)	Carmel	IN	Glen Richie, Controller	317-846-1118	$1,100,000	2005	GESC
171	Our Lady of Mount Carmel (Ph 2)	Carmel	IN	Glen Richie, Controller	317-846-1118	$144,010	2008	GESC
172	Penn-Harris Madison (Ph 1)	Mishawaka	IN	Dr. Jerry Thacker, Supt. Denise Seger, Deputy Supt. Tom Hartman, Dir. Facilities	574-259-7941	$1,800,000	2009	GESC
173	Penn-Harris Madison (Ph 2)	Mishawaka	IN	Dr. Jerry Thacker, Supt. Denise Seger, Deputy Supt. Tom Hartman, Dir. Facilities	574-259-7941	$2,000,000	2009	GESC
174	Penn-Harris Madison (Ph 3)	Mishawaka	IN	Dr. Jerry Thacker, Supt. Denise Seger, Deputy Supt. Tom Hartman, Dir. Facilities	574-259-7941	$1,858,407	2010	GESC
175	Penn-Harris Madison (Ph 4)	Mishawaka	IN	Dr. Jerry Thacker, Supt. Denise Seger, Deputy Supt. Tom Hartman, Dir. Facilities	574-259-7941	$211,825	2011	GESC
176	Penn-Harris Madison (Ph 5)	Mishawaka	IN	Dr. Jerry Thacker, Supt. Denise Seger, Deputy Supt. Tom Hartman, Dir. Facilities	574-259-7941	$344,699	2011	GESC
177	Penn-Harris Madison (Ph 6)	Mishawaka	IN	Dr. Jerry Thacker, Supt. Denise Seger, Deputy Supt. Tom Hartman, Dir. Facilities	574-259-7941	$707,000	2014	GESC
178	Penn-Harris Madison (Ph 7)	Mishawaka	IN	Dr. Jerry Thacker, Supt. Denise Seger, Deputy Supt. Tom Hartman, Dir. Facilities	574-259-7941	$643,079	2014	GESC
179	Penn-Harris Madison (Ph 8)	Mishawaka	IN	Dr. Jerry Thacker, Supt. Denise Seger, Deputy Supt. Tom Hartman, Dir. Facilities	574-259-7941	$379,272	Active	GESC
180	Perennial Washington Street, LLC	Indianapolis	IN	Max Miller, Property Mgr.	317-908-5146	$1,320,000	2011	GESC
181	Perry Central Comm. Schools	Leopold	IN	Mary Roberson, Supt.	812-843-5576	$1,568,000	2013	GESC
182	Perry Township, MSD of	Indianapolis	IN	Mike Bagley, CFO	317-789-3700	$14,397,951	2013	GESC
183	Pulaski Memorial Hospital (Ph 1)	Winamac	IN	Mark Boer, Dir. Plant Eng.	574-946-2123	$385,000	2013	Healthcare
184	Pulaski Memorial Hospital (Ph 2)	Winamac	IN	Mark Boer, Dir. Plant Eng.	574-946-2123	$411,000	2014	Healthcare
185	Pulaski Memorial Hospital (Ph 3)	Winamac	IN	Mark Boer, Dir. Plant Eng.	574-946-2123	$89,000	2014	Healthcare
186	Purdue University-Calumet Campus (Ph 1)	Calumet	IN	Mike Kull, Asst Vice Chancellor	219-989-2231	$360,000	2010	Higher Education
187	Purdue University-Calumet Campus (Ph 2)	Calumet	IN	Mike Kull, Asst Vice Chancellor	219-989-2231	$2,100,000	2013	Higher Education
188	Purdue University-North Central Campus	Westville	IN	Jim Salkee, Dir. Facilities	219-785-5667	$1,737,924	2014	Higher Education

Performance
Services

	Project Name	City	State	Project Contact	Phone	Contract	Year	Work Performed
189	Randolph Eastern Schools (Ph 1)	Union City	IN	Lisa Smith, Supt. Cathy Stephen, Former Supt.	765-964-4994	$1,192,452	2005	GESC
190	Randolph Eastern Schools, (Ph 2)	Union City	IN	Lisa Smith, Supt. Cathy Stephen, Former Supt.	765-964-4994	$1,543,000	2006	GESC
191	Randolph Eastern Schools, (Wind)	Union City	IN	Lisa Smith, Supt. Cathy Stephen, Former Supt.	765-964-4994	$1,850,000	2010	Design Build Wind
192	Randolph Southern School Corp. (Ph 1)	Lynn	IN	Donnie Bowsman, Supt.	765-874-1181	$1,274,055	2006	GESC
193	Randolph Southern School Corp. (Ph 2)	Lynn	IN	Donnie Bowsman, Supt.	765-874-1181	$1,812,256	2011	GESC
194	Rise Learning Center	Indianapolis	IN	Dr. Paul Kaiser, Supt.	317-788-4481	$1,691,000	Active	GESC
195	Robinson CUSD #2 (Ph 1)	Robinson	IL	Josh Quick, Supt.	618-544-7511	$3,256,357	2007	GESC
196	Robinson CUSD #2 (Ph 2)	Robinson	IL	Josh Quick, Supt.	618-544-7511	$498,800	2013	GESC
197	Rockville Comm. School Corp (Ph 1)	Rockville	IN	Gary Storie, Former Supt.	765-345-5101	$1,803,851	1999	GESC
198	Rockville Comm. School Corp (Ph 2)	Rockville	IN	Gary Storie, Former Supt.	765-345-5101	$1,200,000	2006	GESC
199	Rush County Schools (Ph 1)	Rushville	IN	Dr. JohnWilliams, Supt.	765-932-4186	$302,922	2011	GESC
200	Rush County Schools (Ph 2)	Rushville	IN	Dr. JohnWilliams, Supt.	765-932-4186	$304,439	2013	GESC
201	Rush County Schools (Ph 3)	Rushville	IN	Dr. JohnWilliams, Supt.	765-932-4186	$387,000	2014	GESC
202	Salem Community Schools	Salem	IN	Dr. D. Lynn Reed, Supt.	812-883-4437	$2,200,000	2010	GESC
203	School Town of Speedway (Ph 1)	Speedway	IN	Ken Hull, Supt.	317-244-0236	$979,198	2006	GESC
204	School Town of Speedway (Ph 2)	Speedway	IN	Ken Hull, Supt.	317-244-0236	$2,356,240	2008	GESC
205	Scott County School District 2	Scottsburg	IN	Dr. Marc Slaton, Supt.	812-752-8946	$1,152,000	2012	GESC
206	Shenandoah School Corp. (DB)	Middleton	IN	Ron Green, Supt.	765-569-5582	$1,650,000	2014	Design Build
207	Shenandoah School Corp. (DB)	Middleton	IN	Ron Green, Supt.	765-569-5582	$1,850,000	2013	Design Build
208	Shenandoah School Corp. (Ph 1)	Middleton	IN	Ron Green, Supt.	765-569-5582	$93,000	2005	GESC
209	Shenandoah School Corp. (Ph 2)	Middleton	IN	Ron Green, Supt.	765-569-5582	$3,289,961	2007	GESC
210	Shenandoah School Corp. (Ph 3)	Middleton	IN	Ron Green, Supt.	765-569-5582	$2,000,000	2010	GESC
211	Shenandoah School Corp. (Ph 4)	Middleton	IN	Ron Green, Supt.	765-569-5582	$3,142,243	2013	GESC
212	Shenandoah School Corp. (Wind)	Middleton	IN	Ron Green, Supt.	765-569-5582	$2,657,738	2014	Design Build Wind
213	South Adams Schools (Ph 1)	Berne	IN	Scott Litwiler, Supt. Cathy Egolf, Former Supt.	260-589-3133	$4,055,200	2009	GESC
214	South Adams Schools (Ph 2)	Berne	IN	Scott Litwiler, Supt. Cathy Egolf, Former Supt.	260-589-3133	$500,000	2009	GESC
215	South Adams Schools, (DB)	Berne	IN	Scott Litwiler, Supt. Cathy Egolf, Former Supt.	260-589-3133	$21,027,020	2009	Design Build
216	South Central Schools (DB)	Union Mills	IN	Linda Wittlolg, Supt.	219-767-2263	$9,800,000	Active	Design Build
217	South Gibson School Corp.	Fort Branch	IN	Stacey Humbaugh, Supt. Tim Armstrong, Business Mgr.	812-753-4230	$3,512,158	2009	GESC
218	South Montgomery School Corp.	New Market	IN	Dr. Bert Lewis, Supt.	765-866-0209	$744,000	2012	GESC
219	South Putnam Schools (Ph 1)	Greencastle	IN	Bruce Bernhardt, Supt.	765-653-3119	$336,189	1999	GESC
220	South Putnam Schools (Ph 2)	Greencastle	IN	Bruce Bernhardt, Supt.	765-653-3119	$247,646	2003	GESC
221	South Vermillion Schools (Ph 1)	Clinton	IN	Dave Chapman, Supt.	765-832-2426	$1,284,219	1999	GESC
222	South Vermillion Schools (Ph 2)	Clinton	IN	Dave Chapman, Supt.	765-832-2426	$1,724,846	2001	GESC
223	South Vermillion Schools (Ph 3)	Clinton	IN	Dave Chapman, Supt.	765-832-2426	$2,687,759	2002	GESC
224	South Vermillion Schools (Ph 4)	Clinton	IN	Dave Chapman, Supt.	765-832-2426	$3,178,680	2013	GESC
225	Southeast Fountain Schools	Veedersburg	IN	Doug Allison, Supt.	765-294-2254	$2,840,971	2002	GESC
226	Southeastern Schools	Walton	IN	Trudie Hedrick	574-636-2511	$632,000	2014	GESC
227	Southern Hancock Schools	New Palestine	IN	Robert L. Yoder, Business Mgr.	317-861-4463	$1,300,000	2004	GESC
228	Southwest Dubois Co. School Corp.	Huntingburg	IN	Terry Enlow, Supt.	812-683-3971	$1,859,149	2012	GESC
229	Southwest Dubois Co. School Corp.	Huntingburg	IN	Terry Enlow, Supt.	812-683-3971	$2,099,000	2013	GESC
230	Southwest Jefferson School Corp.	Hanover	IN	Steve Telfer, Supt.	812-866-1235	$3,479,461	2011	GESC
231	Southwest Sullivan School Corp. (Ph 1)	Sullivan	IN	Keith Brashear, Supt.	812-268-6311	$2,300,000	2012	GESC
232	Southwest Sullivan School Corp. (Ph 2)	Sullivan	IN	Keith Brashear, Supt.	812-268-6311	$1,067,000	Active	GESC
233	St. Theodore Guerin HS	Noblesville	IN	Paul Lunsford, President	317-582-0120	$98,480	2009	GESC
234	St. Vincent Salem Hospital	Salem	IN	Venon Fleming, Mgr. Plant Ops	812-896-0181	$43,410	2011	Healthcare
235	St. VincentWilliamsport	Indianapolis	IN	William Fenton, R.A.	765-765-4020	$184,740	2007	Healthcare
236	Sunman-Dearborn Comm. School Corp	Sunman	IN	Jeff Hendrix, Supt. (now at Munster)	219-836-9111	$2,000,000	2012	GESC

Performance
Services

	Project Name	City	State	Project Contact	Phone	Contract	Year	Work Performed
237	Tell City Community School Corp.	Tell City	IN	Bruce Chinn, Asst. Supt.	812-547-3300	$4,056,266	2007	GESC
238	Tippecanoe Valley School Corp. (Wind)	Akron	IN	Brett Boggs, Supt.	574-353-7741	$2,467,206	2012	Design Build Wind
239	Tipton Comm. School Corp. (Ph 1)	Tipton	IN	John Junco, Asst. Supt.	765-675-3857	$3,300,011	2014	GESC
240	Tipton Comm. School Corp. (Ph 2)	Tipton	IN	John Junco, Asst. Supt.	765-675-3857	$1,730,628	2014	GESC
241	Tri-Township Cons. School Corp.	LaPorte	IN	Tim Somers, Supt.	219-754-2709	$208,490	2007	GESC
242	Tri-Township Cons. School Corp. (DB, Ph 1)	LaPorte	IN	Tim Somers, Supt.	219-754-2709	$1,850,000	Active	Design Build
243	Tri-Township Cons. School Corp. (DB, Ph 2)	LaPorte	IN	Tim Somers, Supt.	219-754-2709	$1,150,000	Active	Design Build
244	Turkey Run School Corp.	Marshall	IN	Dr. Thomas Rohr, Supt.	765-597-2750	$620,000	1999	GESC
245	Twin Lakes Schools	Monticello	IN	Dr. Tom Fletcher, Supt.	574-583-7211	$1,187,645	Active	GESC
246	Union City (Wind)	Union City	IN	Bryan Conklin	765-964-6534	$1,850,000	2010	Design Build Wind
247	Union Station	Indianapolis	IN	Mary Hauser	317-344-7347	$2,322,000	2007	GESC
248	Valley View SD 365U	Romeoville	IL	Gary Grizaffi, Asst. Supt.	815-886-2700	$517,518	Active	GESC
249	Vincennes Comm. School Corp. (Ph 1)	Vincennes	IN	Greg Parsley, Supt.	812-882-4844	$603,388	2009	GESC
250	Vincennes Comm. School Corp. (Ph 2)	Vincennes	IN	Greg Parsley, Supt.	812-882-4844	$3,140,000	2014	GESC
251	Vincennes Comm. School Corp. (Ph 3)	Vincennes	IN	Greg Parsley, Supt.	812-882-4844	$1,226,818	Active	GESC
252	Wabash County, MSD of	Wabash	IN	Dr. Brian Dawson, Asst Supt	260-563-8050	$5,562,648	2007	GESC
253	Warren County, MSD of	Williamsport	IN	Ralph Shrader, Supt.	765-762-3364	$4,590,670	2004	GESC
254	Warrick County School Corp.	Boonville	IN	Brad Schneider, Supt.	812-897-0400	$1,908,529	2013	GESC
255	Warsaw Community Schools (Ph 1)	Warsaw	IN	Kevin Scott, CFO	574-371-5098	$3,084,692	2009	GESC
256	Warsaw Community Schools (Ph 2)	Warsaw	IN	Kevin Scott, CFO	574-371-5098	$1,925,000	2011	GESC
257	Warsaw Community Schools (Ph 3)	Warsaw	IN	Kevin Scott, CFO	574-371-5098	$1,960,000	2011	GESC
258	Wawasee Community Schools	Warsaw	IN	Dr. Thomas Edington, Supt.	574-457-3188	Energy Leadership	2012	Energy Leadership
259	Wawasee Community Schools (Ph 1)	Warsaw	IN	Dr. Thomas Edington, Supt.	574-457-3188	$7,798,856	2010	GESC
260	Wawasee Community Schools (Ph 2)	Warsaw	IN	Dr. Thomas Edington, Supt.	574-457-3188	$1,900,000	2011	GESC
261	Wawasee Community Schools (Ph 3)	Warsaw	IN	Dr. Thomas Edington, Supt.	574-457-3188	$1,233,367	2012	GESC
262	Wawasee Community Schools (Ph 4)	Warsaw	IN	Dr. Thomas Edington, Supt.	574-457-3188	$1,237,344	2012	GESC
263	West Central School Corp. (Wind)	Francesville	IN	Don Street, Supt.	219-567-9161	$2,395,888	2012	Design Build Wind
264	Western School Corporation	Russiaville	IN	Randy McCracken, Supt.	765-883-5576	$2,600,000	2012	GESC
265	Western Wayne School Corp. (Ph 1)	Cambridge City	IN	Dr. Robert Mahon, Supt.	765-478-5375	$1,800,000	2011	GESC
266	Western Wayne School Corp. (Ph 2)	Cambridge City	IN	Dr. Robert Mahon, Supt.	765-478-5375	$316,210	Active	GESC
267	Western Wayne School Corp. (Ph 3)	Cambridge City	IN	Dr. Robert Mahon, Supt.	765-478-5375	$1,338,224	Active	GESC
268	Western Wayne School Corp. Gym Proj.	Cambridge City	IN	Dr. Robert Mahon, Supt.	765-478-5375	$572,915	2011	GESC
269	Westview School Corporation	Topeka	IN	Dr. Randall Zimmerly, Supt.	260-768-4404	$1,300,000	2011	GESC
270	Westview School Corporation	Topeka	IN	Dr. Randall Zimmerly, Supt.	260-768-4404	$3,670,000	2004	GESC
271	Wheaton CUSD 200 (Ph 1)	Wheaton	IL	Bill Farley, Business Services	630-682-2002	$1,446,040	2013	GESC
272	Wheaton CUSD 200 (Ph 2)	Wheaton	IL	Bill Farley, Business Services	630-682-2002	$410,000	2014	GESC
273	Wheaton CUSD 200 (Ph 3)	Wheaton	IL	Bill Farley, Business Services	630-682-2002	$7,200,000	2015	GESC
274	White River Valley School Corporation	Lyons	IN	Bob Hacker, Supt.	812-659-1424	$2,000,000	2010	GESC
275	Whitko Comm. School Corp	Pierceton	IN	Jeff Hendrix, Supt. (now at Munster)	219-836-9111	$5,355,182	2006	GESC
276	Whitley Co. Cons. Schools	Columbia City	IN	Patricia O'Connor, Supt.	260-244-5771	$1,100,000	2011	GESC
277	Whitley Co. Cons. Schools	Columbia City	IN	Patricia O'Connor, Supt.	260-244-5771	$2,408,182	2006	GESC

Performance

Energy Savings Results Report

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

As of August 2015

BELL COUNTY EXPO CENTER - CENTRAL TEXAS

Infrastructure Improvement and Energy Efficiency Project

The Bell County EXPO Center is a 6,600 seat multi-purpose arena in Belton, TX, located along the I-35 corridor between Dallas and Austin. With a major expansion planned for the near future, facility management identified infrastructure issues that needed immediate attention. Performance Services was hired to work in partnership with Heat Transfer Solutions, Inc. (HTS) on repair and replacement upgrades to address both infrastructure and energy efficiency improvements.

Client comfort was maintained in all Expo facilities during the entire project, encompassing more than 250 events.

PROJECT SCOPE

- Provided connection for and utilized a temporary chiller to satisfy facility cooling load while existing chilled water plant was replaced.
- Replacement of metal halide, fluorescent and incandescent lighting with high efficiency LED lighting.
- Installation of power conditioning equipment that will provide surge suppression and power factor correction. It will also filter out excess harmonics that waste electrical energy and cause unnecessary heat build up.
- Replacement of the existing central plant with a high efficiency modular central plant.
- Conversion of constant volume air handling to variable air volume in order to modulate air delivery to match EXPO conditioning load.
- Replace missing and damaged hot water and chilled water pipe insulation at air handling units.
- Lower the total system pressure drop within the air handling units by installing high capacity, low pressure, drop pleated air filters.
- Install a direct digital control, open protocol building automation system to control HVAC systems. This project includes eliminating the existing pneumatic control system. This will result in optimized control and scheduling of HVAC equipment.
- Installation of weather stripping on building doors.
- Realized utility rebates of $90,000 and annual operational savings of $25,000

Performance Services

BELL COUNTY EXPO
135,000 sq. ft.

CONTRACT
$3,989,822

COMPLETION:
AUG 2015

CONTACT:
MR. JOE LATTEO, BUSINESS MANAGER
(254) 933-5365

We are a Design-Build engineering and construction company specializing in creating optimal learning and working environments. By valuing relationships and workmanship over change orders and shortcuts, Performance Services strives to earn a 100% Customer Satisfaction rating.

PERENNIAL WASHINGTON STREET, LLC

51% Annual Energy Reduction

In 2009, the building at 130 E. Washington Street consumed $711,968 in annual utility costs. Property managers subsequently pursued a matching OED state grant to reduce electricity, steam, and chilled water utility consumption and improve tenant comfort. Performance Services proposed and implemented dramatic improvements to reduce utility costs by 51 percent while increasing energy efficiency of the building, enhancing tenant comfort and improving building control.

"All the folks we met along the way at Performance Services have been consummate professionals and great people to work with. I can't tell you how many times we said, thank goodness we have a quality partner like Performance Services."
– Gus Miller, Partner, Perennial Washington Street, LLC

COSTLY CHALLENGES

- Lack of automatic building controls and old pneumatic controls
- Air systems heat, cool and reheat air unnecessarily to maintain comfort
- Comfort issues cannot be identified until tenants call with complaints
- Existing inefficient constant volume air systems
- Lack of control and inefficient use of chilled water
- Existing chilled water and steam utilities expensive with costs rising

COST EFFECTIVE SOLUTIONS

- Installed new, vendor independent digital controls platform
- Configured new controls to minimize need for reheat
- New digital controls to monitor systems and spaces and send alerts
- Converted air systems to variable air volume
- Installed digital controls on chilled water system
- Installed a heat recovery chiller to use lower cost electricity and to provide cooling and heating and save energy

OWNER FINANCIAL BENEFITS

- Greatly enhanced building market value
- Substantially lowered energy-related operating costs
- Eliminated need for full-time maintenance personnel
- Improved ability to respond to tenant comfort needs
- Awarded the ENERGY STAR in 2012, evidence of a high performance building

Conserving Hoosier Industrial Power (CHIP) Program Grant Recipient

Performance Services

130 E. WASHINGTON ST.
INDIANAPOLIS, INDIANA
201,128 S.F.

DESIGN-BUILD DELIVERY WITH ENERGY SAVINGS GUARANTEE:
$1,919,785

COMPLETION:
APRIL 2011

ACTUAL ENERGY SAVINGS MEASURED AND VERIFIED:
$362,293

AWARDED IN 2012:
ENERGY STAR

CONTACT:
MAXWELL MILLER
PROPERTY MANAGER
PERENNIAL PROPERTY MGMT
(317) 905-5146

We are a design-build engineering and construction company specializing in creating optimal working environments. By valuing relationships and workmanship over change orders and shortcuts, Performance Services strives to earn a 100% Customer Satisfaction rating.

CITY OF INDIANAPOLIS – 15 BUILDINGS

40% Utility Cost Reduction

The City of Indianapolis Department of Public Works issued a request for proposals for a guaranteed energy project in 2009. From a field of 12 competitors, Performance Services was ultimately selected to identify, design and implement energy conservation measures in 15 buildings, including an integrated front-end control system and comprehensive energy retrofit at the City-County Building.

The Marion County Building Authority has overseen a number of energy related improvements over the years, but nothing as comprehensive as this project, which utilizes a holistic approach and includes measurable results. The energy conservation initiatives will serve to demonstrate leadership in sustainable practices and help to achieve the goal of substantial energy savings for Marion County taxpayers.

PROJECT IMPROVEMENTS

- Central plant heat recovery systems
- Exhaust air energy recovery systems
- Conversion of dual duct air handling systems from constant to variable flow
- Conversion of chilled water / hot water systems from constant to variable flow
- Expansion and optimization of building control systems
- Lighting occupancy and light harvesting sensors installed

RENEWABLE ENERGY FEATURES AT CITY-COUNTY BUILDING

- Geothermal and heat recovery system to supplement heating and cooling
- Solar thermal and solar photovoltaic panel installation
- Solar photovoltaic and wind powered LED plaza lights
- Photovoltaic powered LED bus shelter integrated with the new cultural trail
- Lobby Dashboard Display of project green features and building performance

Performance Services

CITY OF INDIANAPOLIS, INDIANA
2,124,643 S.F.

PROJECT AMOUNT:
$15,412,609

GUARANTEED ENERGY SAVINGS CONTRACT – MEASURED & VERIFIED

$1.3M ANNUAL GUARANTEED SAVINGS

COMPLETION:
JUN 2012

CONTACT:
RON REINKING
(317) 327-4343

We are a design-build engineering and construction company specializing in creating optimal learning and working environments. By valuing relationships and workmanship over change orders and shortcuts, Performance Services strives to earn a 100% Customer Satisfaction rating.

CITY OF INDIANAPOLIS – GREENING OF THE CITY COUNTY BUILDING

$750,000 Annual Energy Savings

The City-County Building is a 50-year old downtown landmark constructed at a time when energy efficiency and green technology wasn't a top priority. Given the cost of maintaining the building, the Mayor of Indianapolis, Office of Sustainability and the Indianapolis Marion County Building Authority worked with the nationally recognized Rocky Mountain Institute to lead a design charette with local business leaders and engineers. Subsequent to a request for guaranteed energy savings proposal, Performance Services was selected to create and implement a "deep energy retrofit" design and project at no cost to taxpayers.

Under the direction of Ron Reinking, the Building Authority has overseen a number of energy related improvements over the years, but nothing as comprehensive as this project, which utilizes a holistic approach and includes measurable results. The "Greening of the City-County Building" initiative serves to demonstrate City leadership in sustainable practices. The building achieved the ENERGY STAR label in October 2012.

PROJECT IMPROVEMENTS

- Central plant heat recovery systems
- Exhaust air energy recovery system
- Conversion of heating and cooling systems from constant to variable flow
- Building control systems expansion
- Lighting occupancy sensors install

RENEWABLE ENERGY FEATURES

- Geothermal system to support building heating and cooling
- Solar thermal and photovoltaic to supplement domestic hot water heating
- Solar Photovoltaic and wind powered LED plaza lights
- Photovoltaic powered LED bus shelter integrated with the new cultural trail
- Lobby Dashboard Display of Project Highlights and Building Performance

GUARANTEED RESULTS

Significantly reduce the building's energy profile:

46% expected energy cost savings

Performance Services

CITY COUNTY BUILDING
INDIANAPOLIS, INDIANA

731,000 S.F.

CONTRACT - MEASURED & VERIFIED
$8,000,000

SIMPLE PAYBACK
10.4 YEARS - PROJECT PAID FROM SAVINGS

COMPLETION:
APRIL 2012

ENERGY STAR ACHIEVED 2012

CONTACT:
RON REINKING
(317) 327-4343

We are a Design-Build engineering and construction company specializing in creating optimal learning and working environments. By valuing relationships and workmanship over change orders and shortcuts, Performance Services strives to earn a 100% Customer Satisfaction rating.

3.2.5. Litigation

3.2.5.1. Performance Services, Inc. also known as Performance Services of Texas, Inc. has no current or history of litigation in Texas, including but not limited to administrative claims and proceedings and arbitration within the past five (5) years.

Performance Services DART rates are as follows:
2014: 0.00
2013: 0.00
2012: 0.00

Safety Preparedness and Documentation:

- Jobsite Safety Startup Checklist
- Jobsite Emergency Information
- Jobsite Emergency Action Plan
- Accident Investigation Form
- Accident Near Miss Form
- Employee Witness Accident Statement
- Fitness for Duty Checklist
- Emergency Response Plan Checklist
- Safety Inspection Report
- HAZCOM Training Checklist
- PPE Checklist
- Toolbox Talk Guidelines
- OSHA Form 300A (zero incidents by PSI in 2014)
- First Aid and CPR training for PSI's field personnel
- Annual drug testing for PSI personnel

A primary focus will be to provide a safe work environment throughout the construction process. To achieve this, PSI would perform site safety orientations with workers when they first arrive on site and before they begin any work. The orientation is to make them aware of safety expectations. Subcontractor companies complete Project Specific Safety Plans for their work, which address the Four Focus Hazards for Fall Protection, Struck By, Caught Between, and Electrical. Additional planning is required for Demolition, Excavations, Steel Erection, Cranes, Scaffolding, and Hazard Communication. Job Hazard Analysis (JHA) are completed by Subcontractors for specific task hazard planning that addresses the activity, hazard associated with performing the task, and corrective action/controls to eliminate/reduce exposure to the hazards. In addition to safety planning, onsite supervision completes weekly safety inspections of the project. Random safety audits would be completed with both positive and negative observations recorded. Hazard recognition and prevention are reviewed with workers onsite during these inspections and audits. OSHA standards may also be reviewed to assist with compliance solutions for both pre-planning and abatement items.

systems meeting these goals while maintaining project priorities without impacting the functional value of the design and customer expectations.

Project Schedule Control

The Performance Services team will develop a Critical Path Method (CPM) Network Schedule based on the present design information. This schedule will identify all major activities for design, approvals, procurement and construction. As design information is further developed, this schedule will be expanded into much more detail, particularly for the construction phase. The schedule will be set up on the PSI network utilizing Primavera project scheduling software. This software will be monitored and updated regularly throughout the entire project. From experience, PSI understands that scheduling occurs during phases of the construction process; therefore, we creatively approach solving scheduling challenges by identifying issues early and having viable alternatives.

This approach considers:

- Early procurement of long-lead times;
- Commencement of site development work prior to completing working documents for building elements; striving for interlocal cooperation to successfully procure site development permits before the issuance of complete approvals and permits.

During the working document completion phase, the project manager will prepare a detailed construction CPM schedule. This schedule would be made available to all bidders and the key milestone dates will become part of the contract agreement with each subcontractor. During construction, we would utilize a weekly work schedule to be discussed during weekly project meetings.

Safety Program and Management

Performance Services' safety program has been developed to assure compliance with Federal, State and Local regulations with particular emphasis on the Occupational Safety and Health Act of 1970 (OSHA), and the OSHA requirements that apply to our construction operations (29 CFR Part 1926). It is the obligation of all PSI employees, team partners, and subcontractors to be knowledgeable of the standards established by these agencies and to implement the rules and regulations contained therein on construction projects.

Performance Services EMR rates are as follows:
2014: .73
2013: .76
2012: .99

Performance Services TCIR rates are as follows:
2014: 0.00
2013: 0.00; 2012: 0.00

Customer Communication Checkpoint Process:

Performance Services' Project Communication Checkpoints ensure information is communicated properly and timely between all parties during each transition in the project sequence. A significant amount of detail is included in this process and can be provided upon request.

Gate	Project Phase	Communication Checkpoint Description
1	Qualification	Qualification strategy
2	RFP / Design	RFP strategy Proposal review Owner final scope review
3	Construction	Internal kickoff Owner kickoff Stakeholder meetings throughout construction Above ceiling checklist Substantial completion inspection Post installation stakeholder meeting Internal closeout Owner closeout
4	Guarantee	Post close out debriefing Owner warranty closeout Annual guarantee reconciliation and owner meeting

3.2.4.3 **Project Budget Control**

A budget cost estimate is created early in the design process and updated in real time as design development progresses. This budget estimate will utilize cost factors for various project elements based on a current cost-information system incorporating historical costs from past projects. Priorities will be established based on feedback from TFC. As the project moves through design, the cost estimate would continually be updated as part of the real-time collaboration with the team. This will ensure alignment between the project scope and budget at all phases of the design. At each major design milestone, the cost estimate will be updated using increasingly greater levels of detail and accuracy, appropriate for the level of detail in the design. At each stage, the estimate will become a living document that can be updated and tracked against the base estimate as the design progresses.

If at any estimating checkpoint the project budget and scope prove to be out of alignment, a list of value-engineering alternatives will be prepared for consideration. These alternatives will be structured to allow integration of as many optional components as possible. Value engineering involves a thorough examination of the entire project by system and emphasizes cost reduction through innovative design ahead of scope reduction. A properly structured value-engineering program will analyze all of the cost and schedule variables and direct the design effort toward selection of the most effective and efficient materials, equipment and

IV. Project Close Out
- a. Punch Lists 35-37
- b. Start Up/ Training Requirements 38-40
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- e. Operation & Maintenance Manuals 44
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- g. Punch Cart 47
- h. Closeout Program Schematic 48

V. Mold Remediation 49

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APPENDIX B (Quality Control Checklists Samples) 59-77

3.2.4.2 **Quality Control Program Key Requirements**

PSI's quality objective is to execute superior quality practices during the TFC project that will make punch lists shorter, more manageable and allow closeout to be completed in a shorter period of time.

Key Objectives:

- Customer Satisfaction and High Performing Building Results
- Excellent Design and Construction Team Reputation
- Repeat Customer Business
- Higher Return on Margins
- Employee Satisfaction

Steps to Quality Control:

- Estimating: Selection of Subcontractors/ Suppliers
- Pre-bid Meetings: Explain expectations
- Pre-award Contract: Incorporate trade specifics into Scope of Work
  New Language in AIA Documents
- Operations
  - Quality Practices
    - 48 Hour Notices to Subcontractors/Suppliers
    - Mock Ups
    - Standard Quality Control Checklists
  - Manageable Punch Lists
    - Punch List Kits
    - Incorporate Pre-Punch into Project Schedules
  - Quicker Closeouts
    - Operation & Maintenance Procedural Requirements
- As-Built Procedures for Field
- In-Service/ Attic Stock Reports
- Initiate Closeout Program and Follow Thru

3.2.4. Quality Assurance / Quality Control

3.2.4.1. The PSI team would utilize a quality control program and the Table of Contents for the document is noted below and outlines the elements of the program. Throughout the design and construction process, quality control checklists would be used as a guide and record for monitoring quality on the TFC project. There is a checklist for each division of work that lists common items to be checked during the construction process. The checklist can be used by any member of the project team but in most cases would be the responsibility of the project manager. Scott Morris, Vice President of Operations for Performance Services, leads our firm's quality assurance program.

Quality Control Program - Table of Contents

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- b. Subcontractor Scope of Work Items 5
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- c. Material Delivery 31
- d. 48 Hour Notices 32
- e. Quality Control Checklists (by Division) 33
- f. Quality Requirements 34

Performance Services

Texas Facilities Commission Open Book Pricing Example
Performance Contracting RFQ

Subcontractor	UAR Utility Assessment Report	Base Project Performance Contract at 4 TFC Sites (Budget)	Alternate #1 Solar PV Including Base Project	
LED Lighting				
Audit, Product, Installation				
PDI Group				
Energy Baseline Audit				
Blue Ocean				
Continuous Commissioning				
DFW Consulting - Command Cx				
Lackey de Carvajal				
Water Conservation Audit				
Alan Plumming & Associates, Inc				
Pneumatic to DDC BMS Upgrade				
Performance Services, Inc				
Vendor #1				
Vendor #2				
Solar PV Assessment				
Performance Services, Inc				
Power Conditioning				
Vendor				
Mechanical				
Vendor				
Electrical				
Vendor				
Other Costs				
Misc. Job costs				
Construction Management				
PSI Engineering				
Final Cleaning - 1710				
Warranty - 20800				
Bond - 1905				
Direct Costs				
Overhead				
Total Costs				
Profit				
Construction Cost				
TOTAL				

agreed to IPMVP methods. Construction period savings are quantified following construction and as part of the annual savings report.

Following construction, our Performance Assurance Group engage and is exclusively dedicated to verifying and monitoring energy and operational savings on all Guaranteed Energy Savings projects with the responsibility to meet or exceed customer needs and find process solutions to help reduce energy costs and maintain your buildings. We strive to provide an optimal environment (consistent thermal comfort, good air quality, appropriate humidity and reduced noise levels) to assure staff and satisfaction. Facilities are provided with quality systems to ease maintenance resource time.

3.2.3.1.7.

3.2.3.2. Please see Attachment C, ESCO Questionnaire Form within this response.

3.2.3.2.1 Please see Attachment C, ESCO Questionnaire Form within this response.

3.2.3.2.2 Please see Attachment C, ESCO Questionnaire Form within this response.

PROCESS STEP	DESCRIPTION
Review situation	Obtain and analyze current energy and operating costs
Survey buildings	Survey interior energy use, including water conservation measures
	Measurement of existing building conditions and equipment performance (amperages, voltages, temperatures, CO_2 levels, foot candles and flue gas efficiency
	Record name plate data, evaluate equipment condition and operating schedules
	Conduct site visits, including after hours to field verify equipment operation, including setbacks, shutdowns, etc.
	Interview building occupants, as appropriate, to help identify building operation schedules. This information is used to determine how energy is being used, where energy can be saved and current issues with the learning environment
Identify needs, solutions & benefits	Develop energy and operational cost savings for each energy conservation measure (ECM) improvement in each building based on situation and benefits of implementing proposed solutions
Tracking options	Develop feasible options for measuring and tracking savings including run time tracking on the building automation system and acquiring monthly gas bills to track gas usage
Guarantee structure	Obtain direction on how Guarantee is to be structured. PSI offers a full range of Guarantee options based on International Monitoring and Verification Protocols including Utility Bill Tracking, Utility Bill Comparison, Measurement and Verification, Runtime Totalization and Stipulated Savings. Each method involves different levels of effort, cost and risk
Agreement	PSI and Owner agree to guarantee savings amounts, methodology, terms and monitoring costs and process

3.2.3.1.6. During the UAR, PSIs Performance Assurance Group works with the lead project engineer and project team to develop a comprehensive Measurement & Verification plan. The Performance Assurance Group then works with the customer to finalize the Measurement & Verification plan that will be included within the UAR.

During construction, the Performance Assurance Group begins quantifying savings the

vendor bids/proposals. This technique may be used in conjunction with other cost estimation techniques to ensure that cost estimates are comprehensive. PSI pricing transparency is demonstrated by our use of an Open Book Pricing sheet with Clients. A sample Open Book Pricing sheet is included at the end of this section.

3.2.3.1.4. Building simulation is the process of using a computer to build a virtual replica of a building. In simple terms, the building is built from its component parts on a computer and a simulation is performed by taking that building through the weather conditions of an entire year. As such, building simulation is a way to quantitatively predict the future and thus has considerable value. When it is being applied to existing buildings with energy usage baselines, the model can be fine-tuned before being used to predict future energy use by matching model output to building energy baselines. PSI commonly uses eQuest which is a DOE2 based energy modeling tool. PSI can also use the Trace 700 energy modeling tool. Mr. Temming has been successfully using the eQuest energy modeling tool for more than 5 years.

3.2.3.1.5. In addition to Performance Services Internal quality assurance program, Performance Services is committed to design excellence. PSI accomplishes this through applying our lessons learned to each and every project. PSI's lessons learned documentation is a living document that is reviewed and updated as appropriate following the completion of every project. Lessons learned include better defined design standards; improved control strategies; improved controls integration; Preventing use of inferior equipment; Improved documentation; Improved training; Etc. PSI believes it is critical to learn from each project and to use that information to improve all future projects.

Performance Services accomplishes our design management and engineering methodology in three important steps.

Step 1: Uncover Needs

- ✓ Interview owner
- ✓ Interview building occupants, as appropriate
- ✓ Understand long term goals of owner
- ✓ Evaluate solutions to owner's goals

Step 2. Survey and Analysis

- ✓ Assessment of facility infrastructure, equipment and systems
- ✓ Preliminary conceptual design(s) for each option
- ✓ Review pros and cons of conceptual design(s) with owner
- ✓ PSI and owner agree on best long-term engineering solutions

Step 3: Solution Development

- ✓ PSI and owner review and finalize cost estimates
- ✓ PSI and owner agree to guaranteed savings amounts, methodology, terms and monitoring methods and process

guaranteed savings project for the City of Dallas. This project included building controls, building controls integration, Continuous Commissioning, LED lighting, power conditioning, mechanical system upgrades and limited solar work. Mr. Temming and Mr. Kirkley closely followed SECO guidelines and worked with the City to secure LoanSTAR funds. Mr. Temming and Mr. Kirkley have maintained a solid relationship with the City of Dallas and SECO.

Mineral Wells ISD (Approx. $1.2M)
Mr. Temming and Mr. Kirkley successfully developed, applied for and implemented a Cool Schools project for Mineral Wells ISD. This project consisted of replacing of approximately 120 package rooftop units with new, high efficiency package rooftop units equipped with economizers. The project was fully funded by the Cool Schools SECO grant.

Texas Department of Parks and Recreation ($1M+)
Mr. Temming developed and began implementing a comprehensive guaranteed savings project for the Texas Department of Parks and Recreation. This project included building controls, commissioning, lighting upgrades, and mechanical system upgrades. Mr. Temming closely followed SECO guidelines and worked with the customer to secure LoanSTAR funds.

3.2.3.1.3. Based on the project scope and location, Performance Services uses one or more of the following methods for estimating project costs:
• Expert Judgment – Use of knowledge gained from past project management experience. Performance Services captures relevant data from all projects and stores it in a custom database for use on future estimates. Expert judgment, in conjunction with objective estimation techniques, provides valuable information about the organizational environment and information from prior comparable projects.
• Analogous Estimating – Use of the metrics from a previous, similar project as the basis of estimation for the current project. Analogous estimating takes the actual cost of previous, similar projects as a baseline and then adjusts for known differences (such as size, complexity, scope, duration, etc.).
• Parametric Estimating – Use of a statistical relationship between historical data and other variables (for example, lines of code in software development) to calculate an estimate for activity parameters, such as scope, cost, budget, and duration. Used correctly, this technique can produce high levels of accuracy.
• Bottom-Up Estimating – Estimating all individual work packages/activities with the greatest level of detail, summarizing higher-level estimates with the combination of the individual estimates. The accuracy of bottom-up estimating is optimized when individual work packages/activities are defined in detail.
• Three-Point Estimates – Use of three estimates to determine a range for an activity's cost: the best-case estimate, the most likely estimate, and the worst-case estimate.
• Reserve Analysis – Determination of contingency reserves to account for cost uncertainty.
• Project Management Estimating Software – Use of project management cost estimating software applications such as R.S. Means, computerized spreadsheets, simulation, and statistical tools. Such tools can allow for rapid consideration of multiple cost estimate alternatives.
• Vendor Bid Analysis – Determination of what the project should cost based on a review of

3.2.3. Methodology & Budget/Schedule Compliance

3.2.3.1 Proposed Methodology: A detailed plan outlining the methodology intended to be employed by Performance Services when implementing this project scope of work into a realized and finished project.

3.2.3.1.1 During the audit phases, PSI surveys and documents energy and water using devices using survey tools such as:

- Illumination meter
- Temperature meter
- Hygrometer
- CO meter
- CO2 meter
- Power/power quality meter
- Water flow meter
- Various Hobo loggers
- Camera

These tools allow PSI to accurately document existing space conditions such as room temperature, room temperature variations, relative humidity, CO and CO2 levels, illumination levels, HVAC, lighting and plug load energy usage and water flow of restrooms, irrigation and mechanical systems. We use this information to look for problem areas such as inadequate return air, inadequate supply air, leaky duct work, low and/or high illumination levels, excessive glare, dirty air filters or cooling coils, thermostats/temperature sensors located in areas that do not accurately reflect space conditions, excessive maintenance costs, wasted electrical energy due to harmonics and/or low power factor, etc.

Another audit practice used by PSI includes interviewing the building staff and maintenance personnel to get a better understanding of site conditions, savings opportunities and problem areas. Finally PSI uses existing building automation systems to trend and track space conditions as well as mechanical and electrical system operations.

3.2.3.1.2 Doug Kirkley and David Temming have extensive experience applying for SECO funds and working with the 3rd party engineer throughout the project. A brief and partial summary of that experience follows:

City of Dallas Project (Approx. $5M)
Mr. Temming and Mr. Kirkley developed and began implementing a comprehensive

DENNIS RUNYAN PMP

Water Assessment Auditor and Irrigation Analysis

Dennis is an aquatic biologist working towards completion of an Irrigation Inspector license. His unique experience encompasses water conservation, water efficiency audits, water quality analyses, water supply and reuse projects, regional water planning, biological monitoring and aquatic biota. Dennis is a member of the Project Management Institute.

Dennis has completed or will complete the following training to achieve his Irrigation Inspector license: Basic Landscape Irrigation Training Course (TCEQ Course No. 0010); Texas Landscape Irrigation Auditing and Management Short Course (TCEQ Course No. 0015); City of Austin Authorized Irrigation Inspector Training Certification for Backflow Prevention Assembly Tester (September 2015; TCEQ Course No. 1200)

EDUCATION:

Master of Science, Aquatic Biology, Texas State University, 2007

Bachelor of Science, Wildlife and Fisheries Sciences, Texas A&M University, 2003

PROJECT EXPERIENCE

City of Austin ICI Program, *City of Austin, Texas*

Dennis conducted water efficiency audits at 25 City of Austin office buildings and recreation centers as part of the City's Industrial, Commercial, and Institutional Audit Rebate Pilot Program. Dennis also performed water efficiency calculations for each facility and prepared the respective reports for submittal to Austin Water Utility.

City of Austin Seton Hospital, *Seton Family of Hospitals*

Assisted the project team with a water efficiency audit for Seton Hospital in Austin, Texas.

East Fork Wetland Design, *North Texas Municipal Water District*

A baseline biological, habitat, and water quality assessment was performed to satisfy requirements of a water rights permit for East Fork Trinity River water reuse. Specifically, Dennis worked in conjunction with the client to oversee subconsultants, organize sampling events, and conduct biological sampling and physical habitat assessments.

Lake Remle System Assessment, *Trinity River Authority of Texas*

Dennis served as aquatic biologist, subconsultant coordinator, and field sampling coordinator. Dennis developed and executed a sampling and monitoring plan to assess the fish community and physical habitat of the Lake Remle System. Completion of this project served as the basis for water quality modeling efforts and general biological and habitat characterization of the Lake Remle System. A TCEQ Aquatic Life Use designation will be established based on this research.

Nacogdoches Power Plant – Baseline Biological Characterization, *Nacogdoches Power LLC*

Dennis served as aquatic biologist and field and laboratory coordinator. This project involved an investigation of biological information for the Angelina River, including field sampling for fishes and shellfishes and laboratory processing of samples. Collection, analysis, and presentation of these data satisfied federal and state requirements, which require characterization of baseline biological conditions for proposed raw water intakes for power plant water supplies. Dennis was responsible for coordinating and performing field and laboratory work, directing field staff, analyzing data, and preparing the Baseline Biological Characterization Report. Dennis continues to work on this project, with his effort now focused on biological monitoring requirements required by the TPDES permit.

BRIAN MCDONALD PE

Quantify & Verify Embedded Energy Savings from Water Conservation

Brian specializes in water and wastewater planning, water quality modeling, and water and wastewater system modeling.

PROJECT EXPERIENCE

Water Conservation Strategic Plan, *Tarrant Regional Water District*

Brian was the technical lead for TRWD's Water Conservation Five-Year Strategic Plan. His responsibilities included analysis of historical water use data, development of daily and annual predictive water use models, review of other regional water conservation programs, identification of potentially feasible water conservation strategies, evaluation of potential water savings and costs, and development of an implementation plan. TRWD's Strategic Plan was completed in January 2013. http://www.savetarrantwater.com/docs/default-source/default-document-library/strategic_water_conservation_plan.pdf?sfvrsn=2

Water Conservation Five-Year Strategic Plan, *City of Dallas, Texas*

As technical lead for the 2010 update to the Dallas Water Utilities Water Conservation Five-Year Strategic Plan (URL: http://savedallaswater.com/pdf/ConservationStrategicPlan.pdf), Brian analyzed historical water use data, identified potentially feasible water conservation strategies, reviewed projected water savings and costs, developed an implementation plan, and wrote the updated plan.

Water Resources Evaluation and Conservation Planning, *City of Austin, Texas*

This comprehensive water resource planning study developed data on water supplies and demands in the City of Austin. APAI also provided services for a comprehensive water resources evaluation of new water conservation programs for both short-term and long-term water savings. One purpose of the evaluation was to identify ways to defer the need for an additional water treatment plant and to delay contractual triggers that would cause the City to pay more for its water. As project engineer, Brian identified conservation methods with potential for peak day water savings within five years, evaluated potential water savings, and estimated implementation costs (URL: http://www.ci.austin.tx.us/water/conservation/downloads/Conservation%20Strategies%20final%20draft.pdf). Evaluated ICI strategies included large property irrigation systems analysis and an ICI retrofit by date ordinance.

URS DFW Sustainable Water Supply Evaluation, *LopezGarcia Group*

Brian developed a Water Conservation Five-Year Strategic Plan for the Dallas / Fort Worth International Airport (DFW). Since the airport has no residents, this plan focused exclusively on ICI customers. Brian analyzed available customer billing data, identified major uses and users, researched potentially feasible water conservation strategies, collected feedback from DFW staff, and supervised analysis of the potential water savings and costs. Finally, he recommended water conservation strategies, planned an implementation schedule, identified staffing requirements, projected water savings, and projected program costs. The Airport staff is currently implementing the Strategic Plan.

EDUCATION:

Engineer (Advanced Degree), Civil Engineering, Water Resources Engineering, Stanford University, 1994

Master of Science, Civil Engineering, Water Resources Engineering, Stanford University, 1988

Bachelor of Science, Civil Engineering, Rice University, 1987

REGISTRATION:

Professional Engineer, TX, No. 83332

EDDIE WILCUT

APAI Project Manager
Water and Energy Conservation Opportunity Analysis

Eddie has worked extensively within the water conservation arena for more than 15 years. Eddie served as the Water Conservation Manager for the San Antonio Water System (SAWS) helping companies such as Frito Lay, Coca-Cola, Sea World, and Philips Semiconductor reduce water use by more than 200 million gallons per year.

From 2009 to the present, Eddie has conducted extensive industrial, commercial and institutional (ICI) water and energy efficiency surveys for numerous US cities, including Dallas, Austin, Fort Worth, San Antonio, Phoenix, Tucson, and Lubbock.

Eddie has a strong knowledge of and background in working with a variety of ICI facilities including, manufacturing, cold storage, hospitals, educational, administrative, hospitality, industrial, and physical plants. Eddie has also been involved in the successful development and implementation of several large scale water efficiency projects including process water reclamation, HVAC condensate recovery for cooling tower makeup, third stage reverse osmosis for recovery of process water associated with microchip manufacturing, large scale laundry water reclamation and replacement of large scale water intensive vacuum systems with new air cooled systems.

EDUCATION:

Bachelor of Arts, Applied Arts and Sciences, Texas State University, 1996

Master of Science, Applied Arts and Sciences, Texas State University, 2000

Eddie has published more than two dozen articles on residential, commercial, and industrial water conservation, covering topics such as condensate recovery, cooling tower efficiency, rainwater harvesting and ICI program development that have been published in a variety of trade journals and conference proceedings across the United States.

PROJECT EXPERIENCE

Water Conservation & Drought Contingency Plans, *City of Huntsville, Texas*

Eddie served as the project manager, updated the utility profile, and was primary author of both the updated Water Conservation Plan and the updated Drought Contingency Plan.

Water Conservation Plan, *City of Lubbock, Texas*

Eddie acted as project manager and primary author of the Conservation Strategy and Planning Review, the Drought Contingency Plan Review, and the Water Conservation Plan Review. He also presented findings to the City of Lubbock's Water Resources Committee.

ICI Water Audit Programs, *City of Dallas, Texas and San Antonio Water System (SAWS)*

Eddie acted as Project Manager and Field Auditor

ICI Water Efficiency Survey Program, *City of Fort Worth, Texas*

Eddie acted as Project Manager and Field Auditor

REX HUNT PE

APAI Principal-in-Charge

Rex Hunt is a principal with APAI, located in the Austin office. He offers a wide range of engineering experience, gained in more than 39 years as a civil engineer. Rex's career has included environmental and civil engineering projects in water resources, water conservation, water quality, development and assessment of water supply management strategies, drought planning and management, water reuse, and water-quality modeling. He is APAI's team leader for its Water and Energy Efficiency Services.

Rex has managed APAI's work with several regional water planning groups in Texas. He has developed water management strategies to address projected shortages and evaluated environmental impacts from various water management strategies.

EDUCATION:

Master of Science, Civil Engineering, University of Texas at Arlington, 1984

Bachelor of Science, Civil Engineering, University of Texas at Austin, 1975

REGISTRATION:

Professional Engineer, TX, No. 48237

PROJECT EXPERIENCE

Regional Water Plan—Region I

Rex currently serves as Principal and Project Manager for APAI's work in this region. He was also the Project Manager for the third round and served on the second round planning team. For the fourth round of planning, Rex led a highly-qualified team to evaluate population data, water demand projections, and water availability in order to identify appropriate strategies for the region. Rex worked closely with members of the ETRWPG and with utility managers to develop the plan. He has performed environmental analyses of potential water management strategies, and developed recommendations regarding unique stream segments and unique reservoir projects. Tasks have included evaluation of water management strategies, evaluation of environmental impacts associated with water management strategies, and technical support for the preparation of the regional water plan. He prepared an analysis of bay and estuary inflow targets for Sabine Lake for Round 3, Phase 1 planning for Region I. The analysis included a review of Texas Parks & Wildlife Department recommendations for target freshwater inflows; and a comparison of target inflows to naturalized freshwater inflows, historical freshwater inflows, and drought-of-record inflows. In addition, Rex authored a technical memorandum in the fourth round of planning that addressed projected increases in rice production and irrigation demands.

Regional Water Plan—Region B

Rex served as Project Manager for APAI's role in this region for the first two cycles of planning. He was responsible for preparing a summary of existing planning efforts in the region, assisting with development of drought management plans for more than 50 communities in the region, and development of the region's response to the State's program for unique stream segments and reservoir sites. In addition, he assisted with developing strategies for municipal water management and preparing general recommendations for selecting water management strategies for inclusion in the plan.

Alan Plummer Associates, Inc.

<u>Water Efficiency & Conservation</u>
6300 La Calma Drive, Suite 400
Austin, Texas 78752

ALAN PLUMMER ASSOCIATES, INC. (APAI) has a long record of working with various agencies of the State of Texas. APAI understands and adheres to the policy requirements of each state agency in order to deliver results to their clients.
APAI is currently assisting the City of Austin Water Utility in the Drought Response Feasibility & Engineering Study. Our firm has a long relationship with Austin Water Utility and we understand the unique needs of Austin in respect to water conservation. APAI is recognized throughout Texas for development of water conservation strategies for Regional Water Planning mandates under the Texas Water Development Board. APAI has been instrumental in development of metrics to quantify and qualify results from water efficiency and water conservation projects.

APAI's unique experience on multiple projects within Texas is extremely relevant to the Texas Facility Commission's interest in identifying water conservation initiatives within its facilities.

PROJECT REFERENCE: City of Austin Municipal Building Water Conservation Surveys & Drought Response Study
Scope including:

- Consideration of all water consumption for designated facilities
- Identification of commercial facility opportunities to reduce water consumption while maintaining a level comfort for the occupants
- Evaluate, negotiate and recommend cost-effective water conservation retrofits and strategies
- Quantify the estimated embedded energy savings associated with recommended water conservation strategies and retrofits
- Provide support of energy audit programs for designated facilities

Lackey Commercial Properties, LLC

LACKEY de CARVAJAL

Retro Commissioning
1701 Directors Blvd., #770
Austin, TX 78744

Lackey de Carvajal is a small firm of highly qualified LEED Accredited Professionals who engage in the Energy Engineering Services process from a Program Management point of view. The LC-Cx team consists of trained project managers who understand the whole design and construction process. LC-Cx is a HUB Subcontracting partner and will be working in conjunction with the PSI team to develop a comprehensive list of energy conservation measures within the 4 TFC buildings.

REFERENCE PROJECT: City of San Antonio Retro-Commissioning
Energy benchmarking several buildings for City of San Antonio. Performed ASHRAE level 1, 2 audits on buildings. LC-Cx developed a list of energy conservation measures and will oversee the installation of these as a project manager for the City of San Antonio. LC-Cx will be making application to the local utility on the city's behalf to apply for rebates for the completed energy conservation measures.
Reference: Aaron Stein, Sr. Energy Analyst | City of San Antonio | aaron.stein@sanantonio.gov | 210.207.0269

GEOFF OVERHOLT, PE

ASSOCIATE PRINCIPAL

Joined DFW Consulting in 2005

BACKGROUND

B.S. Electrical Engineering

Texas Tech University

10 Years experience

Geoff serves as our BIM Manager and thought leader. He tackles dimensional challenges of engineering design on all types and sizes of projects. Working with Revit MEP even before it was fully developed, he understands the efforts of coordinating a 3D model with multiple disciplines. Geoff has amassed a portfolio of over four hundred projects.

He has a varied portfolio of projects encompassing churches, office, healthcare, retail and mission critical facilities. Geoff is instrumental to project teams as a project manager. His client first focus and results driven mentality make him an invaluable asset on any project.

Geoff earned his Bachelor of Science in Electrical Engineering from Texas Tech University in Lubbock.

PROFESSIONAL REGISTRATIONS

- Registered Professional Engineer | Texas, License #133173
- Autodesk University Training

PROFESSIONAL AFFILIATIONS

- Institute of Electrical & Electronic Engineers (IEEE)

DESIGN EXPERIENCE

- Argyle United Methodist Church
- AT&T Mobility Data Center Allen
- AT&T Video Hub Offices (VHO)
- Beaumont Police Property Building
- Caris DX Laboratory
- Concord Church
- Corsicana Police Department
- Crosspoint Church McKinney
- Crossroads Christian Church
- Dallas County Schools
- Experience Life Lubbock
- First Baptist Church Allen
- First Baptist Church Dallas
- First Christian Church Nacogdoches
- First United Methodist Church McKinney
- Fluor Corporate Headquarters
- Gateway Church
- Grace Ave United Methodist Church
- Hackberry Creek Church
- Harvest Bible Church
- Highland Park United Methodist Church
- Hillcrest Church
- North Dallas Community Bible Fellowship
- North Dallas Fellowship
- North Pointe Church of Christ
- Parker Public Safety Facility
- Parkway Hills Worship Center
- Pepsico Business Solutions Group Data Center
- Prestonwood Baptist Church North Campus
- Salvation Army
- South Waco Community Center
- Sugarland Hospital
- The Crossing
- The da Vinci School
- The North Texas Enterprise Center For Medical Technology (NTEC) Offices And Lab
- Trinity Presbyterian Church
- Valencia Condominiums
- Villa Toscana Condominiums

SEAN GREEN

Project Technician

TRAINING & CERTIFICATIONS

- OSHA 10 Hour Safety Course
- US Army Special Electronics Device Repairer Advanced Individual Training (Distinguished Honor Graduate)
- Siemens – System Specialist training path
- Siemens – BACnet training course
- Siemens – Data Center training course
- Siemens – Sales training path

Sean Green is a Project Technician at Command Commissioning and is responsible for pre-functional verification, functional testing, project reporting, and project quality control.

Sean has a great amount of knowledge in control systems installation, start-up, and operation, as well as that of mechanical systems and project management experience. With his technical knowledge of such systems, he can accurately and professionally create test scripts that fully verify the operating parameters of today's complex systems as well as complete functional testing of many different systems. His experience in controls project management has provided the understanding necessary to conduct and manage the commissioning process in such a manner that it does not hinder the project schedule.

Prior to joining the Command Commissioning team in 2014, Sean worked for Siemens Building Technologies for 6 years where he started out as a Systems Specialist doing controls startup. He then went on to become an Engineering Specialist where he was still responsible for controls startup as the lead technician but also took on a project management role where he managed every aspect of projects fewer than 150K dollars from scheduling manpower to writing change orders. These projects included new, renovation, and retrofit installations in hospitals, office buildings, research lab facilities, and schools. Just before joining Command Commissioning, he finished his time with Siemens as a Sales Executive where he was responsible for estimating and writing proposals for controls projects as well as securing the PO and booking the project.

Before Siemens, Sean served 4 years in the US Army as a Special Electronics Device Repairer where he first began to develop his technical and troubleshooting skills as well as his leadership abilities. While deployed to Iraq from October 2006 – December 2007, he was promoted to Corporal and assigned Squad Leader of the Communications and Electronics shop where he had 6 direct reports and was the second NCO in charge of the shops operation.

REPRESENTATIVE EXPERIENCE

- City of Dallas CC* ..... Dallas, TX
- Horry County CC* ..... Horry County, SC

REFERENCES

Carlos Yagua
Texas A&M ESL
979.574.2011
carlosyagua@tees.tamus.edu

Ian Nelson, PhD
Texas A&M
ESL 281.728.3686
jcnelson@tamu.edu

Cameron Alexander LEED AP
Skanska
713.401.5266
Cameron.Alexander@skanska.com

JOHN KIMLA, PE, CxA
Mechanical Engineer

BACKGROUND
B.S. Mechanical Engineering,
Texas A&M University

Registered Professional Engineer,
Texas, License #111516

John is a Project Engineer at Command Commissioning and is responsible for Building Automation System, Security, Fire Alarm, and Intelligent Building Controls commissioning at the functional and integrated systems level of complex and highly reliable systems for mission critical facilities. John also applies the commissioning process to existing buildings (retro-commissioning) with an emphasis on HVAC system optimization and measurement and verification (M&V). In this role, John is responsible for the design and implementation of enhanced sequences of operation and the engineering analysis required to validate energy savings.

John earned a Bachelor of Science in Mechanical Engineering from Texas A&M University and a Master of Science in Mechanical Engineering from Texas A&M University. He is a licensed professional engineer in the State of Texas. His experience includes over 6 years of mechanical engineering analysis and research.

Prior to joining Command Commissioning in 2010, John worked at the Energy Systems Laboratory (ESL) at Texas A&M University (TAMU) as a student and became a Research Engineering Associate after graduating. He was involved in the commissioning of existing building HVAC systems as part of an ongoing process known as Continuous Commissioning® (CC®). His focus was on building energy calculations and modeling, field assessments, identifying and implementing energy cost reduction measures, and preparing contract documents at the TAMU campus and other government facilities.

PROFESSIONAL REGISTRATIONS
- Registered Professional Engineer | Texas
- Certified Commissioning Authority CxA

PROFESSIONAL AFFILIATIONS
- American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)

REPRESENTATIVE EXPERIENCE
- 2 AT&T Communications Riser ..... Dallas, TX
- 5 AT&T Central Plant Upgrade ..... Dallas, TX
- 800 Venture Synapsense Re-Cx ..... Allen, TX
- 6th Avenue Place ..... Calgary, Canada
- AAMC HQ Building ..... Washington DC
- AT&T CC® ..... Dallas, TX
- AT&T Data Center ..... Allen, TX
- AT&T Edison Building CC® ..... Ft. Worth, TX
- City of Dallas CC® ..... Dallas, TX
- Devon Energy HQ ..... Oklahoma City, OK
- DFW Airport TRIP Terminal B ..... DFW
- FDA CBER Labs ..... White Oak, MD
- Fidelity One Destiny Way ..... Westlake, TX
- Fidelity Two Destiny Way CC® ..... Westlake, TX
- Great Lakes Naval Station ..... Great Lakes, IL
- Horry County CC® ..... Horry County, SC
- IBM Facility CC® Assessment ..... New York, NY
- One Shell Plaza ..... Houston, TX
- VA Hospital CC® ..... Houston, TX

REFERENCES
Gary Watson
Horry County Government
843.915.5300
watsong@horrycounty.org

Joe Lockwood
Papco
919.609.4302

Bahman Yazdani
Energy System's Laboratory
979.862.2775
bahmanyazdani@tees.tamus.edu

KEN MELINE, PE, CEM, LEED AP, CxA
Principal

BACKGROUND
B.S. Mechanical Engineering,
Texas A&M University

Registered Professional Engineer,
Texas & 6 other states, Texas License #61722

Ken is one of the founding principals of Command Commissioning. Ken serves as principal in charge of mechanical system commissioning for Mission Critical facilities and Continuous Commissioning® at Command Commissioning.

He is responsible for peer design reviews. In addition he oversees commissioning at the functional and integrated systems level of complex HVAC systems for mission critical facilities. Also included in his responsibilities are the quality control procedures for drawings and specifications.

Ken earned a Bachelor of Science in Mechanical Engineering from Texas A&M University. He is a Registered Professional Engineer in seven states.

Ken's experience includes over 30 years of design and commissioning of complex and highly reliable HVAC systems mission critical facilities.

Prior to founding Command Commissioning, Ken established DFW Consulting Group, Inc. in 1989. Earlier on, he was a Project Manager for Steve Dunn & Partners, Inc. While there, he was responsible for mechanical design, project coordination and contract administration for data centers, health care facilities and large commercial high-rise structures.

PROFESSIONAL REGISTRATIONS
- Registered Professional Engineer | Texas & 6 other states.
- Certificate, National Council of Examiners for Engineers and Surveyors
- Certified Energy Manager (CEM from Association of Energy Engineers)
- USGBC LEED® Accredited Professional
- Certified Commissioning Authority (CxA)

PROFESSIONAL AFFILIATIONS
- American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
- National Fire Protection Association (NFPA)
- American Society of Plumbing Engineers (ASPE)
- 7x24 Exchange Lonestar Chapter
- U.S. Green Building Council

REPRESENTATIVE EXPERIENCE
- Archon Data Center ..... Lewisville, TX
- AT&T Data Center ..... Mesa, AZ
- Citigroup ..... Las Colinas, TX
- Countrywide Data Center ..... Chandler, AZ
- Fidelity Office Building ..... Westlake, TX
- Intellicenter ..... Dallas, TX
- Lowes Data Center ..... San Antonio, TX
- One Victory Center Drawing Review ..... Dallas, TX
- Rackspace Data Center ..... Dallas, TX
- Target Data Center ..... Elk Fork, MN
- Texas A&M CUP & SUP ..... College Station, TX
- Texas A&M Vet Lab Expansion ..... College Station, TX
- UNT Health Science Center ..... Denton, TX
- VA Hospital's CC® ..... 4 Locations
- Visa Data Center ..... Loudoun County, VA

DESIGN EXPERIENCE
- Archon Data Center ..... Lewisville, TX
- AT&T 3400 Plano Pkwy Lab ..... The Colony, TX
- Charlton Methodist Cardiac Cath Lab ..... Dallas, TX
- Charlton Methodist Hospital ..... Dallas, TX
- Federal Reserve Bank ..... Dallas, TX
- WPLG-TV Broadcast Facility ..... Miami, FL

TROY SKILLERN, PE

PRESIDENT/PRINCIPAL

Joined DFW Consulting in 1995

BACKGROUND

B.S. Mechanical Engineering

Texas A&M University

40 Years experience

As a 25-year veteran of the firm, Troy Skillern is an integral figure in building the firm's reputation and quality assurance program.

Before being named Principal in 2010, Troy served as the Lead Mechanical Engineer and Quality Control Manager of large mission critical and commercial projects. As the Principal and current President of the firm, Troy adds his extraordinary talent and experience to that of the other Principals. Since being named President of the company, Troy has sought to further solidify the position of the company as an industry leader and technically sound group of engineers. He is a seasoned Professional, and his expertise is favorably recognized and respected by owners, architects, and contractors with whom he has worked. His project experience mainly includes mission critical facilities such as data centers, laboratories and broadcast facilities.

Troy is a graduate of Texas A&M University with a Bachelor of Science in Mechanical Engineering.

PROFESSIONAL REGISTRATIONS

- Registered Professional Engineer | Texas, License #87049
- Registered nationally with the National Council of Engineering Examiners (NCLES)

PROFESSIONAL AFFILIATIONS

- American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

REPRESENTATIVE EXPERIENCE

- Acute Kids
- Archon Data Center
- AT&T Dallas Data Center
- AT&T Messaging Data Center
- Beaumont Police Property Building
- BECO Data Center
- Caris DX Laboratory
- Carrell Clinic
- Celebration Church
- Chesapeake Energy
- Cingular Data Center
- Countrywide Data Center
- EDS Data Centers
- Epsilon Offices
- ETMC Data Center
- First Baptist Church Dallas
- Fiserv Data Center Study
- Frito-Lay Data Center Assessment
- Gateway Church
- John Peter Smith Cardiology Testing Rooms
- Hall Financial Service Center
- Hall Office Park D2
- Intuit Data Center
- McAfee Plano Data Center
- NASCAR Penthouse & TV Studio
- Neospire Data Center
- Nueterra Health Lab
- NTT America, Inc.
- Parkland Hospital 6th Floor
- Pepsico Business Solutions Data Center
- SBC VHO Data Center
- Southwest Airlines Flight Training Facility
- TCU Schieffer School of Journalism
- Texas Oncology
- The Center for Wound Healing
- TxDOT Maintenance Facilities
- US Bank Data Center
- UT Southwestern Bass Center
- WPIG-TV Broadcast Facility

DFW Consulting Group (Cont'd)

REFERENCE PROJECT: Hurst Convention Center, Hurst, TX

The convention center for Hurst, TX is a state-of-the-art facility between downtown Fort Worth and DFW Airport. The center offers on-site catering, audio-visual, IT and conference services ideal for any occasion. The facility is 55,000 ft^2 and boasts a ballroom, gallery 6 meeting rooms, outdoor patio space and kitchen. The Hurst Convention center later added a 4-level parking garage that DFW Consulting Group was also the engineer for. The DFW Consulting Group performed the full scope of MEP design work on the convention center including: HVAC, power/gas and telephone utility source, sanitary sewer, lighting, and fire alarm.

DFW Consulting Group, Inc.

DFW Consulting Group, Inc.

Continuous Commissioning, MEP Consulting
1616 Corporate Ct #100,
Irving, TX 75038

DFW Consulting Group, a HUB and MBE certified firm, has forged a prestigious leadership position in the Mechanical, Electrical and Plumbing space, achieving nationwide recognition and respect with its team of Professional Engineers. Since inception in 1989, DFW Consulting Group has built its distinguished reputation on principles of integrity, dedication and trust. In addition to MEP consulting, DFW Consulting Group is the parent company for Command Commissioning; an independent commissioning company made up of highly experienced, accredited engineers and technicians dedicated to sustainable building operations. Chosen most often by architects, owners and developers, Command Commissioning guarantees advanced innovation and improved efficiencies to each client it serves.

Performance Services will be leveraging the experience of the DFW Consulting Group and Command Commissioning for continuous commissioning and any other system improvement recommendations to increase the efficiency in the TFC buildings.

REFERENCE PROJECT: AT&T Continuous Commissioning, Dallas, TX
2 AT&T is part of a 5 building, 2.54 million ft² campus served by a common central plant. The plant was consuming 132 million kWh's prior to Command Commissioning's implementation of 5 Continuous Commissioning® measures. 2 AT&T houses the data centers that serve this campus. In addition to the data center floors, administrative floors offered energy savings opportunities. The 5 Continuous Commissioning® measures taken include optimization of the underfloor air distribution, CHW valve control, static pressure set-point controls for both data center and administrative floors, and SAT set-point controls. The annual energy savings for this project are estimated at $223,000 and the kWh consumption was reduced by about 3 million a year. The anticipated payback period is less than 2 years.

REFERENCE PROJECT: Horry County Continuous Commissioning, Horry County, South Carolina
The Horry County, South Carolina project includes 17 public buildings totaling over 630,000 ft². The effort has been split between an implementation phase and a maintenance phase over a 24 month period. Five phases of implementation have been taken and 15 different measures are being exercised across the buildings to optimize energy efficiency. The annual savings for Horry County are estimated at $125,000 a year and will save about 1.6 million kWh's annually. The anticipated payback is <2.8 years.

Served as member of the official US negotiating team in bi-lateral international airline negotiations on behalf of the US Department of Interior. Identified and outlined key policies for the administration of, and the enhancement of, the political, economic and social well being of seven island nations. Initiated several projects in education, outreach and economic development for these nations.

US Peace Corps, Country Director for Cameroon (1984-1987)
Administered multiple projects and their support systems for a Peace Corps economic development and education program which encompassed over 200 personnel in 60 locations on a $2.3 million yearly budget. Successfully interfaced with foreign and US officials as well as external contractors to enhance the program. Developed policies and procedures which significantly improved the efficiency and impact of the operation. Used TQM approach to develop yearly management and budget plans with five-year projections for the Peace Corps. Successfully negotiated a 50% budget increase. Represented the US Peace Corps to foreign government officials, international organizations and other US agencies. Results include favorable wide press coverage, the issuance of a commemorative stamp in honor of the Peace Corps by the host government and close competition among all groups and jointly sponsored programs. **Received Peace Corps Certification of Appreciation for Sustained Superior Performance.**

Minority Business Development Agency (MBDA), US Department of Commerce, Confidential Assistant to Deputy Director (1983-1984)
Assessed policies, developed and implemented new policies and procedures which improved the quality of service and the operations of MBDA including its 100 business centers. Organized and directed a Speakers Bureau for MBDA which resulted in the enhancement of the Agency's image and wide press coverage. Organized a trade mission to three Pacific Rim countries for 200 participants. Initiated and developed marketing plans for the increase of minority business contractual opportunities under the Surface Transportation Act with state and local governments. Made a presentation of the plan to the Governors' Association. **Received US DOC Certificates of Merit for Superior Performance.**

Other experience include:

- International Trade and Economic Development Consultant
- Licensed Real Estate Agent
- Information Officer/Special Assistant to Senior Civil Coordinator, Inter-Agency Task Force For Indochina Refugee Resettlement
- Stringer & Representative for CBS News, Radio Program Producer, and Entrepreneur
- Sales Representative for TWA
- Assistant Manager for China Restaurant
- Lecturer, Philadelphia Community College

Organizations and Community Service
President of AACATX for 3 terms. Member of Greater Dallas Planning Council (GDPC), Board Member of the Greater Dallas Asian American Chamber of Commerce (GDAACC), Member Of Asian American Government Executives Network (AAGEN), Board Member, DFW Asian American Citizens Council (DFWAACC), Member of Planning Committee for Regional MBD Week 2004-2005, Member of The Conference of Minority Transportation officials (COMTO, Dallas), Elected National President, Organization of Chinese American Women (OCAW) 1993-1996 , Elected Member of Board of Directors of Dilmpia Hospitality and Travel Industry and served as a member of the official delegation to an industry world conference in Paris.

EDUCATION

Bryn Mawr College, Pennsylvania, USA	M.A. English Literature
Haile Selassie I University, Addis Ababa, Ethiopia	B.A. Magna Cum Laude
Chung Chi College (now Chinese University), Hong Kong	
Ecole Des Arts Decoratifs, Geneva Switzerland	Certificate
English Girl's College, Alexandria, Egypt	GCE (Oxford/Cambridge)

SKILLS TRAINING

Preventing Sexual Harassment	DART Training Certificate
Diversity In The Workplace	DART Training Certificate
EEO For Supervisors	DART Training Certificate
Procurement Basics	DART Training Certificate

Construction Mentor Program Training from [illegible] Dunn & Associates, NTTA RFAQ program
TXDOT Alliance DOT Training, OSHA 10

Katherine Chang Dress

325 E. Rochelle, # 19, Richardson TX 75081
kdress@usapdi.com

Katherine Chang Dress is a versatile executive with over twenty years of experience in Small & Medium Enterprise (SME) development, marketing & PR, journalism & press relations, public administration, organizational development, institutional capacity building, government management and implementation, tourism development, and training. She was educated or worked in several countries in Africa, the Middle East, Europe and Asia. As a result, she speaks five languages and is comfortable in diverse cultures and environments. She has also developed in depth sensitivity to business practices in many countries and possesses excellent inter-personal skills. Her varied career experience resulted in solid general management skills, extensive interaction with government officials and communities. She has served in several mid-level and senior level positions with the Federal Government. She served as Manager of an award-winning Minority/Women-Owned Business Program at Fannie Mae and Senior Outreach and Environmental Justice (EJ) Specialist at the Dallas Area Rapid Transit (DART).

Pacific Dynasty International (PDI) Group, VP Marketing, the company specializes in turnkey LED lighting audit, design, fixtures, installation and Energy Management Contract (EMC). We also specialize in construction and design, fabrication and installation. Ms. Dress is responsible for marketing strategies and activities in the public and private sectors, for vertical and horizontal construction projects. She also designs and brand the entire PDI Group and DBA companies marketing materials. Conducts press and PR relations, draft the annual 5 year plan revision, and company TQM review. She supervises the marketing Assistant and several outside sales team on commission. She has assisted in the growth of Pacific Dynasty International Inc. to PDI Group Inc. with 4 DBA companies and become an award winning company. She has participated in 5 construction mentor programs/training and served as the president of the Asian American Contractors Association of Texas for 3 consecutive terms.

DART, Sr. Outreach and Environmental Justice (EJ) Specialist (2000 - 2003)
Responsibilities include reaching out to DMWBE, ethnic chambers and ethnic community organizations on behalf of DART; Serve as advisor or committee member to the various organizations and government agencies,; Attend events designed to develop small and emerging businesses, and plan/coordinate seminars, workshop, and training sessions for small and emerging business development. She recommended numerous personnel, policy and procedural changes to the new Assistant Vice President of the Outreach Division of the Department that were adopted. **Due to her efforts, DART won two program awards and Ms. Dress received a Certification of Recognition from the Department of Commerce for her service on the annual Regional MED Week (Minority Enterprise Development Week) committee.**

Fannie Mae, Manager of MWOB Developmental Programs (1992-1995)
Developed and implemented the Fannie Mae corporate Minority/Women-Owned Business (MWOB) strategic plan to increase business for minorities and women. Duties entailed outreach activities in the various communities and working closely with regional offices and other business units. Results, after eighteen months, include the expansion of procurement from $1million or 1% in 1991 to over $31 million or over 16% in 1994. Approximately 1000 MWOBs benefited from this growth. In addition, provided valuable advice and support to the main business areas of the corporation resulting in substantial increase of business in areas which never included MWOBs, and formulated five initiatives which increased MWOB contracting opportunities and enhanced Fannie Mae's leadership role in the industry. Represented Fannie Mae in a variety of activities and steering committees. Provided leadership among peer groups of the banking/finance industry and successfully initiated several joint activities with high impact results. These include a law symposium: the minority and women owned law firms jointly sponsored by the Department of Commerce and the FIRREA group as well as a first ever industry benchmarking roundtable for MWOB programs which resulted in the formation of a new association for MWOB managers in the industry. **The excellence of the corporate program received recognition for two corporate awards given by the US Department of Commerce and the Small Business Administration (SBA), and a personal award from *Minority Business Week* magazine.**

US Merit Systems Protection Board, Confidential Advisor the Chairman (1986-1992)
Advised Chairman on administrative, policy and confidential issues for the agency. Managed case flow for the Chairman's Office and represented the office for special projects planning. **Received Meritorious Service and US Government Point of Light Awards.**

US Department of Interior, Deputy Assistant Secretary (1980-1986)

- Experience --minimum 10 years in progressively higher roles of leadership, marketing, training and entomic development

Working conditions:

At liberty to work anyplace with flex hours

Physical requirement:

Driver license and own car

Direct reports:

Marketing assistant, outside sales persons on commission

Approved by: CEO

Date Approved: 1/16/2015

Reviewed: CEO & VP Marketing

YIU, Henry

183 Parkhouse Dallas, TX 75207
Email: hkyiu@usapdi.com
Tel: (214) 417-9826

SUMMARY

Since graduation, Henry has been working in progressively cutting edge technology Projects in various companies with 8 years of management business experience.
Fourteen years ago, he became an entrepreneur and establishes Pacific Dynasty International, Inc, selling LED items on Ebay. Since then, he grew the company capacity to become PDI group with DBA PDI Green Technology, PDI Electrical and PDI EXPERT STEEL specializing in turnkey LED lighting audit, design fixture, installation and energy management contract (EMC), we also specialize in construction steel design fabrication and installation.

EXPERIENCE

President
Pacific Dynasty International (PDI Group), Inc — 5/2002
PDI Green Technology — 2/2010
Specializing in LED Lighting
PDI Expert Steel — 10/2014
Specializing in Steel fabrication and erection
PDI Electrical
Specializing in retrofitting LED Lighting and LED display

5/2002 - Present

PDI Green Technology
Specializing in LED Lighting
and other promotional products

Senior RF Engineer — 10/1998 – 5/2007

Nortel
Radio Frequency Design for international projects
Project Manager for domestic and international
Projects in Israel and China.

RF Engineer — 1989 - 1993
Hong Kong Productivity Council, Hong Kong
Designed RF products

EDUCATION

Master of Business Administration (MBA) — Wichita, KS
Wichita State University — December 1998

Bachelor of Electrical Engineering (EEBS) — Guangzhou, China
Jinan University — July 1988

PDI Lighting

LED Lighting Audits, Procurement, & Installation
183 Parkhouse Street
Dallas, TX 75207

PDI Group is an award winning solution provider of energy management and sustainability solutions using world class LED products and cutting edge energy control systems. PDI has in house lighting consultancy expertise as well as an installation team to execute both new construction and retrofit projects. PDI provides high quality products with UL and/or ETL certifications, DOE labels, or Energy Star labels with competitive prices, excellent service and prompt delivery.

As a HUB Subcontracting Partner, and the only company set-up in the TFC Mentor/Protégé Program, PDI Group will support the Utility Assessment Report (UAR) by performing the LED lighting audit and generate specific recommendations on the most efficient LED lighting solutions in the TFC buildings.

REFERENCE PROJECT: Texas Facilities Commission (Ft. Worth) LED Retrofit
Audited, design, supplied and installed LED lighting.
Replaced (18) x 180W metal halide high bays with (18) x 80W LED high bays. Completed in budget and finished 10 days before negotiated time. Result was 75% in energy savings.
Reference: Rico Gamino, Jr. TFC purchaser (512) 936-3567, rico.gamino@tfc.state.tx.us

REFERENCE PROJECT: MoneyGram Soccer Park LED Parking Lot Lights, City of Dallas
Designed and supplied 500 LED parking lot lights for installation on 30 foot poles
Completed on time and on budget
Reference: Leong F. Lim, Sr. Program Manager, Parks & Rec Dept. for City of Dallas

Paul has evaluated HVAC systems for over 400 commercial buildings, including central plants and thermal storage systems.

EDUCATION:

Associates Degree -Building Trades University of Texas at El Paso

CERTIFICATIONS:

HVACR Masters License (#015511C)

HVAC Certifications, Southwest School for HVAC Professionals, Dallas, Texas

Paul Kuhn — Director of HVAC Services

Paul Kuhn serves as Director of HVAC Services at Blue Ocean Energy. Paul has over three decades of extensive experience in design, installation and service of large-scale, commercial HVAC systems. As former owner/manager of an Austin-based commercial HVAC service company, Paul brings unmatched knowledge and experience to Blue Ocean's projects for evaluating commercial HVAC systems, including central plants and thermal storage system.

Prior to joining Blue Ocean Energy, Paul founded two large commercial mechanical contracting and service companies, Air Craft, Inc. and Air Force Austin. Paul was awarded the prestigious Central Texas Region Carrier Dealer of the Year in 1999. He holds a HVACR Masters License.

YMCA Town Lake HVAC Equipment Bid Evaluation: As part of Blue Ocean's long-term energy management contract with the Austin YMCA, Paul evaluated vendor bids for HVAC replacement/upgrades to control humidity within the YMCA's swimming pool complex. As a result of Paul's evaluation, Blue Ocean's client saved over $30,000 from the preferred vendor's bid by reducing the inclusion of unnecessary equipment replacement costs.

The Terrace Office Building Comprehensive Energy Audit: Paul was instrumental in identifying a number of energy efficiency issues and assisted in the implementation of these. As a result of Paul's work this class "A" office properties all qualified for the Energy Star award for the first time. This was achieved without any capital expenditures.

Centre Creek Office Building Comprehensive Energy Audit: Simultaneous heating and cooling was a major issue for the pneumatically controlled building. With Paul's assistance, all the controllers were recalibrated and several that were non-functioning were replaced at a minimal cost. The building's energy rating improved from below average to above average as a result of these improvements.

Real-time Energy Monitoring Projects: As part of Blue Ocean's energy efficiency evaluations, Paul evaluates major electrical loads to determine which are selected for our real-time monitoring services. Paul supervises Blue Ocean technicians during the installation and testing of the sub-meters, ensuring the safety and accuracy of the installations. Data loggers are connected to wi-fi internet routers to enable the real-time observation of electrical consumption, including kWh, Peak Demand (kW), Power Factor and other measurements.

Bo has developed energy management strategies for over 300 buildings and campuses.

EDUCATION:

Bachelor of Business Administration
The University of Texas at Austin

Master Of Business Administration
Copenhagen Business School

CERTIFICATIONS:

Certified Energy Manager
Association of Energy Engineers

Bo Petersen MBA, CEM — Vice President

As a founding partner of Blue Ocean Energy Management, Bo provides experience and insight from his entire career spent in the energy industry. For Exxon, Enron and Borealis, Bo managed domestic and international energy trading programs for energy risk management and to hedge future energy costs.

Bo is a Certified Energy Manager (CEM), a professional certification earned from the Association of Energy Engineers. Bo also earned his Master of Business Administration from the Copenhagen Business School with a focus on strategic energy management. Bo works closely with Blue Ocean's clients to develop comprehensive energy management strategies designed to reduce energy costs.

As Quality Manager for all Blue Ocean projects, Bo ensures that energy management projects accurately measure, analyze and report energy data that we collect to develop energy saving measures for our clients. Initial recommendations always include low-cost/no-cost operational modifications to produce immediate energy cost savings. Recommendations for capital equipment upgrades/replacements are made only after operational procedures achieve maximized efficiencies. Over the past two years, Blue Ocean's top 10 clients have achieved energy savings averaging over $15,000 per month as a result of Bo's recommendations.

Austin-based Country Club: For an Austin-based country club complex, Bo installed real-time monitoring sub-meters on selected major electrical loads, then maximized their operational efficiency. Web-enabled thermostats were installed to allow remote monitoring and control of multiple zones throughout the country club complex. As a result of Blue Ocean's energy management work, the country club continues to save over 25% in energy costs compared to its previous energy benchmark. The project had a return on investment of less than 1 year. Blue Ocean continues to provide remote monitoring of the complex's energy use to ensure that efficiency levels are maintained.

"Implementing the kind of energy management strategy Blue Ocean identified, Enfield Properties Ltd. achieved a utility cost reduction of 50%. I highly recommend Blue Ocean Energy Management."

Mads Engelstoft - President, Enfield Properties Ltd., Houston Texas

Nationwide Commercial Real Estate Management Company: For a major nationwide commercial real estate management firm, Bo provides the role of outsourced energy strategy manager to support the property management staff with energy efficiency projects. Blue Ocean provides energy benchmarking studies, ENERGY STAR certification (for high-performing buildings), comprehensive energy audits, utility invoice review, and other energy management activities.

YMCA Town Lake: As a result of a Comprehensive Energy Audit, Blue Ocean discovered multiple operational and equipment deficiencies resulting in a prioritized list of energy savings measures recommendations. Operational recommendations alone resulted in energy savings of over $2,000 per month. In addition, Blue Ocean identified and negotiated with the electricity provider to correct billing errors in excess of $30,000, which were credited back to the client. Blue Ocean reviewed capital equipment upgrade/replacement bids from vendors to provide third-party, independent review of the bids. Blue Ocean made multiple improvements, including saving our client over $30,000 (reduction from $80,000 to $50,000) on one vendor bid that included unnecessary upgrades to equipment.

Section 3.2.2.7.4 Partner Relevant Experience

Blue Ocean Energy Management

BLUE OCEAN

Energy Management & Auditing
2313 Lake Austin Blvd #108
Austin, TX 78703

Blue Ocean is an Austin-based energy management consultancy with energy management experience in over 300 commercial buildings within Austin alone, representing over 10 million ft^2.

As a HUB Subcontracting Partner, Blue Ocean Energy Management will support the Utility Assessment Report (UAR) to identify energy savings measures and establish the energy baseline for each building. In addition, Blue Ocean can provide ongoing energy management services throughout the life of the ESCO contract to ensure that energy efficiencies are maximized for the operational aspects of building management to achieve the highest level of energy savings possible. Furthermore, Blue Ocean's unparalleled experience in analyzing Austin Energy's rate structures and utility billing processes will ensure that TFC is operating its facilities to maximize the rate-related energy management strategies to achieve ongoing energy efficiencies and cost savings.

RELEVANT EXPERIENCE IN TEXAS
Clients include building owners and management companies including: Endeavor Real Estate; Barshop and Oles; Covert Auto Group; YMCA; Goodwin Management; The Domain; Aquila Management, Luby's Restaurants; Berhinger Harvard; CBRE/UCR; Kucera; Twin Oaks; and many others.

REFERENCE PROJECT: YMCA Town Lake Campus
As a result of a Comprehensive Energy Audit, Blue Ocean discovered multiple operational and equipment deficiencies resulting in a number of energy savings measures recommendations, which Blue Ocean prioritized for the YMCA. Operational recommendations alone resulted in energy savings of over $2,000 per month. In addition, Blue Ocean identified and negotiated with the electricity provider to correct billing errors in excess of $30,000, which were credited back to the client. Blue Ocean reviewed capital equipment upgrade/replacement bids from vendors to provide third-party, independent review of the bids. Blue Ocean made multiple improvements, including saving the client over $30,000 (reduction from $80,000 to $50,000) on one vendor bid that included unnecessary upgrades to equipment.

PERRY TOWNSHIP SCHOOLS, INDIANAPOLIS, IN

Fast Track Project Schedule

CHALLENGE

MSD Perry Township's renovation project was a challenging renovation with a short two month summer construction schedule. Project coordination and communication were crucial to completing the project before students returned to school.

RESULT

"Throughout this project, I felt that Performance Services truly acted as a partner with not only the Owner, but with each member of the construction team. Jason Christensen, our project manager, coordinated all required field changes as they were discovered so that the design intent was upheld while ensuring that our construction schedule was never compromised. The cooperation and collaboration that Performance Services brought to the table every day was greatly appreciated. This positive atmosphere resulted in a truly enjoyable project experience for everyone involved, a successful end result, and a very satisfied Owner."

Franklin D. Giles, PhD
Associate Superintendent for Operations

PROJECT OVERVIEW

- Project Size: $14,357,951
- Number of Schools: 12
- Total Separate Additions: 2
- Total Added Classrooms: 17
- Total Renovated Classrooms: 313
- Speed of Delivery: 8 months
- Safety: No incidents reported

MAJOR MECHANICAL EQUIPMENT

- Boilers: 19
- Chillers: 3
- Pumps: 23
- Ventilation Units: 300
- Linear feet of fin tube radiation: 1,300
- Air handler cutovers: 86

FINANCIALS

- Completed on budget
- No Change Orders or additional cost to Perry Township Schools
- First year savings through December 2013: $190,034

Operational Savings: $1,752,627

Performance Services

SCHOOLS:

SOUTHPORT H.S., PERRY MERIDIAN H.S., SOUTHPORT M.S., CLINTON YOUNG ELEM., HOMECROFT ELEM., MARY BRYAN ELEM., SOUTHPORT ELEM., WINCHESTER VILLAGE ELEM., ABRAHAM LINCOLN ELEM., DOUGLAS MACARTHUR ELEM., HENRY BURKHART ELEM., GLENNS VALLEY ELEM

RENOVATIONS: 1,300,000 S.F.

ADDITIONS: 18,900 S.F.

CONTRACT TOTAL:
$14,357,951

COMPLETION DATE:
OCT 2012

GUARANTEED ANNUAL ENERGY SAVINGS:
$92,367

ACTUAL ENERGY SAVINGS MOST RECENT YEAR:
$190,034

CONTACT:
MIKE BAGLEY,
CHIEF FINANCIAL OFFICER
INDIANAPOLIS, INDIANA
(317) 789-5700

We are an integrated design and delivery company specializing in creating optimal learning environments. By valuing relationships and workmanship over change orders and shortcuts, Performance Services strives to earn a 100% Customer Satisfaction rating.

HUB Subcontracting Plan (HSP)

QUICK CHECKLIST

While this HSP Quick Checklist is being provided to merely assist you in readily identifying the sections of the HSP form that you will need to complete, it is very important that you adhere to the instructions in the HSP form and instructions provided by the contracting agency.

- If you will be awarding all of the subcontracting work you have to offer under the contract to only Texas certified HUB vendors, complete:

  Section 1 - Respondent and Requisition Information

  Section 2 a. - Yes, I will be subcontracting portions of the contract

  Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors

  Section 2 c. - Yes

  Section 4 - Affirmative

  GFE Method A (Attachment A) – Complete an Attachment A for each of the subcontracting opportunities you listed in Section 2 b.

- If you will be subcontracting any portion of the contract to Texas certified HUB vendors and Non-HUB vendors, and the aggregate percentage of all the subcontracting work you will be awarding to the Texas certified HUB vendors with which you have a *continuous contract* in place for five (5) years or less *meets or exceeds* the HUB Goal the contracting agency identified in the "Agency Special Instructions/Additional Requirements", complete:

  Section 1 - Respondent and Requisition Information

  Section 2 a. - Yes, I will be subcontracting portions of the contract

  Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors and Non-HUB vendors

  Section 2 c. - No

  Section 2 d. - Yes

  Section 4 - Affirmation

  GFE Method A (Attachment A) - Complete an Attachment A for each of the subcontracting opportunities you listed in Section 2 b.

- If you will be subcontracting any portion of the contract to Texas certified HUB vendors and Non-HUB vendors or only to Non-HUB vendors, and the aggregate percentage of all the subcontracting work you will be awarding to the Texas certified HUB vendors with which you have a *continuous contract* in place for five (5) years or less *does not meet or exceed* the HUB Goal the contracting agency identified in the "Agency Special Instructions/Additional Requirements", complete:

  Section 1 - Respondent and Requisition Information

  Section 2 a. - Yes, I will be subcontracting portions of the contract

  Section 2 b. - List all the portions of work you will subcontract, and indicated the percentage of the contract you expect to award to Texas certified HUB vendors and Non-HUB vendors

  Section 2 c. - No

  Section 2 d. - No

  Section 4 - Affirmation

  GFE Method B (Attachment B) - Complete an Attachment B for each of the subcontracting opportunities you listed in Section 2 b.

- If you will not be subcontracting any portion of the contract and will be fulfilling the entire contract with your own resources, complete:

  Section 1 - Respondent and Requisition Information

  Section 2 a. - No, I will not be subcontracting any portion of the contract, and I will be fulfilling the entire contract with my own resources

  Section 3 - Self Performing Justification

  Section 4 - Affirmation

"Continuous Contract: Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.

HUB Subcontracting Plan (HSP)

In accordance with Texas Gov't Code §2161.252, the contracting agency has determined that subcontracting opportunities are probable under this contract. Therefore, all respondents, including State of Texas certified Historically Underutilized Businesses (HUBs) must complete and submit this State of Texas HUB Subcontracting Plan (HSP) with their response to the bid requisition (solicitation).

NOTE: Responses that do not include a completed HSP shall be rejected pursuant to Texas Gov't Code §2161.252(b).

The HUB Program promotes equal business opportunities for economically disadvantaged persons to contract with the State of Texas in accordance with the goals specified in the 2009 State of Texas Disparity Study. The statewide HUB goals defined in 34 Texas Administrative Code (TAC) §20.13 are:

- ***11.2 percent for heavy construction other than building contracts,***
- ***21.1 percent for all building construction, including general contractors and operative builders' contracts,***
- ***32.8 percent for all special trade construction contracts,***
- ***23.7 percent for professional services contracts,***
- ***26.0 percent for all other services contracts, and***
- ***21.1 percent for commodities contracts.***

- - Agency Special Instructions/Additional Requirements - -

In accordance with 34 TAC §20.14(d)(1)(D)(iii), a respondent (prime contractor) may demonstrate good faith effort to utilize Texas certified HUBs for its subcontracting opportunities if the total value of the respondent's subcontracts with Texas certified HUBs meets or exceeds the statewide HUB goal or the agency specific HUB goal, whichever is higher. When a respondent uses this method to demonstrate good faith effort, the respondent must identify the HUBs with which it will subcontract. If using existing contracts with Texas certified HUBs to satisfy this requirement, only contracts that have been in place for five years or less shall qualify for meeting the HUB goal. This limitation is designed to encourage vendor rotation as recommended by the 2009 Texas Disparity Study.

SECTION 1: RESPONDENT AND REQUISITION INFORMATION

a. Respondent (Company) Name _____ State of Texas VID #: _____

Point of Contact: _____ Phone #: _____

E-mail Address: _____ Fax #: _____

b. Is your company a State of Texas certified HUB? ☐ - Yes ☐ - No

c. Requisition #: _____ Bid Open Date: _____
(mm/dd/yyyy)

Enter your company's name here: _____ Requisition #: _____

SECTION 2 SUBCONTRACTING INTENTIONS RESPONDENT

After dividing the contract work into reasonable lots or portions to the extent consistent with prudent industry practices, and taking into consideration the scope of work to be performed under the proposed contract, including all potential subcontracting opportunities, the respondent must determine what portions of work, including goods and services, will be subcontracted. Note: In accordance with 34 TAC §20.11., an "Subcontractor" means a person who contracts with a prime contractor to work, to supply commodities, or to contribute toward completing work for a governmental entity.

a. Check the appropriate box (Yes or No) that identifies your subcontracting intentions:

☐ - *Yes*, I will be subcontracting portions of the contract. (If *Yes*, complete item b, of this SECTION and continue to item c of this SECTION.)

☐ - *No*, I will not be subcontracting any portion of the contract, and I will be fulfilling the entire contract with my own resources. (If *No*, continue to SECTION 3 and SECTION 4.)

b. List all the portions of work (subcontracting opportunities) you will subcontract. Also, based on the total value of the contract, identify the percentages of the contract you expect to award to Texas certified HUBs, and the percentage of the contract you expect to award to vendors that are not a Texas certified HUB (i.e., Non-HUB).

Item #	Subcontracting Opportunity Description	HUBs		Non-HUBs
		Percentage of the contract expected to be subcontracted to HUBs with which you have a "continuous contract" in place for five (5) years or less	Percentage of the contract expected to be subcontracted to HUBs with which you have a "continuous contract" in place for more than five (5) years	Percentage of the contract expected to be subcontracted to non-HUBs
1		%	%	%
2		%	%	%
3		%	%	%
4		%	%	%
5		%	%	%
6		%	%	%
7		%	%	%
8		%	%	%
9		%	%	%
10		%	%	%
11		%	%	%
12		%	%	%
13		%	%	%
14		%	%	%
15		%	%	%
	Aggregate percentages of the contract expected to be subcontracted:	%	%	%

(Note: If you have more than fifteen subcontracting opportunities, a continuation sheet is available online at http://window.state.tx.us/procurement/prog/hub/hub-subcontracting-plan/)

c. Check the appropriate box (Yes or No) that indicates whether you will be using only Texas certified HUBs to perform all of the subcontracting opportunities you listed in SECTION 2, item a.

- *Yes* (If *Yes*, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed.)
- *No* (If *No*, continue to item d. of this SECTION.)

d. Check the appropriate box (Yes or No) that indicates whether the aggregate expected percentage of the contract you will subcontract with Texas certified HUBs with which you have a continuous contract" in place with for five (5) years or less meets or exceeds the HUB goal the contracting agency identified on page 1 in the "Agency Special Instructions/Additional Requirements".

- *Yes* (If *Yes*, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed.)
- *No* (If *No*, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method B (Attachment B)" for each of the subcontracting opportunities you listed.)

"Continuous Contract" Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor where the HUB vendor provides the prime contractor with goods or service under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of this contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.

Enter your company's name here: _____ Requisition #: _____

SECTION 2 SUBCONTRACTING INTENTIONS RESPONDENT (CONTINUATION SHEET)

a. This page can be used as a continuation sheet to the HSP Form's page 2, Section 2, Item b. Continue listing the portions of work (subcontracting opportunities) you will subcontract. Also, based on the total value of the contract, identify the percentages of the contract you expect to award to Texas certified HUBs, and the percentage of the contract you expect to award to vendors that are not a Texas certified HUB (i.e., Non-HUB):

Item #	Subcontracting Opportunity Description	HUBs		Non-HUBs
		Percentage of the contract expected to be subcontracted to HUBs with which you have a continuous contract* in place for the full value of time	Percentage of the contract expected to be subcontracted to HUBs with which you have a continuous contract* in place for more than the full value	Percentage of the contract expected to be subcontracted to non-HUBs
16		%	%	%
17		%	%	%
18		%	%	%
19		%	%	%
20		%	%	%
21		%	%	%
22		%	%	%
23		%	%	%
24		%	%	%
25		%	%	%
26		%	%	%
27		%	%	%
28		%	%	%
29		%	%	%
30		%	%	%
31		%	%	%
32		%	%	%
33		%	%	%
34		%	%	%
35		%	%	%
36		%	%	%
37		%	%	%
38		%	%	%
39		%	%	%
40		%	%	%
41		%	%	%
42		%	%	%
43		%	%	%
	Aggregate percentages of the contract expected to be subcontracted:	%	%	%

Continuous Contract: Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.

Enter your company's name here: Performance Services Inc | Requisition #: 303-6-00006

SECTION 3: SELF PERFORMING JUSTIFICATION (If you responded "No" to SECTION 2, Item a, you must complete this SECTION and continue to SECTION 4)

Check the appropriate box (Yes or No) that indicates whether your response/proposal contains an explanation demonstrating how your company will fulfill the entire contract with its own resources.

☐ - Yes (If Yes, in the space provided below list the specific page(s)/section(s) of your proposal which explains how your company will perform the entire contract with its own equipment, supplies, materials and/or employees.)

☐ - No (If No, in the space provided below explain how your company will perform the entire contract with its own equipment, supplies, materials and/or employees.)

SECTION 4: AFFIRMATION

As evidenced by my signature below, I affirm that I am an authorized representative of the respondent listed in SECTION 1, and that the information and supporting documentation submitted with the HSP is true and correct. Respondent understands and agrees that, if awarded any portion of the requisition:

- The respondent will provide notice as soon as practical to all the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor for the awarded contract. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity they (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract no later than ten (10) working days after the contract is awarded.
- The respondent must submit monthly compliance reports (Prime Contractor Progress Assessment Report – PAR) to the contracting agency, verifying its compliance with the HSP, including the use of and expenditures made to its subcontractors (HUBs and Non-HUBs). (The PAR is available at http://www.window.state.tx.us/procurement/prog/hub/forms/prime-contractor-progress-assessment.xls).
- The respondent must seek approval from the contracting agency prior to making any modifications to its HSP, including the hiring of additional or different subcontractors and the termination of a subcontractor the respondent identified in its HSP. If the HSP is modified without the contracting agency's prior approval, respondent may be subject to any and all enforcement remedies available under the contract or otherwise available by law, up to and including debarment from all state contracting.
- The respondent must, upon request, allow the contracting agency to perform onsite reviews of the company's headquarters and/or work-site where services are being performed and must provide documentation regarding staffing and other resources.

Signature	Doug Kirkley Printed Name	Business Development Mgr Title	Date (mm/dd/yyyy)

Reminder:

- If you responded "Yes" in SECTION 2, Items c or d, you must complete an "HSP Good Faith Effort – Method A (Attachment A)" for each of the subcontracting opportunities you listed in SECTION 2, Item b.
- If you responded "No" SECTION 2, Items c and d, you must complete an "HSP Good Faith Effort – Method B (Attachment B)" for each of the subcontracting opportunities you listed in SECTION 2, Item b.

Rev 10/14

HSP Good Faith Effort - Method A (Attachment A)

Enter your company's name here: _____ Requisition # _____

IMPORTANT: If you responded "*Yes*" to SECTION 2, Items c or d of the completed HSP form, you must submit a completed "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed in SECTION 2, Item b of the completed HSP form. You may photo-copy this page or download the form at http://www.sw.state.tx.us/procurement/forms/hub-forms/hub-attachment-a-method-a-section-a.pdf

SECTION A-1 SUBCONTRACTING OPPORTUNITY

Enter the item number and description of the subcontracting opportunity you listed in SECTION 2, Item b. of the completed HSP form for which you are completing the attachment.

Item Number: Description:

SECTION A-2 SUBCONTRACTOR SELECTION

List the subcontractor(s) you selected to perform the subcontracting opportunity you listed above in SECTION A-1. Also identify whether they are a Texas certified HUB and their VID number, the approximate dollar value of the work to be subcontracted, the expected percentage of work to be subcontracted, and indicate whether the company is a Texas certified HUB.

Company Name	Texas certified HUB	VID Number (Required if Texas certified HUB)	Approximate Dollar Amount	Expected Percentage of Contract
	☑ - Yes - No		$	%
	☐ - Yes - No		$	%
	☐ - Yes - No		$	%
	☐ - Yes - No		$	%
	☐ - Yes - No		$	%
	☐ - Yes - No		$	%
	☐ - Yes - No		$	%
	☐ - Yes - No		$	%
	☐ - Yes - No		$	%
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	☐ - Yes - No		$	%
	☐ - Yes - No		$	%
	☐ - Yes - No		$	%

REMINDER: As specified in SECTION 4 of the completed HSP form, if you (respondent) are awarded any portion of the requisition, you are required to provide notice as soon as practical to all the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity they (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract no later than ten (10) working days after the contract is awarded.

ATTACHMENT B
EXECUTION OF SUBMITTAL

NOTE: FAILURE TO SIGN AND RETURN THE EXECUTION OF SUBMITTAL SHALL RESULT IN REJECTION OF THE RESPONSE.

By signature hereon, the respondent certifies that:

All statements and information prepared and submitted in the response to this RFQ are current, complete and accurate.

He/she has not given, offered to give, nor intends to give at anytime hereafter, any economic opportunity, future employment, gift, loan gratuity, special discount, trip, favor, or service to a public servant in connection with the submitted response. Failure to sign the Execution of Submittal or signing it with a false statement shall void the submitted offer or any resulting contracts.

Neither the respondent or the firm, corporation, partnership, or institution represented by the respondent or anyone acting for such firm, corporation, or institution has violated the antitrust laws of this State, codified in Section 15.01, et seq., Texas Business and Commerce Code, or the Federal antitrust laws, nor communicated directly or indirectly the offer made to any competitor or any other person engaged in such line of business.

Respondent certifies that if a Texas address is shown as the address of the respondent, respondent qualifies as a Texas Resident Bidder as defined in Texas Administrative Code, Title 34, Part 1, Chapter 20.

Under Section 2155.004, Government Code, the vendor certifies that the individual or business entity named in this submittal or contract is not ineligible to receive the specified contract and acknowledges that this contract may be terminated and payment withheld if this certification is inaccurate.

Pursuant to Texas Government code, Title 10, Subtitle D, Section 2155.004(a), the respondent has not received compensation for participation in the preparation of specifications for this solicitation.

Respondent is in compliance with TGC, Title 6, §669.003, relating to contracting with an executive of a state agency. If Section §669.003 applies, respondent shall provide the following information as an attachment to this response: Name of former executive, name of state agency, date of separation from state agency, position with respondent, and date of employment with respondent.

Respondent agrees that any payments due under any contract arising from this Submittal will be applied towards any debt, including but not limited to delinquent taxes and child support that is owed to the State of Texas.

System for Award Management (SAM): Prior to awarding state funds for goods and/or services rendered, the State of Texas will conduct a required search of your firm using the Federal System for Award Management (SAM). This is a Federal government maintained database that records and tracks organizations either known to or suspected of contributing to terrorist organizations. No state funds may be paid to an individual or firm whose name appears on this list. TFC reserves the right, in its sole discretion, to deny and/or exclude any individual or firm from an award whose name appears on this list.

Texas Family Code Compliance Requirement:

Under TGC, Title 5, Subtitle D, Section 231.006, Family Code (relating to child support), the individual or business entity named in this solicitation is eligible to receive the specified payment and acknowledges that this contract may be terminated and payment withheld if this certification is inaccurate. The response includes the names of each person with a minimum of twenty-five percent (25%) ownership of the business entity submitting the response. Respondent shall provide the name(s) below. Upon award, respondent shall provide TFC Procurement the Social Security number(s) of the individual(s) listed below.

Firm Owner(s), Partners, Sole Proprietors, Share Holder(s) of twenty-five percent (25%) interest:

Name: Timothy P. Thoman _____

Name: _____ _____

Name: _____ _____

Name: _____ _____

Respondent represents and warrants that the individual signing this Execution of Submittal is authorized to sign this document on behalf of the respondent and to bind the respondent under any contract resulting from this submittal.

RESPONDENT (COMPANY): Performance Services, Inc.

SIGNATURE (INK): _____

NAME (TYPED/PRINTED) Timothy P. Thoman

TITLE: President

DATE: 8/28/2015

STREET: 3010 LBJ Freeway, #1200

CITY/STATE/ZIP: Dallas, TX 75234

TELEPHONE AND FACSIMILE NO.: 214.272.6963

TEXAS IDENTIFICATION NUMBER (TIN)*: 802039079

*The Texas Identification Number if the taxpayer number assigned and used by the Texas Comptroller of Public Accounts. Enter this number in the space provided above. If this number is not known, complete the following:

Enter your Federal Employer's Identification Number 35-2047928

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Performance Contractor Qualifications Form

Texas Facilities Commission
Facilities Design and Construction
P.O. Box 13047
Austin, Texas 78711-3047

Date:	August 28, 2015
Firm Name:	Performance Services, Inc
Address:	3010 LBJ Freeway, #1200
Address 2:	Dallas, TX 75234
Tax Payer ID No.:	35-2047928
Email Address:	dkirkley@performanceservices.com
Website Address:	www.performanceservices.com
Telephone (Incl. Area Code):	(940) 230-4833
Fax No. (Incl. Area Code):	(317) 713-1751
Other Locations:	4670 Haven Point Boulevard, Suite 200 Indianapolis, IN 46280 (corporate headquarters)
Organization Class	
Individual (y/n):	No
Partnership (y/n):	No
Corporation (y/n):	Yes
Association (y/n):	No
Date of Incorporation:	July 1998
Name of States in which Incorporated:	Indiana
Former Business Names/Locations:	n/a
Date of Dissolution:	n/a
Subsidiary of:	n/a
President's Name:	Timothy P. Thoman
Vice President's Name:	R. Scott Morris
Secretary's Name:	Timothy P. Thoman
Treasurer's Name:	Timothy P. Thoman
If not incorporated in Texas, certificate of authority to do business in Texas	
Certificate No.:	802039079
Date:	8/4/2014
For Partnerships, Type	
General (y/n):	n/a
Limited (y/n):	n/a
Association (y/n):	n/a

Name and address of Partner 1 (incl. zip code)	N/a
Name and address of Partner 2 (incl. zip code)	
Name and address of Partner 3 (incl. zip code)	
Etc. as necessary for all partners	
Construction Capabilities	
General Only (y/n):	Yes
General (y/n):	Yes
Electrical (y/n):	Yes
Mechanical/HVAC (y/n):	Yes
Plumbing (y/n):	Yes
Fire Sprinkler (y/n):	Yes
Other (describe):	Solar systems
Percent of work done by own staff:	50%
No. of permanent employees:	105
Geographical limits of operation:	IN, AR, IL, KY, MO, TX, WI
No. of years in business:	17
Key personnel and responsibilities such as Management, Design, Specification, Documentation, Construction Administration, Construction Management, Superintendent, Project management, etc.	
Name	**Responsibility**
1. Doug Kirkley	Business Development Manager
2. David Temming	Lead Engineer
3. Greg Mizell	Senior Project Manager
4. Ryan Stout	Solar Project Manager
5. Eddie Bohannon	Controls Group Manager
Has firm ever failed to complete a project or defaulted on a contract?	No
Project name/location:	
Reason for default:	
Has firm ever been engaged in litigation over any contract? (y/n)	No
Explanation for yes:	N/A
Professional/Construction Services provided by firm	
Architectural (in-house/outsourced):	In-house
Mechanical Engineering (in-house/outsourced):	In-house
Electrical Engineering (in-house/outsourced):	In-house

Drafting (in-house/outsourced):	In-house
Structural Engineering (in-house/outsourced):	Outsourced
Construction Management (in-house/outsourced):	In-house
Electrical Trade (in-house/outsourced):	Outsourced
HVAC Trade (in-house/outsourced):	Outsourced
Rigging (in-house/outsourced):	Outsourced
Pipefitting (in-house/outsourced):	Outsourced
Insulation (in-house/outsourced):	Outsourced
Other in-house capabilities (list): Controls	In-house (expertise on multiple systems with a focus on vendor independence)
Solar design	In-house

Work Type Distribution (Annual average % by no. of projects)

Category	**Percentage**
Commercial, Office, Retail	1%
Industrial	1%
Educational	90%
Medical	5%
Other Institutional / municipal	3%
Other (specify)	

Type	**Percentage**
New Building Design	1%
Restoration	0%
Renovation	99%
Prime Engineering	99%
Other (specify)	

Preparer's Name:	Doug Kirkley
Title:	Business Development Manager
Signature:	
Date:	August 18, 2015

PRESENT PROJECTS

List the major construction projects your firm has underway on this date. (State responsibility as Prime or Subcontractor on each)

Project	Prime Subcontractor	Owner	Phone No.	A/E	Phone No.	Contract Amount	Percent Complete
Bell County Expo (Ph I)	Subcontractor	Joy Latino, Business Manager	254.933.5368	Performance Services	940.230.4833	$3,989,822	99%
Gleeland Township HSD 87	Prime	Chris McClain, Asst Supt	630.489.9106	Performance Services	940.230.4833	$25,678,599	
Xenostra USD	Prime	Pat Finnemore, Dir of Facilities	262.359.5300	Performance Services	940.230.4833	$16,700,000	
East Porter SD	Prime	Lisa Rosinko, Business Manager	219.756.2214	Performance Services	940.230.4833	$7,035,123	
Nestel HSD	Prime	Brian Roberts, Dir Facilities	414.353.7546	Performance Services	940.230.4833	$4,000,000	
Eastern College	Prime	Ian Smith, Dir Facilities	765.983.1678	Performance Services	940.230.4833	$3,812,000	
Greendale SD	Prime	Erin Green, Business Manager	414.423.2700	Performance Services	940.230.4833	$3,800,000	
New Prairie USC	Prime	Greg Dudek, Dir Facilities	574.654.7272	Performance Services	940.230.4833	$3,573,525	
North Posey MSD	Prime	Todd Garrison, Supt	812.874.2233	Performance Services	940.230.4833	$2,800,000	
Clay Community Schools	Prime	Mike Howard, Dir Facilities	812.443.4461	Performance Services	940.230.4833	$2,770,000	
Wilder SD 96	Prime	Jon Hitsho, Asst Supt	847.459.4260	Performance Services	940.230.4833	$2,054,504	

COMPLETED PROJECTS

List the major construction projects your firm has completed in the past five years, particularly including comparable projects (Note, you may use additional page, printed matter, etc., as long as the info is incorporated)

Municipal, State and Federal Projects:

Project	Prime Subcontractor	Owner	Phone No.	A/E	Phone No.	Contract Amount	Scheduled Comp. Date
City of Indianapolis (14 buildings)	Prime	Ron Reinking	317.327.4343	Performance Services	940.230.4833	$10,000,000	2012

City-County Building Dean Energy Retrofit Indianapolis, IN 130 E Washington Street	Prime	Ron Reinking	317.327.4383	Performance Services	940.230.4833	$8,000,000 (or the $15M noted above	2012

Other Projects.

Noblesville Schools Phase I	Prime	Jeff Bragg, Director of Operations	317.773.3171	A/Orlie McGuire Shook F/ Performance Services	317.842.0000 940.230.4833	$36,522,331	2012
Noblesville MS/HS	Prime	Jeff Bragg, Director of Operations	317.773.3171	A/CSO Architects E/Performance Services	317.848.7800 940.230.4833	$36,146,859	2014
Perry Township MSD	Prime	Mike Bagley, CFO	317.789.9300	Performance Services	940.230.4833	$14,357,951	2013
New Berlin, SD	Prime	Roger Dickson, CFO	262.789.8230	Performance Services	940.230.4833	$8,300,000	2013
Wawasee Community Schools	Prime	Thomas Edington, Supt.	574.457.3388	Performance Services	940.230.4833	$7,796,856	2010
Wheaton CUSD	Prime	Bill Farley, Business Services	630.682.2012	Performance Services	940.230.4833	$7,200,000	2010
Jennings Co. Schools	Prime	Amber Fields, Business Manager	812.346.6483	Performance Services	940.230.4833	$5,200,000	2014
Decatur Township, MSD	Prime	Susan Adams, Direct of Operations	317.856.5265	Performance Services	940.230.4833	$4,629,637	2011
Southwest Jefferson School Corporation	Prime	Steve Teller Supt.	812.866.1325	Performance Services	940.230.4833	$8,474,484	2013
Tipton Community School Corporation	Prime	John Jones, Asst. Supt.	765.675.2857	Performance Services	940.230.4833	$3,300,011	2014
Beech Grove City Schools	Prime	Paul Kasser, Supt.	317.788.4491	Performance Services	940.230.4833	$3,102,300	2014
South Vermillion Schools	Prime	Dave Chapman, Supt.	765.832.2426	Performance Services	940.230.4833	$3,178,680	2013
Shenandoah Schools	Prime	Ron Green,	765.563.5583	Performance Services	940.230.4833	$3,142,143	2013

Vincennes Community Schools	Prime	Greg Parsley, Supt. Harry Weiks, Director of Facilities	$12,302,4644	Performance Services	900,230,4833	$9,640,095	2001	
Hamilton SE Schools	Prime		$13,594,4109	Performance Services	900,230,4833	$3,000,000	2011	

SCHEDULE COMPLIANCE

Construction Phase						
Insert Name/Description of Project Here City of Indianapolis City County Building Project Municipal Performance Contracting Project including a geothermal heat recovery system conversion and major HVAC and controls renovation on a 731,070 square foot office building.	Original Days 277	Adds 133 days	Scheduled Start 12/20/2010	Actual Start 11/16/2010	Scheduled Completion 9/23/2011	Actual Completion 12/31/2011
Contract Time 15 year Guaranteed Savings Contract						
Explanatory Note: Started the project early. Completion was later than anticipated due unforeseen issues including enclosed asbestos in the steel beams above the ceiling. The Owner had to work with the asbestos, per contract, and implement the above ceiling control wiring, and they had very limited labor to do this which pushed back our original schedule.						

Note: Scheduled Start and Completion dates are from our project schedule compiled at the beginning of the project. Actual Start date is our Owner Kickoff meeting and Actual Completion date is the start date from the Warranty Letter which serves as our internal measure of substantial completion.

Construction Phase						
Insert Name/Description of Project Here City of Indianapolis Jail and Out Building Project Municipal Performance Contracting Project including HVAC renovation of 13 different buildings.	Original Days 258	Adds 66 days	Scheduled Start 5/17/2011	Actual Start 4/12/2011	Scheduled Completion 1/30/2012	Actual Completion 3/02/2012
Contract Time 15 year Guaranteed Savings Contract						
Explanatory Note: Started work early and completed later than anticipated due to serious scheduling issues with the municipal courts. Due to changes with the judges' schedules we were not able to get into all areas as originally scheduled.						

Construction Phase						
Insert Name/Description of Project Here Perennial Washington Street, LLC Commercial Office Building Performance Contracting Project including conversion of the primary steam heating and domestic hot water to a hot water system with a heat recovery chiller system and controls upgrade.	Original Days 155	Adds 28 days	Scheduled Start 11/8/2010	Actual Start 12/29/2010	Scheduled Completion 4/12/2011	Actual Completion 07/01/2011
Contract Time 7 year Guaranteed Savings Contract						
Explanatory Note: Very close on schedule but there was a small fire due to welder contractor which pushed back the completion.						

Construction Phase						
Insert Name/Description of Project Here Perry Township, MSD of Guaranteed energy savings HVAC renovation for eleven school buildings totaling 1,289,055 square feet.	Original Days 110	Adds	Scheduled Start 9/12/2011	Actual Start 09/07/2011	Scheduled Completion 12/31/2012	Actual Completion 11/1/2012
Contract Time 10 year Guaranteed Savings Contract						

Explanatory Note:
We were able to reach substantial completion earlier than anticipated.

Construction Phase						
Insert Name/Description of Project Here Bell County Expo	Original Days 161	Adds 0	Scheduled Start Dec. 15, 2015	Actual Start Dec. 15, 2015	Scheduled Completion May 15, 2015	Actual Completion May 16, 2015
Contract Time						
Explanatory Note: We were able to reach substantial completion on schedule.						

BUDGET COMPLIANCE

Insert Name/Description of Project Here City of Indianapolis City County Building Project Municipal Performance Contracting Project including a geothermal heat recovery system conversion and major HVAC and controls renovation on a 731,070 sq. ft. office building	Contract Award Changes Final Contract Amount Percent Changes	$7,865,479 $0 $7,865,479 $0	Comments: No Change Orders guarantee
Insert Name/Description of Project Here City of Indianapolis Jail and Out Building Project Municipal Performance Contracting Project including HVAC renovation 13 different buildings	Contract Award Changes Final Contract Amount Percent Changes	$7,135,313 $0 $7,135,313 $0	Comments: No Change Orders guarantee
Insert Name/Description of Project Here Perennial Washington Street, LLC Commercial Office Building Performance Contracting project with a conversion of the primary steam heating and domestic hot water to a hot water system with a heat recovery chiller system and upgraded controls.	Contract Award Changes Final Contract Amount Percent Changes	$1,919,786 $0 $1,919,785 $0	Comments: No Change Orders guarantee

Insert Name/Description of Project Here Perry Township, MSD of Guaranteed energy savings renovation for eleven school buildings totaling 1,289,055 square feet.	Contract Award $14,357,951 Changes $0 Final Contract Amount $14,357,951 Percent Changes $0	Comments: No Change Orders guarantee
Insert Name/Description of Project Here Bell County, TX	Contract Award $3,989,822 Changes $55,199 Final Contract Amount $4,045,021 Percent Changes 1.4%	Comments: Customer requested Change

INDIVIDUAL EXPERIENCE

List the construction experience of the principal individuals of your organization:

Name	Present Position or Office	Years of Experience	Typical $ Amount	Type of Work Responsible for
Tim Thoman	President	29	$400K - $35M project value	President and Founder
R. Scott Morris	VP of Operations	32	"	Oversee operations
Scott Zlomend	VP of Sales & Marketing	20	"	Business development
Chris Rainey	Managing Engineer	35	"	Engineering Manager
Kimberly Jones	Controller	30	"	Financial Accounting
Eddie Bohannon	Controls Group Mgr.	25	"	Controls Operations
Doug Kirkley	Business Dev Mgr.	30	"	Account Manager
David Temming	Lead Engineer	30	"	Engineering Design
Greg Mizell	Sr. Project Manager	15	"	Construction Mgmt
Ryan Stout	Solar Project Manager	7	"	Solar Assess/Design
Allen Willis	Controls Engineer	25	"	Controls Programming and Optimization

EQUIPMENT

List the major equipment owned by the Firm:

Truck Fleet

MAXIMUM BONDING CAPACITY:

$100 million	Pillar Group 301 Pennsylvania Parkway, Suite 100 Indianapolis, IN 46280 317.853.3500	
Individual Project	Bonding Company with mailing address and zip code	Phone No.
$150 million	Same as above	
Aggregate	Bonding Company with mailing address and zip code	Phone No.

References (Bank and Trade) with addresses and zip codes

1	Key Bank - 10 W. Market Street, Suite 900, Indpls, IN 46240 Phone: 317.464.8028; Contact: Andrew Shaver, Account Manager Acct # 148571001574
2	Alpha Electric - 571 Industrial Blvd., Bargersville, IN 46106, Phone: 317.422.4237; Contact: Ed Neff
3	Validated Custom Solutions, LLC - 6128 North College Avenue, Indpls, IN 46220; 317.259.7604 Contact: Mike Martin

APPROVAL

Performance Services, Inc.
Name of Firm (Contractor)

Signature of Owner or Officer

President and CEO
Title of Person signing

STATE OF Indiana)
COUNTY OF Hamilton)

M Timothy Thomas being duly sworn deposes and says that he or she is

the President of Performance Services
Title — Contractor's Firm Name

and that answers to the foregoing questions and all statements therein contained are true and correct.

Sworn to before me this 24th day of August 2015

Notary Public in and for County, State Dana M Kwatz

My Commission expires

Copy of TBPE or TBAE Certificate of Registration

Performance Services, Inc. is submitting our statement of qualifications as an ESCO and has a Certificate of Authority to do business in Texas.

Professional Engineers

David Temming, P.E. , Lead Engineer #95384
Performance Services, Inc.

Rex Hunt, P.E., Civil Engineer #48237
Alan Plumber Associates, Inc.

Brian McDonald, P.E. Civil Engineer #83332
Alan Plumber Associates, Inc.

Ken Meline, P.E. Mechanical Engineer #61722
Command Commissioning

John Kimla, P.E. Mechanical Engineer #111516
Command Commissioning

Geoff Overholt, P.E. Electrical Engineer #113173
DFW Consulting

Chair
Betty Reinhart

Commissioners
William D. Darby
Virginia Hermosa
Brent C. Ince
Michael Novak
Alvin Shaw
Jack Perry

Executive Director
Harvey Hilderbran

Mailing address:
P. O. Box 13047
Austin, TX 78711-3047

(512) 463-3446
www.tfc.state.tx.us

ADDENDUM #1

DATE: 8/13/2015
RFQ #: 303-6-00006
SUBJECT: Energy Savings Performance Contracting

1.1. Addendum Item: to PROVIDE the sign-in sheets from the pre-submittal conferences: Attached below.

1.2. Addendum Item: a) to CORRECT the HUB goal percentages in the RFQ to match the Attachment A, HUB Subcontracting Plan, b) to CORRECT wording in SECTION III, Scope of Services, and c) to DELETE Dinita Caldwell as a HUB contact: the Revised RFQ is re-posted as 'Package #1' on the ESBD.

John T. Goodrich CTPM
TFC Procurement Department
Phone: 512.463.2743
Email: john.goodrich@tfc.state.tx.us

RECEIPT OF ADDENDUM #1 RFQ #303-6-00006

IN YOUR SUBMITTAL THE RESPONDENT SHALL ACKNOWLEDGE RECEIPT OF THIS ADDENDUM.

Respondent Signature: _____ Date: 8-24-15

Printed Name: Timothy P. Thoman Company Name: Performance Services, Inc.

Chair
Rudy Rodriguez

Commissioners
William D. Darby
Virginia Hernandez
Brad C. Buie
Michael Novak
Jack Perry

Executive Director
Harvey Hildebran

Mailing address:
P. O. Box 13047
Austin, TX 78711-3047

(512) 463-3446
www.tfc.state.tx.us

ADDENDUM #2

DATE: 8/21/2015
RFQ #: 303-6-00006
SUBJECT: Energy Savings Performance Contracting

2.1. Addendum Item: to RESPOND to questions:

Question:	Answer:
1) Please name the controls technology and integration platform that should be included on the respondent's team, specifically for interconnections at CSB.	1) We will want Native BACnet compatibility.
2) Paragraph 3.2.2.1.3 Please consider deleting all words that follow "years". (…Implemented over the past five (5) years. In Texas or its contiguous States.	2) Remove "in Texas or its contiguous states" from Paragraph 3.2.2.1.3.
3) Number of References Requested – On page 8 in Section 3.2.2.1.3 the request is for 3 to 5 references. However, on page 10 in Section 3.2.3.2 the request is for 5 references. Can you please clarify, do we have latitude to provide a minimum of 3 and a maximum of 5, or is the minimum 5 references?	3) Remove the "trues to five (3 to 5)" from Paragraph 3.2.2.1.3 and replace it with "five (5)"
4) Location of References: The RFQ asks for references from Texas and/or contiguous states. May we submit references from non-contiguous states but with the same climate characteristics as Texas?	4) Remove "in Texas or its contiguous states" from Paragraph 3.2.2.1.3.
5) Bonding Capacity – In the Performance Contractor Qualifications Form on page 5 there is a request for Maximum Bonding Capacity. Then there are lines for Individual Project and Aggregate. Below that there are areas for References (Bank or Trade). Typically, RFQs request a Surety Bond Letter for the amount of the project (in your case $5,000,000) or Bank Reference Letters. The request on page 8 is unclear. What is TFC requesting? Please clarify.	5) From a risk perspective, this information allows TFC to compare the size of the project with the ESCO's overall ability to bond its portfolio of projects. Many Contractors also provide with this answer an estimate of how much reserve bonding capacity they have at the time of the response to provide confidence that they can or already have secured capacity to bond the project. See question 6 for additional clarification.

6) The RFQ requests a Texas Taxpayer ID Number. We have a Federal Taxpayer ID Number. Will the Federal Taxpayer ID Number suffice? If not, we will apply for a Texas Taxpayer ID Number. If we have to apply for a Texas Taxpayer ID Number, may we respond by noting "Application Submitted, Texas Taxpayer ID Number Pending"?	6) It is not required to have a Texas Taxpayer ID number to respond to the RFQ. Use your Federal Taxpayer ID number. If you are awarded the project you will need a Texas Taxpayer ID number.
7) In Attachment C, ESCO Questionnaire Form, the Equipment list on page 7 of 8: The company owns numerous tools across many offices in multiple states, most of which are asset tracked by local office personnel, therefore it would be a great effort to list all of this equipment, and would be of considerable length. Is there an alternative way to respond to this question? What is the intent and value of the Commission requesting this information as part of an ESPC RFQ response?	7) This is a question that comes from our Contractor's Questionnaire form. ESCO's are organized in a variety of ways, some coming from the construction industry, some from design, and some from service industry. Since this question is more applicable to subcontractors that would be identified later in the process we are removing it from the form.
8) In Attachment C, ESCO Questionnaire Form, Bonding and Certification form on page 8 of 8: The Commission requests references for "Bank and Trade" with addresses and zip codes. Please clarify the intent of the trade reference. We understand the bank reference since the area of the form is referencing our bonding capabilities, but we are not sure what would be categorized as a trade reference, and how that would speak to our bonding capabilities	8) The term "trade" here is used to expand the category of possible references to be provided beyond simply banks - "trade" meaning commerce, financial transactions, or essentially the business partners or resources with which the ESCO conducts a significant amount of work. This is to provide opportunity to demonstrate the ESCO's sound financial condition, leverage and ultimately, ability to perform.
9) Please confirm the attachments needed to be compliant in our response. The RFQ requests Attachment A HUB Subcontracting Plan Form, Attachment B Execution of Submittal, Attachment C ESCO Questionnaire, and any addenda, but provides Attachment I RFQ Checklist without stating that it must be included in the response. Is Attachment I required to be submitted for a compliant response?	9) The Attachment I, Checklist does not need to be submitted. It is just an aid to make sure you have submitted all required documents.

10) Please clarify Section 3.2.2.1.3. – In the second mandatory pre-bid meeting on August 12, 2015 a question was asked about references being from Texas and contiguous states and why other relevant references from other states could not be used. It is my recollection that Farshad responded with an answer saying that language would be revised to allow other additional state references to be used. I believe you responded to that question stating the intent of the question was to be sure that the successful provider had an office in Texas vs some other state. Please clarify the intent of this Section.	10) Remove "in Texas or its contiguous states" from Paragraph 3.2.2.1.3.
11) If two companies are planning to combine resources (with one of the companies serving as the Prime) and team on the outlined scope of the project, is a teaming agreement between the two companies acceptable?	11) For both companies to submit together as the prime, you must be legally registered as a joint venture. Otherwise, one company can be the respondent as the prime, and the other company a subconsultant to the prime.

John T. Goodrich CTPM
TFC Procurement Department
Phone: 512.463.2743
Email: **john.goodrich@tfc.state.tx.us**

RECEIPT OF ADDENDUM #2 RFQ #303-6-00006

IN YOUR SUBMITTAL THE RESPONDENT SHALL ACKNOWLEDGE RECEIPT OF THIS ADDENDUM.

Respondent Signature	8-24-15 **Date**
Timothy P. Thoman **Printed Name**	Performance Services, Inc. **Company Name**

EXHIBIT E

Performance Services

Exhibit "E" - Utility Assessment Report

UTILITY ASSESSMENT REPORT

FOR

Texas Facilities Commission

1711 San Jacinto Blvd
Austin, Texas 78701

Conducted by:

Performance Services

3010 LBJ Freeway
Suite 1200
Dallas, Texas 75234
July 19, 2016

Number of facilities audited: 4
Total gross square footage: 890,406

This document contains Performance Services Trade Secrets and Confidential Information to be used by the addressee for evaluating the PSI proposal. Addressee shall not disclose the Confidential Information to third parties without written consent of Performance Services.

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F. DETAILED AUDIT/SURVEY FORMS

G. DETAILED IMPLEMENTATION PLAN

H. OPERATION AND MAINTENANCE RECOMMENDATIONS

I. SPECIFICATIONS

J. OTHER SUPPORTING DOCUMENTS - Measurement & Verification Plan & ERS Master Participation Agreement

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Utility Assessment Report of
Texas Facilities Commission, 1711 San Jacinto
Austin, Texas 78701
Contact Person: Mr. Farshad Shahsavary
Phone Number: 512.463.7366

I. EXECUTIVE SUMMARY

A. BACKGROUND

PSI was selected by the Texas Facility Commission (TFC) on September 15, 2015, to begin developing a Utility Assessment Report for an Energy Savings Performance Contract for the following four TFC sites:

- Thomas Jefferson Rusk (TJR) - 200 E. 10th St., Austin – Six story 89,971 gross square foot office building including underground parking garage.
- William P. Hobby (WPH) - 333 Guadalupe St., Austin – Three tower office building with an underground parking garage - 419,276 gross square feet
- Central Service Building (CSB) - 1711 San Jacinto BLVD, Austin – Four story office building with Annex – 111,935 gross square feet
- Brown-Heatly Building (BHB) – 4900 North Lamar, Austin – Seven story office building – 259,224 gross square feet

Site audits were performed in October 2015.

TFC's objectives for this project are as follows:

- Replace pneumatic building controls in the CSB with a native BACnet building automation system
- Replace fluorescent, incandescent and HID lighting with LED lighting
- Add occupancy based lighting controls
- Minimize future operational and maintenance costs
- Reduce future utility usage/costs

This report documents PSI's findings and recommendations. The data presented herein includes engineering and financial analyses, and savings calculation methodology associated with each facility improvement and conservation measure that is recommended by PSI and approved by TFC. The conservation measures recommended herein will result in the desired reduction in energy and water consumption through improved efficiencies, improved controls and related control strategies.

In addition to significant cost reductions attributable to electric, gas, water and wastewater utilities, the improvement measures recommended herein reduce emissions of greenhouse gases. Additionally, TFC will benefit from a number of instances where PSI is including new equipment to replace or improve existing aged equipment infrastructure. These equipment replacements and additions eliminate the need for TFC to devote resources to fund and procure such equipment repairs and replacements while benefiting TFC's operations and reliability of services.

The following is a summary of the conservation measure types included in this project:

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- LED lighting
- Power quality improvement
- Heating Ventilating and Air Conditioning (HVAC) efficiency improvements
- Building Controls
- Water efficiency

B. BUILDINGS/FACILITIES ANALYZED

PSI has conducted a detailed assessment of energy assets and energy use for TFC.

This study focuses on electricity as it accounts for over 80 percent of the utility budget. PSI has identified areas for conservation and increased operational efficiencies. Although there are numerous facilities and sites that comprise TFC, this study targeted the areas where energy savings and retrofits provide the greatest value and return on investments. The following table lists facilities assessed in this report.

TABLE 1A: List of Facilities Included in Report

ID	Facility Name	Use	HVAC & Electrical Systems	Gross Area (SF)
BHB	Brown Heatly Building	Office	**Mech:** 4 Pipe CHW/HW, water cooled chillers, NG Boilers, Constant volume AHUs. **Elect:** 480 V, 3 ϕ Secondary single meter	259,224
CSB	Central Services Building	Office	**Mech:** 4 Pipe CHW/HW, water cooled chillers, NG Boiler, Constant volume AHUs. **Elect:** 480 V, 3 ϕ Secondary single meter	111,935
TJR	Thomas J. Rusk	Office	**Mech:** 4 Pipe CHW/HW, CHW from TFC downtown chilled water loop, NG Boiler, Variable volume AHUs. **Elect:** 480 V, 3 ϕ Secondary single meter	99,971
WPH	William P. Hobby	Office	**Mech:** DX cooling and electric heat condition towers. Lower two floors conditioned by chilled water supplied by Austin Energy downtown chilled water loop and electric heat. Variable volume AHUs. **Elect:** 480 V, 3 ϕ Secondary meters (Two). Lighting 120 volt.	419,276

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C COMPOSITE PROJECT SUMMARY

Table 1B: List of Recommended Utility Cost Reduction Measures

Matrix of UCRMs							
	1	2	3	4	5	6	7
Building	LED Lighting w/ 1,326 Sensors	Power Conditioning	Variable CHW Flow	Water Controls	Building Automation System	Variable Air Volume	Load Coop Demand Response
Thomas Jefferson Rusk	◆	◆		◆			
William P. Hobby	◆	◆		◆			
Central Service	◆	◆	◆	◆	◆	◆	◆
Brown-Heatly	◆	◆	◆	◆			

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Table 1.C: Summary of Project Financial and Savings

SUMMARY OF PROJECT		
	Total[1]	
kWh Savings:	4,603,913	kWh/yr.
Demand Savings:	8,071	kW/yr.
Gas Savings:	10,391	Therms/yr.
Btu Savings:[2]	54,444	MMBtu/yr.
Water Savings:	4,454	kGal/yr.
Cost Savings:	485,139	$/yr.
Base Year Cost Reduction:	26	%
Implementation Cost	3,500,000	$
Payback Period	7.4	Years

1. Building O&M Savings identified for project justification are included in the total.
2. BTU savings should be calculated on the basis of source BTU's (11,800 BTU/kWh and 1,030,000 BTU/MCF)

This report identifies a wide variety of energy conservation measures. Taken collectively, these are the Utility Cost Reduction Measures (UCRM's) recommended by PSI. If implemented in the form recommended by PSI, these UCRMs will result in the savings and costs summarized above. The savings for the recommended composite project listed above account for interdependence of savings of individual UCRMs. Costs for the project likewise account for savings, which accrue from installing several UCRMs at once. All equipment, material, implementation planning and engineering costs for the recommended UCRM's are included and reflect all UCRM's being done at one time under a single construction project. PSI provides professionally managed, turnkey projects for customers and proposes this project as a single turn-key transaction although a number of subcontractors and vendors are involved and managed by PSI.

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TABLE 1D Summary of Utility Cost Reduction Measures and Project Totals

		ANNUAL SAVINGS										
UCRM No.	UCRM Title	Electric Energy (kWh/yr)	Demand (kW/yr)	Electric ($/yr)	Natural Gas (therms/yr)	Natural Gas ($/yr)	Water/Sewer (kgal/yr)	Water/Sewer ($/yr)	Other Savings	Project Cost ($)	Payback (yrs.)	Estimated Project Lifetime (yrs.)
1	LED Lighting w/ 1,326 Sensors	3,979,325	6,768	$463,105	0	$0			$55,577	$2,236,700	7.0	20
2	Power Conditioning	655,104	888	$45,817	0	$0			$7,456	$372,848	7.0	20
3	Variable CHW Flow	116,928	142	$8,093	0	$0			$0	$37,922	4.7	20
4	Water Controls	99,456	236	$7,042			4,454	$67,650	$0	$287,010	3.8	20
5	Building Automation System	315,945	79	$20,925	10,491	$4,988				$489,076	18.9	20
6	Variable Air Volume	35,607	49	$2,525						$22,753	7.8	20
7	Load Class Demand Response	1,139	0	$1,652						$1,523	0.8	20
	Totals	4,603,913	8,071	$549,363	10,491	$4,988	4,454	$67,650	$62,033	$3,447,700	7.1	

Utility Assessment Report Cost	$105,000	
Initial Measurement & Verification Cost	$0	
Construction Bonding Cost	$47,300	
IMPLEMENTATION TOTALS	$3,600,000	
Financing Cost	$407,755	
Project Payback Including Financing Costs	8.3	Does not include or Setpr in guaranteed rebate or M&V fees
Guaranteed Utility Rebate	$175,000	
On-going M&V Service Cost	$390,000	Maximum cost - May be cancelled at any time
Max Energy Savings (Lighting Materials & PFI	$62,933	Shown above

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II. GENERAL FACILITY DESCRIPTIONS

A. FACILITY DESCRIPTION

The PSI audit team conducted on-site tours of all facilities included in the project as listed in Section 1 of this report and described in detail below. During the audit, PSI interviewed key staff members and building occupants to get a better understanding of each of the sites. PSI also met with TFC project managers and gathered information on current facility upgrade projects being implemented at the project sites. An overview of the facility upgrade projects being performed by other contractors within the project buildings follow:

Brown Heatly Building

- New chillers
- New modular boilers
- New DDC building automation system

Central Services Building

- None

Thomas J Rusk Building

- New terminal boxes (set to deliver same airflow as previous boxes)

William P. Hobby Building

- Removal of existing chillers
- Conversion to Austin Energy supplied chilled water
- New DDC building automation system

While a number of improvement opportunities are common across most TFC facilities (such as LED lighting and/or power conditioning), some facilities have specific improvement opportunities that are unique. PSI objective was to identify the least efficient facilities and focus on providing cost-effective solutions and improvements in keeping with the goals of TFC while complying with requirements set forth by TFC and State Energy Conservation Office. In a number of instances the energy improvement measures will provide added "non-energy" benefits to TFC.

In most facilities, all four utilities (electricity, natural gas, water and waste water) exist. Concerning electricity, the City of Austin continues to be a regulated market. As such, Austin Energy is the electric provider for each of these four sites. At two of the project sites, TFC benefits from a negotiated State Government electric rate that remains in effect until May 2017. Although the rate schedule has not changed, the billed cost per kilo-Watt-hour has steadily increased over the last four years by approximately 3 percent per year. Please refer to Section 4 – Utility Rate Schedule Analysis for detailed explanation and discussion of PSI's approach for addressing electric utility costs.

The Texas General Land Office (TGLO) supplies natural gas from state lands, charging a market-based price determined by the date of production. Texas Gas Service (TGS) delivers the gas through its distribution system, charging customer fees and distribution fees on a regular monthly invoice.

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Water and waste water services to each TFC facility is supplied by the City of Austin. As with electricity and gas services, water costs for all included City facilities is in keeping with published tariffs and rates for City of Austin.

5. BUILDING DESCRIPTIONS

The following tables provide detailed information gathered during our site audits of the facilities included within this project. Additional general information follows:

- Each of the project buildings are "typical" office buildings
- These buildings are occupied approximately 55 hours per week
- Buildings are typically closed on government holidays and weekend
- Server rooms are located in both CSB and BHB
- The number of personal computers in these buildings approximately equals the number of building occupants
- Multiple state agencies occupy space within these buildings
- Electric space heat in WPH
- Electric domestic water heaters in all project buildings

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Table 2A. Table of relevant information concerning each of the buildings included in this report.

Building Name	Function	Conditioned Area (SF)	Number of Stories	Wall Construction Type	Typical Occupancy	Roof Construction	Year of Construction	To be Removed from Service in Next 10 Yrs
Brown Heally	Office Building	176,382	7	Concrete Block	1,000	Concrete/Built-up	1989	No
Central Services	Office Building	87,084	4	Concrete Block	475	Concrete/Built-up	1963 / 1980	No
Thomas J. Rusk	Office Building	74,453	6	Steel with Spandrel Glass	255	Concrete/Built-up	1976	No
William P. Hobby	Office Building	312,246	13	Steel-Glass/Concrete/Concrete Block	1,300	Concrete/Built-up	1984	No

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Table 2B: EQUIPMENT LIST The Tables below provide descriptions of all mechanical equipment and collection data regarding power use.

Building Name: Brown Heatly

Equipment Name	Quantity	Nameplate Data	Size	Field Measurement	Efficiency	Annual Operating Hours	Comment / Condition / Area Served
Building Automation System	1	JCI Metasys	NA	NA	NA	8760-	New
Chillers	1	Daikin	450 tons	0.54 kW/ton (D)	0.54 kW/ton (D)	2500	New
Chillers	1	Daikin	450 tons	0.54 kW/ton (D)	0.54 kW/ton (D)	2500	New
Chillers	1	Daikin	150 tons	0.56 kW/ton (D)	0.56 kW/ton (D)	2500	New
Chilled Water Pump	2	US Electrical Motors	25 hp		91% (D)	2500	Constant Speed
Chilled Water Pump	1	US Electrical Motors	10 hp		90% (E)	2500	Constant speed
Cooling Tower	1	Baltimore Air Coil	1700 ton		NA	2500	3 cell - Two speed fans, in process of being replaced
Condenser Water Pumps	2	US Electrical Motors	25 hp		91% (D)	2500	Constant speed
Condenser Water Pumps	1	US Electrical Motors	10 hp		90% (E)	2500	Constant speed
Condenser Water Pumps	1	US Electrical Motors	15 hp		90% (E)	2500	Constant speed
HW Boiler	1	Lochinvar	2000 MBH each		85% (D)	800	New boilers. 5 to 1 turn-down ratio
HW Pump	2	Baldor High Efficiency	10 hp		91.70%	800	Constant speed
Air Handling Unit	3	Vertical Draw Through	15.5 hp total		1.4 in. WG	8760	Constant speed
Air Handling Unit	23	Double Duct	385 hp total		2.3 in. WG	8760	Constant speed
Air Handling Unit	2	Horizontal Draw Through	2.75 hp total		0.5 in. WG	8760	Constant speed
Exhaust/Relief Fans	2	Horizontal Draw Through	25 hp total		NA	8760	Constant speed
Air Compressor	1	Two compressor	20 hp motors each		90% (D)	3000	Pneumatic controls

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Building Name: Central Services

Equipment Name	Quantity	Nameplate Data	Size	Field Measurement	Efficiency	Annual Operating Hours	Comment / Condition / Area Served
Building Automation System	1	JCI- Pneumatic			NA	8760	Already beyond useful life
Chillers	1	Trane Series R	175 tons		0.68 kW/ton (D)	3000	Fair to good condition
Chillers	1	York Centrifugal	150 tons		0.68 kW/ton (D)	3000	Fair to good condition
Chilled Water Pump	2	Teco High Efficiency	20 hp		91.7% (D)	4000	Constant Speed
Cooling Tower	1	Induced Draft Counterflow - 540 gpm	7.5 hp		NA	3000	VFD fan control
Condenser Water Pumps	2	Teco High Efficiency	15 hp		91% (E)	4000	Constant speed
HW Boiler	1	Raypak	3000 MBH		[illegible] (D)	8760	Good condition
HW Pump	1	Bakior High Efficiency	3 hp		[illegible] (E)	8760	Constant speed
Air Handling Unit	1	AHU-1, Trane	15 hp		1.3 in. WG.	8760	Variable air volume
Air Handling Unit	1	AHU-2, Trane	20 hp		2.5 in. WG.	8760	Variable air volume
Air Handling Unit	1	AHU-3, Trane	5 hp		2.0 in. WG.	8760	Constant air volume
Air Handling Unit	1	AHU-1b, Double Duct	60 hp total		1.0 in. WG.	8760	Constant air volume. Fair condition
Air Handling Unit	1	AHU-1C	5 hp		2.0 in. WG.	8760	Constant air volume
Air Handling Unit	1	AHU-2C	3 hp		2.0 in. WG.	8760	Constant air volume
Air Handling Unit	1	AHU-4, Split System DX	2 hp		1.5 in. WG.	8760	Constant air volume
Roof Top Unit	4	RTU-1, Package	1 hp total		1.5 in. WG.	3500	Constant speed
Exhaust/Relief Fans	4	Horizontal Draw Through	<1 hp total		4440 cfm	8760	Constant speed
Air Compressor	1	Two compressor	3 hp motors each		89% (D)	3000	Pneumatic controls

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Building Name: Thomas J. Rusk

Equipment Name	Quantity	Nameplate Data	Size	Field Measurement	Efficiency	Annual Operating Hours	Comment / Condition / Area Served
Building Automation System	1	JCI Metasys			NA	8760	Good condition
Chilled Water Pump	2	Teco High Efficiency	20 hp		93% (D)	8760	Variable speed
HW Boiler	1	Raypak	2499 MBH		82% (D)	8760	Good condition
HW Pump	1	Bolder High Efficiency	3 hp		88% (E)	8760	Constant speed
Air Handling Unit	1	AHU-1, Carrier, Blow Through	15 hp	VFD	2.0 in. WG.	8760	Variable air volume
Air Handling Unit	1	AHU-2, Carrier, Blow Through	30 hp	VFD	2.2 in. WG.	8760	Variable air volume
Air Handling Unit	1	AHU-3, Carrier, Blow Through	40 hp	VFD	2.9 in. WG.	8760	Variable air volume
Air Handling Unit	1	AHU-4, Carrier, Blow Through	15 hp	VFD	2.7 in. WG.	8760	Variable air volume
Air Handling Unit	1	AHU-5, Carrier, Draw Through	5 hp		2.5 in. WG.	8760	Constant air volume
Air Handling Unit	1	AHU-6, Carrier, Draw Through	3 hp		2.0 in. WG.	8760	Constant air volume
Exhaust/Relief Fans	2	Horizontal Draw Through	<1 hp total		4440 cfm	8760	Constant speed
Garage Exhaust Fans	6	Propeller Type	1.5 hp each		69000 cfm total	8760	Constant speed. Controlled by CO levels.

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Building Name: William P. Hobby

Equipment Name	Quantity	Nameplate Data	Size	Field Measurement	Efficiency	Annual Operating Hours	Comment / Condition / Area Served
Building Automation System	1	JCI Metasys with Pneumatics			NA	8760	Generally beyond useful life
Water Cooled Condenser	1	CU-1A Dunham Bush	248 tons	0.65 kW/ton (D)	0.65 kW/ton (D)	3000	Already beyond useful life. In process of being eliminated. Serves Tower 1
Water Cooled Condenser	1	CU-1B Dunham Bush	248 tons	0.65 kW/ton (D)	0.65 kW/ton (D)	3000	Already beyond useful life. In process of being eliminated. Serves Tower 1.
Water Cooled Condenser	1	CU-2 Dunham Bush	183 tons	0.65 kW/ton (D)	0.65 kW/ton (D)	4500	Already beyond useful life. In process of being eliminated. Serves Tower 2.
Water Cooled Condenser	1	CU-3A Dunham Bush	229 tons	0.65 kW/ton (D)	0.65 kW/ton (D)	3000	Already beyond useful life. In process of being eliminated. Serves Tower 3.
Water Cooled Condenser	1	CU-3B Dunham Bush	229 tons	0.65 kW/ton (D)	0.65 kW/ton (D)	3000	Already beyond useful life. In process of being eliminated. Serves Tower 3.
Condenser Water Pumps	5	Baldor High Efficiency	5 hp each		87.5% (E)	4500	Constant speed
Cooling Towers	3	TBD	20 hp fan motors each			4500	Two Speed Fans
Duct Heaters		Electric Resistance Heater	Varies		100% (D)	2500	Good condition
Air Handling Unit	1	AHU-1 Supply Fans	2-30 hp		3 in. WG.	8760	Constant air volume - Tower 1
Air Handling Unit	1	AHU-1 Return Fans	2-5 hp		3 in. WG.	8760	Constant air volume - Tower 1
Air Handling Unit	1	AHU-2, Built Up	2-100 hp		7.0 in. WG.	8760	Variable air volume - Vanaxial - Tower 2
Air Handling Unit	1	AHU-3, Built Up	2-75 hp		7.0 in. WG.	8760	Variable air volume - Vanaxial - Tower 2
Garage Exhaust Fans	18	Propeller Type	1.5 hp each			8760	Constant speed
Exhaust/Relief Fans	1	Horizontal Draw Through	3.5 hp total		11000 cfm	8760	Constant speed
Air Compressor	3	Two compressor	3 hp motors each		89% (D)	3000	Pneumatic controls

Performance Services

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C. UTILITY COST REDUCTION MEASURES (UCRMs)

Matrix of UCRMs							
	1	2	3	4	5	6	7
Building	LED Lighting w/ 1,326 Sensors	Power Conditioning	Variable CHW Flow	Water Controls	Building Automation System	Variable Air Volume	Load Coop Demand Response
Thomas Jefferson Rusk	◆	◆		◆			
William P. Hobby	◆	◆		◆			
Central Service	◆	◆	◆	◆	◆	◆	◆
Brown-Heatly	◆	◆	◆	◆			

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D. UTILITY ANALYSIS METHODOLOGY

Performance Services has developed energy baselines from utility data provided by the TFC. Electrical baselines were established by using 2014 utility data.

Energy savings were determined using standard engineering calculation spreadsheets and computer modeling using the latest version of eQuest (3.65). Concerning building simulation modeling, prior to calculating savings, baseline models were constructed that provided statistically valid baseline matches. Simulation models were constructed and used to model savings for the following buildings:

- Brown Heatly (Variable flow chilled water only)

Engineering calculation spreadsheets were used to determine energy savings in the following buildings:

- Brown Heatly
- Central Services
- Thomas J. Rusk
- William P. Hobby

Savings calculations within the Appendix include the following:

- LED lighting
- Power conditioning
- Variable flow chilled water
- Water retrofits
- Building automation system
- Variable air volume
- Load Cooperative

The following table shows both existing and projected EUIs. Note that the EUI for William P. Hobby includes energy usage associated with the 1,064,595 of chilled water ton-hours being delivered by Austin Energy's district chilled water loop and further that the building square footages for Rusk and Hobby do not include the basement parking garages.

EUI Comparison Table

Building			EUI	
#	Name	Sq. Ft. w/o Parking Garages	Existing Total kBTU/SqFt/Yr	Projected Total kBTU/SqFt/Yr
1	Brown Heatly	259,224	183	161
2	Central Services	111,935	110	83
3	Thomas J. Rusk	74,453	107	92
4	William P. Hobby	312,246	109	88

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III. BASE YEAR UTILITY CONSUMPTION DATA

Table 4: Base Year Utility Consumption

Bldg. ID: Brown Realty
Gross SF: 259,124
EUI: 182.779 Btu/SF
EC: $ 1.74 per SF

For prior 12 month period beginning January, 2014 and ending December, 2014

Reading Date	Electrical							Natural Gas		Water	
Month	Consumption (kWh)	Demand Interval (kW or kVa)	Demand Charged (kW or kVA)	Power Factor	Fuel Adjustment ($/kWh)	Power Factor Penalty	* Total Cost ($)	Consumption (CCF)	Cost ($)	Consumption (kgal)	* Cost ($)
January	654,275	1,202	$11.40	0.88	N/A	$312	$ 48,010	18,402	$ 8,834	857	$ 6,942
February	631,551	1,244	$11.40	0.86	N/A	$607	$ 44,939	15,665	$ 7,521	986	$ 7,382
March	703,740	1,178	$11.40	0.87	N/A	$463	$ 49,890	15,209	$ 7,348	481	$ 7,306
April	678,609	1,261	$12.54	0.87	N/A	$545	$ 49,649	15,683	$ 7,624	458	$ 7,413
May	760,169	1,265	$12.54	0.87	N/A	$547	$ 53,979	14,767	$ 7,088	534	$ 8,112
June	801,036	1,421	$12.54	0.87	N/A	$614	$ 57,801	10,892	$ 6,084	584	$ 8,871
July	742,672	1,400	$12.54	0.87	N/A	$605	$ 54,568	10,976	$ 5,768	709	$ 10,720
August	840,312	1,308	$12.54	0.87	N/A	$566	$ 58,476	11,175	$ 5,364	828	$ 12,425
September	712,204	1,389	$12.54	0.88	N/A	$390	$ 52,465	11,600	$ 5,568	792	$ 12,030
October	757,112	1,350	$11.40	0.88	N/A	$360	$ 54,946	13,702	$ 6,577	645	$ 9,859
November	657,843	1,321	$11.40	0.83	N/A	$519	$ 51,246	15,830	$ 7,589	498	$ 7,565
December	675,783	1,240	$11.40	0.88	N/A	$457	$ 43,374	21,445	$ 10,294	257	$ 4,360
Annual	8,845,053	15,500				$6,186	$ 625,269	175,232	$ 84,159	6,793	$ 103,034

	Electricity	Natural Gas	Water
Company Name:	Austin Energy	Texas Lone Office	City of Austin
Company Rate Schedule	Government Rate	Government Rate	General Services

* Certification:

Charges have been recomputed and are correct:

Signature and Title:

Note: For weather normalized baseline, follow Company accepted protocols. US DOE IPMVP, or ASHRAE Guidelines 14

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Table 4: Base Year Utility Consumption

For prior 12 month period beginning January, 2014 and ending December, 2014

Bldg. ID:	Capitol Services	
Gross SF	121,835	
EUI	109,894	Btu/SF
EC:	$ 3.37	Per SF

Reading Date	Electrical							Natural Gas		Water	
Month	Consumption (kWh)	Demand Measured (kW or kVA)	Demand Charged (kW or kVA)	Power Factor	Fuel Adjustment ($/kWh)	PCRF or Cogeneration ($/kWh)	*Total Cost ($)	Consumption (CCF)	Cost ($)	Consumption (Gal)	*Cost ($)
January	147,600	312	$13.95	0.9	N/A	N/A	$ 13,355	6,265	$ 3,008	339	$ 1,955
February	142,400	312	$13.95	0.9	N/A	N/A	$ 13,037	6,132	$ 2,936	345	$ 2,195
March	160,400	292	$13.95	0.9	N/A	N/A	$ 13,866	4,013	$ 2,357	142	$ 2,150
April	178,800	340	$13.95	0.9	N/A	N/A	$ 15,526	3,731	$ 2,511	180	$ 2,424
May	202,800	352	$13.95	0.9	N/A	N/A	$ 17,779	4,124	$ 1,980	185	$ 2,006
June	190,800	317	$14.95	0.9	N/A	N/A	$ 17,133	2,371	$ 1,616	214	$ 3,149
July	179,200	324	$14.95	0.9	N/A	N/A	$ 16,537	2,777	$ 1,835	128	$ 3,457
August	226,000	348	$14.95	0.9	N/A	N/A	$ 19,456	2,516	$ 1,209	248	$ 3,894
September	180,000	312	$14.95	0.9	N/A	N/A	$ 15,276	3,303	$ 1,585	186	$ 3,633
October	130,000	312	$13.95	0.9	N/A	N/A	$ 10,113	3,376	$ 1,620	215	$ 3,260
November	210,900	276	$13.95	0.9	N/A	N/A	$ 16,707	3,993	$ 1,917	186	$ 3,120
December	132,000	312	$13.95	0.9	N/A	N/A	$ 12,818	4,988	$ 2,146	157	$ 2,366
Annual	2,084,400	3,908					$ 185,291	50,873	$ 24,419	2,236	$ 31,850

	Electricity	Natural Gas	Water
Company Name:	Austin Energy	Texas Land Office	City of Austin
Company Rate Schedule	Government Rate	Government Rate	General Services

* Certification:

Charges have been recomputed and are correct.

Signature and Title:

Note: For weather normalized baseline, follow commonly accepted protocols. IS DOE IPMVP, or ASHRAE Guideline 14?

Table 4: Base Year Utility Consumption

For prior 12 month period beginning January, 2014 and ending December, 2014

Bldg. ID:	Thomas J. Rusk	
Gross SF	94,457	Excludes Parking Garage
EUI	107,984	Btu/SF
EC:	$ 2.74	Per SF

Reading Date	Electrical							Natural Gas		Water	
Month	Consumption (kWh)	Demand Measured (kW or kVA)	Demand Charged (kW or kVA)	Power Factor	Fuel Adjustment ($/kWh)	PCRF or Cogeneration ($/kWh)	*Total Cost ($)	Consumption (CCF)	Cost ($)	Consumption (Gal)	*Cost ($)
January	126,000	350	$13.95	0.9	N/A	N/A	$ 12,683	6,944	$ 3,333	67	$ 1,016
February	116,000	340	$13.95	0.9	N/A	N/A	$ 11,618	2,830	$ 1,358	77	$ 1,170
March	129,000	330	$13.95	0.9	N/A	N/A	$ 12,471	2,372	$ 1,139	88	$ 1,340
April	120,000	280	$13.95	0.9	N/A	N/A	$ 11,225	801	$ 384	66	$ 1,309
May	126,000	270	$13.95	0.9	N/A	N/A	$ 11,451	17	$ 8	92	$ 1,390
June	140,000	280	$14.95	0.9	N/A	N/A	$ 13,425	0	$ -	90	$ 1,360
July	143,000	280	$14.95	0.9	N/A	N/A	$ 13,625	2	$ 1	62	$ 938
August	163,000	290	$14.95	0.9	N/A	N/A	$ 15,092	12	$ 6	85	$ 1,280
September	146,000	290	$14.95	0.9	N/A	N/A	$ 13,970	7	$ 3	80	$ 1,215
October	140,000	280	$13.95	0.9	N/A	N/A	$ 12,933	523	$ 247	77	$ 1,170
November	148,000	300	$13.95	0.9	N/A	N/A	$ 13,212	3,761	$ 1,806	88	$ 1,277
December	156,000	300	$13.95	0.9	N/A	N/A	$ 13,699	5,442	$ 2,612	69	$ 1,053
Annual	1,662,000	3,950					$ 155,607	22,705	$ 10,897	956	$ 14,526

	Electricity	Natural Gas	Water
Company Name:	Austin Energy	Texas Land Office	City of Austin
Company Rate Schedule	Government Rate	Government Rate	General Services

* Certification:

Charges have been recomputed and are correct.

Signature and Title:

Note: For weather normalized baseline, follow commonly accepted protocols. IS DOE IPMVP, or ASHRAE Guideline 14?

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Table 6. Base Year Utility Consumption

For prior 12 month period beginning January, 2014 and ending December, 2014

Bldg. ID: William P. Hobby
Bldg. SF: 512,346 Excludes Parking Garage
EUI: 100.104 kBtu/SF
ECI: $ 2.22 Per SF

Reading Date	Electrical							Natural Gas		Water	
Month	Consumption (kWh)	Demand Measured (kW or kVA)	Demand Charges (dollars/kW)	Power Factor	Total Adjustment ($/kWh)	Power Factor Penalty	* Total Cost ($)	Consumption (GCF)	Cost ($)	Consumption (Kgal)	* Cost ($)
January	780,000	1,780	$11.40	0.9	N/A	N/A	$ 60,709	29	$ 14	347	$ 5,290
February	742,000	1,940	$11.40	0.9	N/A	N/A	$ 60,084	27	$ 13	338	$ 5,172
March	734,000	3,460	$11.40	0.9	N/A	N/A	$ 54,209	67	$ 27	451	$ 6,851
April	654,000	1,400	$12.54	0.9	N/A	N/A	$ 51,071	46	$ 22	479	$ 7,261
May	730,000	1,420	$12.54	0.9	N/A	N/A	$ 55,361	40	$ 19	580	$ 8,810
June	782,000	1,400	$12.54	0.89	N/A	$197	$ 57,571	26	$ 12	704	$ 10,694
July	728,000	1,420	$12.54	0.89	N/A	$200	$ 53,156	54	$ 16	813	$ 12,345
August	864,000	1,440	$12.54	0.89	N/A	$205	$ 62,470	40	$ 18	915	$ 13,889
September	719,000	1,460	$12.54	0.89	N/A	$206	$ 65,508	15	$ 7	903	$ 13,717
October	692,000	1,360	$11.40	0.9	N/A	N/A	$ 51,952	45	$ 22	669	$ 10,162
November	774,000	1,680	$11.40	0.9	N/A	N/A	$ 58,752	25	$ 12	528	$ 8,020
December	862,000	1,920	$11.40	0.9	N/A	N/A	$ 71,114	29	$ 14	445	$ 6,760
Annual	9,148,000	18,700				$806	$ 635,205	432	$ 208	7,387	$ 111,905

	Electricity	Natural Gas	Water
Company Name:	Austin Energy	Texas Land Office	City of Austin
Company Rate Schedule	Government Rate	Government Rate	General Services

* Certification:
Charges have been recomputed and are correct.

Signature and Title:

Note: For weather normalized baseline, follow commonly accepted protocols, US DOE IPMVP, or ASHRAE Guideline 14.

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IV. UTILITY RATE SCHEDULE ANALYSES

A. ELECTRIC RATE SCHEDULE ANALYSIS

For the Brown Heatly and William P. Hobby buildings, TFC is on Austin Energy "Long Term Government Contracts" rate structure. This rate structure is the lowest rate structure offered by Austin Energy and is set to expire in May 2017. In order to be on this rate structure, TFC sites must have a demand of at least 500 kW for at least one month per year.

NAME OF UTILITY: Austin Energy

RATE SCHEDULE ANALYZED: Long Term Government Contracts

SUMMARY OF BILLING COMPONENT CHARGES:

Rate Plan As of 12/31/2014	Demand Charge	Energy Charge	Fuel Charge	Sales Tax	Power Factor Charges	Comments
City of Austin – Long Term Contracts	Winter: $11.40/kW Summer: $12.54/kW Winter: November to April. Summer: May to October	Winter: $0.0111/kWh Summer: $0.0111/kWh Winter: November to April. Summer: May to October	$0.04007/kWh	None	Assessed Monthly if Power factor (PF) is below ".90". Power Factor Charges are calculated as follows: *(Actual kW x (.90/actual PF) less actual kW) x seasonal Demand Charge* Example of an October PF charge calculation: Actual kW = 400 and billing period PF = ".85" Calculation: (400 x (.90/85) less 400) * $12.54 = $295.06	The 54 month average unit cost of $0.67/kWh is very adventurous to TFC compared to normal commercial electricity rates in Austin

Both the Central Services and Thomas J. Rusk facilities are on the Austin Energy's commercial rate structure called the "Electrical Commercial Secondary Voltage > 50kW." The rate components, as well as the current rate, can be observed in the table below. Summer months for this particular rate include June through September. The winter months include October through May.

NAME OF UTILITY: Austin Energy

RATE SCHEDULE ANALYZED: Electrical Commercial Secondary Voltage > 50kW

SUMMARY OF BILLING COMPONENT CHARGES:

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Rate Plan As of 12/31/2014	Demand Charge	Energy Charge	Power Supply Adjustment	Community Benefit Charges	Sales Tax	Customer Charge	Power Factor Charges	GreenChoice Batch 4 (renewable generated power)
City of Austin – Electrical Commercial Secondary Voltage > 50kW	Winter: $13.95/kW Summer: $14.95/kW Winter: October to May Summer: June to September.	Winter: $0.01347/kWh Summer: $0.02347/kWh Winter: October to May Summer: June to September	$0.02545/kWh	$0.00407/kWh	None	$65/Month	Assessed Monthly if Power factor (PF) is below ".90". Power Factor Charges are calculated as follows: *(Actual kW x (.90/actual PF) less actual kW) x seasonal Demand Charge* Example of an October PF charge calculation: Actual kW = 400 and billing period PF = ".85" Calculation: (400 x (.90/.85) less 400) * $13.95 = $928.34	TFC have selected to purchase $3,000kWh per month at $0.025/kWh replacing the Power Supply Adjustment

AVOIDED COST OF ENERGY AND DEMEAND TO BE USED IN CALCULATIONS:

Austin Energy rate components are based on energy (kWh) and also on demand (kW). For electrical avoided cost of energy, Performance Services is using the rates as defined in the rate structures above and summarized below.

Electric Rate for BHB & WPH

Summer (6 months):	$12.54	$0.05117
Winter (6 months):	$11.40	$0.05117

Electric Rate for CSB & TJR

Summer (4 months):	$14.95	$0.06599
Winter (8 months):	$13.95	$0.06099

Austin Energy charges TFC for low power factor at both Brown Heatly and William P. Hobby. For savings analysis purposes, power factor charges are calculated as defined in the rate structure described above. Power factor avoided costs used in the project savings analysis come directly from Section 3 of this report.

COMMENTS:

Performance Services has tracked electric charges at both Brown Heatly and William P. Hobby

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since 2011. Over this four year period, electricity charges have risen an average of 3 percent per year even though TFC is still on the same electric rate schedule.

TFC's current rate structure with Austin Energy expires in May 2017. This rate structure is currently the lowest cost rate structure offered by Austin Energy to any of its customers. As such, it is generally assumed that TFC's electric rate will increase starting in June 2017. However, for the purposes of this project, electric rates have not been escalated.

B. GAS UTILITY RATE SCHEDULE ANALYSIS

NAME OF UTILITY: TEXAS GENERAL LAND OFFICE

RATE SCHEDULE ANALYZED: TFC MARKET RATE PLAN

CUSTOMERS WITHIN THE TFC

The "rate plan" for natural gas supplied to TFC buildings is comprised of two components: The Texas General Land Office (TGLO) supplies the gas from state lands, seemingly charging a market-based price determined by the date of production. Texas Gas Service (TGS) delivers the gas through its distribution system, charging customer fees and distribution fees on a regular monthly invoice.

Rate Plan As of 12/31/2014	Texas General Land Office Charges	Texas Gas Service Charges	Comments
Two Components 1. Texas General Land Office charges for supplying the gas from state leases 2. Texas Gas Service charges for gas delivery within its distribution system	Using example from December 2014 invoice amount of $124.13 for 50 MCF: Commodity Charge: $2.738450 / MCF Contract Maintenance: $0.030300 / MCF Gathering Charge: $0.12000 / MCF Transmission Charge: $0.20000 / MCF	Using example from December 2014 invoice amount of $1,397.62 for 16010 CCF: Customer Charge: $464.92 Delivery Charge: $1,748.58 City Franchise Fee: $116.32 Article 6050 Charge: $11.10	• Texas GLO "supply" invoice does not necessarily match up with monthly TGS "delivery" service on a month-by-month basis • As a result of the dual rate plan components, TFS pays a very low rate price for natural gas.

AVOIDED COST OF ENERGY TO BE USED IN CALCULATIONS:

Since TFC pays the same rate for natural gas at each of the project buildings, PSI has calculated the weighted average price paid for retail natural gas by TFC during calendar year 2015 (January through June) excluding the flat service charges such as the Texas Gas Service Customer Charge. Specifically, this rate was calculated for the Brown Heatly building which uses more natural gas than any of the other project buildings and thus has the lowest effective natural gas cost. Natural gas rates used in this report by building follow:

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Building	Cost/CCF
Brown Heatly	$0.48
Central Services	$0.48
Thomas J. Rusk	$0.48
William P. Hobby	$0.48

Note that natural gas costs comprise only 5.9 percentage of TFC utility costs at these four sites.

C. WATER AND WASTEWATER UTILITY RATE SCHEDULE ANALYSIS

NAME OF UTILITY: City of Austin Water Utility

RATE SCHEDULE ANALYZED: 2015 COMMERCIAL RATE SCHEDULE

SUMMARY OF BILLING COMPONENT CHARGES:

2015 water volume rates for the City of Austin are shown in the table below. The applicable rate for the Facility is $6.17 per 1,000 gallons during Off Peak billing time and $6.77 per 1,000 during Peak billing time.

CITY OF AUSTIN 2015 WATER VOLUME RATES FOR COMMERCIAL CUSTOMERS

Customer Class	Water Volumes (gal)	Water Volume Rates ($/1,000 gal) Off Peak	Peak
Commercial	All	$5.98	$6.58
Water Revenue Stability Reserve Fund Surcharge	All	$0.19	$0.19
Total	All	$6.17	$6.77

2015 wastewater volume rates for the City of Austin are shown below (Table 3). The applicable rate for the Facility is $8.82 per 1,000 gallons. Only water discharged to the sanitary sewer is subject to the wastewater charge.

CITY OF AUSTIN 2015 WASTEWATER VOLUME RATES FOR COMMERCIAL CUSTOMERS

Customer Class	Wastewater Volumes (gal)	Wastewater Volume Rates ($/1,000 gal)
Commercial	All	$8.82

AVOIDED COST OF WATER TO BE USED IN CALCULATIONS:

$15.19 per thousand gallons. Total cost based on using the average water cost of $6.37 per 1,000 gallons.

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V. TECHNICAL ANALYSIS

A UTILITY COST REDUCTION MEASURES

Table 5-1 identifies Utility Cost Reduction Measures (UCRM) that can be economically implemented as part of this guaranteed savings project for TFC. These UCRMs provide a reduction in consumption while also addressing TFC's need for necessary infrastructure improvements.

Table 5-1: Utility Cost Reduction Measures

Measure Type	Utility Cost Reduction Measure
Electrical	LED Lighting
	Power Conditioning
Mechanical	Variable CHW Flow
	Variable Air Volume
Controls	Building Automation System
	Load Cooperative
Water	Water Controls

In addition to the savings associated with reduced energy consumption, TFC will also expect to realize other important benefits, including:

- Replacement of obsolete T-12 fluorescent lighting
- Reduced electrical system harmonics and less electrical surges

Project scope of work specifics follow:

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UCRM NO.: 1

UCRM NAME: LED Lighting

SUMMARY DATA

All projects are analyzed in the dependent mode and in the following sequence:
Building loads, distribution systems, primary equipment, and utility management systems. All recommended UCRMs are assumed to be installed for dependency purposes.

kWh Savings	3,379,335	kWh/Year
Natural Gas Savings	0	Therms/Year
Water Savings	0	kgal/Year
Cost Savings	$318,782	Per Year
Implementation Cost	$2,236,769	
Simple Payback Period	7.0	Years
Est. Useful Life	20	Years

UCRM Description:

The dominant lighting system within the BHB and WPH buildings is T-12 linear fluorescent. Similarly, a significant portion of the lighting within TJR is T-12 linear fluorescent. Within these buildings, TFC staff is slowly replacing the T-12 fluorescent lighting with T-8 fluorescent lighting as lamps and ballasts fail. Lighting within CSB was converted to T-8 through a lighting retrofit project in or around 2009. The drawbacks to the existing lighting systems within the project buildings follow:

- T-12 lamps and ballasts are at or beyond end of useful life
- High lighting O&M costs
- Relatively short lamp life
- Fluorescent lighting systems are becoming obsolete
- Limited replacement parts in the future

To address these issues, this measure considers replacement of the fluorescent, incandescent and HID lighting with LED lighting. Benefits include:

- High efficacy, low energy usage
- 50,000+ hour lamp life
- Ten year warranty on most product
- Improved illumination levels
- Improved lighting controls to reduce operational hours

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This measure also includes converting and/or replacing exterior fixtures with LED fixtures.

A detailed scope of work for this measure follows:

- Retrofit and/or replace 4,789 fixtures at Brown Heatly
- Install approximately 490 occupancy sensors at Brown Heatly
- Retrofit and/or replace 1,561 fixtures at Central Services
- Install approximately 188 occupancy sensors at Central Services
- Retrofit and/or replace 1,199 fixtures at Thomas J. Rusk
- Install approximately 59 occupancy sensors at Thomas J. Rusk
- Retrofit and/or replace 7,147 fixtures at William P. Hobby
- Install approximately 589 occupancy sensors at William P. Hobby
- Provide one percent spare lamps and/or drivers
- All material made obsolete during this work will be disposed of according to state and local requirements.

Savings were calculated using manufacturer data and spreadsheet calculations. Savings include lamp and ballast material only maintenance savings which are consistent with actual costs. Hours of operation by space type were determined by averaging measured (logged) usages. T-12 fixture wattages used in this analysis are 80 percent of ANSI stated values based on field measurements. Lighting documentation including saving calculations are included in the Appendix. Linear LED lamps, drivers and new fixtures will have a 10 year manufacturer's warranty.

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UCRM NO.: 2

UCRM NAME: Power Conditioning

SUMMARY DATA

All projects are analyzed in the dependent mode and in the following sequence:
Building loads, distribution systems, primary equipment, and utility management systems. All recommended UCRMs are assumed to be installed for dependency purposes.

kWh Savings	655,504	kWh/Year
Natural Gas Savings	0	Therms/Year
Water Savings	0	kgal/Year
Cost Savings	$53,073	Per Year
Implementation Cost	$372,848	
Simple Payback Period	7.0	Years
Est. Useful Life	20	Years

UCRM Description: Power quality issues can typically be summarized as follows:

Poor Power Factor caused by the inductive loads such as: electric motors, transformers, compact fluorescent lighting and high intensity discharge lighting. Inductive loads increase the amount of energy required by your electrical equipment to work properly, which in turn creates excess heat that reduces the efficiency and longevity of electrical equipment. Note that these devices will not cause the buildings to go into a lead power factor condition.

Harmonic Interference is caused by non-linear loads such as computers, fax machines, copiers, medical devices and variable frequency drives. Non-linear loads create heat that increases energy usage and damages electrical equipment causing an increase in repair, maintenance, and replacement costs.

Transient Surges & Spikes are caused by turning equipment on and off, lighting, utility grid changes, and back-up power supplies. These conditions attack electrical equipment and also cause increased repair, maintenance, and equipment costs.

To address these issues, this measure considers installation of a total of 31 power conditioners with modular capacitance (where applicable) to improve power factor making your motor load run cooler and more efficiently. This results in a reduction in energy consumption and an extension of the useful life of your motor load. The Power Conditioning System will also provide harmonic filtration to mitigate harmonic distortion and recycle waste energy resulting in reduced energy consumption which prolongs the longevity of electrical equipment.

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Lastly, the Power Conditioning System with its industrial grade metal oxide varistors (MOVs) protects electrical equipment from transient electrical equipment.

A detailed scope of work for this measure follows:

- Installation of 11 power conditioning panels at Brown Heatly
- Installation of 4 power conditioning panels at Central Services
- Installation of 4 power conditioning panels at Thomas J. Rusk
- Installation of 12 power conditioning panels at William P. Hobby

Note that the Power Conditioners will be connected in parallel with the electrical system and will be installed at or near primary electrical loads within buildings, i.e. Chillers, data centers, large motors, etc. The Power Conditioners will not affect the operation of the electrical system. In the event of a significant surge or spike, the equipment will provide addition protect to electrical equipment.

Savings were calculated using a harmonic reduction spreadsheet calculator. Savings calculations were also performed by the manufacturer's representative.

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UCRM NO.: 3

UCRM NAME: Variable Chilled Water Flow

SUMMARY DATA

All projects are analyzed in the dependent mode and in the following sequence:
Building loads, distribution systems, primary equipment, and utility management systems. All recommended UCRMs are assumed to be installed for dependency purposes.

kWh Savings	116,938	kWh/Year
Natural Gas Savings	0	Therms/Year
Water Savings	0	kgal/Year
Cost Savings	$8,093	Per Year
Implementation Cost	$37,922	
Simple Payback Period	4.7	Years
Est. Useful Life	20	Years

UCRM Description:
Chilled water within the central plants at Brown Heatly is constant flow. This measure includes installation of variable speed drives with electrical bypass to control the speed of the chilled water pump motors. Drives to be located within mechanical room adjacent to or near chilled water pump motors. Variable flow control strategy will be implemented within the building automation system. Chilled water plants to be converted to variable flow:

- Brown Heatly building chilled water system
- Central Service building chilled water system

The following is a summary of the scope of this measure:

- Install and commission variable speed drives to serve chilled water pump motors CH-1, CH-2 and CH-3 at Brown Heatly and chilled water pump motors CH-1 and CH-2 at Central Services
- Coordinate with controls contractor to integrate variable speed drives into building automation system and provide necessary graphics.
- Install differential pressure sensor in chilled water loop
- Verify minimum flow through chiller
- Commission variable flow chilled water pumping system. Control system to vary speed of chilled water pump motors based on system pressure differential.

Energy savings were calculated using the latest version of eQuest (3.64). Prior to calculating savings, baseline models were constructed that provided statistically valid baseline matches.

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UCRM NO.: 4

UCRM NAME: Water Controls

SUMMARY DATA

All projects are analyzed in the dependent mode and in the following sequence:
Building loads, distribution systems, primary equipment, and utility management systems. All recommended UCRMs are assumed to be installed for dependency purposes.

kWh Savings	99,456	kWh/Year
Natural Gas Savings	0	Therms/Year
Water Savings	4,454	kgal/Year
Cost Savings	$74,698	Per Year
Implementation Cost	$287,010	
Simple Payback Period	3.8	Years
Est. Useful Life	20	Years

UCRM Description:
Domestic plumbing fixtures assessed during the facility survey included toilets, urinals, lavatory faucets, kitchen/break room faucets, showerheads, and custodial faucets. This survey included a count of the plumbing fixtures, measurements of the flow rates or flush volumes, and identification of leaks or defects.

Based on the water balance and observations during the water efficiency survey, we identified several opportunities for water savings and developed recommendations for achieving these savings

High Efficiency Toilet (HET) Retrofit

Recommendation: HETs use a maximum of 1.28 gpf, or 20% less water than standard 1.6 gpf toilets. With the passage of the 1992 Energy Policy Act, 1.6 gpf toilets became the standard in the United States. The State of Texas now requires all toilets sold on or after January 1, 2014 to operate at 1.28 gpf or less.

The recommendation involves removal of all existing toilets with flush volumes of 1.6 gpf or greater and replacement with HETs (a total of 203 toilets). This recommendation includes replacing all porcelain and flush valves, which is necessary to ensure that the fixtures work with maximum efficiency.

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High Efficiency Urinal (HEU) Retrofit

Recommendation: HEUs are available that use a maximum of one pint per flush (0.125 gpf), or 87.5% less water than standard 1.0 gpf urinal. With the passage of the 1992 Energy Policy Act, 1.0 gpf urinals became the standard in the United States. New Standards developed by the EPA WaterSense Program are being adopted by the majority of plumbing manufacturers. PSI recommends 0.125 gpf over waterless toilets because of possible sediment and other maintenance issues that arise with waterless toilets.

The recommendation involves removal of 71 high flow urinals with a flush volume of 1.0 gpf. This recommendation includes replacing all porcelain and flush valves, which is necessary to ensure that the fixtures work with maximum efficiency. Failure to install the correct and compatible combination can result in sedimentation of the drain line and other components.

High Efficiency Lavatory Faucet Aerator Retrofit

Recommendation: High efficiency aerators for lavatories typically use 0.5 gpm or less. The recommended action involves replacing 220 lavatory faucet aerators that have a flow rate of 2.2 gpm or greater with new high efficiency aerators having flow rates of 0.5 gpm or less.

High Efficiency Hand Wash Faucet Aerator Retrofit

Recommendation: High efficiency aerators for hand wash faucets typically use 0.5 gpm or less. The recommended action involves installing two high efficiency aerators on kitchen/break room faucets. It is recommended that the faucets be fitted with high efficiency aerators with flow rates not to exceed 0.5 gpm.

High Efficiency Kitchen/Break Room Faucet Aerator Retrofit

Recommendation: High efficiency aerators for kitchens and break rooms typically use 1.5 gpm or less. The recommended action involves installing 41 high efficiency aerators on kitchen/break room faucets. It is recommended that the faucets be fitted with high efficiency aerators with flow rates not to exceed 1.5 gpm.

High Efficiency Showerhead Retrofit

Recommendation: High efficiency showerheads typically use 1.5 gpm or less. The recommended action involves installing five high efficiency showerheads. It is recommended that the showerhead flow rate not to exceed 1.5 gpm.

Water savings were calculated using engineering spreadsheets. Prior to calculating savings, baseline models were constructed that provided statistically valid baseline matches.

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UCRM NO.: 5

UCRM NAME: New DDC Building Automation System

SUMMARY DATA

All projects are analyzed in the dependent mode and in the following sequence:
Building loads, distribution systems, primary equipment, and utility management systems. All recommended UCRMs are assumed to be installed for dependency purposes.

kWh Savings	315,545	kWh/Year
Natural Gas Savings	10,391	Therms/Year
Water Savings	0	kgal/Year
Cost Savings	$25,913	Per Year
Implementation Cost	$489,076	
Simple Payback Period	18.9	Years
Est. Useful Life	20	Years

UCRM Description:

The HVAC system is controlled by an obsolete control system that relies on pneumatic actuation and pneumatic sensors. This measure replaces the existing obsolete controls, with a native BACnet, web-based/accessible and integrated direct digital controls (DDC) building automation system (BAS). Additionally, this measure replaces existing pneumatic valves and damper actuators with electric actuators. All existing pneumatic controls, devices, and associated tubing will be removed from the building. The new DDC system will provide for scheduling, trending, alarms and graphics of the equipment in the building. The scope of this upgrade includes the installation of DDC control for the equipment listed below:

- Chilled Water and Heating Water Central Plants
- (5) Variable Air Volume Air Handling Units
  - AHU-1, AHU-1A, AHU-2A, AHU-1C, AHU-2C, AHU-3B
- (1) Dual Duct Variable Air Volume Air Handling Unit
  - AHU-1B
- (1) Single Zone Air Handling Unit
  - AHU-4
- (1) Packaged Rooftop Unit
- RTU-1
- (43) VAV Boxes with Reheat coils
- (39) VAV Boxes – Cooling Only
- (11) Dual Duct VAV Boxes
- (4) Exhaust Fans

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Energy savings will be realized through temperature set-point adjustments and optimized equipment operation according to occupancy and load conditions. The proposed BAS system will be capable of providing all commonly used energy conservation control strategies. The types of energy management and control sequences to be employed include:

Optimized Mechanical System Schedules

The air handling units are currently operating 24x7 to maintain the desired temperatures in each area. The new BAS will enable scheduling of equipment to reduce operating hours while still maintaining the building comfort during occupied times. Unoccupied times for each day will be identified by the property manager and trends will be utilized to ensure set points are achieved at the start of each occupied period.

Hot Water Reset

The heating load present in the building decreases as outdoor air temperature increases. During periods of rising outdoor air temperature, the temperature of the heating water loop used to provide space conditioning can be reduced. This reduction of hot water loop temperature reduces the amount of energy that must be used to heat the water and reduces the heat loss from the distribution system. The hot water temperature can be adjusted down to more closely match the building load during part-load conditions. The reset control loop will adjust the heating water temperature set-point as a function of outdoor air temperature.

Economizer Control

Some of the existing air conditioning units are equipped to use outside air for cooling when outdoor air conditions permit, however, not all of these units operate properly. The BAS would take over this control so that the system will monitor the outdoor air conditions and modulate the outdoor air and return air dampers to provide a mixed air temperature acceptable for cooling conditions. Economizer control would be done by monitoring outdoor air temperature. When outdoor temperature is below 55°F, economizer control is enabled, the outdoor air and return dampers are positioned to maintain a 55°F mixture, and the mechanical cooling is disabled or at least minimized.

Space Temperature Set-point Scheduling

The required space conditions in the buildings can be changed based on the occupancy schedule. During periods when the building is unoccupied, the set-points would be adjusted to a level so that desired space conditions can be recovered at the beginning of the next occupancy period. This ECM will work with the building management groups to clearly define both the occupancy schedules and space conditions that should be maintained for each building area. The BAS will maintain the set-points and schedules.

During unoccupied periods, the HVAC equipment will operate only when required to maintain conditions at the unoccupied set-point. Additionally, exhaust fans will only be operated during occupied periods.

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Outside air ventilation will be eliminated during unoccupied periods. Optimum start routines will be used to delay the recovery period as long as possible based on outdoor air conditions and historical performance data.

Cooling	
Setpoint	Default Value
Occupied Cooling Setpoint	74°F
Unoccupied Cooling Setpoint	90°F

Heating	
Setpoint	Default Value
Occupied Heating Setpoint	70°F
Unoccupied Heating Setpoint	50°F

Supply Air Temperature Reset

Space temperatures will be maintained first and primarily by varying supply air flows. Secondarily, space temperature will be maintained by supply air temperature reset. Use of supply air temperature reset can increase comfort levels and save energy.

Demand Controlled Ventilation

Existing air conditioning unit outdoor air dampers have minimum position settings to bring in minimum outdoor air for ventilation based on the design maximum number of people in the area served by the system on a continuous basis. Installation of carbon dioxide sensors in the space or return air will allow control of outdoor air dampers to provide the required amount of ventilation air to maintain the level of carbon dioxide (CO_2) below the recommended level. Outdoor air will be adjusted to the required amount for the number of people in the conditioned area on a real time basis. Heating and cooling of excess outdoor air will be eliminated, therefore yielding substantial savings.

Controlled Building Exhaust

Existing building exhaust fans operate 24 hours per day, seven days a week throughout the year. During unoccupied periods when building HVAC systems are off, operation of building exhaust fans results an excessive and uncontrolled infiltration of outdoor air.

The BAS will be used to control the exhaust fans so that they only operate when building HVAC systems are in use.

Points List
Points list is included in Appendix

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UCRM NO.: 6

UCRM NAME: Variable Air Volume

SUMMARY DATA

All projects are analyzed in the dependent mode and in the following sequence:
Building loads, distribution systems, primary equipment, and utility management systems. All recommended UCRMs are assumed to be installed for dependency purposes.

kWh Savings	35,607	kWh/Year
Natural Gas Savings	0	Therms/Year
Water Savings	0	kgal/Year
Cost Savings	$2,925	Per Year
Implementation Cost	$22,753	
Simple Payback Period	7.8	Years
Est. Useful Life	20	Years

UCRM Description:
Air handling unit 1b is a constant air volume unit. This measure includes installed variable speed drives with bypass to control the cold and hot deck supply fans. Drives to be located within mechanical room near fan motors. Variable air volume control strategy will be implemented as part of the new building automation system. Air handling unit fans to be converted to variable air volume:

Building	Air Handling Unit	Supply Fan Motor	Voltage	Area Served
CSB	1B - Cold Deck	40 hp	480 V	First Floor
CSB	1B - Hot Deck	20 hp	480 V	First Floor

The following is a summary of the scope of this measure:

- Install and commission variable speed drives to control the cold and hot deck supply fan motors for AHU-1B
- Coordinate with controls contractor to integrate variable speed drives into building automation system and provide all graphics.
- Commission variable air volume conversion of air handling units. Control system to vary speed of supply fans based on difference between actual space temperature and set point space temperature as well as outdoor air temperature. Fan shall be scheduled off during unoccupied periods.

Energy savings were calculated using the latest version of eQuest (3.64). Prior to calculating savings, baseline models were constructed that provided statistically valid baseline matches.

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UCRM NO.: 7

UCRM NAME: Load Coop Demand Response

SUMMARY DATA

All projects are analyzed in the dependent mode and in the following sequence:
Building loads, distribution systems, primary equipment, and utility management systems. All recommended UCRMs are assumed to be installed for dependency purposes.

kWh Savings	1,139	kWh/Year
Natural Gas Savings	0	Therms/Year
Water Savings	0	kgal/Year
Cost Savings	$1,652	Per Year
Total Project Implementation Cost	$1,323	
Simple Payback Period	0.8	Years
Est. Useful Life	10	Years

UCRM Description:
Austin Energy offers a load cooperative program that allows customers to be paid an incentive for reducing electrical load during peak load periods. Program participants receive a one-hour notice before each use reduction, or curtailment, event. Austin Energy will deliver event start and stop times to you via email, text message, or both, depending on your preference.

Curtailment events are held for up to 3-hour intervals between 4:00 p.m. and 8:00 p.m. from June through September (excluding weekends and holidays). There are approximately 15 curtailment events in the four-month season.

Simple participation strategies include:

- Turning off non-essential lighting, signage, and decorations
- Precooling or cycling refrigeration and HVAC systems
- Delaying non-essential production

After each event, Austin Energy remotely reads your meter to determine incentive payments based on performance. Austin Energy pays participants $1.45 per kWh saved.

The following is a summary of the scope of this measure:

- Add a Load Coop setting to the building automation systems at Central Services
- The Load Coop setting will reduce building electrical demand by reducing the load on the central plant and air handling units
- The Load Coop setting will raise space temperature set points between 4:00 pm and 5:00 pm and then further raise these set points after 5:00 pm

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Energy savings calculations are documented in the appendix and additionally were calculated using engineering spreadsheets.

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Energy savings calculations are documented in the appendix and additionally were calculated using engineering spreadsheets.

Summary Saving Analysis Table

Building		Baseline			Guaranteed Savings					
Building Name & UCRTA	Sqft w/o Parking Garages	Electricity (kWh)	Natural Gas (CCF)	Water WW (gal)	Electricity (kWh)	% Savings	Natural Gas (CCF)	% Savings	Water WW (gal)	Savings
Brown Weatly Totals	288,234	8,646,963	175,332	8,782,000	6,697,812	19%			1,283,878	15%
1-LED Lighting					1,290,055					
2-Power Conditioning					253,695					
3-Variable Chilled Water Flow					86,940					
4-Water Controls					36,542				1,283,878	
Central Services Totals	111,936	2,084,400	50,873	2,235,600	701,918	34%	10,381	20%	494,354	22%
1-LED Lighting					278,257					
2-Power Conditioning					55,734					
4-Water Controls					14,336					
5-Building Automation System					315,945		12,381			
6-Variable Air Volume					35,607					
7-Load Coop Demand Response					1,139				494,354	
Thomas J. Rusk Totals	74,461	1,653,000	22,700	966,300	348,621	21%			488,896	40%
1-LED Lighting					297,267					
2-Power Conditioning					48,326					
4-Water Controls					7,983				488,896	
William P. Hobby Totals	312,246	9,169,000	433	7,367,000	6,872,254	20%			2,206,580	30%
1-LED Lighting					1,533,760					
2-Power Conditioning					297,878					
4-Water Controls					40,594				2,206,580	

Performance Services

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II. DETAILED COMMISSIONING PLAN

Systems Start-up and Commissioning & Operating Parameters

1.0 General

Performance Services shall commission the UCRMs, including major equipment and systems, to ensure they are set up to operate as intended and as required to achieve the guaranteed savings. During the final design and construction phases, Performance Services shall develop testing, commissioning and start-up procedures for the equipment, components and systems installed for the UCRMs. These procedures shall be in accordance with the manufacturers' guidelines, system performance objectives, and sequences of operation. Additionally, Performance Services will provide training and instruction for the operation and maintenance of the UCRMs.

Performance Services will provide and be responsible for the commissioning and start-up of all UCRMs at TFC. This is accomplished as a continuation with the same team that developed and constructed and engineered the project. Commissioning is the act of statically and dynamically testing the installed equipment and systems, making sure the installed systems work and perform as they were designed. Although a simple concept, it is often overlooked and tremendously important. Because we guarantee energy savings, Performance Services has a vested interest that all systems, equipment, and controls work as designed and produce the intended results. The commissioning planning process begins during project development phase and is finalized during the implementation phase.

Performance Services believes that commissioning is a team activity, involving not only the Performance Services personnel, but also the customer's personnel, manufacturer's representatives, control technicians and the appropriate subcontractor. The commissioning plan is a valuable tool – for both Performance Services and all TFC stakeholders involved with the project. It will accomplish the following:

- Verify compliance with specific equipment installation requirements and UCRM design intent
- Verify compliance with a facility's specific performance requirements
- Establish UCRM functional testing protocol and parameters
- Identify unique or seasonal testing requirements
- Coordinate testing requirements for M&V purposes
- Verify completion of commissioning activities and customer concurrence as appropriate

During the Construction Phase, Performance Services will finalize a detailed commissioning plan specific to the UCRMs selected by TFC. Performance Services' commissioning is a comprehensive process that is an integral part of the design, construction, and operational phases of a project. It will, at a minimum, confirm that the systems and equipment installed by Performance Services fully function as intended and as designed.

The procedures, methods, documentation, and signoff requirements in the plan shall cover each phase of the commissioning process from pre-design through final acceptance and post-occupancy. All equipment will be fully tested and operationally verified in accordance with the manufacturer's operating parameters, requirements and recommendations. Additionally, Performance Services may utilize an authorized manufacturer's representative or qualified consulting engineer, to inspect and approve

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system installation for major equipment items (i.e., air valves, fan-walls, chillers, VAV terminal units, VSDs, controls, etc.).

Overview of Commissioning Process

Commissioning (Cx) is a systematic process of ensuring that all building systems perform interactively according to the design intent and the UCRM performance requirements. This is achieved through a complete commissioning process; beginning at the design phase with documented design and operating intent and continuing through construction and acceptance phases, with actual verification of performance.

Commissioning activities during the design phases are intended to achieve the following specific objectives:

- Provide a plan for the implementation of the commissioning process, including the initial scope of systems to be commissioned for the project.
- Ensure that the design and operational intent are clearly documented.
- Provide a design review focusing on system performance, maintainability, and adherence to UCRM performance requirements.
- Ensure that commissioning for the construction phase is adequately reflected in the bid documents.
- Ensure the various members of the commissioning team clearly understand their responsibilities in their commissioning roles.
- Ensure the applicable equipment and systems are installed properly and receive adequate preoperational checkout.
- Verify and document proper performance of equipment and systems.
- Ensure that operation and maintenance documentation is provided for the continued management of the facility after the construction project is complete.
- Ensure proper training of facilities management, Performance Services Operation & Maintenance and Performance Services Measurement & Verifications personnel.
- This plan does not provide a detailed explanation of required testing procedures. The detailed testing requirements and procedures will be found in the Commissioning Manual and contract specifications to be developed after UAR acceptance. Additionally, this plan does not provide extensive narrative on all commissioning concepts, as may be provided in other commissioning guides.

UCRM specific commissioning check lists will be provided as a separate submittal after the 100% design phase.

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5 DETAILED PROJECT MANAGEMENT PLAN

The purpose of this plan is to provide the necessary controls, supervision, inspections, tests and documentation for the utility cost reduction measures and definable features of work (DFOW) required by the Contract. Conformance to this plan will ensure compliance with the Contract documents and applicable standards related to materials, equipment, craftsmanship, finish and functional performance. This plan will assure quality results in keeping with budget, scope and schedule requirements. The Performance Services project management planning is compatible with project management processes and knowledge bases developed by Project Management Institute for the Project Management Professional® certification.

This plan will be accomplished with a Four-Phase process:

- Preparatory
- Initial
- Follow-up
- Functional Testing & Commissioning

The Quality Control plan will cover all suppliers and subcontractors, as well as Performance Services staff.

Performance Services, through the utilization of this Quality Control Plan, strives to obtain a uniform, high quality level of workmanship throughout design, procurement, fabrication construction, start-up and functional testing. To achieve this standard, the following policies will be followed:

1. Assure high quality by maintaining supervised controls and written instructions governing quality control procedures and practice.
2. Establish clearly defined responsibilities and authorities responsible for compliance.
3. Comply with the contractual requirements, specifications, standards, and the Quality Control Plan.
4. Maintain a document tracking system that would provide objective evidence of compliance to the Contract documents.
5. Initiate proactive procedures which would anticipate and pre-empt deficient practices which might lead to unsatisfactory quality.
6. Identify discrepancies in quality for immediate corrective action.
7. Assure that corrective action is implemented properly and in a timely manner.

The Quality Control Assurance Team shall coordinate with jobsite personnel to assure compliance with the quality control requirements of the project, and successfully implement the procedures contained in this plan. The responsibilities of the Team are as follows:

- Provide review of design documents.
- Maintain documentation files and logs.
- Coordinate the quality control efforts of the subcontractors.
- Coordinate the activities of outside testing agencies.
- Check craftsman qualifications and certifications as part of standard submittal review.
- Conduct technical submittal reviews to support the Performance Services Construction Department.
- Lead the Preparatory Meetings.
- Develop and maintain the master inspection and test register and track completion of inspection and testing activities.
- Perform and document Initial, Follow-Up and Final Inspections.

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- Generate and manage Work Completion lists.
- Administer Discrepancy Reports.
- Administer the Final Punch List.
- Complete Construction Quality Control (CQC) Reports.

The Quality Control/Assurance process is designed to have direct effect on the work at the sites. The organization shall employ a four-phase process to provide the highest degree of accountability and compliance possible. The Four-phase process will be covered in detail in Section 6.0 Quality Control Process. This team and process are designed to prevent errors and omissions before they occur.

PREPARATORY PHASE – This phase shall be performed prior to beginning work on each URCM. Prior to the preparatory phase meeting, the Quality Control Assurance Team must examine carefully the contract plans and specifications for the particular feature of work. With a thorough knowledge of the Contract requirements, the Quality Control Assurance Team can assure all necessary items pertaining to the work are covered. The Quality Control Systems Manager is in charge of the meeting. He must ensure that the proper people representing the contractor and/or subcontractors who will be involved in the URCM and definable feature of work are present. He must provide notice to the Owner's representative as to when the meeting will be held. A successful Preparatory Phase results in a clear understanding of the work and the standards to which the work will be evaluated. The meeting shall also result in a list of steps to be employed to ensure common deficiencies are eliminated. Minutes will be prepared and attached to the Construction Quality Control Daily Report.

INITIAL PHASE - This phase must be accomplished at the beginning of any URCM and definable feature of work. The "Initial Phase" will verify that control for the work developed in the "Preparatory Meeting" is implemented and the work is performed at the level of workmanship that is mutually agreed upon. This sets the standard of workmanship for this feature of work. This phase is where all differences are resolved. Safety is checked to include compliance with the Environmental Site Specific Safety and Health Plan (ESS&HP) and Activity Hazard Analysis is reviewed during the "Preparatory Meeting." The Owner's representative shall be notified in advance of the "Initial Phase" inspection. The results will be documented and attached to the Quality Control Daily Reports. The purpose is to ensure the work methods, materials, and the workmanship all comply with the approved design documents. The primary emphasis is on the effectiveness of the controls put into practice. Minutes will be prepared and attached to the CQC Daily Report.

FOLLOW-UP PHASE - This shall be performed to assure continuing compliance with contract requirements, including control testing, until completion of the particular feature of work. The Quality Control Assurance Team should continually refer back to the standards set in the "Preparatory and Initial Phases." The primary emphasis is on the continued effectiveness of the controls established in the Preparatory Phase and demonstrated in the Initial Phase. Both the QC Systems Manager and the CQC Manager will document this activity in their respective daily reports. The preceding phases were accomplished as a team. However this phase involves the separate observation of the QC Systems Manager and the CQC Manager.

FUNCTIONAL TESTING and COMMISSIONING PHASE - This is the final phase. Commissioning is critical in ensuring the system (especially mechanical systems) performs as intended per the contract.

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CONSTRUCTION CLOSEOUT

Performance Services shall use all reasonable efforts to install the Equipment and perform all Services hereunder in accordance with the Installation Schedule and the Scope of work. Performance Services will cooperate and coordinate with TFC as to facilitate Performance Services performance.

Upon the completion of each URCM and/or per each location, Performance Services will request formal inspection from TFC. Each of the items of Equipment shall be inspected by Performance Services, TFC and Performance Services Contractor. These inspections can be scheduled on a weekly basis by means of the construction progress meeting to be held throughout the duration of the Project. The installation of Equipment and Performance Services related Services shall have achieved substantial completion ("Substantial Completion is defined as having beneficial use of equipment") when all Equipment has been physically constructed and installed in accordance with the Equipment/Services Scope Document, except for minor items of work that will not materially affect safe and substantial normal use and operation of the Equipment taken as a whole (such minor items of uncompleted work shall constitute the "Punch List") and the Equipment has successfully completed such operational tests, in accordance with operational standards established by the Equipment manufacturers.

When Performance Services determines that Substantial Completion has been achieved, Performance Services shall provide TFC a Substantial Completion Notice, along with a list of punch list items of work outstanding and request a formal inspection. TFC shall accept the Substantial Completion Notice if the applicable requirements of scope of work for that particular URCM have been satisfied and inspected. Within ten days after receipt of Performance Services Substantial Completion Notice, TFC shall inspect and respond to Performance Services in writing either confirming that Substantial Completion has been achieved or if reasonable cause exists, rejecting such Substantial Completion Notice and specifying in detail the reasons therefore.

If TFC rejects Performance Services Substantial Completion Notice and/or Punch List, Performance Services shall complete, correct or explain the deficiem aspect of its Services, the Substantial Completion Notice or the Punch List, as the case may be, and shall submit an amended Substantial Completion Notice and/or Punch List, as appropriate, whereupon TFC shall once again respond thereto as provided above.

The date of Substantial Completion shall be deemed to be and relate back to the date upon which Performance Services submitted to TFC the Substantial Completion Notice which is either approved or deemed approved with comments or punch list by TFC.

Generally the installation of Equipment and Performance Services related Services hereunder shall have achieved final completion ("Final Completion") when Substantial Completion has been achieved and all Punch List items have been completed. When Performance Services determines that Final Completion has been achieved, Performance Services shall provide TFC a Final Completion Notice. TFC shall accept Performance Services Final Completion Notice if the applicable requirements of the URCM have been satisfied. Within ten days after receipt of Performance Services Final Completion Notice, TFC shall respond to Performance Services in writing either confirming that Final Completion has been achieved or if reasonable cause exists, rejecting such Final Completion Notice and specifying the Punch List items which have not been completed.

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If TFC rejects Performance Services Final Completion Notice, Performance Services shall complete, correct or explain the deficient aspect of its Services or the Final Completion Notice, as the case may be, and shall submit an amended Final Completion Notice, whereupon TFC shall once again respond thereto as provided above. The date of Final Completion shall be deemed to be and relate back to the date upon which Performance Services submitted to TFC the Final Completion Notice which is either approved or deemed approved.

POST CONSTRUCTION SERVICES

Performance Services Project Management staff will coordinate, schedule and provide training on all the UCRMs implemented. Operation and Maintenance Manuals will be provided in hard copy and electronically. The O&M Manuals will include product data, commissioning and Labor and Material warranties. The warranty documents will clearly outline the procedures for material and labor warranties. Performance Services will assist TFC with all warranty issues to ensure a quick, smooth and reasonable solution with all materials and workmanship.

Performance Services can offer and manage maintenance plans, re-commissioning plans to ensure that the equipment is maintained, operating properly and achieving the savings as required.

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VI. PROJECT FINANCIAL ANALYSIS

The following provides details of the project necessary to quantify cost of installed equipment, guaranteed savings and payback.

		ANNUAL SAVINGS									
UCRM No.	UCRM Title	Electric Energy (kWh/yr)	Demand (kW/yr)	Electric ($/yr)	Natural Gas (therm)	Natural Gas ($/yr)	Water/Sewer (gal/yr)	Water/Sewer ($/yr)	Total Savings	Project Cost ($)	Payback (yrs)
1	LED Lighting w/ Lite Sensors	2,379,135	0.750	$268,305	0	$0			$66,877	$1,236,768	7.0
2	Power Conditioning	659,504	686	$85,617	0	$0			$7,256	$372,848	7.0
3	Variable CHW Flow	116,978	142	$8,093	0	$0			$0	$37,922	4.7
4	Water Controls	99,456	136	$7,047	0	$0	$4,454	$67,650	$0	$207,010	3.8
5	Building Automation System	315,545	78	$28,825	10,391	$4,558			$0	$489,076	16.9
6	Variable Air Volume	32,607	49	$2,925	0	$0			$0	$22,753	7.8
7	Load Coop Demand Response	2,339	0	$1,152	0	$0			$0	$1,313	0.8
Totals		6,605,915		$348,569	10,391	$4,558	4,454	$67,650	$61,983	$2,447,700	

Contract Term	10 Years	
Utility Assessment Report Cost	$105,000	
P&P Bonding Cost	$47,300	
Design Costs	$216,000	5.9% of project cost (included in above UCRMs)
Construction Management Cost	$212,331	5.8% of project cost (included in above UCRMs)
IMPLEMENTATION TOTALS	$3,600,000	Total cost of project
Guaranteed Savings	$466,135	Utility and maintenance savings
Simple Payback (Excluding Financing Cost)	7.4	Years
On-going M&V Service Cost	$350,000	Maximum cost - May be cancelled at any time
Guaranteed Utility Rebate	$125,000	
Non Energy Savings (Lighting Materials & PT)	$67,983	Shown above

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10 Year Cash Flow

Total Construction Cost	$	3,495,000
Investment Grade Audit	$	100,000
Performance Bond (if required)		
Finance Fees to Lessor (Legal, insurance, placement, closing, etc.)	$	
Construction Period (Months)		10.0
Construction Interest (Capitalized) - Optional	$	
Guaranteed Utility Rebate ($175,000 included in Year 1 of Other Savings below)		
Total Construction amount including incidental expenses	$	3,595,000
Term of Financing: 10 years		
TOTAL AMOUNT FINANCED USING 3.00% INTEREST RATE	$	3,500,000

	Guaranteed Savings			Payments					
Year	Energy	Other Savings	Total	Annual Debt Service	Annual Service Cost	Annual Maintenance Cost	M&V Services	Total Annual Payments	Projected Net Cash Flow 5
1	2	3	4	5	6	7	8	9	10
0	$84,440	$12,587	$97,027	$0	$0	$0	$0	$0	$97,027
1	$422,201	$237,933	$660,135	$400,776	$0	$0	$40,000	$440,776	$219,359
2	$422,201	$62,933	$485,135	$400,776	$0	$0	$40,000	$440,776	$44,359
3	$422,201	$62,933	$485,135	$400,776	$0	$0	$40,000	$440,776	$44,359
4	$422,201	$62,933	$485,135	$400,776	$0	$0	$40,000	$440,776	$44,359
5	$422,201	$62,933	$485,135	$400,776	$0	$0	$40,000	$440,776	$44,359
6	$422,201	$54,582	$476,783	$400,776	$0	$0	$40,000	$440,776	$36,007
7	$422,201	$54,582	$476,783	$400,776	$0	$0	$40,000	$440,776	$36,007
8	$422,201	$54,582	$476,783	$400,776	$0	$0	$40,000	$440,776	$36,007
9	$422,201	$54,582	$476,783	$400,776	$0	$0	$40,000	$440,776	$36,007
10	$422,201	$54,582	$476,783	$400,776	$0	$0	$40,000	$440,776	$36,007
Total	$4,306,464	$775,160	$5,081,614	$4,007,755	$0	$0	$390,000	$4,397,755	$683,859

Notes by Column:

1. The projections reflect the economic benefits over a 10-year term and during the construction period (yr. 0).
2. Assumes an annual increase in energy costs per year of 0%. Currently TPC electric rate is scheduled to go up in May 2017.
3. Includes Power Factor Correction, Lighting Maintenance savings and Guaranteed Utility Rebate (Year 1). Savings reflect a 7-year Extension on all LED lighting fixtures (7-year warranty).
4. Sum of Energy and Other Savings.
5. Annual estimated debt service. Paid monthly after Commencement Date (Variable conditions of project based on financing at 2.0% over 10 years).
6. Annual service Cost. Assumes an annual increase for inflation of 0%.
7. Annual maintenance labor costs for replacing failed LED lamps during warranty/guarantee period.
8. Measurement and Verification Services. Assumes an annual increase for inflation of 0%. The M&V cost assumes $0 and estimated 3rd party amount.
9. Total projected annual payments.
10. Represents net annual cash flow.
11. Guaranteed Utility Rebate: Assumes TPC submits and fully supports rebate applications with Alabama Energy.

This document exhibits Performance Services Trade Secrets and Confidential information that is to be used by the addressee for evaluating the RFQ proposal. Addressee shall not disclose the Confidential information to third parties without written consent of Performance Services.

ANALYST CERTIFICATION

State Agency/Owner: Texas Facilities Commission

ESCO/Contractor: Performance Services, Inc.

Contract Name/Number: Energy Savings Performance Contracting/15-020-0802

Date of Review: July 19, 2016

SECO requires that the Utility Assessment Report be developed in accordance with the Texas Performance Contracting Guidelines as administered by the State Energy Conservation Office (SECO).

Yes	No		
☒	☐	1)	Does the Utility Assessment Report contain an Executive Summary, as prescribed in the guidelines? Document: UAR Page reference(s): 4
☒	☐	2)	Does the Utility Assessment Report contain a General Facilities Description in the prescribed in the guidelines? Document: UAR Page reference(s): 9
☒	☐	3)	Does the Utility Assessment Report contain a Base Year Utility Consumption Data as prescribed in the guidelines? Document: UAR Page reference(s): 18
☒	☐	4)	Does the Utility Assessment Report contain a Technical Analyses, as prescribed in the guidelines? Document: UAR Page reference(s): 25
☒	☐	5)	Does the Utility Assessment Report contain a Project Financial Analyses as prescribed in the guidelines? Document: UAR Page reference(s): 46

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I certify that the data and the cost reduction estimates presented are factual, accurate, reasonable, and in accordance with generally accepted engineering practices to the best of my knowledge, and that this knowledge is based on documents provided by the Owner or the Owner's representative, and on the analyst's on-site investigation of the facilities involved.

The answers I have provided are to the best of my knowledge and in my best professional judgment.

signature

David M. Temming
(printed name)

Lead Engineer
title or position

3010 LBJ Freeway
mailing address

Suite 1200
(street address)

Dallas, Texas
City, Texas

214-789-1001
office telephone number

dtemming@performanceserv.com
Email address

95384
Texas P.E. Registration Number

STATE OF TEXAS
DAVID M. TEMMING
95384
LICENSED
PROFESSIONAL ENGINEER

7/29/2016

Affix Official P. E. Seal

(Only if signed by Engineer)

FOR SECO USE ONLY

Date Received: 11/4/16

Approved By: Fred Tulus

Date Approved: 11/7/16

Or

Date Returned to Agency: _____

Comments: _____

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VIII. APPENDICES

This document contains Performance Services Trade Secrets and Confidential Information to be used by the addressee for evaluating the PSI proposal. Addressee shall not disclose the Confidential information to third parties without written consent of Performance Services.

Closed Rate Schedule

Application:
THIS RATE SCHEDULE IS CLOSED TO NEW CUSTOMERS. This rate schedule applies to electric service whose point of delivery is located within the limits of Austin Energy's service territory.

Character of Service:
Service provided under this rate schedule are pursuant to City Code Chapter 15-9 (*Utility Service Regulations*) and the City of Austin Utility Criteria Manual, as both may be amended from time to time and such other rules and regulations as may be prescribed by the City of Austin. Electric service of one standard character will be delivered to one point of service on the customer's premises and measured through one meter unless, at Austin Energy's sole discretion, additional metering is required.

Terms and Conditions:
Customers shall permit Austin Energy to install all equipment necessary for metering and permit reasonable access to all electric service facilities installed by Austin Energy for inspection, maintenance, repair, removal, or data recording purposes. All non-kilowatt-hour charges under this schedule shall remain unaffected by the application of a rider(s).

Large Service Contract (Closed)

Application:
These rates are only available to the State of Texas and apply to a large service contract (LSC) customer that executed a separate contract for this service on or after October 9, 2006, in form and substance acceptable to Austin Energy, but before May 24, 2012. The contract requires the customer to remain a full requirements customer of Austin Energy through May 31, 2017, on which date the customer's contract and the terms of this rate schedule shall terminate. If Austin Energy subsequently adopts a rate schedule that provides more favorable rates, terms, or conditions than provided by this rates schedule and which describes a customer class for which the customer's large service contract accounts qualify, then the customer may terminate its contract and receive service pursuant to such subsequent rate schedule. Austin Energy enters and executes the contract and assumes its obligation in its proprietary capacity as the owner and operator of a utility enterprise increasingly in competition with other power suppliers for the attraction and retention of industrial loads, and in order to induce customer to remain a customer of Austin Energy. This rate schedule shall be effective through May 31, 2017, for all contracts between Austin Energy and the State of Texas.

Terms and Conditions:
Services under this rate schedule are eligible for application of Time-Of-Use Rates and Thermal Energy Storage (Rider) attached to them.

The LSC rates begins on the first day of the customer's billing cycle following the date that a separate contract has been executed between Austin Energy and the State of Texas, and shall be in effect for a period of thirty-six (36) months thereafter.

Not earlier than the first day of the thirty-seventh month after the effective date and not later than the last day of the seventy-second month after the effective date, a most favored nations clause applies (which clause does not apply to a rate paid by a governmental entity of the State of Texas, that is mandated by Federal or State law, the Public Utility Commission, a judicial body, or a retail pilot program affecting a customer of Austin Energy). It is the intent of this provision that the most favored nations clause will not

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apply unless Austin Energy voluntarily charges a lower rate to another LSC customer (who receives power at 12,500 volts or higher and has a demand for power that meets or exceeds 3,000 kW for any two months within the previous twelve months). If Austin Energy is required by Federal or State law, the Public Utility Commission, or a judicial body to charge a lower rate to a customer or group of customers, then the most favored nations clause does not apply.

For the remainder of the term of the contract after the seventy-second month after the effective date, Austin Energy may keep customer loads on-system by exercising a continuing right of first refusal to match the best offer of any competing suppliers. Austin Energy shall have until the later of sixty (60) months from the effective date, or seventy-five (75) days from the date it receives proper notice from Customer to exercise its right of first refusal. All such alternative proposals may be disclosed to Austin Energy on a confidential trade secret basis to the extent permitted by law, and shall be supported by a sworn affidavit signed by a corporate officer of the customer involved.

For the remainder of the term of the contract after the seventy-second month after the effective date, provided that retail competition in the electric utility industry in Texas is allowed and is available in Austin, Texas, Austin Energy shall not be obligated to charge the customer the service contract rates. In the event that retail competition is not allowed in Texas, or is not available in Austin, Texas, the customer shall continue to take power from Austin Energy at the LSC rates and be subject to extended application of the most favorable nations clause, until the end of the term of the contract.

These service contract rate schedules do not obligate Austin Energy to match the best offer of any competing supplier. In addition, nothing herein shall obligate Austin Energy to match any portion of an offer or other consideration not directly related to the supply of electric energy (i.e. generation, transmission and distribution) to the customer's facilities in the Austin area. In other words, Austin Energy would be required to match the total delivered cost of electric energy to the customer.

Contracts entered into under the provisions of these service contract rate schedules shall protect the integrity and enforceability of the City's right of first refusal. After a customer commences to purchase electric generation from a competing supplier (and Austin Energy fails to exercise its right of first refusal or to match the offer of a competing supplier), provision of generation service by Austin Energy to that portion of customer's total load removed from Austin Energy Electric System shall thereafter be at the sole option of Austin Energy. However, Austin Energy shall have a continuing obligation to provide transmission and distribution services, including ancillary services if needed, pursuant to its tariffs and the Public Utility Commission's Substantive Rules or other applicable laws and regulations.

A customer may not submit bids or offers received from competing suppliers, and thereby cause or require Austin Energy to exercise its right of first refusal in accordance with the terms of this tariff, more than once every twelve months.

Nothing in these service contract rate schedules or a contract under these service contract rate schedules shall operate to prevent, prohibit, or delay Austin Energy from recovering "stranded" costs from the customer, to the extent authorized by law, including those described in the Public Utility Regulatory Act.

If, notwithstanding the foregoing paragraph, any subsequent legislation would in any way operate to prevent, prohibit or delay recovery of the full amount, otherwise authorized by law, of "stranded" costs through any surcharge or additional charge or any new or revised rate level or element solely because of the existence or contents of these service contract rate schedules or the contract then the contract rates specified in these service contract rate schedules for energy, demand and fuel shall be deemed to be changed by an amount designed to exactly equal the revenue Austin Energy would otherwise recover but for the existence or contents of these service contract rate schedules or contract. Any such change shall

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take effect on the same date that the surcharge, additional charge or new or revised rate level or element would otherwise go into effect. If necessary the change may take the form of a one-time charge assessable prior to or after customer switches generation suppliers. To the extent possible, while still allowing full recovery of the otherwise authorized amount, the change shall be incorporated into prospective monthly recurring charges.

The contract to be signed by customer shall explicitly incorporate the terms of the preceding two paragraphs, and also provide that the results contemplated by such paragraphs are essential and non-severable terms of the contract.

Notwithstanding any provision of these special contract rate schedules, neither customer nor Austin Energy shall be precluded from challenging the legal validity of any statute, regulations, or other provisions of law.

This rate schedule shall be extended to all of an LSC customer's accounts having a maximum demand of at least 500 kW.

Upon request, customers receiving service under these service contract rate schedules will be provided dual feed service with reserve capacity and maintenance under the 10 year long contract provisions of the Service Contract Rider, except that the customer will be responsible for the initial assessment fee, customer requested changes to the initial assessment, and facilities design and construction costs, as established in the fee schedule. Dual feed service with reserve capacity is electric service provided to the customer's premise(s) through two (or more) independent distribution feeders, with one feeder in normal service and the other in back-up service, capacity is reserved for the second feeder, and is placed into service upon an outage of the primary feeder.

If it is determined at any time by Austin Energy that the customer violated the provisions of these special contract rate schedules or the contract implementing the tariff, then the customer will be immediately billed on the LSC rate schedule, or as amended, from the date service was first commenced under these special contract rate schedules. The difference, plus interest at one percent (1%) per month, or the maximum allowable legal interest rate, whichever is less, from the date service was first commenced under these special contract rate schedules, shall immediately become due by customer to Austin Energy.

The contract executed under these special contract rate schedules shall address the rights of the City and the customer relating to the transfer or assignment of rights under these special contract rate schedules.

Definitions:

- Full Requirement Service – means generation, transmission, and distribution, (i.e., "bundled") service as presently supplied by City of Austin to customer, provided however, that the customer may self-generate up to 500 kW of its requirements from customer-owned, on-site renewable energy technology, subject to the terms and conditions of Austin Energy's Non-Residential Distributed Generation from Renewable Sources (Rider).

- Best Offer – means the cost of generation of a competing supplier, plus other costs, fees or expenses that a customer incurs in order to bring the generation to its point of service, including but not limited to: 1) transmission wheeling costs to Austin Energy Electric System, 2) transmission and distribution wheeling costs to the customer's point of service, and 3) costs to install or construct any on-site generation, interconnection or metering facilities.

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- Competing Suppliers – includes, but is not limited to, a provider of generation services, energy services, and ancillary services, whether or not the supplier is located inside Austin Energy's current service territory, to the extent that the provider is permitted by law to serve the customer load.

- Billing Demand – the kilowatt demand during the fifteen-minute interval of greatest use during the current billing month as indicated or recorded by metering equipment installed by Austin Energy. When customer's power factor during the interval of greatest use is less than 85 percent, Billing Demand shall be determined by multiplying the indicated demand by 85 percent and dividing by the lower peak power factor; provided, however, the power factor adjustment specified in this paragraph shall be superseded by any subsequent rate schedule or ordinance governing power factor that may be enacted or amended by Austin Energy from time to time.

- Power Supply Adjustment (PSA) – plus an adjustment for variable costs, calculated according to the Power Supply Adjustment rate schedule, multiplied by the billable kWh.

Time-Of-Use Periods

	On-Peak Hours	Off-Peak Hours
Summer (May through October)		
Monday – Friday	*1:00 P.M. – 9:00 P.M.*	*9:00 P.M. – 1:00 P.M.*
Saturday, Sunday, and Holidays[1]	*None*	*12:00 A.M. – 12:00 A.M.*
Non-Summer (November through April)		
Monday – Friday	*500 A.M. – 10:00 P.M.*	*10:00 P.M. – 5:00 A.M.*
Saturday, Sunday, and Holidays[1]	*None*	*12:00 A.M. – 12:00 A.M.*

Monthly Charges:
Customer will be assessed a monthly minimum bill of $12.00, if the below calculation result in a charge of less than $12.00.

Standard Rates

	Summer (May through October)	Non-Summer (November through April)
Demand Charges ($/kW)		
All kWs	$12.54	$11.40
Energy Charges ($/kWh)		
All kWhs	$0.01110	$0.01110
Power Supply Adjustment ($/kWh)		
All kWhs	$0.03068	$0.03068

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Secondary Voltage (Demand greater than or equal to 50 kW)

These rates apply to any customer whose average metered peak demand for power during the most recent June through September billing months met or exceeded 50 kW, or as decided by Austin Energy, if insufficient usage history is available. Demand data will be reviewed annually in October to assign customers to a respective rate schedule.

These rates shall apply for not less than twelve months following the last month in which the required metered demand level was met. The twelve month requirement may be waived by Austin Energy, if a customer has made significant changes in their connected load, which prevents the customer from meeting or exceeding the minimum-metered demand threshold of this rate schedule and Austin Energy has verified these changes.

Standard Rates

This is the default rate option under this schedule

	Inside City Limits	Outside City Limits
Basic Charges		
Customer ($/month)	$65.00	$65.00
Delivery ($/kW)	$4.50	$4.47
Summer Charges – June through September		
Demand Charges ($/kW)	$7.85	$7.81
Energy Charges ($/kWh)	$0.02247	$0.02234
Non-Summer Charges – October through May		
Demand Charges ($/kW)	$6.85	$6.81
Energy Charges ($/kWh)	$0.01747	$0.01737
Power Supply Adjustment Charge ($/kWh)		
Power Supply	$0.03139	$0.03139
Community Benefit Charges ($/kWh)		
Customer Assistance Program	$0.00065	$0.00065
Service Area Lighting	$0.00068	$0.00000
Energy Efficiency Services	$0.00198	$0.00198
Regulatory Charges ($/kW)		
Regulatory	$4.43	$4.43
Supplemental Regulatory	$0.00	$0.17

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City of Austin, Texas
Austin Water Utility

WATER SERVICE RATES - COMMERCIAL CUSTOMERS
Approved Rates
Effective November 1, 2014

MONTHLY CUSTOMER ACCOUNT CHARGE:

Meter Size	Customer Account Charge Per Month	Equivalent Meter Charge Per Month	Fire Protection Component Per Month	Commercial Monthly Minimum Fixed Charge	Total Customer Charge Per Month
5/8	$ 4.83	$ 2.24	$ 0.48	$ 7.67	$ 15.22
3/4	4.83	5.68	2.49	12.00	25.00
1	4.83	5.85	3.34	19.00	33.00
1 1/4	4.83	7.66	3.51	29.00	45.00
1 1/2	4.83	13.15	5.02	38.00	61.00
2	4.83	17.47	13.70	61.00	97.00
3	4.83	34.79	19.38	123.00	182.00
4	4.83	63.64	49.53	192.00	310.00
6	4.83	129.78	103.39	383.00	621.00
8	4.83	211.93	659.24	613.00	1,489.00
10	4.83	316.57	714.60	882.00	1,918.00
12	4.83	418.35	802.82	1,303.00	2,529.00

Volume Unit Charges: All Volumes

Commercial	Off Peak	$	5.98
	Peak		6.58

Water Revenue Stability Reserve Fund Surcharge:

	UNIT RATE PER 1,000 GALLONS
All Volumes	$ 0.19

Performance Services

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City of Austin, Texas
Austin Water Utility

WASTEWATER SERVICE RATES - RETAIL CUSTOMERS
Approved Rates
Effective November 1, 2014

MONTHLY CUSTOMER ACCOUNT CHARGE:

Customer Account Charge ($/month)	$	10.30

VOLUME UNIT CHARGE: ALL VOLUMES

	UNIT COST PER 1000 GALLONS	
Single-Family		
0 - 2,000 Gallons	$	4.51
2,001 - over Gallons		9.13
Multifamily	$	8.79
Commercial	$	8.82
Large Volume		
Freescale	$	8.16
Hospira		8.38
Samsung		7.42
Novati		7.32
Spansion		7.51
University of Texas		8.82

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B. DETAILED BACKUP CALCULATIONS & COMPUTER INPUT/OUTPUT SHEETS

Spreadsheet Analysis

1. UCRM #1 - LED Lighting Savings (All Sites)
2. UCRM #2 - Power Conditioning Savings (All Sites)
3. UCRM #3 - Variable Chilled Water Flow Savings (CSB)
4. UCRM #4 - Water Controls Savings (All Sites)
5. UCRM #6 – Variable Air Volume (CSB)
6. UCRM #7 – Load Coop Demand Response

Modeling Output

1. UCRM #3 - Variable Chilled Water Flow Savings (BHB)
2. UCRM #5 – Building Automation System (CSB)

Building Controls Summary

Brown Heatly Building

	Annual HVAC Hours	Unoccupied Setback	Deck Resets	OD Air Optimization	CHW Reset	HW Reset
Baseline Conditions	8,760	No	No	No	No	No
Proposed Conditions	3,700	Yes	No	No	No	No

Central Services Building

	Annual HVAC Hours	Unoccupied Setback	Deck Resets	OD Air Optimization	CHW Reset	HW Reset
Baseline Conditions	8,760	No	No	No	No	No
Proposed Conditions	3,700	Yes	Yes	Yes	Yes	Yes

Thomas J. Rusk

	Annual HVAC Hours	Unoccupied Setback	Deck Resets	OD Air Optimization	CHW Reset	HW Reset
Baseline Conditions	8,760	No	No	No	No	No
Proposed Conditions	3,700	Yes	Yes	Yes	Yes	Yes

William P. Hobby

	Annual HVAC Hours	Unoccupied Setback	Deck Resets	OD Air Optimization	CHW Reset	HW Reset
Baseline Conditions	8,760	No	No	No	No	No
Proposed Conditions	3,700	Yes	No	No	No	No

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UCRM-1 LED Lighting Upgrades

Building	Measure	Annual kW Savings	Annual kWh Savings	Demand Savings	Energy Savings	Total Cost Savings
BHB	LED Lighting	2,424	1,391,364	$29,015	$71,196	$100,211
CSB	LED Lighting	468	302,453	$6,685	$18,951	$25,635
TJR	LED Lighting	792	312,221	$11,312	$19,363	$30,675
WPH	LED Lighting	3,672	1,667,152	$43,954	$85,308	$129,262
TOTAL ALL BUILDINGS		7,356	3,673,190	$90,966	$195,018	$285,984
TOTAL AFTER SAFETY FACTOR		6,788	3,379,335	$83,689	$179,416	$263,105

Electric Rate for BHB & WPH

Season	Cost per kW	Cost per kWh
Summer (6 months):	$12.54	$0.05117
Winter (6 months):	$11.46	$0.05117

Electric Rate for CSB & TJR

Season	Cost per kW	Cost per kWh
Summer (6 months):	$14.95	$0.06599
Winter (6 months):	$13.95	$0.06095

Savings Safety Factor: 92%

Performance Services

Lighting Lamps & Ballasts (No Labor) Warranty Savings Analayis (10 Year Warranty[7]) - Likely Cost Scenario

All T12 and T8 lamps will need to be replaced within the next 3 years. Ballasts from T12 fixtures will need to be replaced within next 3 years.	T12 to T8 Upgrade over years 1-3					
	Fixtures	Lamps to be Replaced	Cost per lamp	Cost per ballast[4,5]	Ballasts to be Replaced	Cost
	8,232	24,696	$4.17	$13.59	8,232	$398,336
	T8 and Other to T8 Replacements and Other over years 1-3					
	Fixtures	Lamps to be Replaced	Cost per lamp	Cost per ballast	Ballasts to be Replaced	Cost
	6,464	16,160	$4.17	$10.59	1,385	$82,001
A portion of lamps and ballasts will need to be replaced a 2nd time within the 10 year warranty period.	T8 and Other to T8 and Other Replacements over years 4-10					
	Fixtures	Lamps to be Replaced	Cost per lamp	Cost per ballast	Ballasts to be Replaced	Cost
	14,696	47,655	$4.17	$10.59	7,348	$276,434
					TOTAL	$556,771
					Cost per Fixture per Year	$3.79

Notes:

1. Typical lighting fixture: 3 lamp with ballast
2. Average fluorescent lamp life – 6 years
3. Average fluorescent ballast life – 14 years
4. T12 ballast cost replacement includes a hazardous material disposal fee
5. Typical T12 fixture – 2x4 troffer with 3, T12 lamps and 2 magnetic ballasts
6. Typical T8 fixture – 2x4 troffer with 2 T8 lamps and 1 electronic ballast
7. Linear LED lamps, associated drivers and new fixtures will come with a 10 year manufacturer warranty

Lighting Material Maintenance Costs
Provided by Billy Knapp on March 2, 2016

T8 Ballasts

Units Ordered	Unit Price
100	9.49
50	9.49
100	9.49
100	9.49
50	9.49
30	9.49
50	9.49
30	9.49
50	10
30	10
50	12.14
20	20.21
30	10.58
20	10.58
50	10.58
30	10.58
30	10.58
30	10.58
30	10.07
30	10.07
Average	$ 10.55

T8 Lamps

Units Ordered	Unit Price
160	5.55
150	3.96
150	3.96
108	3.96
96	3.96
16	3.96
96	3.96
96	3.96
96	3.96
160	3.96
160	3.96
64	3.96
64	2.99
48	2.99
48	2.99
64	2.99
64	5.15
48	5.51
32	5.15
64	5.15
20	4.27
60	4.27
20	4.27
32	5.15
Average	$ 4.17

[illegible] A

[illegible] Facilities Commissioning Lighting Analysis

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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Table Partition Communication Liability Analysis

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PEL 48

Texas Facilities Commission Lighting Analysis

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Texas Facilities Commission Lighting Analysis

Transit Facilities Commissioned Licence Switch

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Table A

Texas Facilities Commission Staffing Analysis

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Texas Facilities Commission Lighting Analysis

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Texas Facilities Commission Lighting Analysis

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Texas Facilities Commission Lighting Analysis

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Texas Facilities Commission Lighting Analysis

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Trees Facilities Accommodation Listing example

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PGI - KMO

Texas Facilities Commission Lighting Analysis

Texas Facilities Commission Lighting Analysis

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Texas Facilities Commission Lighting Analysis

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Texas Facilities Commission Lighting Analysis

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Texas Facilities Commission Lighting Analysis

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Tyson Facilities Commission Lighting Analysis

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Texas Facilities Commission Lighting Analysis

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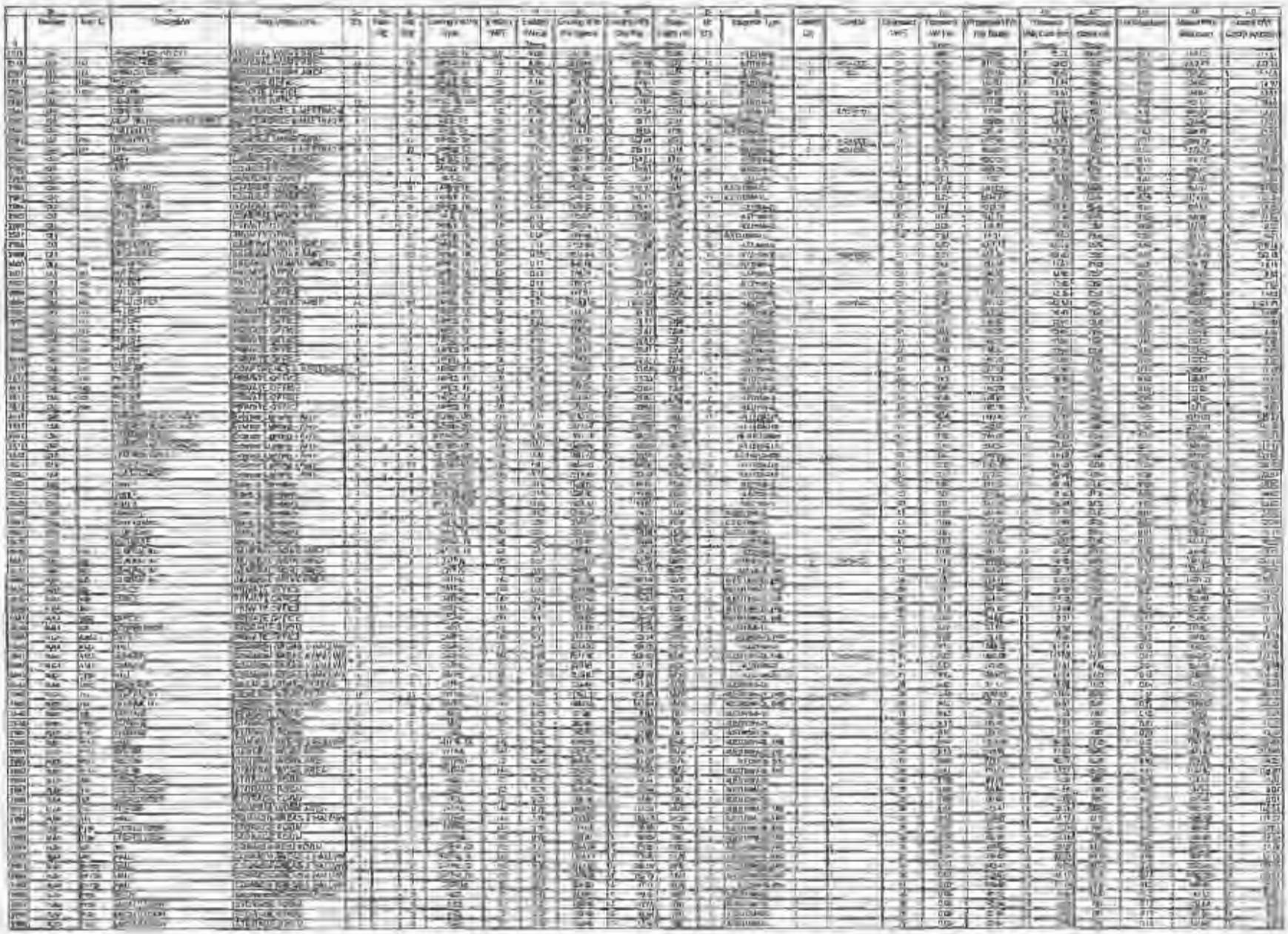

Texas Facilities Commission Lighting Analysis

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Texas Facilities Commission Lighting Analysis

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Texas Facilities Commission Lighting Analysis

UCRM-2 Power Conditioning

Building	Measure	Annual kW Savings	Annual kWh Savings	Demand Savings	Energy Savings	Avoided PF Charges	Total Cost Savings
BHB	Harmonic Reduction	352	256,900	$4,212	$13,146		$17,358
BHB	PF Correction	38	27,726	$456	$1,425	$6,154	$8,041
CSB	Harmonic Reduction	80	58,385	$1,142	$3,658		$4,801
CSB	PF Correction	6	4,238	$83	$265		$348
TIR	Harmonic Reduction	91	30,621	$899	$3,184		$4,179
TIR	PF Correction	5	3,555	$70	$223		$292
WPH	Harmonic Reduction	416	311,057	$5,100	$15,917		$21,017
WPH	PF Correction	32	23,629	$308	$1,710	$1,180	$2,698
TOTAL ALL BUILDINGS		1,009	736,511	$12,300	$39,033	$8,356	$58,735
TOTAL AFTER SAFETY FACTOR		896	655,592	$11,008	$34,738	$7,153	$53,073

Electric Rate for BHB & WPH

Season	Cost per kW	Cost per kWh
Summer (6 months)	$12.58	$0.05117
Winter (6 months)	$11.40	$0.05117

Electric Rate for CSB & TIR

Season	Cost per kW	Cost per kWh
Summer (6 months)	$14.95	$0.06596
Winter (6 months)	$13.85	$0.06096

Savings Safety Factor: 89%

HARMONICS

Full Report

Summary

HARMONICS

Full Report

Total kWh of new lamps used

kW Savings from new lamps

Total of Air Conditioners

kW

Annual dollar savings for residential and for business

Summary

Amount of [illegible] saved by harmonics [illegible]

[illegible]

Total annual dollar savings

[illegible]

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HARMONICS

Full Report

Summary

HARMONICS

Full Report

Summary

Power Factor Savings Analysis

TFC Energy Savings Project

PF Correction Energy Savings Calculation Equation from Con Edison & Power Studies

Annual kWh Savings = (Average kW) x (System Loss Percentage) x (1 - Original PF² /new PF²) x 8760 hou

Brown Heatly

Average kW =	988	
Original PF (per AE) =	87%	
Projected PF =	95%	
System Loss =	2%	(Typical range 2% to 5%)
Annual kWh Savings =	**27,926**	

Central Services

Average kW =	236	
Original PF (Measured) =	90%	
Projected PF =	95%	
System Loss =	2%	(Typical range 2% to 5%)
Annual kWh Savings =	**4,238**	

Thomas J. Rusk

Average kW =	198	
Original PF (Measured) =	90%	
Projected PF =	95%	
System Loss =	2%	(Typical range 2% to 5%)
Annual kWh Savings =	**3,555**	

William P. Hobby

Average kW =	1,103	
Original PF (Measured) =	89%	
Projected PF =	95%	
System Loss =	2%	(Typical range 2% to 5%)
Annual kWh Savings =	**23,835**	

UCRM-3 Variable CHW Flow

Building	Measure	Annual kW Savings	Annual kWh Savings	Demand Savings	Energy Savings	Total Cost Savings
BHB	Variable CHW Flow	320	248,400	$3,885	$12,711	$16,546
CSB	NA	33	33,320	$471	$2,088	$2,559
TJR	NA			$0	$0	$0
WPH	NA			$0	$0	$0
TOTAL ALL BUILDINGS		353	281,720	$4,307	$14,798	$19,105
TOTAL AFTER SAFETY FACTOR		242	116,928	$1,767	$6,326	$8,093

Electric Rate for BHB & WPH

Season	Cost per kW	Cost per kWh
Summer (6 months):	$12.54	$0.05117
Winter (6 months):	$11.40	$0.05117

Electric Rate for CSB & TJR

Season	Cost per kW	Cost per kWh
Summer (4 months):	$14.95	$0.06599
Winter (8 months):	$13.95	$0.06099

Model Savings Safety Factor: 35%

Spreadsheet Savings Safety Factor: 70%

Savings Calculation Examples for Energy Conservation Measures
Central Services Building

MEASURE NO.: ECM #

MEASURE NAME: CHW System to variable primary conversion and optimization

MEASURE DESCRIPTION:
The existing constant flow primary chilled water (CHW) system is converted to variable primary flow system. This estimate includes the CHW pump energy savings.

MEASURE SUMMARY DATA:

kWh Savings:	33,120	kWh/Year
kW Savings:	33	kW/Year
Gas Savings:	0.0	Therms/Year
Energy Cost Savings:	$2,542	/Year

EXAMPLE CALCULATION:

Summary Data

			Existing System			Optimized System						
	Bin Avg. OAT (°F)	Occ Bin Hrs	CHW Flow (GPM)	Head (ft)	Brake Horsepower (bhp)	% CHW Flow	CHW Flow (GPM)	Optimized Head Factor	Head (ft)	Brake Horsepower (bhp)	Pump Power Reduction (kW)	Pump Energy Reduction (kWh)
Bin 1	102.5	15	350	115	13.6	100.0%	350	1.000	115.0	13.6	-0.3	-5
Bin 2	97.5	212	350	115	13.6	94.6%	331	0.931	107.1	11.9	1.0	215
Bin 3	92.5	326	350	115	13.6	89.2%	312	0.866	99.5	10.5	2.2	723
Bin 4	87.5	490	350	115	13.6	83.8%	293	0.804	92.5	9.1	3.4	1647
Bin 5	82.5	586	350	115	13.6	78.5%	275	0.747	85.9	7.9	4.4	2559
Bin 6	77.5	710	350	115	13.6	73.1%	256	0.693	79.7	6.9	5.3	3742
Bin 7	72.5	583	350	115	13.6	67.7%	237	0.643	73.9	5.9	6.1	3557
Bin 8	67.5	496	350	115	13.6	62.3%	218	0.597	68.6	5.0	6.8	3373
Bin 9	62.5	509	350	115	13.6	56.9%	199	0.554	63.7	4.3	7.4	3786
Bin 10	57.5	383	350	115	13.6	51.5%	180	0.516	59.3	3.6	8.0	3041
Bin 11	52.5	335	350	115	13.6	46.2%	162	0.481	55.3	3.0	8.5	2848
Bin 12	47.5	219	350	115	13.6	40.8%	143	0.450	51.8	2.5	8.9	1958
Bin 13	42.5	258	350	115	13.6	35.4%	124	0.423	48.7	2.0	9.3	2406
Bin 14	37.5	195	350	115	13.6	30.0%	105	0.400	46.0	1.6	9.7	1884
Bin 15	32.5	101	350	115	13.6	30.0%	105	0.400	46.0	1.6	9.7	976
Bin 16	27.5	61	350	115	13.6	30.0%	105	0.400	46.0	1.6	9.7	589
Bin 17	22.5	18	350	115	13.6	30.0%	105	0.400	46.0	1.6	9.7	174
Bin 18	17.5	4	350	115	13.6	30.0%	105	0.400	46.0	1.6	9.7	39
Bin 19	12.5	0	350	115	13.6	30.0%	105	0.400	46.0	1.6	9.7	0
Bin 20	7.5	0	350	115	13.6	30.0%	105	0.400	46.0	1.6	9.7	0

Assumptions

CHW Pump Efficiency	0.75	
CHW Pump Motor Efficiency	0.917	
CHW Pump Motor VFD Efficiency	0.97	
Minimum Chiller Flow	30%	of Design Flow
CHW Design Flow	350	gpm
CHW Pump Design Head	115	ft
Minimum CHW Pump Head	40%	of Design Head
Chiller Operating Hours	5 AM–7 PM	

The optimized CHW Flow is assumed to decrease from 100% to 30% of the Design Flow as a linear function of Bin Outside Air Temperature from the Bin 1 to Bin 14. From the Bin 14 to Bin 20, the CHW Flow is assumed to be constant at 30% of the Design Flow. The optimized CHW pump head is assumed to decrease from 100% to 40% of the Design Head as a quadratic function of the Bin CHW Flow from the Bin 1 to Bin 14. From the Bin 14 to Bin 20, the optimized CHW Pump Head is assumed to be constant at 40% of the Design Head. The ratio of the Optimized Head to the Design Head is called the Optimized Head Factor in the calculation.

The CHW Design Flow is the existing CHW primary pump flow. The CHW Design Head is existing CHW primary pump head. The values were obtained from the Central Services Building Controls Evaluation Report (Hulin-Zollars, 2014). According to this report, one chiller will be operational while the other is in stand-by. Therefore, the savings calculation assumes only one of two primary pumps are required to run.

The chiller operating hours were determined based on the Load Profiler for the period 1/1/2015–10/14/2015, provided by Austin Energy.

Weather data was obtained from the Austin-Muller Municipal Airport weather station.

The following electrical utility rates were applied in this analysis:

Season*	Cost per kW	Cost per kWh
Summer (4 months)	$14.95	$0.06599
Winter (8 monts)	$13.95	$0.06099

*Summer defined as June – September

The seasonal consumption rate ($/kWh) was applied to the consumption savings (kWh) for each temperature bin according to individual seasonal hours ratio. For example, if 60% of the hours in temperature bin 3 occurred during the summer and 40% of the hours occurred during the winter, 60% of the kWh savings in bin 1 were multiplied by the summer consumption rate and 40% of the kWh savings were multiplied by the winter consumption rate to find the total annual savings of bin 1.

The estimated electric demand savings were estimated based on the following methodology assuming that peak demand in each month occured at the highest outside air temperature:

1. Calculate the maximum temperature for each month.
2. Sum the number of months whose maximum temperature falls within the temperature limits of each temperature bin.
3. Multiply the kW saved of each temperature bin by the number of months in each bin calculated from Step 2.

4. Sum the totals of each bin in Step 3 for the annual demand savings and multiply by the appropriate seasonal demand rate.

Calculations

Bin 8 (65–70°F)

Existing CHW Pump Brake Horsepower (BHP) =	Design Flow × Design Head / 3960 / Pump Efficiency
=	350 [gpm] × 115 [ft] / 3960 / 0.75
=	13.6 [hp]
	Note: 3960 is a unit conversion factor
Optimized CHW Flow =	Design Flow × % CHW Flow
=	350 [gpm] × 62.3 %
=	218 [gpm]
Optimized Head Factor =	$0.34065 + 0.65934 \times (\%\text{CHW Flow} / 100)^2$
=	$0.34065 + 0.65934 \times (62.3 / 100)^2$
=	0.597
Optimized CHW Head =	Design Head × Optimized Head Factor
=	115 [ft] × 0.597
=	68.6 [ft]
Optimized CHW Pump BHP =	CHW Flow × CHW Head / 3960 / Pump Efficiency
=	218.1 [gpm] × 68.6 [ft] / 3960 / 0.75
=	5.0 [hp]
CHW Pump Power Reduction =	Existing CHW Pump BHP × 0.746 / CHW Pump Motor Efficiency − Optimized CHW Pump BHP × 0.746 / CHW Pump Motor Efficiency / CHW Pump Motor VFD Efficiency
=	13.6 [hp] × 0.746 / 0.917 − 5.0 [hp] × 0.746 / 0.917 / 0.97
=	6.8 [kW]
	Note: 0.746 is a unit conversion factor.
CHW Pump Energy Reduction =	Pump Power Reduction × Bin Hours Occupied
=	6.8 [kW] × 496 [hrs]
=	3373 [kWh]
Total Energy Savings =	Sum of all Energy Savings in all Bins
=	33320 [kWh/yr]

Electric Consumption (kWh)

Gas Consumption (Btu)

Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling

Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	37.5	34.5	62.3	89.0	128.5	155.7	183.7	179.1	126.7	98.7	60.5	39.8	1,206.1
Heat Reject.	0.5	0.5	1.0	2.9	8.1	6.2	8.2	8.0	5.4	3.2	1.7	0.7	44.5
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	3.0	2.8	1.5	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.4	3.2	11.6
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	1.8	1.5	1.6	1.7	1.5	1.4	1.4	1.3	1.2	1.4	1.2	1.6	17.2
Vent. Fans	81.9	70.8	89.1	84.0	74.4	85.5	97.4	97.0	79.4	66.5	60.2	78.2	924.8
Pumps & Aux.	51.1	45.3	52.4	52.2	55.3	54.4	57.2	57.0	53.8	53.8	50.5	51.3	635.5
Ext. Usage	8.3	7.6	8.4	8.2	8.8	9.6	9.8	9.5	9.2	9.5	9.2	9.5	106.8
Misc. Equip.	153.1	138.7	153.9	154.3	153.8	150.7	156.7	153.9	150.7	156.7	140.7	156.7	1,820.0
Task Lights	15.1	13.6	15.1	15.7	15.1	15.0	15.7	15.1	15.0	15.7	13.0	15.7	180.0
Area Lights	118.9	107.4	118.9	117.9	116.0	118.2	120.6	118.9	116.3	120.6	111.1	120.6	1,406.2
Total	472.1	423.8	484.9	508.0	560.0	592.7	647.6	639.7	567.0	528.3	448.6	477.3	6,346.9

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	493.8	419.4	388.5	243.1	173.2	111.4	75.3	84.8	146.1	320.5	326.8	515.2	3,198.0
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	493.8	419.4	388.5	243.1	173.2	111.4	75.3	84.8	146.1	320.5	326.8	515.2	3,198.0

Electric Consumption (kWh)

Gas Consumption (Btu)

Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling

Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	32.4	29.6	37.0	84.0	124.6	162.3	189.6	176.0	133.1	93.9	55.0	34.8	1,133.1
Heat Reject.	0.5	0.5	1.3	2.9	5.1	6.6	8.1	7.9	5.4	3.1	1.7	0.7	43.9
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	3.0	2.8	1.5	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.4	2.2	11.0
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	1.6	1.3	1.6	1.7	1.5	1.4	1.4	1.3	1.2	1.4	1.2	1.6	17.2
Vent. Fans	81.9	70.8	89.1	84.0	74.4	85.5	97.4	97.0	79.4	66.5	60.2	78.2	924.8
Pumps & Aux.	29.8	26.3	30.8	31.6	34.0	34.8	36.9	36.8	33.9	32.9	29.7	30.5	387.1
Ext. Usage	9.5	7.6	8.4	8.2	8.8	9.6	9.8	9.5	9.2	9.5	9.2	9.5	100.8
Misc. Equip.	153.1	138.7	153.9	154.3	152.9	150.7	156.7	152.9	150.7	156.2	149.7	158.7	1,820.0
Task Lights	16.1	13.5	15.1	15.7	15.1	15.0	15.7	15.1	15.0	15.7	15.0	15.7	180.0
Area Lights	119.9	107.4	118.5	117.9	118.9	116.2	120.6	118.9	116.2	120.6	117.1	120.6	1,406.2
Total	445.4	398.8	457.9	480.3	534.9	589.4	634.3	616.4	544.2	500.4	422.2	450.3	6,044.8

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	493.8	418.4	388.5	243.1	172.2	111.4	75.3	84.8	146.1	320.6	328.6	515.2	3,109.0
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	493.8	418.4	388.5	243.1	172.2	111.4	75.3	84.8	146.1	320.6	328.6	515.2	3,109.0

UCIM-4 Water Controls

Building	Measure	Annual kW Savings	Annual kWh Savings	Demand Savings	Energy Savings	Total Cost Savings
BHB	Water Controls	33	45,678	$749	$2,337	$3,086
CSB	Water Controls	15	17,920	$351	$1,123	$1,473
TJR	Water Controls	14	9,979	$195	$625	$821
WPH	Water Controls	70	50,743	$882	$2,597	$3,479
TOTAL ALL BUILDINGS		170	124,320	$2,177	$6,682	$8,859
TOTAL AFTER SAFETY FACTOR		136	99,456	$1,742	$5,346	$7,087

Electric Rate for BHB & WPH

Season	Cost per kW	Cost per kWh
Summer (6 months):	$12.54	$0.05117
Winter (6 months):	$11.40	$0.05117

Electric Rate for CSB & TJR

Season	Cost per kW	Cost per kWh
Summer (4 months):	$14.95	$0.06599
Winter (8 months):	$13.95	$0.06065

Savings Safety Factor: 80%

Water & Sewer Savings

Building	Measure	Annual kgal Savings	Combined W&S Rate ($/kgal)	Annual Water/Sewer Savings
BHB	Water Controls	1,606	$15.19	$24,378
CSB	Water Controls	618	$15.19	$9,387
TJR	Water Controls	586	$15.19	$8,901
WPH	Water Controls	2,758	$15.19	$41,897
TOTAL ALL BUILDINGS		5,567		$84,563
TOTAL AFTER SAFETY FACTOR		4,454		$67,650

[illegible] Building Water/Sewer Savings Analysis

FIXTURE	QUANTITY	CURRENT FLUSH VOLUME (GPF)/FLOW RATE (GPM)	RECOMMENDED REFLUSH VOLUME (GPF)/FLOW RATE (GPM)	ESTIMATED SAVINGS (GPF/GPM)
[illegible]	[illegible]	2.2	0.5	1.7
[illegible]	[illegible]	0.5	0.5	0
[illegible]	[illegible]	2	0.5	[illegible]
[illegible]	[illegible]	2.2	0.5	[illegible]
[illegible]	[illegible]	[illegible]	0.5	[illegible]
Hand Wash [illegible]	[illegible]	2.2	0.5	[illegible]
[illegible]	[illegible]	1.6	1.28	0.32
[illegible]	22	[illegible]	1.28	[illegible]
[illegible]	[illegible]	3.5	1.28	2.22
[illegible]	[illegible]	1	0.125	0.875
[illegible]	[illegible]			
[illegible]	[illegible]			
[illegible]	[illegible]			
[illegible] 2.5 gpm	[illegible]	2.5	[illegible]	[illegible]
Ice Machine [illegible]	[illegible]			
Ice Machine [illegible]	[illegible]			
[illegible]	[illegible]			
[illegible]	[illegible]			
[illegible]	[illegible]			
Ice Machine [illegible]	[illegible]			
[illegible]	[illegible]			
Ice Machine [illegible]	[illegible]			

Water Balance

[illegible] Employee Count
[illegible] total

[illegible] (Jan 2012–Dec 2012)

[illegible]

	Avg Flow Rate	Flush/yr	Gal/yr	End Consumption	Proposed Flow	New Volume	% Consumption
Toilets	2.60	[illegible]	[illegible]	[illegible]	1.28	[illegible]	
Lavatories	2.20		[illegible]	[illegible]	0.5	[illegible]	
Urinals	1.00	[illegible]	[illegible]	[illegible]	0.125	[illegible]	
Kitchen/Break Room	2.20		[illegible]	[illegible]	1.5	[illegible]	
Showerheads	2.5		[illegible]	[illegible]	1.5	[illegible]	
Kitchen Equipment			[illegible]	[illegible]			
Hand Wash Faucets	2.2		[illegible]	[illegible]	0.5	[illegible]	
Cooling Tower/Other				[illegible]			

Kitchen equipment	Qty	Flow consumption	Gal/yr	Recommendation	New Volume
[illegible]	1	[illegible] gal/day	[illegible]		[illegible]
[illegible]	1	[illegible] gal/day	[illegible]		[illegible]
[illegible] 1.45 gpm	6	2.45 gpm	[illegible]		[illegible]
		Annual Total	[illegible]		[illegible]

Project Estimated Savings

Recommended Conservation Measure	Estimated Annual Water Savings (gal/yr)	Value of Estimated Annual Water Savings	Estimated Project Cost	Number of Proposed Fixtures	Simple Payback (years)	Percent Water Consumption Reduction (%)
High Efficiency Toilets	721,231	$17,[illegible]		[illegible]		17.4
High Efficiency Urinals	107,077	$3,[illegible]		[illegible]		5.2
High Efficiency Aerators - Lavatory Faucets	231,[illegible]	$8,[illegible]		[illegible]		[illegible]
High Efficiency Aerators - Hand Wash Faucets	2,[illegible]	$[illegible]		3		[illegible]
High Efficiency Aerators - Kitchen/Breakroom Faucets	46,[illegible]	[illegible]		[illegible]		[illegible]
High Efficiency Showerheads	21,000	[illegible]		5		[illegible]
	1,[illegible]	$[illegible]		[illegible]		[illegible]

Annual Savings [illegible]
Prev Consumption [illegible]
New Consumption [illegible]

Prev [illegible] [illegible]
New [illegible] [illegible]

Estimated total cost $
Estimated total annual savings $ [illegible]

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

[illegible]		[illegible]	
[illegible]	$	[illegible]	
[illegible]	$	[illegible]	
Total	$	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	#VALUE!	
[illegible]	#VALUE!	
Total	#VALUE!	#VALUE!

Annualized Electrical Savings

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Central Services Building [illegible]

FIXTURE	QUANTITY	CURRENT FLUSH VOLUME (GPF)/FLOW RATE (GPM)	RECOMMENDED FLUSH VOLUME (GPF)/FLOW RATE (GPM)	ESTIMATED SAVINGS (GPF/GPM)
Lav 2.2	43	2.2	0.5	1.7
[illegible] 1.8	1	1.8	1.5	[illegible]
[illegible] 2.0	1	2	1.5	0.5
[illegible] 2.2	1	2.2	1.5	0.7
[illegible] disposal	1			
Toilet Wall Mount 1.28 gpf	8	1.28	1.28	0
Toilet Wall Mount 1.6 gpf	42	1.6	1.28	0.32
Toilet Wall Mount 3.5 gpf	6	3.5	1.28	2.22
Urinal 1.0 gpf	7	1	0.125	0.875
[illegible]	1			
[illegible]	[illegible]			
Ice Machine [illegible]	2			
Ice Machine [illegible]	[illegible]			

Water Balance

Average annual water consumption [illegible] ([illegible] 2017): [illegible] gal/yr (baseline)

[illegible] (total fixed employees)
[illegible] Employee Hours
[illegible] Total

	Avg Flow Rate	Flushes	Gal/yr	% of Consumption	Proposed Flow	Gal Savings	% Consumption
Toilets	1.73	[illegible]	[illegible]	[illegible]	1.28	[illegible]	
Lavatories	2.20		[illegible]	[illegible]	0.5	[illegible]	
Urinals	1.00	[illegible]	[illegible]	[illegible]	0.125	[illegible]	
Kitchen/Break Room	2.00		[illegible]	[illegible]	1.5	[illegible]	
Cooling Tower/Boiler				[illegible]			
		[illegible]	[illegible]	[illegible]			

Project Scope and Savings

Recommended Conservation Measure	Estimated Annual Water Savings (gal/yr)	Value of Estimated Annual Water Savings	Estimated Project Cost	Number of Proposed Retrofits	Simple Payback Period (yrs)	Percent Water Consumption Reduction (%)
High Efficiency Toilets	220,[illegible]	[illegible]		[illegible]		[illegible]
High Efficiency Urinals	142,[illegible]	[illegible]		7		[illegible]
High Efficiency Aerators - Lavatory Faucets	136,[illegible]	[illegible]		[illegible]		[illegible]
High Efficiency Aerators - [illegible]	40,[illegible]	[illegible]		[illegible]		[illegible]
	[illegible]	[illegible]		[illegible]		[illegible]

Estimated cost/project: $ -
Estimated [illegible] annual savings: $ [illegible]
Aggregate Payback: [illegible]

Annual Savings: [illegible]
[illegible] [illegible]
[illegible] [illegible]

[illegible] [illegible]
[illegible] [illegible]

[illegible]	[illegible] gal	
Off Peak		[illegible]
Peak		[illegible]
[illegible]		[illegible]
[illegible]		[illegible]

Replacement Costs
Toilet
Urinal
[illegible]
[illegible]

[illegible]

[illegible]		[illegible]	
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	#VALUE!

[illegible]	[illegible]	[illegible]
[illegible]	#VALUE!	
[illegible]	#VALUE!	
[illegible]	#VALUE!	#VALUE!

Associated External Services

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Tenant 2 Bank (WaterSense Series Analysis)

FIXTURE	QUANTITY	CURRENT FLUSH VOLUME (GPF/GPM FLOW RATE (GPM))	RECOMMENDED FLUSH VOLUME (GPF/GPM FLOW RATE (GPM))	ESTIMATED SAVINGS (GPD/GPY)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Water Engineer

[illegible] (1125) [illegible]
[illegible] (10000) Employee Rooms
[illegible] (21,250) Total

[illegible] gallon (Gallons)

	Avg Flow Rate	Fixtures	Kalsis	Total Consumption	Flushed Vol	Total Volume	% Consumption
Toilets	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Urinals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Lavatories	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
Kitchen/Food Service	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
Dishwashers			[illegible]	[illegible]			
Other				[illegible]			
		[illegible]	[illegible]	[illegible]			

	gallon/day	[illegible]	[illegible]
Totals	[illegible]	[illegible]	[illegible]

Comparison: [illegible]

Project Costs and Savings

Recommended Conservation Measures	Estimated Annual Water Savings (gallon)	Value of Estimated Annual Water Savings	Estimated Project Cost	Payback Period (Yrs)	Annual Savings Per Dollar Invested	Percent Water Consumption Reduction (%)
High Efficiency Toilets	[illegible]	[illegible]		[illegible]		[illegible]
High Efficiency Urinals	[illegible]	[illegible]		[illegible]		[illegible]
High Efficiency Aerators - Lavatory Faucets	[illegible]	[illegible]		[illegible]		[illegible]
High Efficiency Aerators - Kitchen/Healthcare Faucets	[illegible]	[illegible]		[illegible]		[illegible]
	[illegible]	[illegible]		[illegible]		[illegible]

Overall Payback: [illegible]
Year: [illegible]
Post Coverage: [illegible]
Year Coverage: [illegible]

Post cost: [illegible]
Year cost: [illegible]

Estimated cost: [illegible]
Estimated annual savings:
Aggregate Payback

Water Rate	[illegible] gal
Off Peak	[illegible]
Peak	[illegible] Jul – Oct
Restricted Peak Surcharge	[illegible]
Wastewater	[illegible]

Implementation Costs
Toilet
Urinal
Aerator
Showerhead

Domestic (annual average)		[illegible] gallons	
Peak	[illegible]	[illegible]	
Off-peak	[illegible]	[illegible]	
Total	[illegible]	[illegible]	#VALUE!

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]

Annulawi Electrical Safety

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	2.07	[illegible]

FIXTURE	QUANTITY	CURRENT FLOW VOLUME (GPF/FLOW RATE (GPM)	RECOMMENDED FLOW VOLUME (GPF/FLOW RATE (GPM)	ESTIMATED SAVINGS (GPF/GPM)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Water Balance:

	Avg Flow Rate	Frequency	Duration	Total Consumption	Proposed Flow	New Volume	% Consumption
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]			[illegible]	[illegible]			
[illegible]			[illegible]	[illegible]			
[illegible]			[illegible]	[illegible]			
[illegible]		[illegible]	[illegible]	[illegible]			

[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]			

Consumption

- [illegible]
- [illegible]
- [illegible]

[illegible]

Water Savings summary

Recommended Conservation Measure	Estimated Annual Water Savings (gal/yr)	Value of Estimated Annual Water Savings	Estimated Project Cost	Simple Payback Period (yr)	Simple Payback Period (yr)	Proposed Water Consumption Reduction (%)
High Efficiency Toilets	[illegible]	[illegible]		[illegible]		[illegible]
High Efficiency Urinals	[illegible]	[illegible]		[illegible]		[illegible]
High Efficiency Aerators - Lavatory Faucets	[illegible]	[illegible]		[illegible]		[illegible]
High Efficiency Aerators - Kitchen/Janitorial Faucets	[illegible]	[illegible]		[illegible]		[illegible]
[illegible]	[illegible]	[illegible]		[illegible]		[illegible]
	[illegible]	[illegible]		[illegible]		[illegible]

Estimated Annual Savings: [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Total Costs	[illegible]	
Off-peak	[illegible]	
Peak	[illegible]	
Percent Fuel Savings	[illegible]	
Frequency	[illegible]	

Supplemental Costs	
Toilet	
Lamp	
Heater	
Refrigerator	

Demand (kW) Savings			
Peak	$	[illegible]	
Off-peak	$	[illegible]	
Total	$	[illegible]	#VALUE!

Demand Fuel Savings			
Peak		#VALUE!	
Off-peak		#VALUE!	
Total		#VALUE!	#VALUE!

Annual Electricity Savings

Incremental Conservation Measure	Gross Savings	[illegible]	[illegible]
High Efficiency Appliances - Laundry Rooms	[illegible]	[illegible]	[illegible]
High Efficiency Appliances - Kitchen Dishwasher Rooms	[illegible]	[illegible]	[illegible]

UCHM-5 Building Automation System

Building	Measure	Annual kW Savings	Annual kWh Savings	Demand Savings	Energy Savings	Total Cost Savings
BHB	NA			$0	$0	$0
CSB	Building Automation	93	371,700	$1,328	$23,289	$24,618
TJR	NA			$0	$0	$0
WPH	NA			$0	$0	$0
TOTAL ALL BUILDINGS		93	371,700	$1,328	$23,289	$24,618
TOTAL AFTER SAFETY FACTOR		79	315,945	$1,129	$19,796	$20,925

Electric Rate for BHB & WPH

Season	Cost per kW	Cost per kWh
Summer (6 months):	$12.54	$0.05117
Winter (6 months):	$11.40	$0.05117

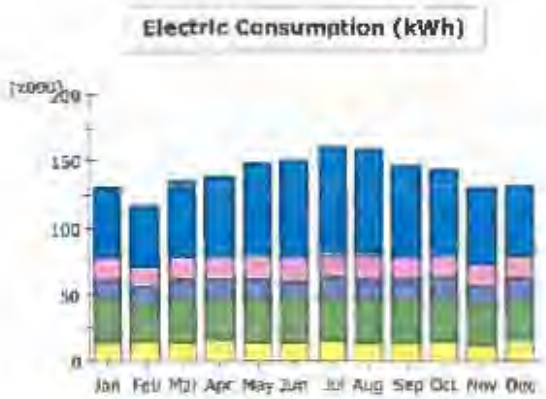
Electric Rate for CSB & TJR

Season	Cost per kW	Cost per kWh
Summer (4 months):	$14.95	$0.06598
Winter (8 months):	$13.95	$0.06098

Savings Safety Factor: 85%

Natural Gas Savings

Building	Measure	Annual CCF Savings	NG Rate ($/CCF)	Annual NG Savings
BHB	NA		$0.48	
CSB	Building Automation	12,225	$0.48	$5,868
TJR	NA		$0.48	
WPH	NA		$0.48	
TOTAL ALL BUILDINGS		12,225		$5,868
TOTAL AFTER SAFETY FACTOR		10,391		$4,988



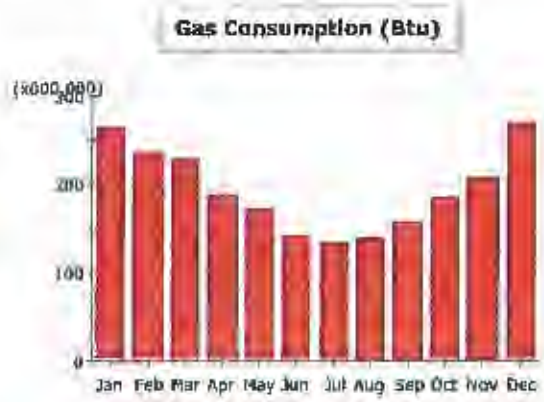
Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling

Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	57.1	46.9	54.5	49.2	69.8	75.5	91.8	77.1	68.1	62.7	56.3	53.5	746.9
Heat Reject.	0.1	0.2	0.5	1.0	1.8	2.4	3.0	3.9	2.0	1.0	0.7	0.2	16.4
Refrigeration													
Space Heat													
HP Supp.													
Hot Water													
Vent. Fans	15.4	14.0	15.9	15.6	16.3	15.0	16.4	15.9	15.7	16.0	15.3	15.5	187.7
Pumps & Aux.	13.5	12.3	13.6	12.2	13.7	13.1	15.4	12.5	12.1	13.0	13.2	13.5	159.5
Ext. Usage	1.4	1.1	1.2	1.2	1.0	0.9	1.2	1.4	1.3	1.4	1.1	1.4	14.3
Misc. Equip.	32.7	29.5	33.9	33.1	33.9	34.2	33.5	32.8	32.2	31.5	29.9	33.5	389.8
Task Lights													
Area Lights	14.3	12.9	14.3	14.1	14.3	14.2	14.8	14.3	14.2	14.4	13.7	14.8	170.3
Total	129.7	117.0	134.7	126.7	148.5	150.1	159.9	156.5	146.8	143.1	130.3	131.5	1,687.0

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool													
Heat Reject.													
Refrigeration													
Space Heat	401.0	414.0	360.7	257.6	229.4	188.5	187.8	172.1	202.0	249.1	327.5	468.2	3,810.9
HP Supp.													
Hot Water	4.7	4.4	4.9	4.5	4.5	4.0	4.1	3.9	3.8	4.3	3.8	4.6	51.5
Vent. Fans													
Pumps & Aux.													
Ext. Usage													
Misc. Equip.													
Task Lights													
Area Lights													
Total	405.7	418.4	365.6	257.2	222.8	189.8	171.9	175.9	206.6	253.4	331.1	473.9	3,862.3



Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	[illegible]	22.4	30.4	[illegible]	[illegible]	[illegible]	[illegible]	67.6	[illegible]	42.7	30.7	24.4	510.8
Heat Reject.	0.1	0.1	0.3	0.8	1.2	1.8	2.9	2.3	1.4	0.7	0.4	0.1	11.3
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	9.8	9.1	9.0	8.6	9.2	9.5	10.1	10.1	9.7	9.1	8.9	8.8	113.2
Pumps & Aux.	9.1	7.9	7.3	7.0	8.7	10.7	12.8	12.6	10.0	8.0	8.1	8.5	109.3
Ext. Usage	1.4	1.1	1.2	1.2	1.0	0.8	1.0	1.4	1.1	1.4	1.2	1.4	14.5
Misc. Equip.	32.7	29.6	32.0	33.1	32.8	32.2	31.9	31.8	32.1	33.5	29.9	33.5	388.8
Task Lights	-												-
Area Lights	14.3	12.9	14.2	14.7	14.2	14.2	14.8	14.2	14.2	14.0	12.7	14.0	170.2
Total	91.2	83.4	95.0	103.7	116.4	137.9	143.8	141.2	121.4	110.2	89.0	92.8	1,316.1

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-			-	-	-	-	-	-	-	-	-	-
Heat Reject.	-		-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-			-	-	-	-	-	-				
Space Heat	259.3	232.9	232.7	191.9	145.8	137.9	129.5	137.4	152.5	180.4	203.5	263.7	2,394.2
HP Supp.													
Hot Water	4.7	4.4	4.8	4.3	4.5	4.1	4.1	4.3	4.1	4.0	3.6	4.5	51.1
Vent. Fans													
Pumps & Aux.		-											-
Ext. Usage													
Misc. Equip.	-	-					-	-	-	-	-	-	-
Task Lights													
Area Lights	-	-											
Total	264.0	237.3	237.5	196.6	171.3	142.0	133.5	137.2	156.3	184.4	207.1	268.2	2,445.4

Electric Consumption (kWh)

Gas Consumption (Btu)

Area Lighting
Task Lighting
Misc. Equipment
Exterior Usage
Pumps & Aux.
Ventilation Fans
Water Heating
Ht Pump Supp.
Space Heating
Refrigeration
Heat Rejection
Space Cooling

Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Heat Reject.	0.4	0.1	0.7	1.1	2.2	3.9	3.3	3.6	2.4	1.2	0.4	0.1	19.7
Refrigeration													
Space Heat	-	-	-	-	-		-	-	-	-	-	-	-
HP Supp.													
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	22.2	20.0	22.2	21.5	22.2	21.4	22.1	22.1	21.5	22.2	21.5	22.2	264.2
Pumps & Aux.	20.5	18.5	20.4	18.9	20.2	19.4	19.8	19.9	19.8	20.2	19.7	20.5	238.3
Ext. Usage	1.4	1.1	1.2	1.2	1.0	0.1	1.0	1.4	1.3	1.4	1.3	1.3	14.5
Misc. Equip.	32.7	29.6	32.0	31.1	32.0	31.2	31.5	32.0	32.2	31.8	29.6	31.5	368.5
Task Lights													
Area Lights	31.2	28.2	31.2	31.5	31.2	30.7	31.0	31.2	30.7	32.0	28.3	32.0	369.8
Total	165.0	149.7	171.0	174.6	184.6	184.7	194.4	192.0	181.4	179.5	162.6	168.1	2,199.0

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-		-	-	-			-		-	-
Heat Reject.	-	-	-		-	-	-			-		-	-
Refrigeration													
Space Heat	604.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	219.0	[illegible]	122.6	[illegible]	[illegible]	[illegible]	3,005.0
HP Supp.													
Hot Water	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Vent. Fans													
Pumps & Aux.													
Ext. Usage													
Misc. Equip													
Task Lights													
Area Lights													
Total	609.4	530.9	511.0	416.6	[illegible]	[illegible]	243.1	254.3	[illegible]	[illegible]	478.5	598.5	5,056.5

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UCHM-5 Variable Air Volume

Building	Measure	Annual kW Savings	Annual kWh Savings	Demand Savings	Energy Savings	Total Cost Savings
BHB	NA			$0	$0	$0
CSB	Variable Air Volume	54	39,563	$771	$2,479	$3,250
TJR	NA			$0	$0	$0
WPH	NA			$0	$0	$0
TOTAL ALL BUILDINGS		54	39,563	$771	$2,479	$3,250
TOTAL AFTER SAFETY FACTOR		35	35,607	$694	$2,231	$2,925

Electric Rate for BHB & WPH

Season	Cost per kW	Cost per kWh
Summer (6 months):	$12.54	$0.05117
Winter (6 months):	$11.40	$0.05117

Electric Rate for CSB & TJR

Season	Cost per kW	Cost per kWh
Summer (4 months):	$14.95	$0.06599
Winter (8 months):	$13.95	$0.06099

Savings Safety Factor: 90%

MEASURE NO.: ECM 8

MEASURE NAME: VFD Retrofit to Built-up Dual Duct AHU (AHU-1B)

MEASURE DESCRIPTION:
The inlet vanes of the cold deck and hot deck fans for AHU-1 B are replaced with VFDs.

MEASURE SUMMARY DATA:

kWh Savings:	39,563	kWh/Year
Gas Savings:	0.0	Therms
Energy Cost Savings:	$2,849	/Year

EXAMPLE CALCULATION:

Summary Data

Cold Deck (CD) Fan

	Bin Avg. OAT (°F)	Occ Bin Hrs	Airflow Ratio	Inlet Vane PR	Existing Fan Break Horsepower (hp)	Optimized Fan Brake Horsepower (bp)	Fan Elect Reduction (kW)	Fan Energy Reduction (kWh)
Bin 1	102.5	15	1.000	0.990	34	34	-1.49	-22
Bin 2	97.5	212	0.975	0.945	32	31	-0.31	-65
Bin 3	92.5	326	0.950	0.903	31	29	0.54	177
Bin 4	87.5	490	0.925	0.863	29	27	1.35	663
Bin 5	82.5	586	0.900	0.826	28	25	2.13	1248
Bin 6	77.5	730	0.875	0.790	27	25	2.87	2038
Bin 7	72.5	585	0.850	0.757	26	21	3.58	2093
Bin 8	67.5	496	0.825	0.727	25	19	4.25	2108
Bin 9	62.5	500	0.800	0.698	24	17	4.89	2489
Bin 10	57.5	355	0.775	0.671	23	16	5.49	1951
Bin 11	52.5	335	0.750	0.646	22	14	6.07	2033
Bin 12	47.5	219	0.725	0.622	21	13	6.61	1447
Bin 13	42.5	256	0.700	0.601	20	12	7.12	1826
Bin 14	37.5	195	0.700	0.601	20	12	7.12	1388
Bin 15	32.5	101	0.700	0.601	20	12	7.12	719
Bin 16	27.5	61	0.700	0.601	20	12	7.12	434
Bin 17	22.5	18	0.700	0.601	20	12	7.12	128
Bin 18	17.5	4	0.700	0.601	20	12	7.12	28
Bin 19	12.5	0	0.700	0.601	20	12	7.12	0
Bin 20	7.5	0	0.700	0.601	20	12	7.12	0

Hot Deck (HD) Fan

	Bin Avg. OAT (°F)	Occ Bin Hrs	Airflow Ratio	Inlet Vane PIR	Existing Fan Break Horsepower (bp)	Optimized Fan Brake Horsepower (bp)	Fan Elect Reduction (kW)	Fan Energy Reduction (kWh)
Bin 1	102.5	15	0.700	0.601	10	6	3.51	53
Bin 2	97.5	212	0.700	0.601	10	6	3.51	743
Bin 3	92.5	326	0.700	0.601	10	6	3.51	1143
Bin 4	87.5	490	0.700	0.601	10	6	3.51	1718
Bin 5	82.5	586	0.700	0.601	10	6	3.51	2055
Bin 6	77.5	710	0.700	0.601	10	6	3.51	2490
Bin 7	72.5	583	0.700	0.601	10	6	3.51	2051
Bin 8	67.5	496	0.700	0.601	10	6	3.51	1739
Bin 9	62.5	509	0.700	0.601	10	6	3.51	1785
Bin 10	57.5	355	0.700	0.601	10	6	3.51	1245
Bin 11	52.5	335	0.700	0.601	10	6	3.51	1175
Bin 12	47.5	219	0.700	0.601	10	6	3.51	768
Bin 13	42.5	258	0.700	0.601	10	6	3.51	905
Bin 14	37.5	195	0.743	0.659	11	7	3.05	595
Bin 15	32.5	101	0.786	0.682	12	8	2.55	257
Bin 16	27.5	61	0.829	0.751	12	10	1.99	122
Bin 17	22.5	18	0.871	0.786	13	11	1.39	25
Bin 18	17.5	4	0.914	0.847	14	13	0.73	3
Bin 19	12.5	0	0.957	0.945	16	15	0.02	0
Bin 20	7.5	0	1.000	0.990	17	17	-0.74	0

Assumptions

Utility Rate	0.072	$/kWh
CD Fan Motor Horseposer	40	hp
CD Fan Motor Efficiency	0.88	
CD Motor VFD Efficiency	0.96	
CD Fan Motor Load Factor	0.85	
HD Fan Motor Horsepower	20	hp
HD Fan Motor Efficiency	0.88	
HD Fan Motor Load Factor	0.85	
AHU Operating Hours	5 AM–7 PM	

The existing duct static pressure setpoints and control sequence are unknown. In the savings estimation it was assumed that each of the cold deck and hot deck airflow was varied between 70% and 100% of the design flow. The cold deck airflow was linearly decreased from 100% to 70% of the design flow from the Bin 1 to Bin 13 and the hot deck air flow was linearly increased from 70% to 100% of the design flow from Bin 13 to Bin 20.

The fan motor horsepower values were obtained from the Central Services Building Controls Evaluation Report (Hultt-Zollars, 2014). The existing inlet vane power was estimated using the Power Input Ratio (PIR) found in Kreider et al. (2005).

The AHU operating hours were determined based on the Load Profile for the period 1/1/2015–10/14/2015, provided by Austin Energy.

Calculations

Bin 8 (65–70°F)

CD Inlet Vane Power Input Ratio (PIR) = 0.351 + 0.308 × Airflow Ratio − 0.541 × (Airflow Ratio)^2 + 0.872 × (Airflow Ratio)^3

= 0.351 + 0.308 × 0.825 − 0.541 × 0.825^2 + 0.872 × 0.825^3

= 0.727

CD Existing Fan Brake Horsepower (BHP) = Fan Motor Horsepower × Fan Motor Load Factor × Inlet Vane PIR

= 40 [hp] × 0.85 × 0.727

= 25 [hp]

CD Optimized Fan BHP

= Fan Motor Horsepower × Fan Motor Load Factor × (Airflow Ratio)^3

= 40 [hp] × 0.85 × 0.825^3

= 19 [hp]

CD Fan Power Reduction = Existing Fan BHP × 0.746 / Fan Motor Efficiency − Optimized Fan BHP × 0.746 / Fan Motor Efficiency / VFD Efficiency

= 24.7 [hp] × 0.746 / 0.88 − 18.9 [hp] × 0.746 / 0.88 / 0.96

= 4.25 [kW]

Note: 0.746 is a conversion factor.

CD Fan Energy Reduction = Bin Power Reduction × Bin Hours Occupied

= 4.25 [kW] × 496 [hrs]

= 2108 [kWh]

CD Total Energy Savings

= Sum of CD Fan Energy Savings in all Bins

= 20692 [kWh/yr]

HD Total Energy Savings

= Sum of HD Fan Energy Savings in all Bins

= 18871 [kWh/yr]

Note: HD fan savings is calculated in the same way as CD fan savings.

Total Energy Savings = CD Total Energy Savings + HD Total Energy Savings

= 39563 [kWh/yr]

Total Energy Cost Savings = Total Energy Savings x Unit Energy Cost

= 39563 [kWh/yr] × 0.072 [$/kWh]

= $2849 annually

References

Huitt-Zollars (2014) Central Services Building Controls: Evaluation Report. Submitted to Texas Facilities Commission. Project Number 14-018-4106. May 30th, 2014

Kreider, J.F., Curtiss, P. and Rabl, A. (2005) Heating and Cooling of Buildings: Design for Efficiency, 2nd Ed. Kreider and Associates, LLC. Boulder, CO.

UCIM 7: Load Coop Revenue

Load Coop

Building	Interuptable Load (4pm-8pm)	AE Rate $/kWh	kWh Reduction	Est. ERS Value
CSB	Space Temp - Chiller	$1.45	1,139	$1,652

CSB Load Coop Energy Savings

1. Unload central plant by 25% during curtailment event for period of 3 hours. 150 ton base load @ 0.75kW/ton
2. Savings based on 15 curtailment events per year per Austin Energy
3. Savings include a 10% safety factor (0.9 x Calc. kWh Reduction)

C. MANUFACTURER'S LITERATURE

UCRM 1: LED Lighting

UCRM 2: Power Conditioning

UCRM 3&6: Variable Frequency Drives

UCRM 4: Water Controls

UCRM 5: Building Automation System

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UCRM 1: LED LIGHTING

The document contains Performance Services Trade Secrets and Confidential Information to be used by the addressee for evaluating the PSI proposal. Addressee shall not disclose the Confidential Information to third parties without written consent of Performance Services.

eTECH LED™

FASTFIT®

T8 Series

External Power LED Tubes

SPECIFICATION DATA

Model:	T82 - A6 -10	T83 - A6 - 10	T84 - A6 - 15	T84 - A6 - 18	T84 - A6 - 22
Lm/W:	113.7	110.0	109.0	131.6	118.6
Rated Wattage @ 5000K:	9.3	10.0	16.3	18.1	21.5
Rated Lumens @ 4000K:	1050	1045	1760	2504	2450
Rated Lumens @ 5000K:	1057	1100	1852	2382	2551
CRI:	87.0	82.0	80.3	87.0	87.0
THD @ 120VAC:	16.05	15.8	10.84	13.67	12.25
DUV:	0.0023	0.0035	0.0051	0.0022	0.0082
Power Supply*:	100-277VAC / External Mounted Class 2 / 0-10VDC Dimming & Non Dimming Option				
Lamp Base:	G13 Bi-pin				
CCT Options:	3000K / 3500K / 4000K / 4500K / 5000K				
L70 Lifespan:	50,000 Hrs.				
Beam Angle / Field Angle	120° / 160°				
ength / Diameter:	23.62in / 1.02in	35.43in / 1.02in	47.24in / 1.02in		
Weight:	6.5oz. / 185g	12.8oz. / 365g	13oz. / 370g		
Operation Temperature:	10°C to +40°C Ambient				
Limited Warranty:	10 Years				
Notes:	Tested Values@Ta=25°C All values are nominal. See Power Supply Spec. Sheet for Specifications and Configurations.				

PART NUMBER SPECIFICATION				*Part Number Example: EXPS T82 A6 30 30 ND*
EXPS -	-	-	-	-
Series	Length / Series	Nominal Wattage	CCT Option	Dimming Option
External Power Supply	T82 - A6 (2ft)	10 (10 Watts)	30 (3000K) 35 (3500K) 40 (4000K) 45 (4500K) 50 (5000K)	D (0-10VDC Dimming) ND (Non Dimming)
	T83 - A6 (3ft)	10 (10 Watts)		
	T84 - A6 (4ft)	15 (15 Watts) 18 (18 Watts) 22 (22 Watts)		

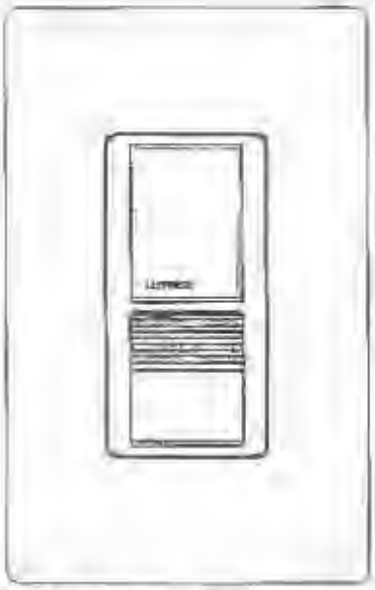
PROJECT SPECIFICATION		
Project:	Part Numbers:	Quantity:
Approved:		
Date:		128

(920) 267 6109 information@etechled.com www.etechled.com

Maestro® Dual Technology Sensor Switch

The Maestro® Dual Technology (Dual Tech) Occupancy Sensor Switch applies our exclusive XCT™ Technology to the ultrasonic as well as the passive infrared technology in this sensor to create a product that can detect very fine motion, such as typing. This product also includes all of the great features found in the rest of the Maestro® sensor family, including: adaptive relay switching, smart ambient light detection, and simple button presses for changing settings. The Maestro® Dual Tech Occupancy Sensor Switch is available in single-circuit and dual-circuit versions.

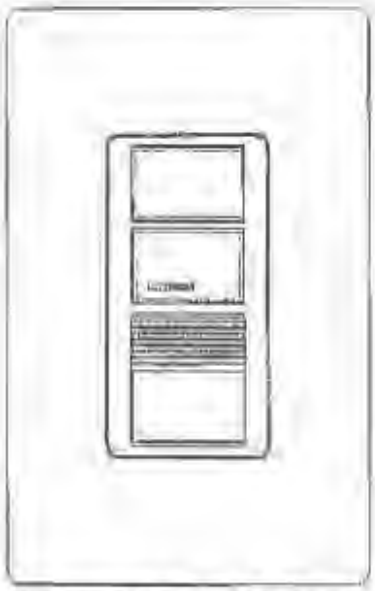
The single-circuit versions (MS-A102, MS-B102) can be used to meet many of the Title 20/24, ASHRAE 90.1, and IECC code requirements such as "automatic shutoff". The dual-circuit versions (MS-A202, MS-B202) can be used to meet many of the Title 20/24, ASHRAE 90.1, and IECC code requirements such as "automatic shutoff" and "multi-level lighting control". To find some examples of code-specific applications, visit www.lutron.com/energycodes



MS-A102-XX (Occupancy model)
MS-A102-V-XX (Vacancy model)
MS-B102-XX (Occupancy model)
MS-B102-V-XX (Vacancy model)

Features

- XCT™ Technology for major, minor, fine, and very fine motion detection
- 180° sensor field-of-view
- Tamper-resistant PIR lens
- Up to 900 ft² (81 m²) major motion coverage and 400 ft² (36 m²) minor motion coverage
- Two Ambient Light Detect (ALD) options:
  - Learning ALD Mode:
    Uses adaptive algorithm.
    Sensor learns user's preferred light level over time
  - Fixed ALD mode:
    Four selectable light level thresholds: Hi, Med, Low, Min
- Occupancy models (MS-A102-XX, MS-B102-XX, MS-A202-XX, MS-B202-XX) can be set to Auto-ON/Auto-OFF or Manual-ON/Auto-OFF per circuit
- Dual-circuit models (MS-A202, MS-B202) meet Title 24 requirements for multi-level lighting control.
- Single-circuit "Vacancy" models (MS-A102-V-XX, MS-B102-V-XX) available to meet Title 24/Title 20 requirements for vacancy sensors.
- Adjustable timeout for each circuit (1, 5, 15, or 30 minutes)
- Sensitivity adjustment:
  - PIR (Hi, Med, Low, Min)
  - Ultrasonic (Hi, Med, Low, Off)
- Switches all lighting loads: incandescent, halogen, ELV, MLV, CFL, LED magnetic fluorescent, electronic fluorescent
- Switches fan loads at 120 V~
- MS-B102, MS-B102-V work with Maestro® accessory switches in multi-location applications
- MS-A models DO NOT require neutral wiring, while the MS-B models DO require neutral wiring.



MS-A202-XX (Occupancy model)
MS-B202-XX (Occupancy model)

Notes:
- "XX" in the model number represents color/finish code. See Colors and Finishes at end of document.
- Wallplate not included.

Job Name:	Model Numbers:	
Job Number:		

Specifications

Regulatory Approvals

- UL® Listed to U.S. and Canadian safety requirements (applies only to MS-B102, MS-B102-V, MS-B202)
- NOM certified
- Title 20/24 certified lighting control device
  - Complies with Title 20 and Title 24 section 110.9

Power/Load Control

- 120–277 V~ 50/60 Hz

Key Design Features

- Dual Sensing Technology
- Switches all lighting loads
- 6 A of lighting load per circuit at 120–277 V~
- 4.4 A (1/6 HP) of fan load per circuit at 120 V~
- Crush/tamper resistant lens
- Smart Ambient Light Detection (ALD)
- Fixed Ambient Light Detection
- Adaptive zero-cross switching algorithm for extended relay life (patent pending)
- XCT™ Technology for major, minor, fine, and very fine motion detection
- Programmable Circuit Swapping eliminates need for rewiring to reassign circuits after installation of a dual-circuit product. (patent pending)
- Product ground current does not exceed 0.5 mA

Environment

- Ambient operating temperature: 32 °F to 104 °F (0 °C to 40 °C), 0%–90% humidity, non-condensing. Indoor use only.

Warranty

- 5-Year Limited Warranty. For additional Warranty information, please visit www.lutron.com/TechnicalDocumentLibrary/Sensor_Warranty.pdf

Sensor Detection

Lutron® Dual Tech sensors operate by triggering initial occupancy using PIR technology, and maintain occupancy using both ultrasonic and PIR technology.

Advanced Features

Switching

- Adaptive zero-cross switching—maximizes relay life by switching at the point of minimum energy on the AC power curve (patent pending). Actively adapts to variations in relay timing.

Additional Information on Sensors

- For single-circuit PIR Maestro® Occupancy Sensor Switch models, please see Lutron® P/N 369666
- For Maestro® Occupancy Sensor C-L® Dimmer models, please see Lutron® P/N 369748
- For dual-circuit PIR Maestro Occupancy Sensor Switch, please see Lutron® P/N 369758
- For more information, please see www.lutron.com/occvacsensors
- Lutron Technical Hotline: 1.800.523.9466

Job Name:	Model Numbers:	
Job Number:		

369730 3 04.08.14

Custom Settings

Default settings shown in bold

(🕒) - Timeout

- 30 min
- **15 min**
- 5 min
- 1 min

Mode - Sensor Modes

Lights automatically turn off in all sensor modes

- **Occ -Occupancy mode (No ALD)** [1,2,3]
- Lrn – Occupancy with learning ALD mode
- Fixd - Occupancy with fixed ALD mode
- Vac - Vacancy mode (No ALD) [2,3]

1 MS-A102-XX, MS-B102-XX default mode
2 MS-A102-XX, MS-B102-XX if locked in
3 MS-A202-XX, MS-B202-XX default is "Occ" (No ALD) mode

(((•)) – Ultrasonic Sensitivity

- High
- **Med**
- Low
- Off

PIR - Passive Infrared Sensitivity

- **High**
- Med
- Low
- Min

Additional Settings

Fixed ALD Light Level

- Hi
- Med
- **Low***
- Min

*Low is the default setting for any sensor that is set to the mode: Occupancy with fixed ALD mode

Off-While-Occupied

- **Enabled**
- Disabled

Walk-Thru Mode

- Enabled
- **Disabled**

Custom Settings - Details

Ambient Light Detection (ALD) mode

Lights turn on only when natural light in the room is below the set threshold.

- Learning: The ambient light threshold adjusts to the user's preference via manual interaction with the sensor switch.
- Fixed: Choose a fixed ALD light level from four pre-set options:
  High, Medium, Low, and Minimum

Manual Off-While-Occupied Options

ENABLED (default setting)

- When the sensor switch is manually turned off the sensor switch will not turn the lights back on automatically while the room is occupied.
- Once the room is vacated, the Auto-On feature returns to normal operation after the timeout period has expired.
- This may be the preference in conference rooms or classrooms while viewing presentations. This feature requires motions to keep the lights off.

DISABLED

- When the sensor switch is manually turned off, the Auto-On feature will return to normal operation after 25 seconds.
- This may be the preference in a restroom if the user always wants the lights to turn on upon entering and the lights to turn off when the room is vacant.

Walk-Thru Mode

ENABLED [1]

- If motion is not detected within 3 minutes after initial occupancy, the lights will turn off after 3 minutes, instead of the current timeout.
- This setting may be the preference in commercial applications where personnel may briefly trigger sensors during non-working hours.

DISABLED (default setting)

- When motion is detected, the lights will ALWAYS remain on for the entire timeout duration, regardless of the duration of occupancy detection.

1 minute timeout would be overridden if walk-thru mode is also ENABLED

Load Type and Capacity

Control	Neutral Connection Required	Vacancy Only	Number of Circuits	Voltage / Load Type / Maximum Load (Anywhere in Gang)[1]	Minimum Load	3-Way with Mechanical Switch	Multi-Location with Accessory Switch
MS-A102			1	120 - 277 V~ Lighting 6 A[2] 120 V~ Fan 4.4 A (1/6 HP)[3]	0 A		
MS-A102-V		✓	1		0 A		
MS-A202			2		0 A		
MS-B102	✓		1		0 A	✓	✓
MS-B102-V	✓	✓	1		0 A	✓	✓
MS-B202	✓		2		0 A	✓	

[1] Ratings shown are per circuit.

[2] Sensor Switch Load Type: Designed for use with permanently installed incandescent, halogen, MLV, ELV, CFL, LED, magnetic fluorescent, and electronic fluorescent lighting loads.

[3] When controlling light and fan loads simultaneously on a single-circuit, maximum load capacity per circuit is 4.4 A at 120 V~.

Sensor Switch Placement

- The sensor switch performs better with an unobstructed view of room occupants.
- Hot objects and moving air currents can affect the performance of the sensor switch. The sensor switch performs best when located 6 ft (1.8 m) or more away from hot objects or moving air currents.
- The PIR performance depends on a temperature differential between the ambient room temperature and that of room occupants. Warmer rooms may reduce the ability of the sensor switch to detect occupants.
- The ultrasonic performance can be affected by air currents and moving objects. Consider the effects of fans, HVAC vents, open windows, or moving objects when installing the sensor switch.
- If the sensor sees a specific area that is not desired (e.g., hallway), Lutron offers a lens mask kit (Lutron® P/N 50013614) that can be ordered through Tech Support (1.800.523.9466). Alternatively, selectively placing opaque tape (e.g., painter's tape, electrical tape, masking tape) over certain parts of the lens can limit it's field of vision to block undesired detection areas. Masking the lens may affect ALD performance, but DOES NOT block ultrasonic frequencies.

Definitions

Major motion: movement of a person entering or passing through an area.

Minor motion: movement of a person occupying an area and engaging in small activities (e.g., reaching for a telephone, turning the pages of a book, opening a file folder, picking up a coffee cup).

Fine Motion: movement of a person occupying an area and engaging in very small activities (e.g., reading a magazine).

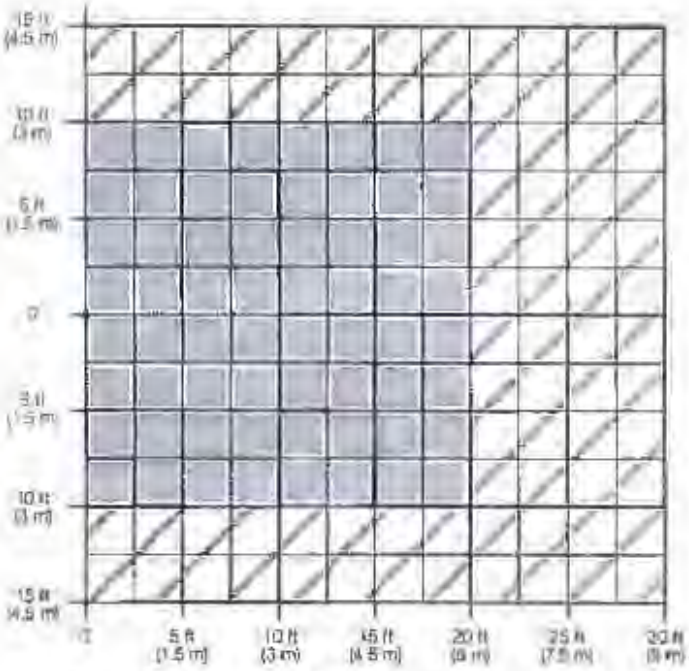
Very Fine Motion: movement of a person occupying an area and engaging in very small activities (e.g., typing on a keyboard).

Sensor Switch Placement *(continued)*

NEMA WD7 Coverage

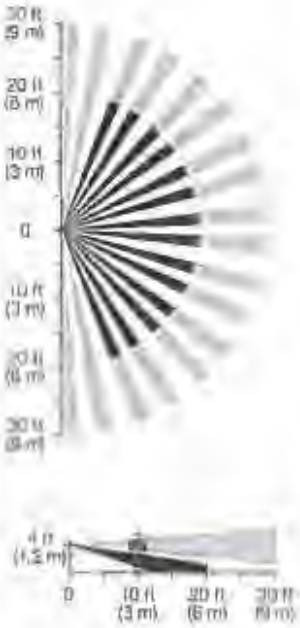
Major motion coverage: 900 ft² (81 m²)

Minor motion coverage: 400 ft² (36 m²)

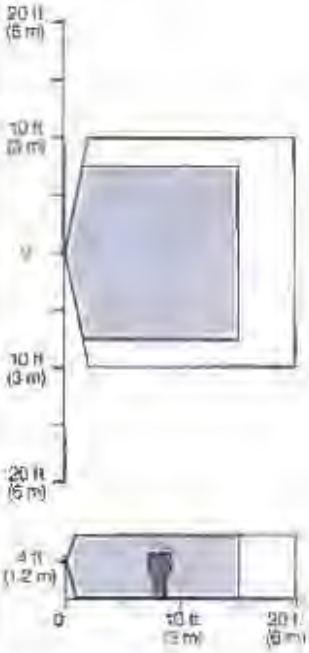


Test Room Dimensions: 37 ft x 38 ft (11.28 m x 11.6 m)
Test Floor Surface Material: Carpet
Sensor Coverage Angle: 180 °
Major motion coverage: Initial trigger motion detection
Minor motion coverage: Maintained motion detection

Passive Infrared Beam Diagram
(For Reference Only)



Ultrasonic Coverage
(For Reference Only)

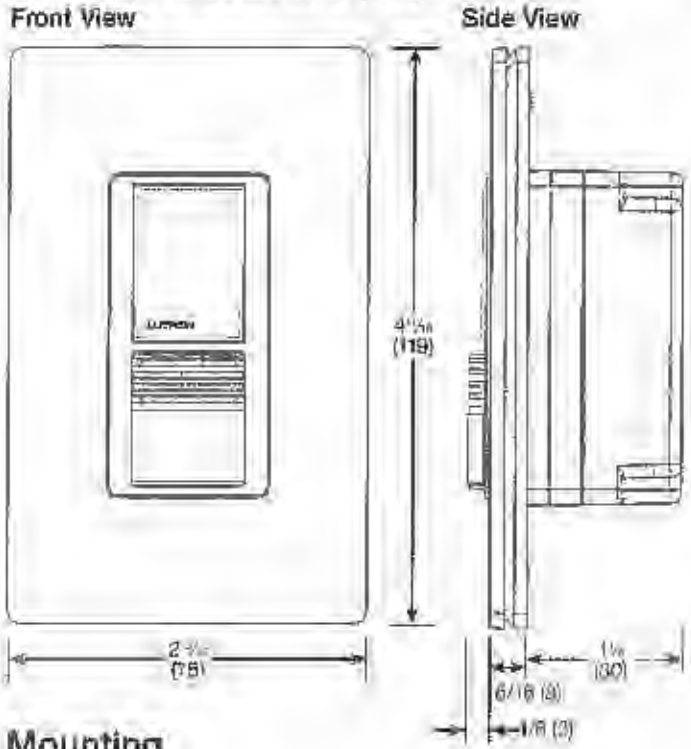


Ultrasonic Frequency: 40 kHz

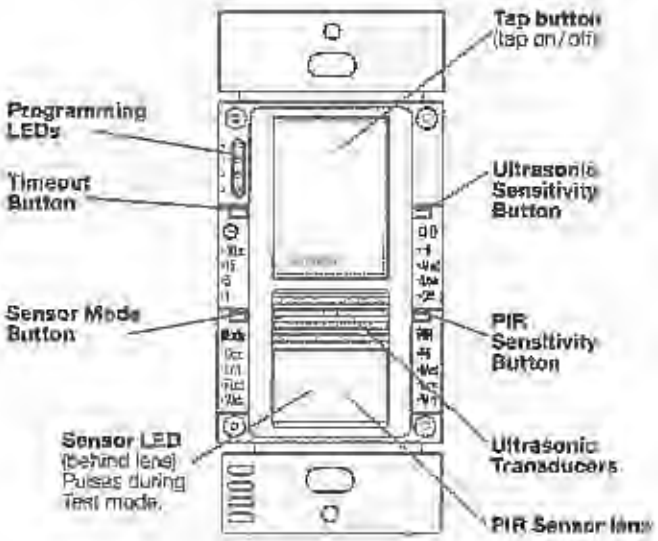
Job Name:	Model Numbers:	
Job Number:		

Dimensions - Single-Circuit
MS-A102, MS-A102-V, MS-B102, MS-B102-V

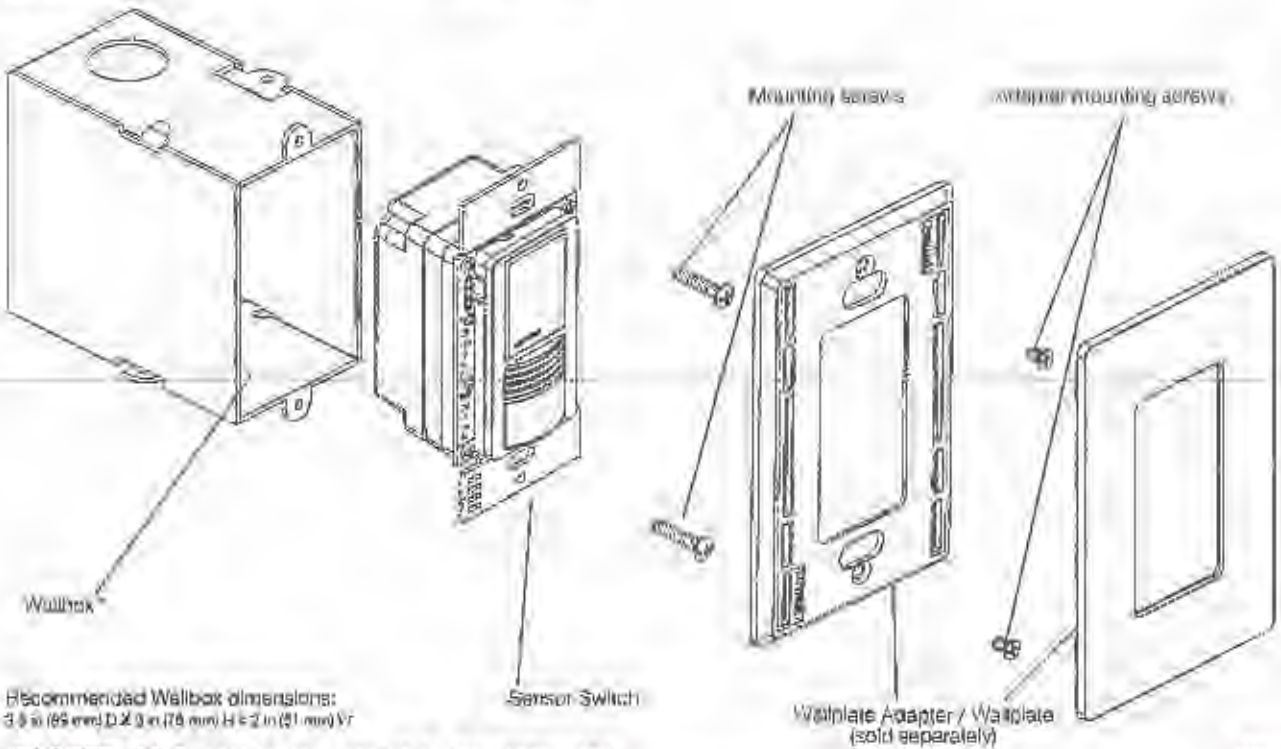
Measurements shown as: in (mm).



Operation



Mounting



* Recommended Wallbox dimensions: 3 3/8 in (86 mm) D x 3 in (76 mm) H x 2 in (51 mm) W

Job Name:	Model Numbers:	134
Job Number:		

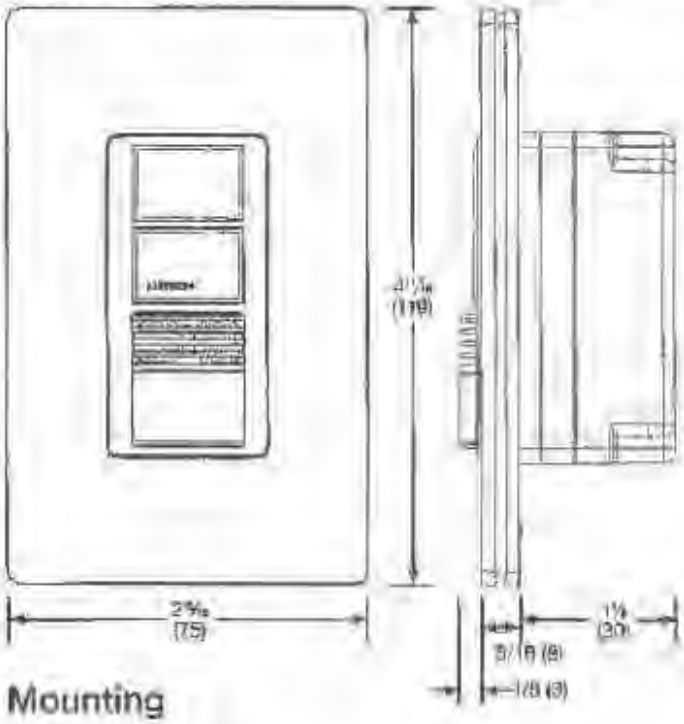
7 04.09.14

Dimensions – Dual-Circuit MS-A202, MS-B202

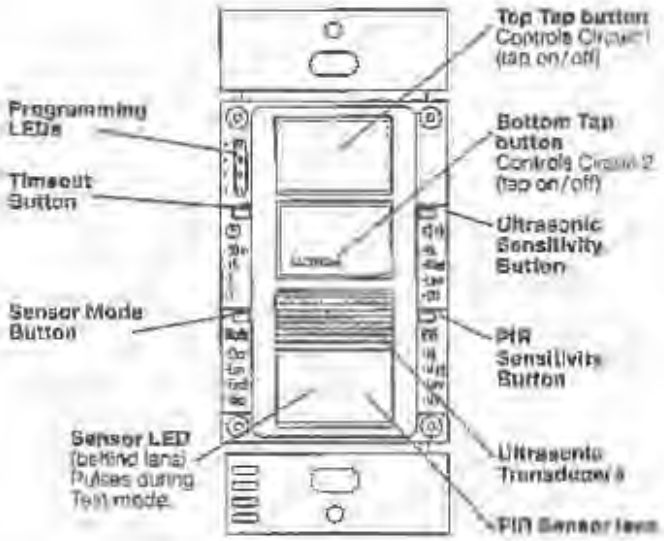
Measurements shown as: in (mm).

Front View

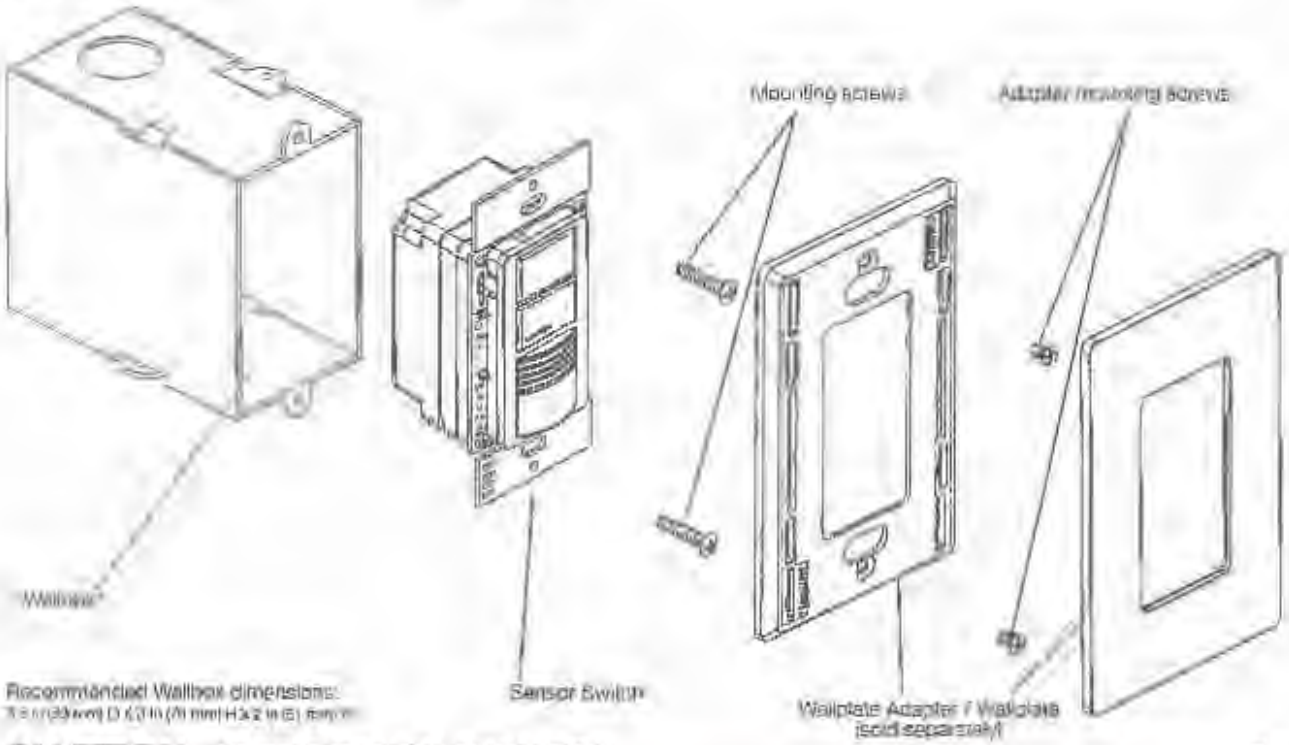
Side View



Operation



Mounting

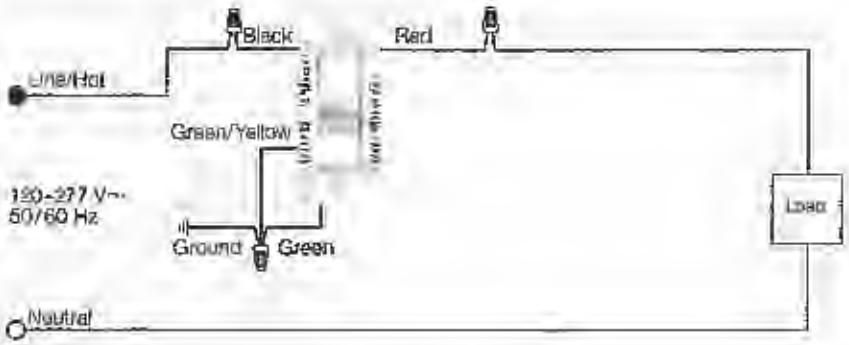


Recommended Wallbox dimensions:
3 1/2 (89 mm) D x 3 in (76 mm) H x 2 in (51 mm) W

Wiring Diagrams - Single-Circuit

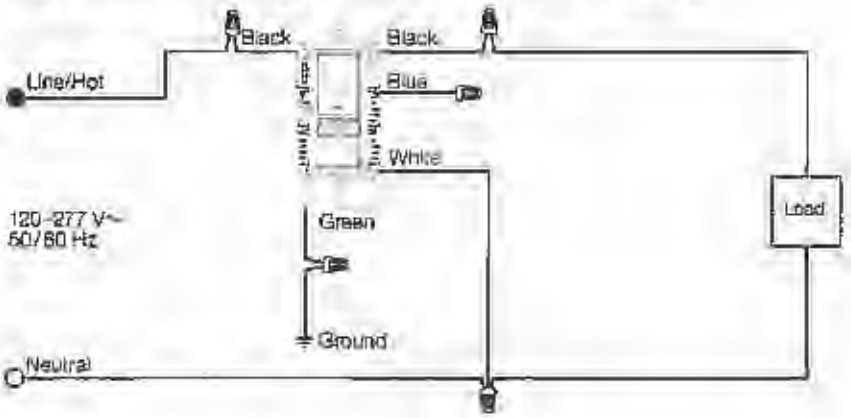
Wiring Diagram 1

Single Pole Wiring - Single-Circuit (MS-A102, MS-A102-V)



Wiring Diagram 2

Single Pole Wiring - Single-Circuit (MS-B102, MS-B102-V)



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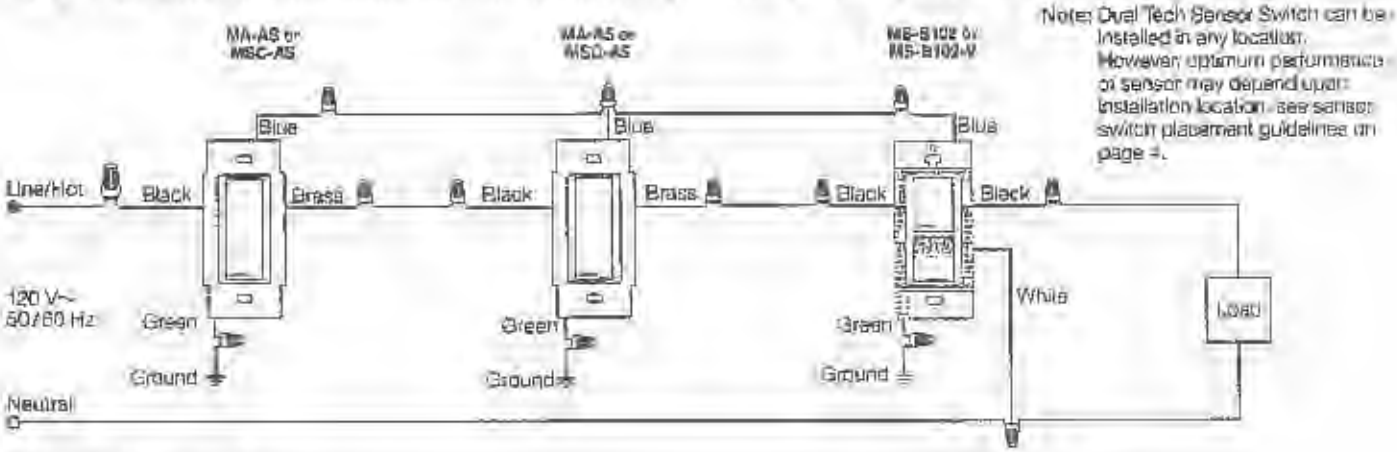
Wiring Diagram 3

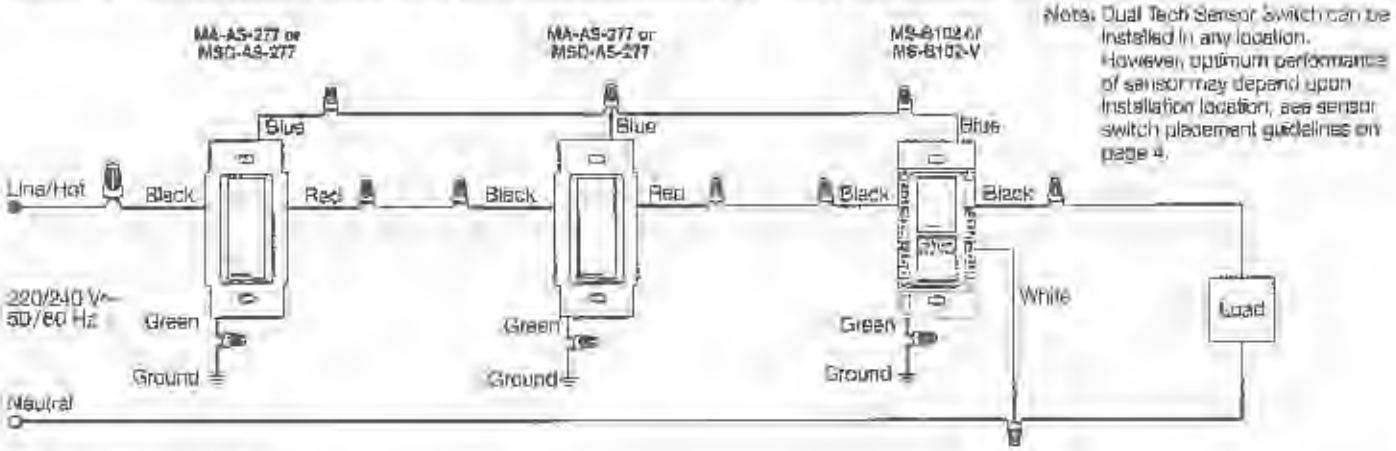
120 V~ Multi-Location Installation with Maestro® Accessory Switches (MS-B102, MSB102-V)



Note: Dual Tech Sensor Switch can be installed in any location. However, optimum performance of sensor may depend upon installation location, see sensor switch placement guidelines on page 4.

Wiring Diagram 4

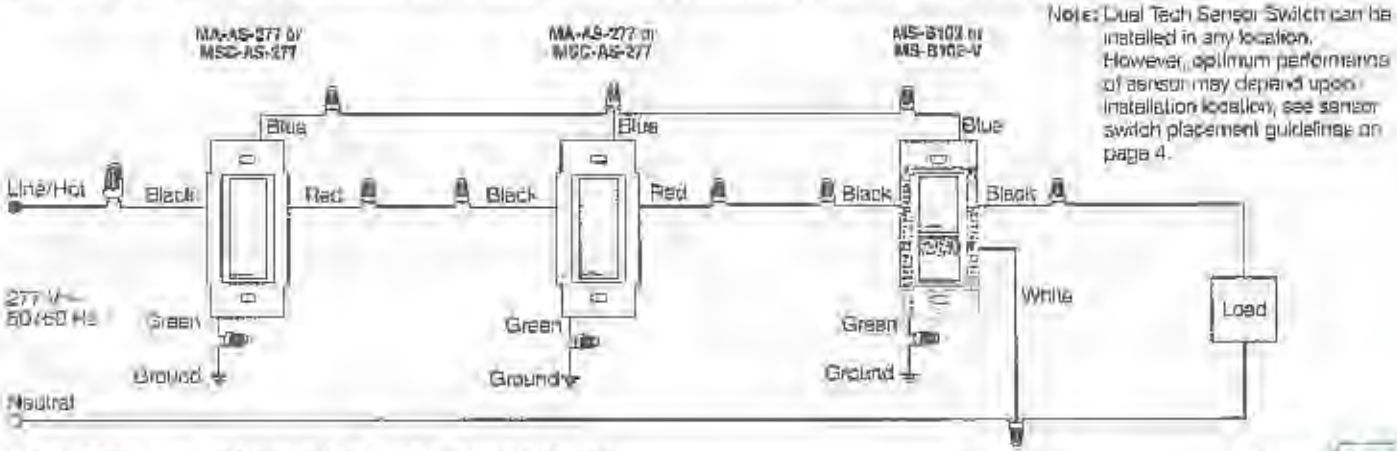
220/240 V~ Multi-Location Installation with Maestro® Accessory Switches (MS-B102, MSB102-V)



Note: Dual Tech Sensor Switch can be installed in any location. However, optimum performance of sensor may depend upon installation location, see sensor switch placement guidelines on page 4.

Wiring Diagram 5

277 V~ Multi-Location Installation with Maestro® Accessory Switches (MS-B102, MSB102-V)

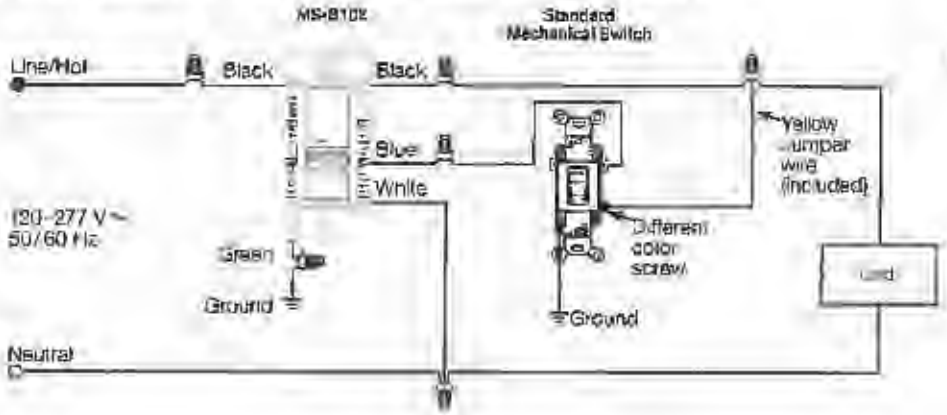


Note: Dual Tech Sensor Switch can be installed in any location. However, optimum performance of sensor may depend upon installation location, see sensor switch placement guidelines on page 4.

Wiring Diagrams - Single-Circuit *(continued)*

Wiring Diagram 6

3-Way Installation - Single-Circuit (MS-B102, MS-B102-V)

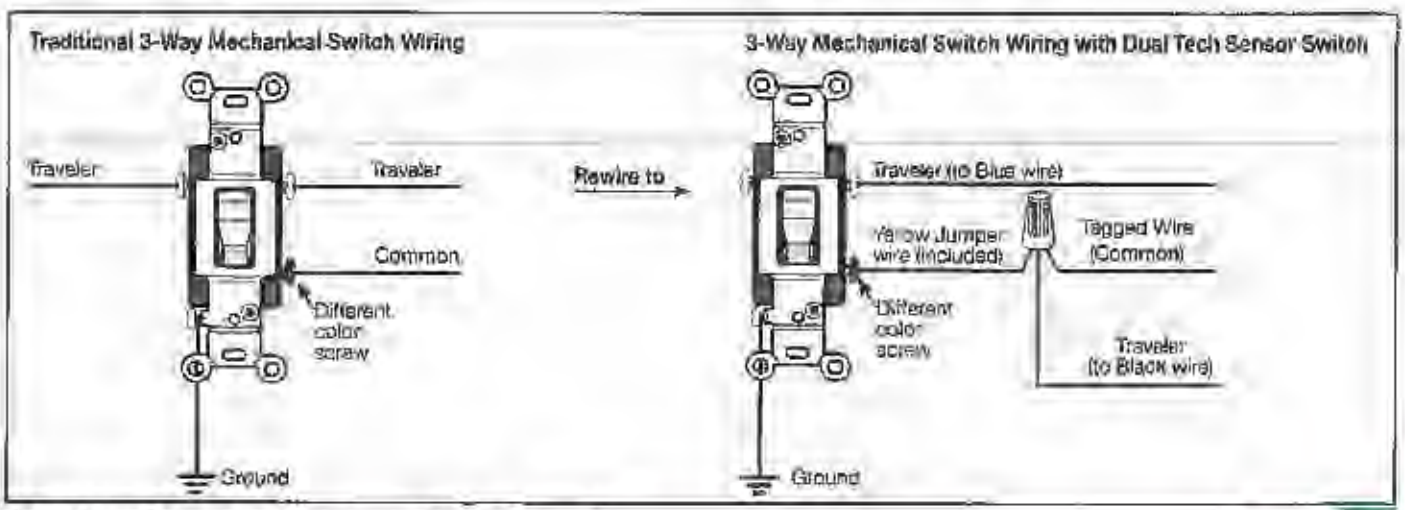


Note: Dual Tech Sensor Switch can be installed in any location. However, optimum performance of sensor may depend upon installation location, see sensor switch placement guidelines on page 4.

3-Way Installation

For retrofit 3-way installations the mechanical switch needs to be rewired as shown in the diagram below after wiring the Dual Tech Sensor Switch. Otherwise the 3-way installation will not work as expected. Single Pole mechanical switches may also be used in a 3-way installation with MS-B102, MS-B102-V and MS-B202 models.

1. Connect Ground: Ensure the bare copper or green ground wire from the wallbox is connected to the green ground screw of the mechanical switch.
2. Tag circuit Common: Your 3-way mechanical switch should have three screw terminals, two of the same color, and one of a different color. Tag the wire that is connected to the screw terminal of a different color.
3. Identify the wire that matches the color of the wire you connected to the blue wire of the Maestro® Dual Technology Occupancy Sensor Switch. Connect this wire to one of the two terminals of the same color.
4. Combine the tagged wire, the remaining wire and yellow jumper wire (included) using a wire connector. Connect the other end of jumper wire to the different color screw.



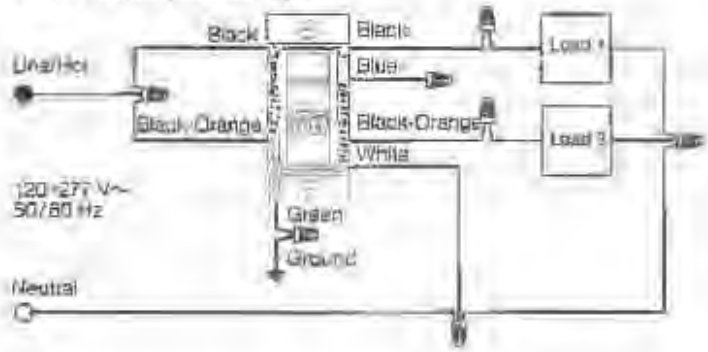
Wiring Diagrams - Dual-Circuit

Wiring Diagram 1

Single Pole, Single Breaker Feed Wiring - Dual-Circuit (MS-A202)

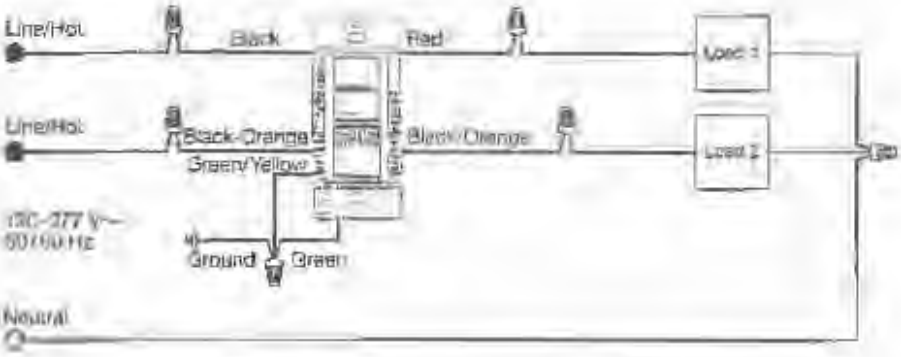
Wiring Diagram 2

Single Pole, Single Breaker Feed Wiring - Dual-Circuit (MS-B202)



Wiring Diagram 3

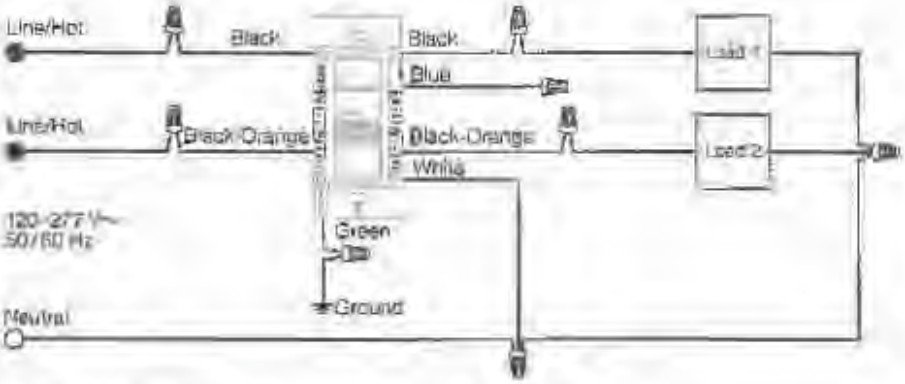
Single Pole, Two Breaker Feed Wiring: Dual-Circuit (MS-A202)



Wiring must comply with NEC® code for wiring multiple branch circuits. Where two or more branch circuits supply devices or equipment on the same yoke, a means to simultaneously disconnect the ungrounded conductors supplying those devices shall be provided at the point at which the branch circuits originate.

Wiring Diagram 4

Single Pole, Two Breaker Feed Wiring: Dual-Circuit (MS-B202)



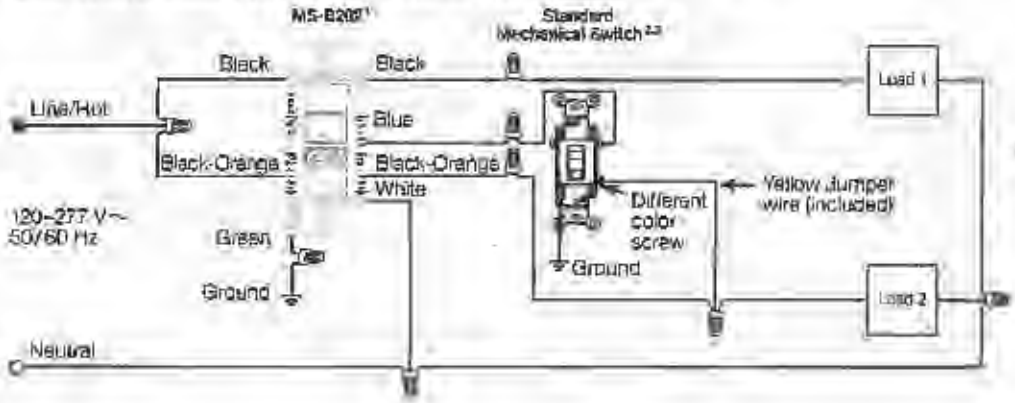
continued on next page...

Wiring Diagrams - Dual-Circuit *(continued)*

Wiring Diagram 5

3-Way Installation, Single Breaker Feed Wiring: Dual-Circuit (MS-B202)

NOTE: Do not use Maestro® accessory switches with MS-B202.

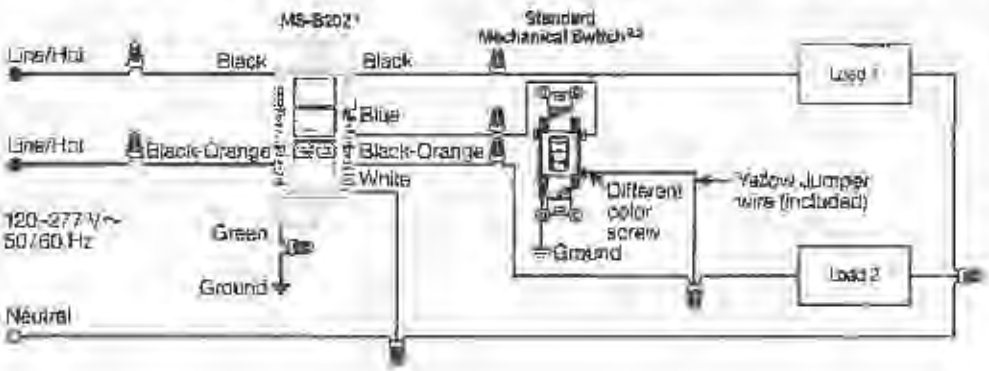


Note: Optimum performance of sensor may depend upon installation location, see sensor switch placement guidelines on page 4.

Wiring Diagram 6

3-Way Installation, Two Breaker Feed Wiring: Dual-Circuit (MS-B202)

Wiring must comply with NEC® code for wiring multiple branch circuits. Where two or more branch circuits supply devices or equipment on the same yoke, a means to simultaneously disconnect the ungrounded conductors supplying those devices shall be provided at the point at which the branch circuits originate.



Note: Do not use Maestro® accessory switches with MS-B202.

Note: Optimum performance of sensor may depend upon installation location, see sensor switch placement guidelines on page 4.

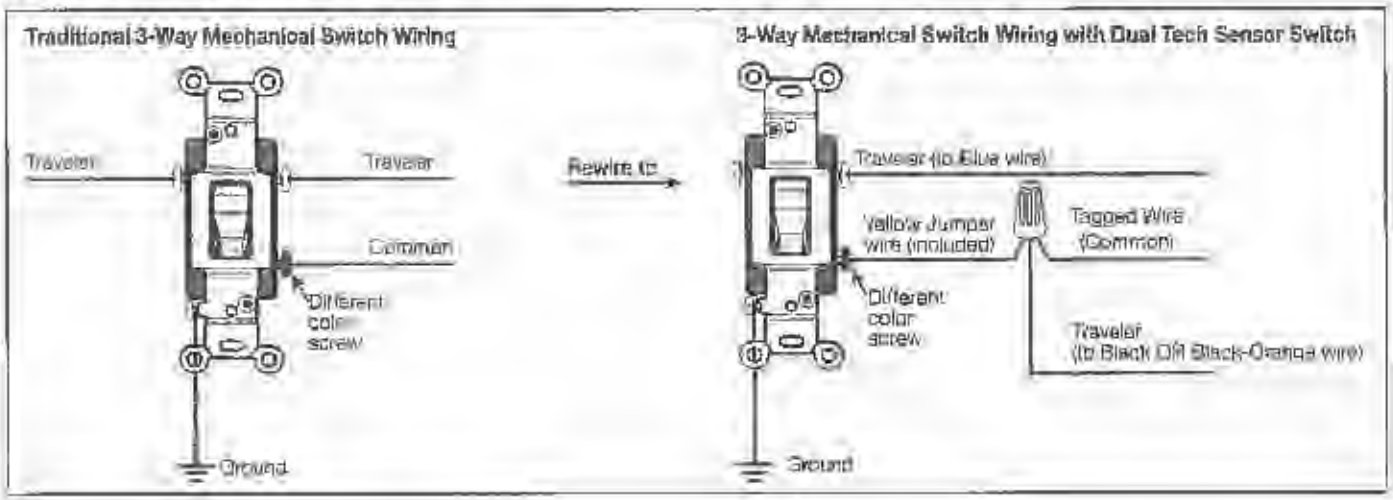
1. Dual Tech Sensor Switch can be installed in any location.
2. Mechanical switch may be wired to either circuit, and will control both. Do NOT wire mechanical switch to both circuits.
3. You may use no more than one mechanical switch with a dual circuit Dual Tech Sensor Switch.

Job Name:	Model Numbers: 140
Job Number:	

3-Way Installation

For retrofit 3-way installations the mechanical switch needs to be rewired as shown in the diagram below after wiring the Dual Tech Sensor Switch. Otherwise the 3-way installation will not work as expected. Single Pole mechanical switches may also be used in a 3-way with MS-B102, MS-B102-V and MS-B202 models.

1. Connect Ground: Ensure the bare copper or green ground wire from the wallbox is connected to the green ground screw of the mechanical switch.
2. Tag circuit Common: Your 3-way mechanical switch should have three screw terminals, two of the same color, and one of a different color. Tag the wire that is connected to the screw terminal of a different color.
3. Identify the wire that matches the color of the wire you connected to the blue wire of the Maestro® Dual Technology Occupancy Sensor Switch. Connect this wire to one of the two terminals of the same color.
4. Combine the tagged wire, the remaining wire and yellow jumper wire (included) using a wire connector. Connect the other end of jumper wire to the different color screw.



How Loads Operate in 3-Way with Dual-Circuit Sensor Switch (MS-B202)

	Initial Load State		After flipping 3-way mechanical switch	
	Circuit 1	Circuit 2	Circuit 1	Circuit 2
When All Lights are OFF	Off	Off	On	On
When All Lights are ON	On	On	Off	Off
When One Circuit is ON	On	Off	Off	Off
	Off	On	Off	Off

Colors and Finishes

Gloss Finishes

White
WH

Ivory
IV

Almond
AL

Light Almond
LA

Gray
GR

Brown
BR

Black
BL

Satin Finishes

Hot
HT

Merlot
MR

Plum
PL

Turquoise
TQ

Taupe
TP

Eggshell
ES

Biscuit
BI

Snow
SW

Palladium
PD

Midnight
MN

Sienna
SI

Terracotta
TC

Greenbriar
GB

Bluestone
BG

Mocha Stone
MS

Goldstone
GS

Desert Stone
DS

Stone
ST

Limestone
LS

Sea Glass
SG

- Due to printing limitations, colors and finishes shown cannot be guaranteed to match actual product colors perfectly.
- Color chip keychains are available for more precise color matching:
  Gloss Finishes: DG-CK-1
  Satin Finishes: SC-CK-1

Energi TriPak® Basic Packages

The Energi TriPak® Basic Package incorporates Maestro® load controls and wireless sensors which provides a system that delivers energy savings, convenience, and ease of installation.

Maestro Wireless® switches use Lutron® patented Clear Connect® RF Technology, which enables wireless communication with Radio Powr Savr® sensors for light control.

Features

- The Energi TriPak® Basic package provides switching and occupancy/vacancy sensing of multiple load types.
- Lutron® patented Clear Connect® RF Technology works through walls and floors.
- Controls include Front Accessible Service Switch (FASS®) for safe lamp replacement.
- Two-wire installation for any retrofit application.
- Power failure memory: If power is interrupted, the control will return to its previously set level prior to interruption.

Model Numbers

MRF2-1S8A-1OC	(1) 8 A Switch (1) Radio Powr Savr® ceiling sensor
MRF2-1S8A-1OH	(1) 8 A Switch (1) Radio Powr Savr® hallway sensor
MRF2-1S8A-1OK	(1) 8 A Switch (1) Radio Powr Savr® corner sensor
MRF2-1S8A-1OW	(1) 8 A Switch (1) Radio Powr Savr® wall sensor
MRF2-1S8A-1VC	(1) 8 A Switch (1) Radio Powr Savr® ceiling vacancy sensor
MRF2-2S8A-1OW	(2) 8 A Switches (1) Radio Powr Savr® wall sensor

Receiving Devices

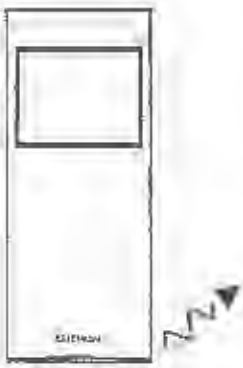
Maestro Wireless® Control

RF Switch

Transmitting Devices

Radio Powr Savr® Sensors

Ceiling-Mounted Occupancy and Vacancy Sensor



Wall, Corner, or Hall Mounted Occupancy and Vacancy Sensor

Job Name:	Model Numbers:	
Job Number:		

Maestro Wireless® Switch

Model Number

Switch
Lighting and motor loads

MRF2-8S-DV-XX	8 A Lighting, 3 A Fan (1/10 HP motor, 120 V~ only), Spec Grade Electronic Switch 120–277 V~, NO NEUTRAL WIRE REQUIRED

Companion Controls
Claro® Gloss Finishes

MA-AS-XX	Companion Switch 120 V~
MA-AS-277-XX	Companion Switch 277 V~

Satin Colors® Satin Finishes

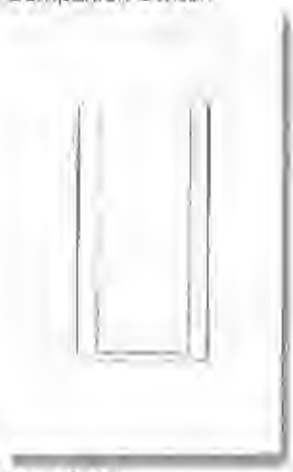
MSC-AS-XX	Companion Switch 120 V~
MSC-AS-277-XX	Companion Switch 277 V~

"XX" in the model number represents color/finish code.

Switch

MRF2-8S-DV-XX

Companion Switch



MA-AS-XX

Switch Load Type and Capacity

No Neutral Required

Control	Voltage	Load Type	Minimum Load	Maximum Load		
				Not Ganged	End of Gang	Middle of Gang
MRF2-8S-DV[1]	120–277 V~	Incandescent/ Halogen	25 W	8 A	8 A / 7 A[3]	7 A
	120–277 V~	Fluorescent/ LED/CFL	40 W (LUT-MLC)[4]	8 A	8 A / 7 A[3]	7 A
	120 V~	Fan Motor	0.4 A	1/10 HP 3 A	1/10 HP 3 A	1/10 HP 3 A

[1] Switch Load Type: MRF2-8S-DV is designed for use with permanently installed lighting loads and with fan motor loads up to 1/10 HP (3 A, 120 V~ only).
[2] Switch Load Type: MRF2-8S-DV are designed for use with permanently installed lighting loads.
[3] Maximum load for double gang application is 8 A. Triple gang application carries a maximum load of 7 A.
[4] The LUT-MLC (included) ensures proper function with certain fluorescent, CFL, and LED load types.

Job Name:	Model Numbers:	
Job Number:		

Specifications

Regulatory Approvals

- UL® Listed.
- CSA Certified.
- FCC Approved. Complies with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.
- Industry Canada Certified.

Power

Operating voltage:
120 – 277 V~ 50/60 Hz

Key Design Features

Switch

- On a single-tap, lights turn ON or OFF.

All RF Local Controls

- Tested to withstand electrostatic discharge without damage or memory loss, in accordance with IEC 61000-4-2.
- Tested to withstand surge voltages without damage or loss of operation, in accordance with IEEE C62.41-1991 Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
- Controls always operate locally and do not require system control.
- Power failure memory: should power be interrupted, the control will return to its previously set level prior to the interruption when power is restored.
- Uses conventional Single-pole, 3-way and 4-way wiring.
- Multiple location control from Switch and up to 9 Companion Switches.
- Use Lutron® Designer (Claro® and Satin Colors®) wallplates or designer-style wallplates from other manufacturers. Wallplates are sold separately.
- Lutron Claro® and Satin Colors® wallplates snap on with no visible means of attachment.
- Requires a 1-gang U.S. wallbox. 3½ in (89 mm) deep recommended. 2¼ in (57 mm) deep minimum.
- Green indicator light.

System Communications and Capacity

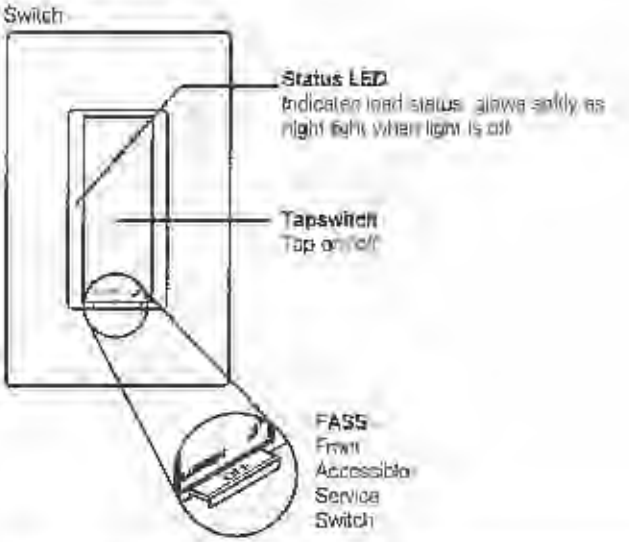
- Maestro Wireless® controls communicate with the Pico® wireless controls and Radio Power Savr® sensors through radio frequency (RF).
- Maestro Wireless® local controls must be located within 60 ft (18 m) line of sight or 30 ft (9 m) through walls, of Radio Power Savr® sensors.
- Maestro Wireless® local controls must be located within 60 ft (18 m) line of sight or 30 ft (9 m) through walls, of a Pico® wireless control.
- Up to 10 sensors or Pico® wireless controls can be assigned to each switch.
- Sensors can be assigned to multiple switches.

Environment

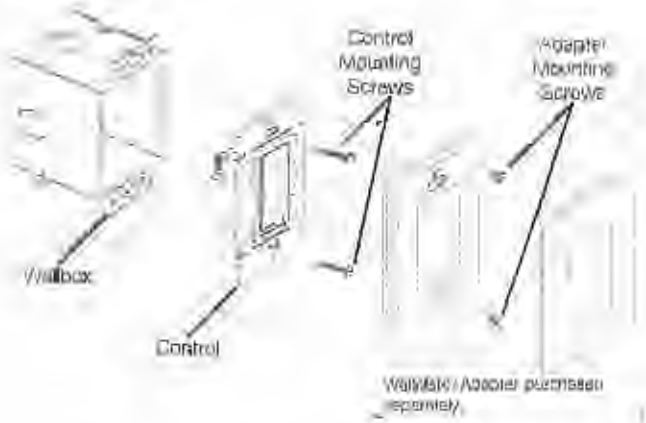
- Ambient operating temperature: 32 °F to 104 °F (0 °C to 40 °C), 0%-90% humidity, non-condensing, indoor use only.

Job Name:	Model Numbers:	
Job Number:		

Operation



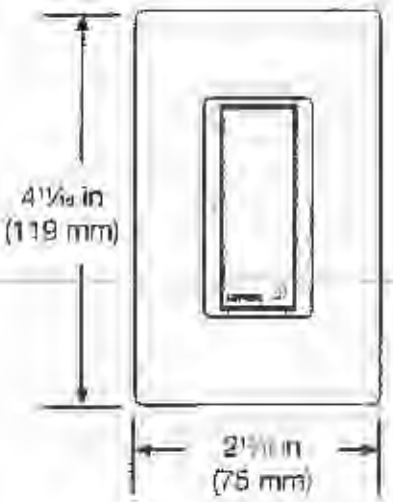
Mounting



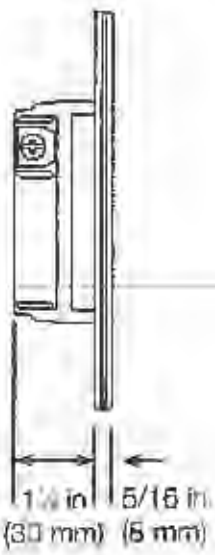
IMPORTANT NOTICE:
FASS® – Front Accessible Service Switch – to service load, remove power by pulling the FASS® switch out completely on either the Switch or Companion Switch. After servicing load, push the FASS® switch back in fully to restore power to the control.

Dimensions

Front View



Side View

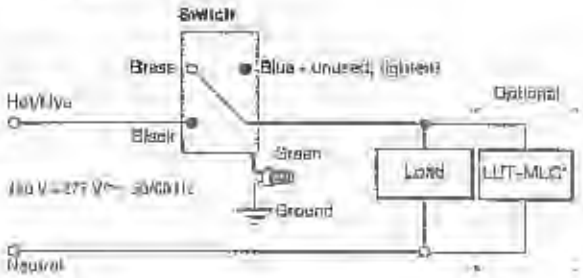


Job Name:	Model Numbers:	
Job Number:		

Wiring Diagrams

Single Location Installation

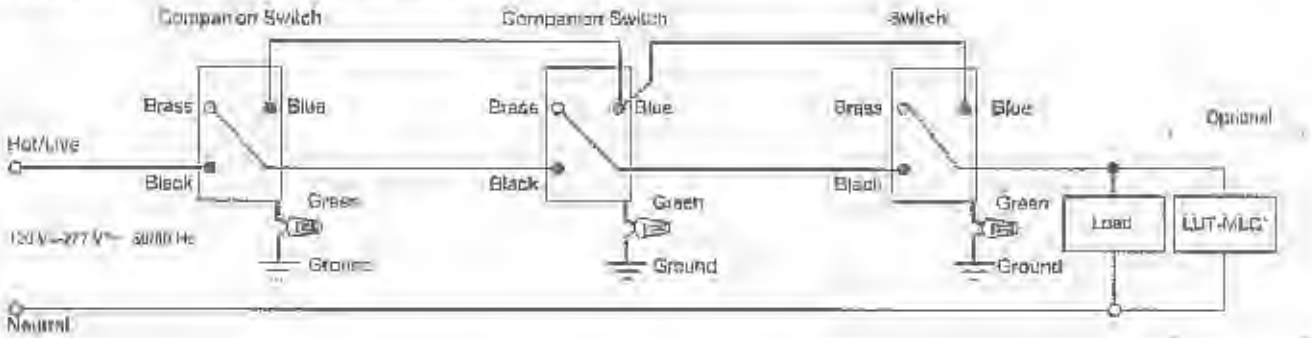
MRF2-8S-DV



* A LUT-MLC ensures proper function when fluorescent, CFL, or LED loads are used. Install the LUT-MLC inside a load fixture or in a separate J-box of the circuit.

Multi-Location Installation†

MRF2-8S-DV* with MA-AS/MA-AS-277 or MSC-AS/MSC-AS-277



When using controls in single location installations, tighten the blue terminal without any wires attached. DO NOT connect the blue terminal to any other wiring or to ground.

* Up to 9 Maestro Companion Switches may be connected to the Maestro Wireless Switch. Total blue terminal wire length may be up to 250 ft (76 m).

† Requires MA-AS/MSC-AS for 120 V~ applications, and MA-AS-277/MSC-AS-277 for 277 V~ applications.

Job Name:	Model Numbers:	
Job Number:		

Colors and Finishes

Gloss Finishes

White
WH

Ivory
IV

Almond
AL

Light Almond
LA

Gray
GR

Brown
BR

Black
BL

Satin Finishes

Hot
HT

Merlot
MR

Plum
PL

Turquoise
TQ

Taupe
TP

Eggshell
ES

Biscuit
BI

Snow
SW

Palladium
PD

Midnight
MN

Sienna
SI

Terracotta
TC

Greenbrier
GB

Bluestone
BG

Mocha Stone
MS

Goldstone
GG

Desert Stone
DS

Stone
ST

Limestone
LS

Due to printing limitations, colors and finishes shown cannot be guaranteed to perfectly match actual product colors.

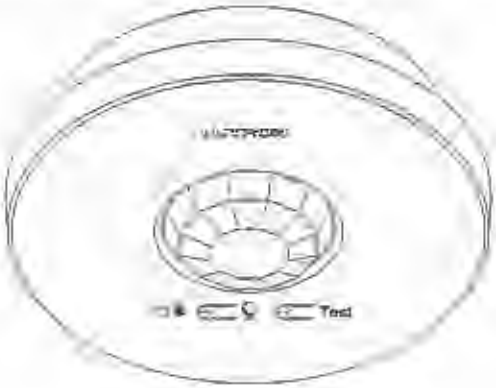
Metal Finish (wallplate only)

When using Stainless Steel wallplates, it is recommended to order the controls in Black (BL) or Midnight (MN).

Stainless Steel
SS

Job Name:	Model Numbers:	
Job Number:		

Radio Powr Savr™ Wireless Occupancy/Vacancy Ceiling Sensor



Lutron® Radio Powr Savr™ occupancy/vacancy sensors are wireless, battery-powered passive infrared (PIR) sensors that automatically control lights via RF communication to compatible dimming and switching devices. These sensors detect the heat from people moving within an area to determine when the space is occupied. The sensors then wirelessly transmit the appropriate commands to the associated dimming and switching devices to turn the lights on or off automatically. They combine both convenience and exceptional energy savings potential along with ease of installation.

Features

- Wireless occupancy sensor has 3 settings available: Auto-On/Auto-Off, Auto-On Low-Light/Auto-Off, and Manual-On/Auto-Off
- Auto-On Low-Light feature will only turn lights on automatically if there is less than approximately 10 Lux (1 fc) of ambient light
- Vacancy only model available to meet California (U.S.A.) Title 24 requirements
- Uses Clear Connect® technology
- Passive infrared motion detection with exclusive Lutron XCT™ Technology for fine motion detection
- 360° coverage ranges from 324 ft² (30.2 m²) to 676 ft² (62.4 m²), depending on mounting height. See range diagrams for more details.
- Simple and intuitive adjustments available for Timeout, Auto-On, and Activity settings
- Supports advanced occupancy features, such as dependent occupancy groups and customizable occupied/unoccupied presets in some systems
- Multiple sensors can be added for extended coverage—refer to product specification submittal of receiving device to determine system limits
- Lens illuminates during test mode to verify ideal locations
- Multiple ceiling-mount methods available for different ceiling materials
- Front accessible test buttons make programming easy
- 10-year battery life design
- RoHS compliant

Job Name:	Model Numbers:	
Job Number:		

Specifications

Regulatory

- Lutron® Quality Systems Registered to ISO 9001:2008

Standards Approved

- FCC certified
- IC certified
- Meets CA (U.S.A.) Energy Commission Title 24 requirements
- COFETEL
- ANATEL
- SUTEL

Power/Performance

- Operating voltage: 3 V⎓
- Operating current: 14 µA nominal
- Requires one CR 123 lithium battery
- 10-year battery life
- Non-volatile memory (saved changes are stored during power loss)

Environment

- Temperature: 32 °F to 104 °F (0 °C to 40 °C)
- For indoor use only

Range

Local load controls must be located within 60 ft (18 m) line of sight, or 30 ft (9 m) through walls, of a sensor.

Sensor Coverage Test

- Front accessible test button
- Lens illuminates orange in response to motion during test mode and is visible from 60 ft (18 m)

Wireless Communication Test

- Front accessible test button
- Turn associated loads on and off

Timeout Options

- 1 minute *
- 5 minutes
- 15 minutes – default setting
- 30 minutes

Auto-On Options (Occupancy Versions Only)

- "Enabled" – Sensor turns lights ON and OFF automatically – default setting.
- "Low Light" – Sensor turns lights ON automatically only in low ambient light conditions. Sensor turns lights OFF automatically.
- "Disabled" ** – Lights must be turned ON manually from dimming or switching device. Sensor turns lights OFF automatically.

Activity Options

- Low Activity (🚶) – default setting
- Medium Activity (🚶🚶)
- High Activity (🚶🚶🚶)

Intended for use in high-activity, briefly occupied areas only

** There is a 15-second grace period that begins when the lights are automatically turned off, during which the lights will automatically turn back on in response to motion. This grace period is provided as a safety and convenience feature in the event the lights turn off while the room is still occupied, so that the user does not need to manually turn the lights back on. After 15 seconds, the grace period expires and the lights must be manually turned on.

Job Name:	Model Numbers:	
Job Number:		

Installation Overview

Sensor Setup

- Sensor setup is available as a service by Lutron. For more information see the **Sensor Layout and Tuning** service document (Lutron, P/N 3601235).

Sensor Placement

- The ability of the sensor to detect motion requires line of sight of room occupants. The sensor must have an unobstructed view of the room. **DO NOT** mount behind or near tall cabinets, shelves, hanging fixtures, ceiling fans, etc. The sensor cannot see through glass objects such as patio or shower doors.
- Hot objects and moving air currents can affect the performance of the sensor. To ensure proper operation, the sensor should be mounted at least 4 ft (1.2 m) away from HVAC vents and light bulbs that are below the ceiling line.
- The performance of the sensor depends on a temperature differential between the ambient room temperature and that of room occupants. Warmer rooms may reduce the ability of the sensor to detect occupants.

Mounting

Temporary mounting is optional to test sensor coverage and wireless communication before permanently installing the sensor.

Drop Ceiling (Compressed Fiber Ceiling Tile)

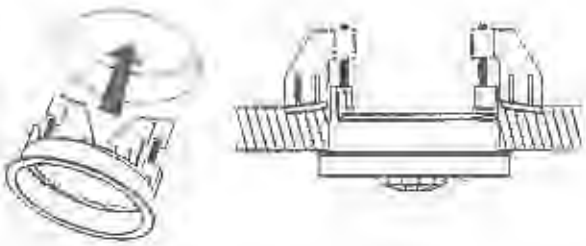
The mounting wire is provided for both temporary and permanent mounting of the sensor to ceiling tiles. It is designed to allow temporary mounting, testing, and repositioning (if necessary) of the sensor without damaging a ceiling tile. Once the final position of the sensor has been chosen, the mounting wire should be twisted together to permanently secure the sensor in place.

Solid Ceiling (Drywall, Plaster, Concrete, or Wood)

- Temporary mounting: Ten (10) temporary mounting strips can be purchased in the kit L-CMDPIRKIT for temporarily mounting and testing the sensor.
- Permanent mounting: Screws and anchors (for drywall or plaster) provided to mount the sensor.

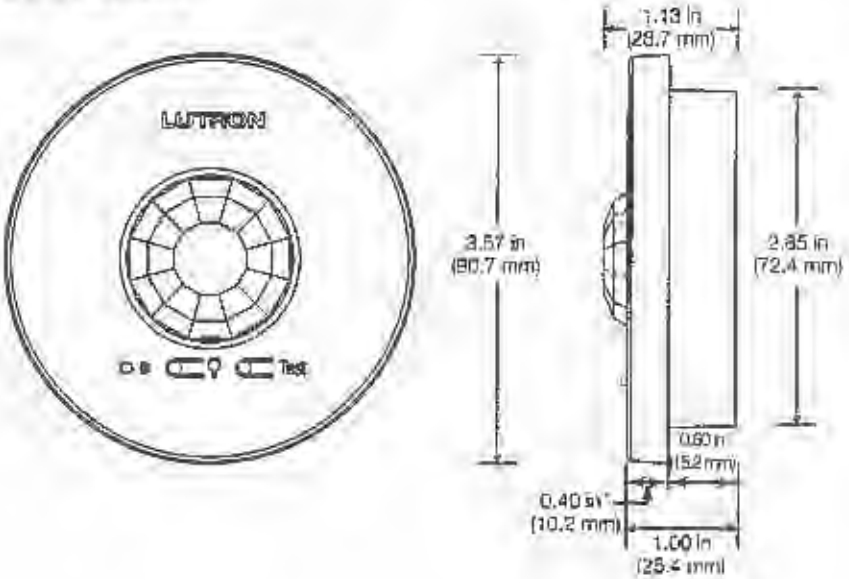
Recess Mount

- Do not recess mount sensor in a metal surface.
- Recess mounting ring requires an opening of 3 in (76 mm) in diameter.
- Recess mounting ring secures internally to ceiling. Sensor twists into the recess mounting ring and sits flush with ceiling (see image to right).
- Recess mounting ring purchased as a separate kit: **L-CRMK-WH**.



Job Name:	Model Numbers:	
Job Number:		

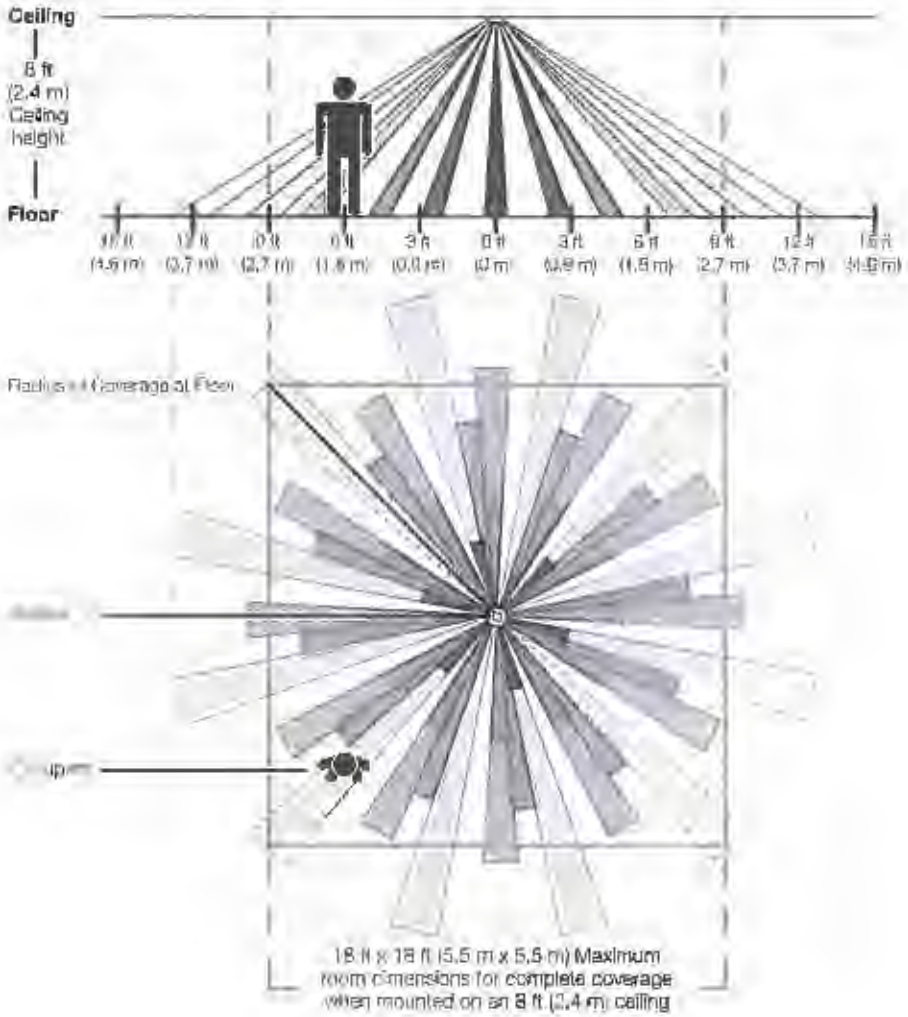
Dimensions



* With the recess mounting kit 0.46 (11.7 mm) is below the plane of the ceiling

Job Name:	Model Numbers:	
Job Number:		

Range Diagrams



Sensor Coverage Chart (for sensor mounted in center of room)

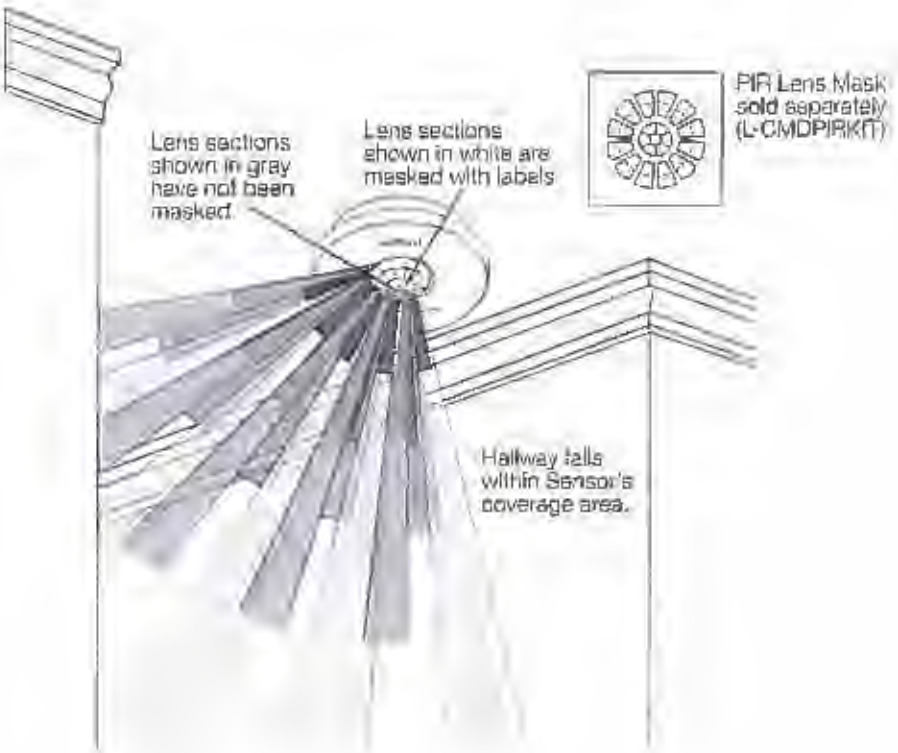
Ceiling Height	Maximum Room Dimensions for Complete Floor Coverage*	
8 ft (2.4 m)	18 ft x 18 ft (5.5 m x 5.5 m)	324 ft² (30.2 m²)
9 ft (2.7 m)	20 ft x 20 ft (6.1 m x 6.1 m)	400 ft² (37.2 m²)
10 ft (3.0 m)	22 ft x 22 ft (6.7 m x 6.7 m)	484 ft² (44.9 m²)
12 ft (3.7 m)	26 ft x 26 ft (7.9 m x 7.9 m)	676 ft² (62.4 m²)

* 12 ft (3.7 m) is the recommended maximum mounting height

Job Name:	Model Numbers:	
Job Number:		

Lens Masking

Whenever possible, the sensor should be installed in a location where it cannot view areas outside the intended space, such as hallways or adjacent rooms. If this situation cannot be avoided, portions of the lens may be masked to block the view of the sensor into undesired areas. Ten (10) PIR Lens Masks can be purchased in the kit L-CMDPIRKIT.



Job Name:	Model Numbers:	
Job Number:		

Wireless Wall-Mount Sensor

Lutron® wall-mounted occupancy and vacancy sensors are wireless battery-powered passive infrared (PIR) sensors that automatically control lights via RF communication to compatible dimming or switching devices. These sensors detect the heat from people moving within an area to determine when the space is occupied. The sensors then wirelessly transmit the appropriate commands to the associated dimming or switching devices to turn the lights on or off automatically. They combine both convenience and exceptional energy savings along with ease of installation.

Features

- Wireless occupancy/vacancy sensor has 2 settings available: Auto-On/Auto-Off, and Manual-On/Auto-Off
- Vacancy model meets California Title 24 requirements
- Passive infrared motion detection with exclusive Lutron® XCT Technology for fine motion detection
- 180° field of view model:
  Minor motion = 1500 ft² (139.4 m²)
  Major motion = 3000 ft² (278.7 m²)
- 90° field of view model:
  Minor motion = 1225 ft² (113.8 m²)
  Major motion = 2500 ft² (232.3 m²)
- Hallway model with long, narrow field of view:
  Major motion = coverage of up to 150 ft (45.7 m)
- Simple and intuitive adjustments available for Timeout, Activity, and Auto-On settings
- Accessible test buttons make setup easy
- Lens illuminates during test mode to verify ideal locations
- Multiple sensors can be added for extended coverage—refer to product specification submittal of receiving device to determine system limits
- 10-year battery life design
- RoHS compliant

Compatible RF Devices

- For use with Lutron® products only
- Communicates to various wireless Lutron® Clear Connect® systems*

* *Contact Lutron Customer Service at www.lutron.com for frequency/channel code compatibility with your particular geographic region, and for integrating with other Lutron® lighting and shading products.*

Job Name:	Model Numbers:	
Job Number:		

Specifications

Regulatory

- Lutron Quality Systems Registered to ISO 9001:2008

Regulatory Approvals

- cULus Listed
- FCC certified
- IC certified
- COFETEL certified
- ANATEL certified
- SUTEL certified
- Meets CA (U.S.A.) Energy Commission Title 24 requirements

Power/Performance

- Operating voltage: 3 V ⎓
- Operating current: 14 µA nominal
- Requires one CR 123 lithium battery
- 10-year battery life design
- Non-volatile memory (saved changes are stored during power loss)

Environment

- Temperature: 32 °F to 104 °F (0 °C to 40 °C)
- For indoor use only

RF Range

Distance between local load controls and sensor should not exceed 60 ft (18 m) line of sight or 30 ft (9 m) through walls.

Sensor Coverage Test

- Dedicated test button
- Lens illuminates orange in response to motion during test mode

Wireless Communication Test

- Dedicated test button
- Turn associated loads on and off

Timeout Options

- 1 minute *
- 5 minutes
- 15 minutes – default setting
- 30 minutes

Auto-On Options (Occupancy Versions Only)

- "Enabled" – Sensor turns lights ON and OFF automatically – default setting.
- "Disabled" ** – Lights must be turned ON manually from dimming or switching device. Sensor turns lights OFF automatically.

Sensitivity Options

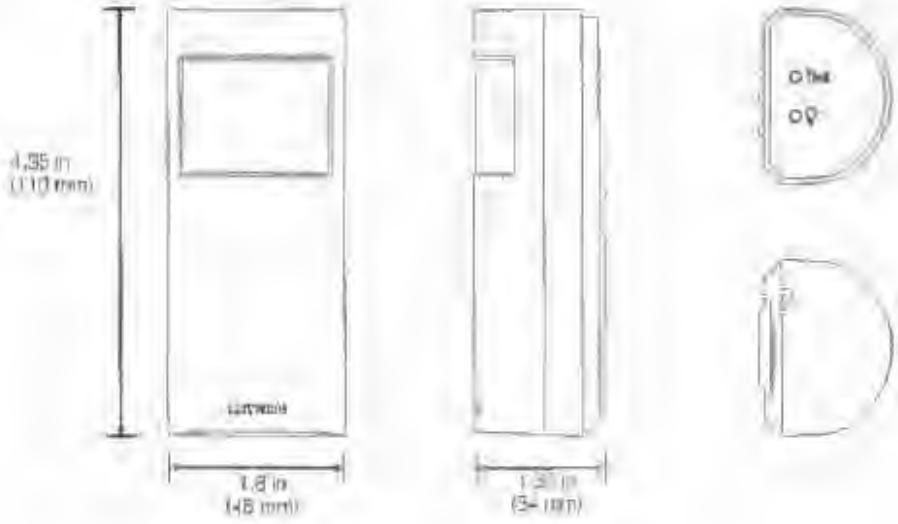
- Low Activity – default setting
- Medium Activity
- High Activity

* Intended for use in high-activity, briefly occupied areas only

** There is a 15-second grace period that begins when the lights are automatically turned off, during which the lights will automatically turn back on in response to motion. This grace period is provided as a safety and convenience feature in the event the lights turn off while the room is still occupied, so that the user does not need to manually turn the lights back on. After 15 seconds, the grace period expires and the lights must be manually turned on.

Job Name:	Model Numbers:	
Job Number:		

Dimensions

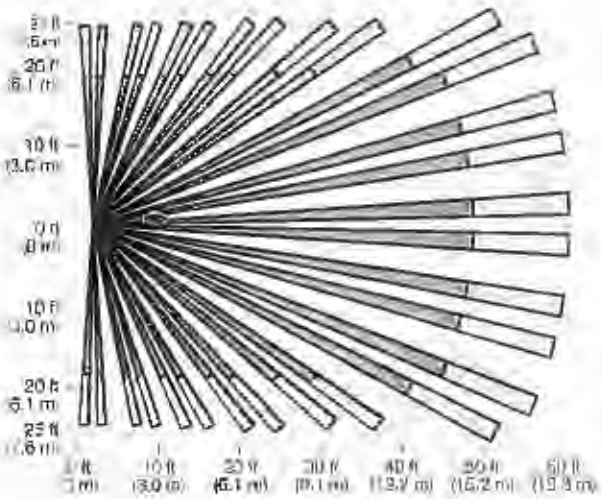


Job Name:	Model Numbers:	
Job Number:		

Coverage Diagrams

180° Wall-Mount Sensors
(Models: LRFX-OWLB-P-WH and LRFX-VWLB-P-WH)

Horizontal Beam Diagram



Vertical Beam Diagram*

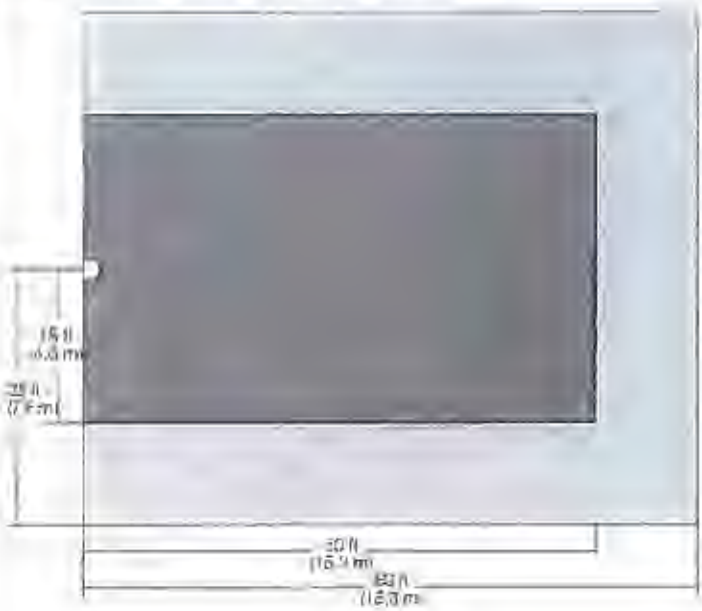
*Sensor mounting elevation 7 ft (2.1 m). Mounting height should range between 6 ft and 10 ft (1.8 m and 3.0 m).

Tested Coverage Area

Major Motion 3000 ft² (278.7 m²) coverage

Minor Motion 1500 ft² (139.4 m²) coverage

Compliant to NEMA WD7 test grid shown below

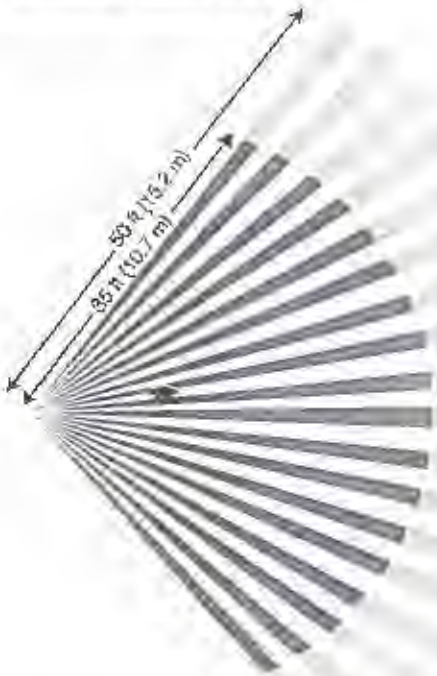


Job Name:	Model Numbers:	
Job Number:		

Coverage Diagrams

90° Corner-Mount Sensors
(Models: LRFX-OKLB-P-WH and LRFX-VKLB-P-WH)

Horizontal Beam Diagram

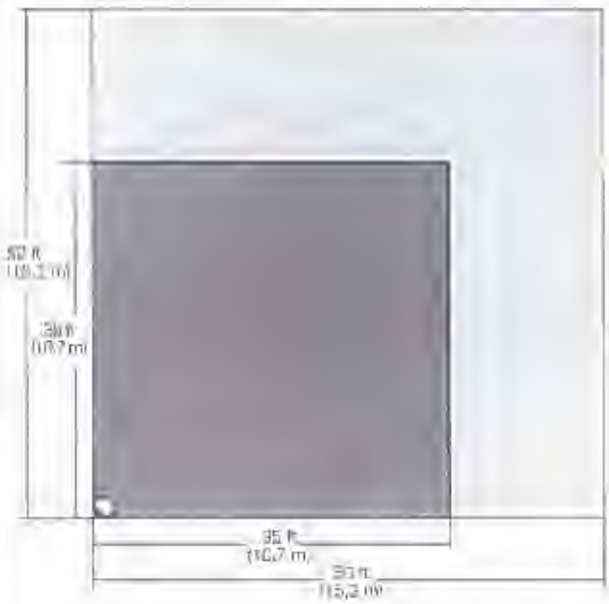


Tested Coverage Area

Major Motion 2500 ft² (232.3 m²) coverage

Minor Motion 1225 ft² (113.8 m²) coverage

Compliant to NEMA WD7 test grid shown below



Vertical Beam Diagram*

*Sensor mounting shown at 7 ft (2.1 m). Mounting height should be between 0 ft and 8 ft (0 m and 2.4 m)

Job Name:	Model Numbers:	
Job Number:		

Coverage Diagrams

Hallway Sensors
(Models: LRFX-OHLB-P-WH and LRFX-VHLB-P-WH)

Maximum Recommended Hallway Length

Width of Hall	Length of Hall
6 ft (1.8 m) or less	50 ft (15.2 m)
8 ft (2.4 m)	100 ft (30.5 m)
10 ft (3.0 m) or more	150 ft (45.7 m)

Top View

Side View

* Sensor mounting shown at 7 ft (2.1 m). Mounting height should be between 6 ft and 8 ft (1.8 m and 2.4 m) and centered within hallway.

- Designed to mount at the end of a hallway with a clear view down the length of a hall.
- Detection at longer distances is best when motion occurs at right angles to the sensor
- Multiple sensors can be used to extend coverage.

Job Name:	Model Numbers:
Job Number:	

Installation Overview

Sensor Placement

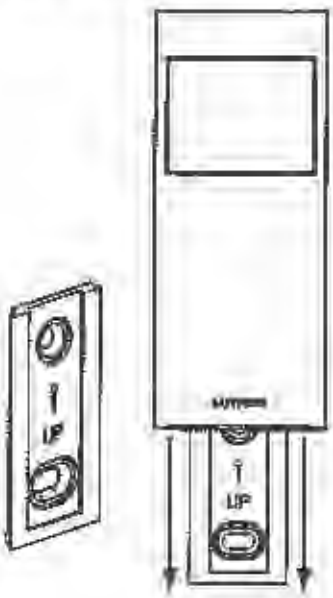
- The mounting height of the sensor should be between 6 ft and 8 ft (1.8 m and 2.4 m).
- For smaller rooms less than 12 ft x 12 ft (3.7 m x 3.7 m), detection may be improved by mounting the sensor at 6 ft (1.8 m) from the floor.
- The ability to detect motion requires that the sensor have line-of-sight of all room occupants. The sensor must have an unobstructed view of the room. **DO NOT** mount behind or near tall cabinets, shelves, hanging fixtures, etc. The sensor cannot detect occupants through glass objects such as patio or shower doors.
- Hot objects and moving air currents can affect the performance of the sensor. To ensure proper operation, the sensor should be mounted at least 4 ft (1.2 m) away from light bulbs and HVAC vents.
- The performance of the sensor depends on a temperature differential between the ambient room temperature and that of room occupants. Warmer rooms may reduce the sensor's ability to detect occupants.
- Distance between local load controls and sensor should not exceed 60 ft (18 m) line of sight or 30 ft (9 m) through walls.

Job Name:	Model Numbers:	
Job Number:		

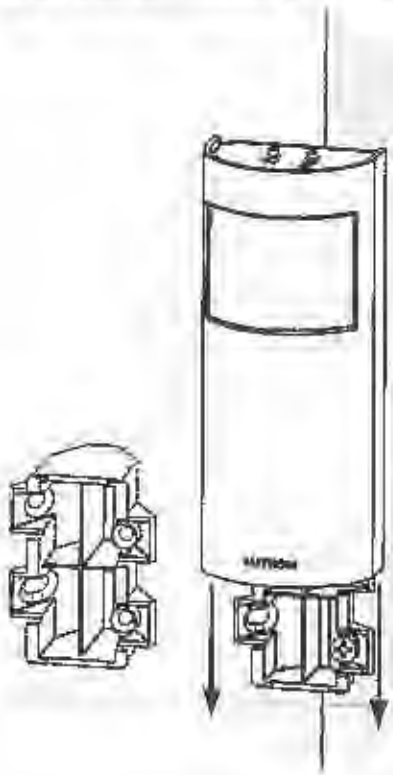
Mounting

- 180° and hallway sensors mount directly to wall with mounting bracket (included). See figure below.
- 90° sensors mount directly in corner or on wall offset away from corner with mounting bracket (included). See figure below.
- Temporary mounting is recommended to test sensor coverage and wireless communication before permanently installing the sensor.
  - Temporary mounting: A 3M™ Command™ adhesive strip is provided for temporarily mounting and testing the sensor. This strip is designed for easy, damage-free removal and is not reusable.
  - Permanent mounting: Mounting bracket, screws and anchors are provided to mount sensor.
  - Flexible Armature Mounting Kit - P/N LRF2-MTG-KIT-CPN5991 (sold separately): A flexible sensor mounting bracket which allows sensor to be mounted at right angles and at greater heights to increas coverage area.

180° Wall-Mount Sensor & Hallway Sensor



90° Corner-Mount Sensor



3M and Command are trademarks of 3M Company.

Job Name:	Model Numbers:	
Job Number:		

PHILIPS

Recessed

EvoKit LED
Retrofit Kit Gen 3

Office Solution

Conveniently **transform a space**

Philips EvoKit LED Retrofit Kit

Enhance the elegance and energy efficiency of your space

Now, you can enjoy stylish, modern lighting without the expense, time and hassle of a complete luminaire renovation. Philips EvoKit LED Retrofit Kits are designed to quickly and easily install into existing 2x2 and 2x4 fluorescent troffers*, providing the appearance of a new fixture, the energy-saving performance of LED, and the flexibility of efficient connected lighting solutions.

Enjoy performance and value

Cost savings

Compared to fluorescent, EvoKit LED Retrofit Kits are energy efficient and dimmable to help reduce maintenance and operating costs. Connected lighting options help to further optimize lighting-related energy expenses. Additionally, EvoKit is a more cost-effective solution than complete luminaire renovations because of its low price and reduced project scrap, and can be installed in less than five minutes without tools or the need to enter the ceiling space.

Efficacy

With performance as high as 118 LPW, which is on par or better with new fixtures, and a lifetime of 70,000 hours, you may reduce your payback period for energy savings and also qualify for rebates.

Dimming

Reduce energy consumption and costs further with 0-10V, Mark 10 and Step/Bi-level dimming options. Mark 10 dimming adds dimming over line voltage without time-consuming and costly wiring, while Step/Bi-level dimming satisfies Title 24 requirements.

Eco-friendly

In addition to the stylish, modern aesthetics, EvoKit helps to support sustainability goals and mandates with LED's long life and energy savings, and reduction in scrap materials compared to a complete replacement.

Easy to install

See installation guide on **www.philips.com/evokit**.

* Minimum 3 inch depth

EvoKit with new SimpleSet Technology for wireless lumen level programming

EvoKit with new SimpleSet Technology allows the maximum lumen level to be set prior to installation using a smartphone-based app without requiring power to the luminaire. Available in the 0-10V and SR versions only. The app can be downloaded at Google Play. Please contact your Philips representative for the current list of approved Android smartphones. Distributors can set lumen levels prior to shipping, and contractors can set lumen levels prior to installation. Lumen level is quickly and easily set in two steps:

Step 1: Place the smartphone next to the NFC antenna on the driver.

Step 2: Follow the on-screen instructions.

EvoKitSR with Xitanium SR for connected lighting solutions

EvoKitSR is a new platform that allows users to choose different control platforms to suit their needs and budget: from simple occupancy and daylight sensing to cloud-connected data-reporting sensing. This empowers users to fine-tune their energy use for reduced energy costs. Contact your Philips representative for a current list of approved sensors. Sensors are connected in the field with just a few simple steps.

Step 1: EvokitSR is shipped with a plate covering the sensor hole. There are two wires secured to the back of the plate.

Step 2: The plate can be removed before or after you install EvoKit SR. Just gently slide the plate to one end and remove.

Step 3: Remove the two wires that were secured to the back of the plate.

Step 4: Take these two wires and insert them into the sensor. They are not polarity sensitive.

Step 5: Insert the sensor back into the hole. The sensor may or may not require a socket.

EvoKit with Spacewise Technology for wireless group control

For those seeking occupancy sensing and daylight harvesting without network control, EvoKit with Spacewise Technology offers a wireless and minimalist method to achieve energy cost reductions; with easy grouping and handheld remote control of up to 50 luminaires. Available with 0-10V dimming only.

Speed up payback periods

In addition to reduced initial cost compared to new luminaires, EvoKit LED Retrofit Kits can help to drive cost and workflow efficiencies. EvoKit is easily installed in a few short minutes so your lighting project can be completed quickly. Once installed, the elegant retrofit luminaires contribute even more efficiency by immediately lowering energy costs without sacrificing performance, while a long lifetime of approximately 70,000 hours helps to reduce maintenance and operating costs.

Payback periods are further reduced by incorporating dimming and optional connected LED lighting solutions.

EvoKit 2 x 2 ordering info

Product Number	Description	Watts	Volts	Lumen Maintenance (Hrs.)[1]	Average Lumens[1]	CRI	Color Temperature (K)
2'x2' Stock SKUs							
506766	EvoKit 2x2 P 32L 28W 840 2.0-10 7 G3	28	120-277	70,000	3200	80	4000
506741	EvoKit 2x2 P 32L 30W 835 2.0-10 7 G3	30	120-277	70,000	3200	80	3500
506840	EvoKit 2x2 P 32L 31W 840 9 MK10 7 G3	31	277	70,000	3250	80	4000
2'x2' Made to Order SKU's							
506499	EvoKit 2x2 P 23L 20W 840 2.0-10 7 G3	20	120-277	70,000	2300	80	4000
507057	EvoKit 2x2 P 23L 20W 850 2.0-10 7 G3	20	120-277	70,000	2300	80	5000
506469	EvoKit 2x2 P 23L 21W 835 2.0-10 7 G3	21	120-277	70,000	2300	80	3500
507293	EvoKit 2x2 P 23L 21W 840 6.0-10 7 G3	21	347	70,000	2300	80	4000
507285	EvoKit 2x2 P 23L 22W 835 6.0-10 7 G3	22	347	70,000	2300	80	3500
507186	EvoKit 2x2 P 23L 22W 835 2 STEP 7 G3**	22	120-277	70,000	2274	80	3500
506493	EvoKit 2x2 P 23L 22W 835 MK10 7 G3	22	120	70,000	2274	80	3500
507194	EvoKit 2x2 P 23L 22W 840 2 STEP 7 G3**	22	120-277	70,000	2361	80	4000
506576	EvoKit 2x2 P 23L 22W 840 1 MK10 7 G3	22	120	70,000	2361	80	4000
506618	EvoKit 2x2 P 23L 23W 835 8 MK10 7 G3	23	277	70,000	2374	80	3500
506708	EvoKit 2x2 P 23L 23W 840 5 MK10 7 G3	23	277	70,000	2361	80	4000
507111	EvoKit 2x2 P 32L 28W 850 2.0-10 7 G3	28	120-277	70,000	3200	80	5000
507400	EvoKit 2x2 P 32L 29W 840 2 SP 7 G3	29	120-277	70,000	3200	80	4000
507319	EvoKit 2x2 P 32L 29W 840 6.0-10 7 G3	29	347	70,000	3200	80	4000
506857	EvoKit 2x2 P 32L 29W 850 2 SP 7 G3	29	120-277	70,000	3200	80	5000
507301	EvoKit 2x2 P 32L 30W 835 6.0-10 7 G3	30	347	70,000	3200	80	3500
507210	EvoKit 2x2 P 32L 30W 840 2 STEP 7 G3**	30	120-277	70,000	3259	80	4000
507392	EvoKit 2x2 P 32L 31W 835 2 SP 7 G3	31	120-277	70,000	3202	80	3500
507202	EvoKit 2x2 P 32L 31W 835 2 STEP 7 G3**	31	120-277	70,000	3265	80	3500
506282	EvoKit 2x2 P 32L 31W 840 MK10 7 G3	31	120	70,000	3259	80	4000
506774	EvoKit 2x2 P 32L 32W 835 MK10 7 G3	32	120	70,000	3265	80	3500
506832	EvoKit 2x2 P 32L 35W 835 8 MK10 7 G3	33	277	70,000	3265	80	3500

See footnotes on page 11

EvoKit 2 x 4 ordering info

Product Number	Description	Watts	Volts	Lumen Maintenance Hours	Approx. Lumens*	CRI	Color Temperature (K)
2'x4' Stock SKUs							
506861	EvoKit 2x4 P 36L 31W 840 2 0-10 7 G3	31	120-277	70,000	3600	80	4000
506865	EvoKit 2x4 P 36L 32W 835 2 0-10 7 G3	32	120-277	70,000	3500	80	3500
506779	EvoKit 2x4 P 42L 38W 840 5 MR10 7 G3	39	277	70,000	4219	80	4000
507130	EvoKit 2x4 P 42L 38W 840 2 0-10 7 G3	39	120-277	70,000	4200	80	4000
506864	EvoKit 2x4 P 42L 38W 835 2 0-10 7 G3	39	120-277	70,000	4200	80	3500
2'x4' Made to Order SKU's*							
507335	EvoKit 2x4 P 36L 31W 840 6 0-10 7 G3	31	347	70,000	3600	80	4000
507236	EvoKit 2x4 P 36L 31W 840 2 STEP 7 G3**	31	120-277	70,000	3492	80	4000
506873	EvoKit 2x4 P 36L 31W 850 2 0-10 7 G3	31	120-277	70,000	3600	80	5000
507327	EvoKit 2x4 P 36L 32W 835 6 0-10 7 G3	32	347	70,000	3600	80	3500
506915	EvoKit 2x4 P 36L 32W 840 1 MR10 7 G3	32	120	70,000	3492	80	4000
506931	EvoKit 2x4 P 36L 32W 840 5 MR10 7 G3	32	277	70,000	3492	80	4000
507228	EvoKit 2x4 P 36L 33W 835 2 STEP 7 G3**	33	120-277	70,000	3600	80	3500
506907	EvoKit 2x4 P 36L 34W 835 1 MR10 7 G3	34	120	70,000	3615	80	3500
506923	EvoKit 2x4 P 36L 34W 835 5 MR10 7 G3	34	277	70,000	3615	80	3500
506956	EvoKit 2x4 P 42L 36W 830 2 0-10 7 G3	36	120-277	70,000	4200	80	3000
506451	EvoKit 2x4 P 42L 37W 840 2 LR 7 G3	37	120-277	70,000	4200	80	4000
507251	EvoKit 2x4 P 42L 37W 840 2 STEP 7 G3	37	120-277	70,000	4219	80	4000
507369	EvoKit 2x4 P 42L 37W 840 6 0-10 7 G3	37	347	70,000	4200	80	4000
506772	EvoKit 2x4 P 42L 37W 850 2 SR 7 G3	37	120-277	70,000	4200	80	5000
507350	EvoKit 2x4 P 42L 38W 835 6 0-10 7 G3	38	347	70,000	4200	80	3500
506477	EvoKit 2x4 P 42L 38W 835 2 SR 7 G3	38	120-277	70,000	4200	80	3500
507244	EvoKit 2x4 P 42L 39W 835 2 STEP 7 G3	39	120-277	70,000	4268	80	3500
507053	EvoKit 2x4 P 42L 39W 840 1 MR10 7 G3	39	120	70,000	4215	80	4000
507049	EvoKit 2x4 P 42L 40W 835 1 MR10 7 G3	41	120	70,000	4268	80	3500
507061	EvoKit 2x4 P 42L 41W 835 5 MR10 7 G3	41	277	70,000	4268	80	3500
507384	EvoKit 2x4 P 47L 41W 840 6 0-10 7 G3	41	347	70,000	4700	80	4000
507426	EvoKit 2x4 P 47L 42W 840 2 SR 7 G3	42	120-277	70,000	4700	80	4000
507277	EvoKit 2x4 P 47L 42W 840 2 STEP 7 G3	42	120-277	70,000	4715	80	4000
506759	EvoKit 2x4 P 47L 42W 850 2 SR 7 G3	42	120-277	70,000	4700	80	5000
507129	EvoKit 2x4 P 47L 42W 840 2 0-10 7 G3	42	120-277	70,000	4700	80	4000
507030	EvoKit 2x4 P 47L 42W 850 2 0-10 7 G3	42	120-277	70,000	4700	80	5000
507408	EvoKit 2x4 P 47L 43W 835 2 SR 7 G3	43	120-277	70,000	4528	80	3500
507193	EvoKit 2x4 P 47L 43W 835 2 0-10 7 G3	43	120-277	70,000	4700	80	3500
507376	EvoKit 2x4 P 47L 43W 835 6 0-10 7 G3	43	347	70,000	4700	80	3500
507151	EvoKit 2x4 P 47L 44W 840 1 MR10 7 G3	44	120	70,000	4715	80	4000
507179	EvoKit 2x4 P 47L 44W 840 5 MR10 7 G3	44	277	70,000	4715	80	4000
507268	EvoKit 2x4 P 47L 45W 835 2 STEP 7 G3	45	120-277	70,000	4797	80	3500
507131	EvoKit 2x4 P 47L 47W 835 1 MR10 7 G3	47	120	70,000	4797	80	3500
507160	EvoKit 2x4 P 47L 47W 835 5 MR10 7 G3	47	277	70,000	4797	80	3500

See footnotes on page 11

SpaceWise ordering info

Model	Initial Lumens	Input Power Max Output (W)	Input Power Background Output (W)
EvoKit:			
EvoKit 2x2 P 32L 28W 840 2 0-10 7 G3 (506766)	3200	28	–
EvoKit 2x4 P 42L 36W 840 2 0-10 7 G3 (507038)	4200	36	–
EvoKit 2x2 with Spacewise (SW2)			
High Power Setting (120/277V)	3200	26	9
Medium Power Setting (120/277V)	3816	25	8
Low Power Setting (120/277V)	2464	22	7
Minimum Power Setting (120/277V)	2112	18	6
EvoKit 2x4 with Spacewise (SW2)			
High Power Setting (120/277V)	4200	36	13
Medium Power Setting (120/277V)	3696	32	11
Low Power Setting (120/277V)	3234	28	10
Minimum Power Setting (120/277V)	2772	24	8

Prod. No.	12NC	Description
503599	929000725913	EvoKit 2x2 SpaceWise Accessory
503615	929000726013	EvoKit 2x4 SpaceWise Accessory
504449	913700359100	Spacewise Programming Tool
455435	913700364403	Switch/Dimmer
455428	913700364203	4 position scene selector

Specifications/ordering info

Instantly transform your space with elegance and energy efficiency by incorporating Philips EvoKit LED Retrofit Kits.

Contact your local Philips sales representative to schedule a personalized demonstration or visit www.philips.com/evokit for more information

FOOTNOTES:

1) L_{70} 72,000 hours @ 35°C based on TM21 and LM80.
2) Based on photometric testing consistent with IES LM-79.
"Made-To-Order" product is not kept in inventory. Minimum quantities will apply.
– These products do not meet DLC criteria.
† DLC requires the product to meet specific performance requirements regarding lumen output, spacing criteria, lumens per watt, color temperature, CRI, lifetime and warranty.

Notes

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Rev. 0085 - Oct 14 - philips.com/luminaires

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Elite A19 A-Lamps

Omni-Directional and All-Purpose

High efficiency A-Lamps. Light output in all directions to suit many applications.

Limitless options for the following applications:

- General Lighting
- Floor Lamps
- Ceiling Fixtures
- Table Lamps
- Sconces

Great features and benefits:

- Energy efficient: Up to 85% more efficient than incandescent alternatives
- Smooth, uniform dimming; also available as non-dimming
- Long life: 25,000 hours
- Similar look and feel as incandescent alternative
- Excellent color consistency and high color rendering (CRI)
- Available in 2400K, 2700K, 3000K, 4100K and 5000K
- Fits any installations where a standard A19 bulb is used
- Rated for totally enclosed fixtures

All-Purpose A-Lamp

Omni-Directional A-Lamp

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TCP ELITE Series — LED A19 A-Lamp

LED	25,000 Hours average rated life, 120 Volts

Catalog Number	
Notes	Type

Applications:

Ideal for applications where uniform multi-directional light output is required.

- Table Lamps
- Floor Lamps
- Sconces
- Ceiling Fixtures
- Decorative Fixtures

Features	Benefits
Up to 85% less energy than halogen alternatives	Instant energy savings
Long life	Minimizes replacement and maintenance costs
Very low heat generation	Perfect for sensitive display lighting such as art galleries
Excellent Color Consistency and CRI	Enhances colors of focal point while maintaining uniformity throughout lighting installation from lamp to lamp
UL approved for damp location	Can be used outdoors when protected from elements. Withstands humidity indoors/outdoors
Shatter resistant	Lower the risk of injury and breakage
ANSI construction compliant	Fits all A19 installations

Specifications

Input Line Voltage:	120 VAC
Input Power	See Chart
Input Line Frequency	50/60HZ
Lamp Life (Rated)	25,000 hrs
Minimum Starting Temp	-30°C
Maximum Operating Temp	40°C
CRI	82

A19 A-Lamp

Omni-Directional

Full Light Output

- Best "technical" A-Lamp replacement
- Based on ENERGY STAR standard for omni-directional lamps
- Supported by many utility rebates

All-Purpose

230° Light Output

- Best "value" A-Lamp replacement
- All-purpose lamp with excellent uniformity within 230 degrees that works well in all A-Lamp fixtures

5 YEAR WARRANTY*

For the most up-to-date specs, please visit www.tcpi.com

*Based on 12 hours use per day

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Warranties and Certifications

UL DR

5 YEAR WARRANTY*

For the most up-to-date specs, please visit www.tcpi.com

Item #	Description	Voltage	Wattage	Equivalent Wattage Comparison	Lumens	LPW	CCT	CRI	R9	M.O.L. (inches)	Diameter (inches)	Case Quantity
60W Equivalent Options												
10W A19 Omni-Directional A-Lamp - Dimmable												
LED10A19D0024K	10W Omni Dimmable A-Lamp - 2400K	120	10	60	750	75.0	2400K	82	>0	4.3	2.4	12
LED10A19D0027K	10W Omni Dimmable A-Lamp - 2700K	120	10	60	800	80.0	2700K	82	>0	4.3	2.4	12
LED10A19D0030K	10W Omni Dimmable A-Lamp - 3000K	120	10	60	825	83.0	3000K	82	>0	4.3	2.4	12
LED10A19D0041K	10W Omni Dimmable A-Lamp - 4100K	120	10	60	850	85.0	4100K	82	>0	4.3	2.4	12
LED10A19D0050K	10W Omni Dimmable A-Lamp - 5000K	120	10	60	850	85.0	5000K	82	>0	4.3	2.4	12
10W A19 Omni Directional A-Lamp - Non Dimmable												
LED10A19D027K	10W Omni Non Dim A-Lamp - 2700K	120	10	60	800	80.0	2700K	82	>0	4.3	2.4	12
LED10A19D030K	10W Omni Non Dim A-Lamp - 3000K	120	10	60	825	83.0	3000K	82	>0	4.3	2.4	12
LED10A19D041K	10W Omni Non Dim A-Lamp - 4100K	120	10	60	850	85.0	4100K	82	>0	4.3	2.4	12
10W A19 All Purpose A-Lamp - Dimmable												
LED10A19D27K	10W Dimmable A-Lamp - 2700K	120	10	60	800	80.0	2700K	82	>0	4.3	2.4	12
LED10A19D30K	10W Dimmable A-Lamp - 3000K	120	10	60	825	83.0	3000K	82	>0	4.3	2.4	12
LED10A19D41K	10W Dimmable A-Lamp - 4100K	120	10	60	850	85.0	4100K	82	>0	4.3	2.4	12
LED10A19D50K	10W Dimmable A-Lamp - 5000K	120	10	60	850	85.0	5000K	82	>0	4.3	2.4	12
9W A19 All Purpose A-Lamp - Non Dimmable												
LED9A19027K	9W Non Dimmable A-Lamp - 2700K	120	9	60	800	88.9	2700K	82	>0	4.3	2.4	12
LED9A19030K	9W Non Dimmable A-Lamp - 3000K	120	9	60	825	91.7	3000K	82	>0	4.3	2.4	12
LED9A19041K	9W Non Dimmable A-Lamp - 4100K	120	9	60	850	94.4	4100K	82	>0	4.3	2.4	12
LED9A19050K	9W Non Dimmable A-Lamp - 5000K	120	9	60	850	94.4	5000K	82	>0	4.3	2.4	12
40W Equivalent Options												
7W A19 Omni Directional A-Lamp - Dimmable												
LED7A19D0024K	7W Omni Dimmable A-Lamp - 2400K	120	7	40	400	57.0	2400K	82	>0	4.3	2.4	12
LED7A19D0027K	7W Omni Dimmable A-Lamp - 2700K	120	7	40	450	64.0	2700K	82	>0	4.3	2.4	12
LED7A19D0030K	7W Omni Dimmable A-Lamp - 3000K	120	7	40	475	68.0	3000K	82	>0	4.3	2.4	12
LED7A19D0041K	7W Omni Dimmable A-Lamp - 4100K	120	7	40	465	66.0	4100K	82	>0	4.3	2.4	12
LED7A19D0050K	7W Omni Dimmable A-Lamp - 5000K	120	7	40	500	71.0	5000K	82	>0	4.3	2.4	12
7W A19 Omni Directional A-Lamp - Non Dimmable												
LED7A19D027K	7W Omni Non Dim A-Lamp - 2700K	120	7	40	450	64.9	2700K	82	>0	4.3	2.4	12
LED7A19D030K	7W Omni Non Dim A-Lamp - 3000K	120	7	40	475	68.0	3000K	82	>0	4.3	2.4	12
7W A19 All Purpose A-Lamp - Dimmable												
LED7A19D24K	7W Dimmable A-Lamp - 2700K	120	7	40	400	57.0	2400K	82	>0	4.3	2.4	12
LED7A19D27K	7W Dimmable A-Lamp - 2700K	120	7	40	450	64.0	2700K	82	>0	4.3	2.4	12
LED7A19D30K	7W Dimmable A-Lamp - 3000K	120	7	40	475	68.0	3000K	82	>0	4.3	2.4	12
LED7A19D41K	7W Dimmable A-Lamp - 4100K	120	7	40	500	71.0	4100K	82	>0	4.3	2.4	12
LED7A19D50K	7W Dimmable A-Lamp - 5000K	120	7	40	500	71.0	5000K	82	>0	4.3	2.4	12
5W A19 All Purpose A-Lamp - Non Dimmable												
LED5A19027K	5W Non Dimmable A-Lamp - 2700K	120	5	40	450	90.0	2700K	82	>0	4.3	2.4	12
LED5A19030K	5W Non Dimmable A-Lamp - 3000K	120	5	40	475	95.0	3000K	82	>0	4.3	2.4	12
LED5A19041K	5W Non Dimmable A-Lamp - 4100K	120	5	40	500	100.0	4100K	82	>0	4.3	2.4	12
LED5A19050K	5W Non Dimmable A-Lamp - 5000K	120	5	40	525	105.0	5000K	82	>0	4.3	2.4	12

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TCP has a **20-year history in energy-efficient lighting.** Thanks to our **cutting edge technology** and deep manufacturing expertise, we have shipped literally billions of high quality lamps and our **integrated technology** and **manufacturing** provides **expedited time-to-market.** With TCP, you can count on unique lighting products designed to meet very specific needs — lighting that transforms your surroundings and envelopes you in warmth — **lighting that generates beauty** with every flip of the switch.

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Elite Designer PAR Series

TCP's award winning PARs have just gotten better. With over 500 options, TCP's new PAR series combines traditional beauty with top-notch technology.

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Limitless options for the following applications:

- Track Lights
- Recessed Downlights
- Display Lights
- Outdoor Fixtures that Protect Lamps from the Elements

Great features and benefits:

- Energy Efficient: Up to 85% less energy than halogen replacements.
- Smooth, uniform dimming; also available as non-dimming.
- Long Life: 25,000 hours
- 120W, 90W, 75W, 60W and 50W replacements.
- NEW smooth outer housing.
- Excellent color consistency and high color rendering (CRI).
- Available in 2400K, 2700K, 3000K, 3500K, 4100K and 5000K.

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ENERGY STAR AWARD 2014 PARTNER OF THE YEAR

Item #	Description	Voltage	Wattage	Incandescent Wattage Comparison	Lumens	LPW	CBCP	Beam Angle	CCT	CRI	M.O.L. (Inches)	Diameter (Inches)	Case Quantity	STK/MTO
PAR38														
LED17P38D24KFL	Dimmable 17W Smooth PAR38 - 2400K 40°	120	17	120	1200	70.6	2024	40	2400K	82	5.3	4.8	12	MTO
LED17P38D24KNFL	Dimmable 17W Smooth PAR38 - 2400K 25°	120	17	120	1200	70.6	5520	25	2400K	82	5.3	4.8	12	MTO
LED17P38D24KSP	Dimmable 17W Smooth PAR38 - 2400K 15°	120	17	120	1200	70.6	8832	15	2400K	82	5.3	4.8	12	MTO
LED17P38D27KFL	Dimmable 17W Smooth PAR38 - 2700K 40°	120	17	120	1200	70.6	2024	40	2700K	82	5.3	4.8	12	STK
LED17P38D27KNFL	Dimmable 17W Smooth PAR38 - 2700K 25°	120	17	120	1200	70.6	5520	25	2700K	82	5.3	4.8	12	STK
LED17P38D27KSP	Dimmable 17W Smooth PAR38 - 2700K 15°	120	17	120	1200	70.6	8832	15	2700K	82	5.3	4.8	12	MTO
LED17P38D30KFL	Dimmable 17W Smooth PAR38 - 3000K 40°	120	17	120	1250	73.5	2200	40	3000K	82	5.3	4.8	12	STK
LED17P38D30KNFL	Dimmable 17W Smooth PAR38 - 3000K 25°	120	17	120	1250	73.5	6000	25	3000K	82	5.3	4.8	12	STK
LED17P38D30KSP	Dimmable 17W Smooth PAR38 - 3000K 15°	120	17	120	1250	73.5	9600	15	3000K	82	5.3	4.8	12	MTO
LED17P38D35KFL	Dimmable 17W Smooth PAR38 - 3500K 40°	120	17	120	1275	75.0	2244	40	3500K	82	5.3	4.8	12	MTO
LED17P38D35KNFL	Dimmable 17W Smooth PAR38 - 3500K 25°	120	17	120	1275	75.0	6160	25	3500K	82	5.3	4.8	12	MTO
LED17P38D35KSP	Dimmable 17W Smooth PAR38 - 3500K 15°	120	17	120	1275	75.0	9868	15	3500K	82	5.3	4.8	12	MTO
LED17P38D41KFL	Dimmable 17W Smooth PAR38 - 4100K 40°	120	17	120	1300	76.5	2332	40	4100K	82	5.3	4.8	12	MTO
LED17P38D41KNFL	Dimmable 17W Smooth PAR38 - 4100K 25°	120	17	120	1300	76.5	6369	25	4100K	82	5.3	4.8	12	MTO
LED17P38D41KSP	Dimmable 17W Smooth PAR38 - 4100K 15°	120	17	120	1300	76.5	10174	15	4100K	82	5.3	4.8	12	MTO
LED17P38D50KFL	Dimmable 17W Smooth PAR38 - 5000K 40°	120	17	120	1300	76.5	2231	40	5000K	82	5.3	4.8	12	MTO
LED17P38D50KNFL	Dimmable 17W Smooth PAR38 - 5000K 25°	120	17	120	1300	76.5	5382	25	5000K	82	5.3	4.8	12	MTO
LED17P38D50KSP	Dimmable 17W Smooth PAR38 - 5000K 15°	120	17	120	1300	76.5	10059	15	5000K	82	5.3	4.8	12	MTO
LED14P38D24KFL	Dimmable 14W Smooth PAR38 - 2400K 40°	120	14	90	1050	75.0	1840	40	2400K	82	5.3	4.8	12	MTO
LED14P38D24KNFL	Dimmable 14W Smooth PAR38 - 2400K 25°	120	14	90	1050	75.0	4876	25	2400K	82	5.3	4.8	12	MTO
LED14P38D24KSP	Dimmable 14W Smooth PAR38 - 2400K 15°	120	14	90	1050	75.0	7802	15	2400K	82	5.3	4.8	12	MTO
LED14P38D27KFL	Dimmable 14W Smooth PAR38 - 2700K 40°	120	14	90	1050	75.0	1840	40	2700K	82	5.3	4.8	12	STK
LED14P38D27KNFL	Dimmable 14W Smooth PAR38 - 2700K 25°	120	14	90	1000	71.4	4876	25	2700K	82	5.3	4.8	12	STK
LED14P38D27KSP	Dimmable 14W Smooth PAR38 - 2700K 15°	120	14	90	1050	75.0	7802	15	2700K	82	5.3	4.8	12	MTO
LED14P38D30KFL	Dimmable 14W Smooth PAR38 - 3000K 40°	120	14	90	1100	78.6	2000	40	3000K	82	5.3	4.8	12	STK
LED14P38D30KNFL	Dimmable 14W Smooth PAR38 - 3000K 25°	120	14	90	1100	78.6	5300	25	3000K	82	5.3	4.8	12	STK
LED14P38D30KSP	Dimmable 14W Smooth PAR38 - 3000K 15°	120	14	90	1100	78.6	8480	15	3000K	82	5.3	4.8	12	MTO
LED14P38D35KFL	Dimmable 14W Smooth PAR38 - 3500K 40°	120	14	90	1125	80.4	2060	40	3500K	82	5.3	4.8	12	MTO
LED14P38D35KNFL	Dimmable 14W Smooth PAR38 - 3500K 25°	120	14	90	1125	80.4	5459	25	3500K	82	5.3	4.8	12	MTO
LED14P38D35KSP	Dimmable 14W Smooth PAR38 - 3500K 15°	120	14	90	1125	80.4	8734	15	3500K	82	5.3	4.8	12	MTO
LED14P38D41KFL	Dimmable 14W Smooth PAR38 - 4100K 40°	120	14	90	1150	82.1	2120	40	4100K	82	5.3	4.8	12	MTO
LED14P38D41KNFL	Dimmable 14W Smooth PAR38 - 4100K 25°	120	14	90	1150	82.1	5618	25	4100K	82	5.3	4.8	12	MTO
LED14P38D41KSP	Dimmable 14W Smooth PAR38 - 4100K 15°	120	14	90	1150	82.1	8988	15	4100K	82	5.3	4.8	12	MTO
LED14P38D50KFL	Dimmable 14W Smooth PAR38 - 5000K 40°	120	14	90	1150	82.1	2120	40	5000K	82	5.3	4.8	12	MTO
LED14P38D50KNFL	Dimmable 14W Smooth PAR38 - 5000K 25°	120	14	90	1150	82.1	5618	25	5000K	82	5.3	4.8	12	MTO
LED14P38D50KSP	Dimmable 14W Smooth PAR38 - 5000K 15°	120	14	90	1150	82.1	8988	15	5000K	82	5.3	4.8	12	MTO
PAR30														
LED14P30D24KFL	Dimmable 14W Smooth PAR30 - 2400K 40°	120	14	90	1050	75.0	1840	40	2400K	82	4.8	3.8	12	MTO
LED14P30D24KNFL	Dimmable 14W Smooth PAR30 - 2400K 25°	120	14	90	1050	75.0	4876	25	2400K	82	4.8	3.8	12	MTO
LED14P30D24KSP	Dimmable 14W Smooth PAR30 - 2400K 15°	120	14	90	1050	75.0	7802	15	2400K	82	4.8	3.8	12	MTO
LED14P30D27KFL	Dimmable 14W Smooth PAR30 - 2700K 40°	120	14	90	1050	75.0	1840	40	2700K	82	4.8	3.8	12	STK
LED14P30D27KNFL	Dimmable 14W Smooth PAR30 - 2700K 25°	120	14	90	1050	75.0	4876	25	2700K	82	4.8	3.8	12	STK
LED14P30D27KSP	Dimmable 14W Smooth PAR30 - 2700K 15°	120	14	90	1050	75.0	7802	15	2700K	82	4.8	3.8	12	MTO
LED14P30D30KFL	Dimmable 14W Smooth PAR30 - 3000K 40°	120	14	90	1100	78.6	2000	40	3000K	82	4.8	3.8	12	STK
LED14P30D30KNFL	Dimmable 14W Smooth PAR30 - 3000K 25°	120	14	90	1100	78.6	5300	25	3000K	82	4.8	3.8	12	STK
LED14P30D30KSP	Dimmable 14W Smooth PAR30 - 3000K 15°	120	14	90	1100	78.6	8480	15	3000K	82	4.8	3.8	12	MTO
LED14P30D35KFL	Dimmable 14W Smooth PAR30 - 3500K 40°	120	14	90	1125	80.4	2060	40	3500K	82	4.8	3.8	12	MTO
LED14P30D35KNFL	Dimmable 14W Smooth PAR30 - 3500K 25°	120	14	90	1125	80.4	5459	25	3500K	82	4.8	3.8	12	MTO
LED14P30D35KSP	Dimmable 14W Smooth PAR30 - 3500K 15°	120	14	90	1125	80.4	8734	15	3500K	82	4.8	3.8	12	MTO
LED14P30D41KFL	Dimmable 14W Smooth PAR30 - 4100K 40°	120	14	90	1150	82.1	2120	40	4100K	82	4.8	3.8	12	MTO
LED14P30D41KNFL	Dimmable 14W Smooth PAR30 - 4100K 25°	120	14	90	1150	82.1	5618	25	4100K	82	4.8	3.8	12	MTO
LED14P30D41KSP	Dimmable 14W Smooth PAR30 - 4100K 15°	120	14	90	1150	82.1	8988	15	4100K	82	4.8	3.8	12	MTO
LED14P30D50KFL	Dimmable 14W Smooth PAR30 - 5000K 40°	120	14	90	1150	82.1	2120	40	5000K	82	4.8	3.8	12	MTO
LED14P30D50KNFL	Dimmable 14W Smooth PAR30 - 5000K 25°	120	14	90	1150	82.1	5618	25	5000K	82	4.8	3.8	12	MTO
LED14P30D50KSP	Dimmable 14W Smooth PAR30 - 5000K 15°	120	14	90	1150	82.1	8988	15	5000K	82	4.8	3.8	12	MTO
LED12P30D24KFL	Dimmable 12W Smooth PAR30 - 2400K 40°	120	12	75	800	66.7	1380	40	2400K	82	4.8	3.8	12	MTO
LED12P30D24KNFL	Dimmable 12W Smooth PAR30 - 2400K 25°	120	12	75	800	66.7	3450	25	2400K	82	4.8	3.8	12	MTO
LED12P30D24KSP	Dimmable 12W Smooth PAR30 - 2400K 15°	120	12	75	800	66.7	5520	15	2400K	82	4.8	3.8	12	MTO
LED12P30D27KFL	Dimmable 12W Smooth PAR30 - 2700K 40°	120	12	75	800	66.7	1380	40	2700K	82	4.8	3.8	12	STK
LED12P30D27KNFL	Dimmable 12W Smooth PAR30 - 2700K 25°	120	12	75	800	66.7	3450	25	2700K	82	4.8	3.8	12	STK
LED12P30D27KSP	Dimmable 12W Smooth PAR30 - 2700K 15°	120	12	75	800	66.7	5520	15	2700K	82	4.8	3.8	12	MTO
LED12P30D30KFL	Dimmable 12W Smooth PAR30 - 3000K 40°	120	12	75	825	68.8	1406	40	3000K	82	4.8	3.8	12	STK
LED12P30D30KNFL	Dimmable 12W Smooth PAR30 - 3000K 25°	120	12	75	825	68.8	3750	25	3000K	82	4.8	3.8	12	STK
LED12P30D30KSP	Dimmable 12W Smooth PAR30 - 3000K 15°	120	12	75	825	68.8	6000	15	3000K	82	4.8	3.8	12	MTO
LED12P30D35KFL	Dimmable 12W Smooth PAR30 - 3500K 40°	120	12	75	850	70.8	1442	40	3500K	82	4.8	3.8	12	MTO
LED12P30D35KNFL	Dimmable 12W Smooth PAR30 - 3500K 25°	120	12	75	850	70.8	3862	25	3500K	82	4.8	3.8	12	MTO
LED12P30D35KSP	Dimmable 12W Smooth PAR30 - 3500K 15°	120	12	75	850	70.8	6180	15	3500K	82	4.8	3.8	12	MTO
LED12P30D41KFL	Dimmable 12W Smooth PAR30 - 4100K 40°	120	12	75	875	72.9	1484	40	4100K	82	4.8	3.8	12	MTO
LED12P30D41KNFL	Dimmable 12W Smooth PAR30 - 4100K 25°	120	12	75	875	72.9	3975	25	4100K	82	4.8	3.8	12	MTO
LED12P30D41KSP	Dimmable 12W Smooth PAR30 - 4100K 15°	120	12	75	875	72.9	6360	15	4100K	82	4.8	3.8	12	MTO
LED12P30D50KFL	Dimmable 12W Smooth PAR30 - 5000K 40°	120	12	75	875	72.9	1484	40	5000K	82	4.8	3.8	12	MTO
LED12P30D50KNFL	Dimmable 12W Smooth PAR30 - 5000K 25°	120	12	75	875	72.9	3975	25	5000K	82	4.8	3.8	12	MTO
LED12P30D50KSP	Dimmable 12W Smooth PAR30 - 5000K 15°	120	12	75	875	72.9	6360	15	5000K	82	4.8	3.8	12	MTO

Smooth Uniform Dimming

Item #	Description	Voltage	Wattage	Incandescent Wattage Comparison	Lumens	LPW	CBCP	Beam Angle	CCT	CRI	M.O.L. (Inches)	Diameter (Inches)	Case Quantity	STK/MTO
PAR30SN														
LED12P30S024KFL	Dimmable 12W Smooth PAR30 Short Neck - 2400K 40°	120	12	75	800	66.7	1280	40	2400K	82	3.5	3.8	12	MTO
LED12P30S024KNFL	Dimmable 12W Smooth PAR30 Short Neck - 2400K 25°	120	12	75	800	66.7	3430	25	2400K	82	3.5	3.8	12	MTO
LED12P30S024KSP	Dimmable 12W Smooth PAR30 Short Neck - 2400K 15°	120	12	75	800	66.7	5520	15	2400K	82	3.5	3.8	12	MTO
LED12P30S027KFL	Dimmable 12W Smooth PAR30 Short Neck - 2700K 40°	120	12	75	800	66.7	1280	40	2700K	82	3.5	3.8	12	STK
LED12P30S027KNFL	Dimmable 12W Smooth PAR30 Short Neck - 2700K 25°	120	12	75	800	66.7	3430	25	2700K	82	3.5	3.8	12	STK
LED12P30S027KSP	Dimmable 12W Smooth PAR30 Short Neck - 2700K 15°	120	12	75	800	66.7	5520	15	2700K	82	3.5	3.8	12	MTO
LED12P30S030KFL	Dimmable 12W Smooth PAR30 Short Neck - 3000K 40°	120	12	75	825	68.8	1400	40	3000K	82	3.5	3.8	12	STK
LED12P30S030KNFL	Dimmable 12W Smooth PAR30 Short Neck - 3000K 25°	120	12	75	825	68.8	3750	25	3000K	82	3.5	3.8	12	STK
LED12P30S030KSP	Dimmable 12W Smooth PAR30 Short Neck - 3000K 15°	120	12	75	825	68.8	6000	15	3000K	82	3.5	3.8	12	MTO
LED12P30S035KFL	Dimmable 12W Smooth PAR30 Short Neck - 3500K 40°	120	12	75	850	70.8	1417	40	3500K	82	3.5	3.8	12	MTO
LED12P30S035KNFL	Dimmable 12W Smooth PAR30 Short Neck - 3500K 25°	120	12	75	850	70.8	3863	25	3500K	82	3.5	3.8	12	MTO
LED12P30S035KSP	Dimmable 12W Smooth PAR30 Short Neck - 3500K 15°	120	12	75	850	70.8	6100	15	3500K	82	3.5	3.8	12	MTO
LED12P30S041KFL	Dimmable 12W Smooth PAR30 Short Neck - 4100K 40°	120	12	75	875	72.9	1484	40	4100K	82	3.5	3.8	12	MTO
LED12P30S041KNFL	Dimmable 12W Smooth PAR30 Short Neck - 4100K 25°	120	12	75	875	72.9	3975	25	4100K	82	3.5	3.8	12	MTO
LED12P30S041KSP	Dimmable 12W Smooth PAR30 Short Neck - 4100K 15°	120	12	75	875	72.9	6360	15	4100K	82	3.5	3.8	12	MTO
LED12P30S050KFL	Dimmable 12W Smooth PAR30 Short Neck - 5000K 40°	120	12	75	875	72.9	1484	40	5000K	82	3.5	3.8	12	MTO
LED12P30S050KNFL	Dimmable 12W Smooth PAR30 Short Neck - 5000K 25°	120	12	75	875	72.9	3975	25	5000K	82	3.5	3.8	12	MTO
LED12P30S050KSP	Dimmable 12W Smooth PAR30 Short Neck - 5000K 15°	120	12	75	875	72.9	6360	15	5000K	82	3.5	3.8	12	MTO
LED10P30S024KFL	Dimmable 10W Smooth PAR30 Short Neck - 2400K 40°	120	10	60	600	60.0	985	40	2400K	82	3.5	3.8	12	MTO
LED10P30S024KNFL	Dimmable 10W Smooth PAR30 Short Neck - 2400K 25°	120	10	60	600	60.0	2629	25	2400K	82	3.5	3.8	12	MTO
LED10P30S024KSP	Dimmable 10W Smooth PAR30 Short Neck - 2400K 15°	120	10	60	600	60.0	4227	15	2400K	82	3.5	3.8	12	MTO
LED10P30S027KFL	Dimmable 10W Smooth PAR30 Short Neck - 2700K 40°	120	10	60	600	60.0	985	40	2700K	82	3.5	3.8	12	STK
LED10P30S027KNFL	Dimmable 10W Smooth PAR30 Short Neck - 2700K 25°	120	10	60	600	60.0	2629	25	2700K	82	3.5	3.8	12	STK
LED10P30S027KSP	Dimmable 10W Smooth PAR30 Short Neck - 2700K 15°	120	10	60	600	60.0	4227	15	2700K	82	3.5	3.8	12	MTO
LED10P30S030KFL	Dimmable 10W Smooth PAR30 Short Neck - 3000K 40°	120	10	60	650	65.0	1071	40	3000K	82	3.5	3.8	12	STK
LED10P30S030KNFL	Dimmable 10W Smooth PAR30 Short Neck - 3000K 25°	120	10	60	650	65.0	2848	25	3000K	82	3.5	3.8	12	STK
LED10P30S030KSP	Dimmable 10W Smooth PAR30 Short Neck - 3000K 15°	120	10	60	650	65.0	4588	15	3000K	82	3.5	3.8	12	MTO
LED10P30S035KFL	Dimmable 10W Smooth PAR30 Short Neck - 3500K 40°	120	10	60	675	67.5	1103	40	3500K	82	3.5	3.8	12	MTO
LED10P30S035KNFL	Dimmable 10W Smooth PAR30 Short Neck - 3500K 25°	120	10	60	675	67.5	2934	25	3500K	82	3.5	3.8	12	MTO
LED10P30S035KSP	Dimmable 10W Smooth PAR30 Short Neck - 3500K 15°	120	10	60	675	67.5	4726	15	3500K	82	3.5	3.8	12	MTO
LED10P30S041KFL	Dimmable 10W Smooth PAR30 Short Neck - 4100K 40°	120	10	60	700	70.0	1135	40	4100K	82	3.5	3.8	12	MTO
LED10P30S041KNFL	Dimmable 10W Smooth PAR30 Short Neck - 4100K 25°	120	10	60	700	70.0	3040	25	4100K	82	3.5	3.8	12	MTO
LED10P30S041KSP	Dimmable 10W Smooth PAR30 Short Neck - 4100K 15°	120	10	60	700	70.0	4860	15	4100K	82	3.5	3.8	12	MTO
LED10P30S050KFL	Dimmable 10W Smooth PAR30 Short Neck - 5000K 40°	120	10	60	700	70.0	1135	40	5000K	82	3.5	3.8	12	MTO
LED10P30S050KNFL	Dimmable 10W Smooth PAR30 Short Neck - 5000K 25°	120	10	60	700	70.0	3040	25	5000K	82	3.5	3.8	12	MTO
LED10P30S050KSP	Dimmable 10W Smooth PAR30 Short Neck - 5000K 15°	120	10	60	700	70.0	4860	15	5000K	82	3.5	3.8	12	MTO
PAR20														
LED10P20S024KFL	Dimmable 10W Smooth PAR20 - 2400K 40°	120	10	60	600	60.0	780	40	2400K	82	3.5	2.5	12	MTO
LED10P20S024KNFL	Dimmable 10W Smooth PAR20 - 2400K 25°	120	10	60	600	60.0	780	25	2400K	82	3.5	2.5	12	MTO
LED10P20S027KFL	Dimmable 10W Smooth PAR20 - 2700K 40°	120	10	60	600	60.0	780	40	2700K	82	3.5	2.5	12	STK
LED10P20S027KNFL	Dimmable 10W Smooth PAR20 - 2700K 25°	120	10	60	600	60.0	780	25	2700K	82	3.5	2.5	12	STK
LED10P20S030KFL	Dimmable 10W Smooth PAR20 - 3000K 40°	120	10	60	650	65.0	780	40	3000K	82	3.5	2.5	12	STK
LED10P20S030KNFL	Dimmable 10W Smooth PAR20 - 3000K 25°	120	10	60	650	65.0	780	25	3000K	82	3.5	2.5	12	STK
LED10P20S035KFL	Dimmable 10W Smooth PAR20 - 3500K 40°	120	10	60	675	67.5	780	40	3500K	82	3.5	2.5	12	MTO
LED10P20S035KNFL	Dimmable 10W Smooth PAR20 - 3500K 25°	120	10	60	675	67.5	780	25	3500K	82	3.5	2.5	12	MTO
LED10P20S041KFL	Dimmable 10W Smooth PAR20 - 4100K 40°	120	10	60	700	70.0	780	40	4100K	82	3.5	2.5	12	MTO
LED10P20S041KNFL	Dimmable 10W Smooth PAR20 - 4100K 25°	120	10	60	700	70.0	780	25	4100K	82	3.5	2.5	12	MTO
LED10P20S050KFL	Dimmable 10W Smooth PAR20 - 5000K 40°	120	10	60	725	72.5	780	40	5000K	82	3.5	2.5	12	MTO
LED10P20S050KNFL	Dimmable 10W Smooth PAR20 - 5000K 25°	120	10	60	725	72.5	780	25	5000K	82	3.5	2.5	12	MTO
LED8P20S024KFL	Dimmable 8W Smooth PAR20 - 2400K 40°	120	8	50	500	62.5	734	40	2400K	82	3.5	2.5	12	MTO
LED8P20S024KNFL	Dimmable 8W Smooth PAR20 - 2400K 25°	120	8	50	500	62.5	2670	25	2400K	82	3.5	2.5	12	MTO
LED8P20S027KFL	Dimmable 8W Smooth PAR20 - 2700K 40°	120	8	50	500	62.5	734	40	2700K	82	3.5	2.5	12	STK
LED8P20S027KNFL	Dimmable 8W Smooth PAR20 - 2700K 25°	120	8	50	500	62.5	2670	25	2700K	82	3.5	2.5	12	STK
LED8P20S030KFL	Dimmable 8W Smooth PAR20 - 3000K 40°	120	8	50	515	64.4	820	40	3000K	82	3.5	2.5	12	STK
LED8P20S030KNFL	Dimmable 8W Smooth PAR20 - 3000K 25°	120	8	50	515	64.4	2250	25	3000K	82	3.5	2.5	12	STK
LED8P20S035KFL	Dimmable 8W Smooth PAR20 - 3500K 40°	120	8	50	525	65.6	845	40	3500K	82	3.5	2.5	12	MTO
LED8P20S035KNFL	Dimmable 8W Smooth PAR20 - 3500K 25°	120	8	50	525	65.6	2310	25	3500K	82	3.5	2.5	12	MTO
LED8P20S041KFL	Dimmable 8W Smooth PAR20 - 4100K 40°	120	8	50	520	65.3	869	40	4100K	82	3.5	2.5	12	MTO
LED8P20S041KNFL	Dimmable 8W Smooth PAR20 - 4100K 25°	120	8	50	520	65.3	2385	25	4100K	82	3.5	2.5	12	MTO
LED8P20S050KFL	Dimmable 8W Smooth PAR20 - 5000K 40°	120	8	50	555	69.4	869	40	5000K	82	3.5	2.5	12	MTO
LED8P20S050KNFL	Dimmable 8W Smooth PAR20 - 5000K 25°	120	8	50	555	69.4	2385	25	5000K	82	3.5	2.5	12	MTO

5 YEAR WARRANTY

For the most up-to-date specs, please visit www.tcpi.com

ENERGY STAR AWARD 2011 PARTNER OF THE YEAR

Item #	Description	Voltage	Wattage	Incandescent Wattage Comparison	Lumens	LPW	CBCP	Beam Angle	CCT	CRI	M.O.L. (Inches)	Diameter (Inches)	Case Quantity	STK/MTO
PAR38														
LED17P3824KFL	Non-Dimmable 17W Smooth PAR38 - 2400K 40°	120	17	120	1200	70.6	2024	40	2400K	82	5.3	4.8	12	MTO
LED17P3824KNFL	Non-Dimmable 17W Smooth PAR38 - 2400K 25°	120	17	120	1200	70.6	5520	25	2400K	82	5.3	4.8	12	MTO
LED17P3824KSP	Non-Dimmable 17W Smooth PAR38 - 2400K 15°	120	17	120	1200	70.6	8832	15	2400K	82	5.3	4.8	12	MTO
LED17P3827KFL	Non-Dimmable 17W Smooth PAR38 - 2700K 40°	120	17	120	1200	70.6	2024	40	2700K	82	5.3	4.8	12	STK
LED17P3827KNFL	Non-Dimmable 17W Smooth PAR38 - 2700K 25°	120	17	120	1200	70.6	5520	25	2700K	82	5.3	4.8	12	STK
LED17P3827KSP	Non-Dimmable 17W Smooth PAR38 - 2700K 15°	120	17	120	1200	70.6	8832	15	2700K	82	5.3	4.8	12	MTO
LED17P3830KFL	Non-Dimmable 17W Smooth PAR38 - 3000K 40°	120	17	120	1250	73.5	2200	40	3000K	82	5.3	4.8	12	STK
LED17P3830KNFL	Non-Dimmable 17W Smooth PAR38 - 3000K 25°	120	17	120	1250	73.5	6000	25	3000K	82	5.3	4.8	12	STK
LED17P3830KSP	Non-Dimmable 17W Smooth PAR38 - 3000K 15°	120	17	120	1250	73.5	9600	15	3000K	82	5.3	4.8	12	MTO
LED17P3835KFL	Non-Dimmable 17W Smooth PAR38 - 3500K 40°	120	17	120	1275	75.0	2266	40	3500K	82	5.3	4.8	12	MTO
LED17P3835KNFL	Non-Dimmable 17W Smooth PAR38 - 3500K 25°	120	17	120	1275	75.0	6182	25	3500K	82	5.3	4.8	12	MTO
LED17P3835KSP	Non-Dimmable 17W Smooth PAR38 - 3500K 15°	120	17	120	1275	75.0	9888	15	3500K	82	5.3	4.8	12	MTO
LED17P3841KFL	Non-Dimmable 17W Smooth PAR38 - 4100K 40°	120	17	120	1300	76.5	2332	40	4100K	82	5.3	4.8	12	MTO
LED17P3841KNFL	Non-Dimmable 17W Smooth PAR38 - 4100K 25°	120	17	120	1300	76.5	6360	25	4100K	82	5.3	4.8	12	MTO
LED17P3841KSP	Non-Dimmable 17W Smooth PAR38 - 4100K 15°	120	17	120	1300	76.5	10176	15	4100K	82	5.3	4.8	12	MTO
LED17P3850KFL	Non-Dimmable 17W Smooth PAR38 - 5000K 40°	120	17	120	1300	76.5	2332	40	5000K	82	5.3	4.8	12	MTO
LED17P3850KNFL	Non-Dimmable 17W Smooth PAR38 - 5000K 25°	120	17	120	1300	76.5	6360	25	5000K	82	5.3	4.8	12	MTO
LED17P3850KSP	Non-Dimmable 17W Smooth PAR38 - 5000K 15°	120	17	120	1300	76.5	10176	15	5000K	82	5.3	4.8	12	MTO
LED14P3824KFL	Non-Dimmable 14W Smooth PAR38 - 2400K 40°	120	14	90	1050	75.0	1840	40	2400K	82	5.3	4.8	12	MTO
LED14P3824KNFL	Non-Dimmable 14W Smooth PAR38 - 2400K 25°	120	14	90	1050	75.0	4876	25	2400K	82	5.3	4.8	12	MTO
LED14P3824KSP	Non-Dimmable 14W Smooth PAR38 - 2400K 15°	120	14	90	1050	75.0	7802	15	2400K	82	5.3	4.8	12	MTO
LED14P3827KFL	Non-Dimmable 14W Smooth PAR38 - 2700K 40°	120	14	90	1050	75.0	1840	40	2700K	82	5.3	4.8	12	STK
LED14P3827KNFL	Non-Dimmable 14W Smooth PAR38 - 2700K 25°	120	14	90	1050	75.0	4876	25	2700K	82	5.3	4.8	12	STK
LED14P3827KSP	Non-Dimmable 14W Smooth PAR38 - 2700K 15°	120	14	90	1050	75.0	7802	15	2700K	82	5.3	4.8	12	MTO
LED14P3830KFL	Non-Dimmable 14W Smooth PAR38 - 3000K 40°	120	14	90	1100	78.6	2000	40	3000K	82	5.3	4.8	12	STK
LED14P3830KNFL	Non-Dimmable 14W Smooth PAR38 - 3000K 25°	120	14	90	1100	78.6	5300	25	3000K	82	5.3	4.8	12	STK
LED14P3830KSP	Non-Dimmable 14W Smooth PAR38 - 3000K 15°	120	14	90	1100	78.6	8480	15	3000K	82	5.3	4.8	12	MTO
LED14P3835KFL	Non-Dimmable 14W Smooth PAR38 - 3500K 40°	120	14	90	1125	80.4	2060	40	3500K	82	5.3	4.8	12	MTO
LED14P3835KNFL	Non-Dimmable 14W Smooth PAR38 - 3500K 25°	120	14	90	1125	80.4	5457	25	3500K	82	5.3	4.8	12	MTO
LED14P3835KSP	Non-Dimmable 14W Smooth PAR38 - 3500K 15°	120	14	90	1125	80.4	8734	15	3500K	82	5.3	4.8	12	MTO
LED14P3841KFL	Non-Dimmable 14W Smooth PAR38 - 4100K 40°	120	14	90	1150	82.1	2120	40	4100K	82	5.3	4.8	12	MTO
LED14P3841KNFL	Non-Dimmable 14W Smooth PAR38 - 4100K 25°	120	14	90	1150	82.1	5618	25	4100K	82	5.3	4.8	12	MTO
LED14P3841KSP	Non-Dimmable 14W Smooth PAR38 - 4100K 15°	120	14	90	1150	82.1	8989	15	4100K	82	5.3	4.8	12	MTO
LED14P3850KFL	Non-Dimmable 14W Smooth PAR38 - 5000K 40°	120	14	90	1150	82.1	2120	40	5000K	82	5.3	4.8	12	MTO
LED14P3850KNFL	Non-Dimmable 14W Smooth PAR38 - 5000K 25°	120	14	90	1150	82.1	5618	25	5000K	82	5.3	4.8	12	MTO
LED14P3850KSP	Non-Dimmable 14W Smooth PAR38 - 5000K 15°	120	14	90	1150	82.1	8989	15	5000K	82	5.3	4.8	12	MTO
PAR30														
LED14P3024KFL	Non-Dimmable 14W Smooth PAR30 - 2400K 40°	120	14	90	1050	75.0	1840	40	2400K	82	4.8	3.8	12	MTO
LED14P3024KNFL	Non-Dimmable 14W Smooth PAR30 - 2400K 25°	120	14	90	1050	75.0	4876	25	2400K	82	4.8	3.8	12	MTO
LED14P3024KSP	Non-Dimmable 14W Smooth PAR30 - 2400K 15°	120	14	90	1050	75.0	7802	15	2400K	82	4.8	3.8	12	MTO
LED14P3027KFL	Non-Dimmable 14W Smooth PAR30 - 2700K 40°	120	14	90	1050	75.0	1840	40	2700K	82	4.8	3.8	12	STK
LED14P3027KNFL	Non-Dimmable 14W Smooth PAR30 - 2700K 25°	120	14	90	1050	75.0	4876	25	2700K	82	4.8	3.8	12	STK
LED14P3027KSP	Non-Dimmable 14W Smooth PAR30 - 2700K 15°	120	14	90	1050	75.0	7802	15	2700K	82	4.8	3.8	12	MTO
LED14P3030KFL	Non-Dimmable 14W Smooth PAR30 - 3000K 40°	120	14	90	1100	78.6	2000	40	3000K	82	4.8	3.8	12	STK
LED14P3030KNFL	Non-Dimmable 14W Smooth PAR30 - 3000K 25°	120	14	90	1100	78.6	5300	25	3000K	82	4.8	3.8	12	STK
LED14P3030KSP	Non-Dimmable 14W Smooth PAR30 - 3000K 15°	120	14	90	1100	78.6	8480	15	3000K	82	4.8	3.8	12	MTO
LED14P3035KFL	Non-Dimmable 14W Smooth PAR30 - 3500K 40°	120	14	90	1125	80.4	2060	40	3500K	82	4.8	3.8	12	MTO
LED14P3035KNFL	Non-Dimmable 14W Smooth PAR30 - 3500K 25°	120	14	90	1125	80.4	5457	25	3500K	82	4.8	3.8	12	MTO
LED14P3035KSP	Non-Dimmable 14W Smooth PAR30 - 3500K 15°	120	14	90	1125	80.4	6724	15	3500K	82	4.8	3.8	12	MTO
LED14P3041KFL	Non-Dimmable 14W Smooth PAR30 - 4100K 40°	120	14	90	1150	82.1	2120	40	4100K	82	4.8	3.8	12	MTO
LED14P3041KNFL	Non-Dimmable 14W Smooth PAR30 - 4100K 25°	120	14	90	1150	82.1	5618	25	4100K	82	4.8	3.8	12	MTO
LED14P3041KSP	Non-Dimmable 14W Smooth PAR30 - 4100K 15°	120	14	90	1150	82.1	8989	15	4100K	82	4.8	3.8	12	MTO
LED14P3050KFL	Non-Dimmable 14W Smooth PAR30 - 5000K 40°	120	14	90	1150	82.1	2120	40	5000K	82	4.8	3.8	12	MTO
LED14P3050KNFL	Non-Dimmable 14W Smooth PAR30 - 5000K 25°	120	14	90	1150	82.1	5618	25	5000K	82	4.8	3.8	12	MTO
LED14P3050KSP	Non-Dimmable 14W Smooth PAR30 - 5000K 15°	120	14	90	1150	82.1	8989	15	5000K	82	4.8	3.8	12	MTO
LED12P3024KFL	Non-Dimmable 12W Smooth PAR30 - 2400K 40°	120	12	75	800	66.7	1288	40	2400K	82	4.8	3.8	12	MTO
LED12P3024KNFL	Non-Dimmable 12W Smooth PAR30 - 2400K 25°	120	12	75	800	66.7	3450	25	2400K	82	4.8	3.8	12	MTO
LED12P3024KSP	Non-Dimmable 12W Smooth PAR30 - 2400K 15°	120	12	75	800	66.7	5520	15	2400K	82	4.8	3.8	12	MTO
LED12P3027KFL	Non-Dimmable 12W Smooth PAR30 - 2700K 40°	120	12	75	800	66.7	1288	40	2700K	82	4.8	3.8	12	STK
LED12P3027KNFL	Non-Dimmable 12W Smooth PAR30 - 2700K 25°	120	12	75	800	66.7	3450	25	2700K	82	4.8	3.8	12	STK
LED12P3027KSP	Non-Dimmable 12W Smooth PAR30 - 2700K 15°	120	12	75	800	66.7	5520	15	2700K	82	4.8	3.8	12	MTO
LED12P3030KFL	Non-Dimmable 12W Smooth PAR30 - 3000K 40°	120	12	75	825	68.8	1400	40	3000K	82	4.8	3.8	12	STK
LED12P3030KNFL	Non-Dimmable 12W Smooth PAR30 - 3000K 25°	120	12	75	825	68.8	3750	25	3000K	82	4.8	3.8	12	STK
LED12P3030KSP	Non-Dimmable 12W Smooth PAR30 - 3000K 15°	120	12	75	825	68.8	6000	15	3000K	82	4.8	3.8	12	MTO
LED12P3035KFL	Non-Dimmable 12W Smooth PAR30 - 3500K 40°	120	12	75	850	70.8	1447	40	3500K	82	4.8	3.8	12	MTO
LED12P3035KNFL	Non-Dimmable 12W Smooth PAR30 - 3500K 25°	120	12	75	850	70.8	3863	25	3500K	82	4.8	3.8	12	MTO
LED12P3035KSP	Non-Dimmable 12W Smooth PAR30 - 3500K 15°	120	12	75	850	70.8	6180	15	3500K	82	4.8	3.8	12	MTO
LED12P3041KFL	Non-Dimmable 12W Smooth PAR30 - 4100K 40°	120	12	75	875	72.9	1484	40	4100K	82	4.8	3.8	12	MTO
LED12P3041KNFL	Non-Dimmable 12W Smooth PAR30 - 4100K 25°	120	12	75	875	72.9	3975	25	4100K	82	4.8	3.8	12	MTO
LED12P3041KSP	Non-Dimmable 12W Smooth PAR30 - 4100K 15°	120	12	75	875	72.9	6360	15	4100K	82	4.8	3.8	12	MTO
LED12P3050KFL	Non-Dimmable 12W Smooth PAR30 - 5000K 40°	120	12	75	875	72.9	1484	40	5000K	82	4.8	3.8	12	MTO
LED12P3050KNFL	Non-Dimmable 12W Smooth PAR30 - 5000K 25°	120	12	75	875	72.9	3975	25	5000K	82	4.8	3.8	12	MTO
LED12P3050KSP	Non-Dimmable 12W Smooth PAR30 - 5000K 15°	120	12	75	875	72.9	6360	15	5000K	82	4.8	3.8	12	MTO

TCP ELITE Designer Series — LED Non-Dimmable PAR Lamps

Item #	Description	Voltage	Wattage	Incandescent Wattage Comparison	Lumens	LPW	CBCP	Beam Angle	CCT	CRI	M.B.L. (inches)	Diameter (inches)	Case Quantity	STK/MTO
PAR30SL														
LED12P30S24KFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 2400K 40°	120	12	75	800	66.7	1280	40	2400K	82	3.5	3.8	12	MTO
LED12P30S24KNFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 2400K 25°	120	12	75	800	66.7	3450	25	2400K	82	3.5	3.8	12	MTO
LED12P30S24KSP	Non-Dimmable 12W Smooth PAR30 Short Neck - 2400K 15°	120	12	75	800	66.7	5520	15	2400K	82	3.5	3.8	12	MTO
LED12P30S27KFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 2700K 40°	120	12	75	800	66.7	1280	40	2700K	82	3.5	3.8	12	STK
LED12P30S27KNFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 2700K 25°	120	12	75	800	66.7	3450	25	2700K	82	3.5	3.8	12	STK
LED12P30S27KSP	Non-Dimmable 12W Smooth PAR30 Short Neck - 2700K 15°	120	12	75	800	66.7	5520	15	2700K	82	3.5	3.8	12	MTO
LED12P30S30KFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 3000K 40°	120	12	75	825	68.8	1400	40	3000K	82	3.5	3.8	12	STK
LED12P30S30KNFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 3000K 25°	120	12	75	825	68.8	3750	25	3000K	82	3.5	3.8	12	STK
LED12P30S30KSP	Non-Dimmable 12W Smooth PAR30 Short Neck - 3000K 15°	120	12	75	825	68.8	6000	15	3000K	82	3.5	3.8	12	MTO
LED12P30S35KFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 3500K 40°	120	12	75	850	70.8	1442	40	3500K	82	3.5	3.8	12	MTO
LED12P30S35KNFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 3500K 25°	120	12	75	850	70.8	3863	25	3500K	82	3.5	3.8	12	MTO
LED12P30S35KSP	Non-Dimmable 12W Smooth PAR30 Short Neck - 3500K 15°	120	12	75	850	70.8	6180	15	3500K	82	3.5	3.8	12	MTO
LED12P30S41KFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 4100K 40°	120	12	75	875	72.9	1404	40	4100K	82	3.5	3.8	12	MTO
LED12P30S41KNFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 4100K 25°	120	12	75	875	72.9	3975	25	4100K	82	3.5	3.8	12	MTO
LED12P30S41KSP	Non-Dimmable 12W Smooth PAR30 Short Neck - 4100K 15°	120	12	75	875	72.9	6360	15	4100K	82	3.5	3.8	12	MTO
LED12P30S50KFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 5000K 40°	120	12	75	875	72.9	1404	40	5000K	82	3.5	3.8	12	MTO
LED12P30S50KNFL	Non-Dimmable 12W Smooth PAR30 Short Neck - 5000K 25°	120	12	75	875	72.9	3975	25	5000K	82	3.5	3.8	12	MTO
LED12P30S50KSP	Non-Dimmable 12W Smooth PAR30 Short Neck - 5000K 15°	120	12	75	875	72.9	6360	15	5000K	82	3.5	3.8	12	MTO
LED10P30S24KFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 2400K 40°	120	10	60	600	60.0	985	40	2400K	82	3.5	3.8	12	MTO
LED10P30S24KNFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 2400K 25°	120	10	60	600	60.0	2630	25	2400K	82	3.5	3.8	12	MTO
LED10P30S24KSP	Non-Dimmable 10W Smooth PAR30 Short Neck - 2400K 15°	120	10	60	600	60.0	4921	15	2400K	82	3.5	3.8	12	MTO
LED10P30S27KFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 2700K 40°	120	10	60	600	60.0	985	40	2700K	82	3.5	3.8	12	STK
LED10P30S27KNFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 2700K 25°	120	10	60	600	60.0	2630	25	2700K	82	3.5	3.8	12	STK
LED10P30S27KSP	Non-Dimmable 10W Smooth PAR30 Short Neck - 2700K 15°	120	10	60	600	60.0	4921	15	2700K	82	3.5	3.8	12	MTO
LED10P30S30KFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 3000K 40°	120	10	60	650	65.0	1071	40	3000K	82	3.5	3.8	12	STK
LED10P30S30KNFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 3000K 25°	120	10	60	650	65.0	2860	25	3000K	82	3.5	3.8	12	STK
LED10P30S30KSP	Non-Dimmable 10W Smooth PAR30 Short Neck - 3000K 15°	120	10	60	650	65.0	4500	15	3000K	82	3.5	3.8	12	MTO
LED10P30S35KFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 3500K 40°	120	10	60	675	67.5	1103	40	3500K	82	3.5	3.8	12	MTO
LED10P30S35KNFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 3500K 25°	120	10	60	675	67.5	2954	25	3500K	82	3.5	3.8	12	MTO
LED10P30S35KSP	Non-Dimmable 10W Smooth PAR30 Short Neck - 3500K 15°	120	10	60	675	67.5	4726	15	3500K	82	3.5	3.8	12	MTO
LED10P30S41KFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 4100K 40°	120	10	60	700	70.0	1135	40	4100K	82	3.5	3.8	12	MTO
LED10P30S41KNFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 4100K 25°	120	10	60	700	70.0	3040	25	4100K	82	3.5	3.8	12	MTO
LED10P30S41KSP	Non-Dimmable 10W Smooth PAR30 Short Neck - 4100K 15°	120	10	60	700	70.0	4863	15	4100K	82	3.5	3.8	12	MTO
LED10P30S50KFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 5000K 40°	120	10	60	700	70.0	1135	40	5000K	82	3.5	3.8	12	MTO
LED10P30S50KNFL	Non-Dimmable 10W Smooth PAR30 Short Neck - 5000K 25°	120	10	60	700	70.0	3040	25	5000K	82	3.5	3.8	12	MTO
LED10P30S50KSP	Non-Dimmable 10W Smooth PAR30 Short Neck - 5000K 15°	120	10	60	700	70.0	4863	15	5000K	82	3.5	3.8	12	MTO
PAR20														
LED10P20S24KFL	Non-Dimmable 10W Smooth PAR20 - 2400K 40°	120	10	60	600	60.0	380	40	2400K	82	3.5	2.5	12	MTO
LED10P20S24KNFL	Non-Dimmable 10W Smooth PAR20 - 2400K 25°	120	10	60	600	60.0	380	25	2400K	82	3.5	2.5	12	MTO
LED10P20S27KFL	Non-Dimmable 10W Smooth PAR20 - 2700K 40°	120	10	60	600	60.0	380	40	2700K	82	3.5	2.5	12	STK
LED10P20S27KNFL	Non-Dimmable 10W Smooth PAR20 - 2700K 25°	120	10	60	600	60.0	380	25	2700K	82	3.5	2.5	12	STK
LED10P20S30KFL	Non-Dimmable 10W Smooth PAR20 - 3000K 40°	120	10	60	650	65.0	380	40	3000K	82	3.5	2.5	12	STK
LED10P20S30KNFL	Non-Dimmable 10W Smooth PAR20 - 3000K 25°	120	10	60	650	65.0	380	25	3000K	82	3.5	2.5	12	STK
LED10P20S35KFL	Non-Dimmable 10W Smooth PAR20 - 3500K 40°	120	10	60	675	67.5	380	40	3500K	82	3.5	2.5	12	MTO
LED10P20S35KNFL	Non-Dimmable 10W Smooth PAR20 - 3500K 25°	120	10	60	675	67.5	380	25	3500K	82	3.5	2.5	12	MTO
LED10P20S41KFL	Non-Dimmable 10W Smooth PAR20 - 4100K 40°	120	10	60	700	70.0	380	40	4100K	82	3.5	2.5	12	MTO
LED10P20S41KNFL	Non-Dimmable 10W Smooth PAR20 - 4100K 25°	120	10	60	700	70.0	380	25	4100K	82	3.5	2.5	12	MTO
LED10P20S50KFL	Non-Dimmable 10W Smooth PAR20 - 5000K 40°	120	10	60	700	70.0	380	40	5000K	82	3.5	2.5	12	MTO
LED10P20S50KNFL	Non-Dimmable 10W Smooth PAR20 - 5000K 25°	120	10	60	700	70.0	380	25	5000K	82	3.5	2.5	12	MTO
LED8P20S24KFL	Non-Dimmable 8W Smooth PAR20 - 2400K 40°	120	8	50	500	62.5	754	40	2400K	82	3.5	2.5	12	MTO
LED8P20S24KNFL	Non-Dimmable 8W Smooth PAR20 - 2400K 25°	120	8	50	500	62.5	2070	25	2400K	82	3.5	2.5	12	MTO
LED8P20S27KFL	Non-Dimmable 8W Smooth PAR20 - 2700K 40°	120	8	50	500	62.5	754	40	2700K	82	3.5	2.5	12	STK
LED8P20S27KNFL	Non-Dimmable 8W Smooth PAR20 - 2700K 25°	120	8	50	500	62.5	2070	25	2700K	82	3.5	2.5	12	STK
LED8P20S30KFL	Non-Dimmable 8W Smooth PAR20 - 3000K 40°	120	8	50	515	64.4	820	40	3000K	82	3.5	2.5	12	STK
LED8P20S30KNFL	Non-Dimmable 8W Smooth PAR20 - 3000K 25°	120	8	50	515	64.4	2250	25	3000K	82	3.5	2.5	12	STK
LED8P20S35KFL	Non-Dimmable 8W Smooth PAR20 - 3500K 40°	120	8	50	525	65.6	845	40	3500K	82	3.5	2.5	12	MTO
LED8P20S35KNFL	Non-Dimmable 8W Smooth PAR20 - 3500K 25°	120	8	50	525	65.6	2318	25	3500K	82	3.5	2.5	12	MTO
LED8P20S41KFL	Non-Dimmable 8W Smooth PAR20 - 4100K 40°	120	8	50	530	66.3	869	40	4100K	82	3.5	2.5	12	MTO
LED8P20S41KNFL	Non-Dimmable 8W Smooth PAR20 - 4100K 25°	120	8	50	530	66.3	2385	25	4100K	82	3.5	2.5	12	MTO
LED8P20S50KFL	Non-Dimmable 8W Smooth PAR20 - 5000K 40°	120	8	50	530	66.3	869	40	5000K	82	3.5	2.5	12	MTO
LED8P20S50KNFL	Non-Dimmable 8W Smooth PAR20 - 5000K 25°	120	8	50	530	66.3	2385	25	5000K	82	3.5	2.5	12	MTO

5 YEAR WARRANTY

For the most up-to-date specs, please visit www.tcpi.com

TCP ELITE Designer Series — LED PAR Lamps

LED	25,000 Hours average rated life, 120 Volts

Catalog Number	
Notes	Type

Applications

Ideal for PAR38, PAR30, and PAR20 flood and spot light applications.

- Track Lights
- Recessed Downlights
- Display Lights
- Outdoor Fixtures that Protect Lamps from the Elements

Features	Benefits
Up to 85% less energy than halogen alternatives	Instant energy savings
Long life	Minimizes replacement and maintenance costs
Unique full face optic	Provides designer grade light quality with same look as halogen replacement.
Smooth, clean outside housing	Seamlessly blends into lighting applications
Very low heat generation	Perfect for sensitive display lighting such as art galleries
Excellent Color Consistency and CRI	Enhances colors of focal point while maintaining uniformity throughout lighting installation from lamp to lamp.
Low weight	Track or down light installations are not strained by excess weight.
UL approved for damp location	Can be used outdoors when protected from elements. Withstands humidity indoors/outdoors.
Shatter resistant	Lower the risk of injury and breakage

Specifications

	PAR38	PAR30LN	PAR30SN	PAR20
Input Line Voltage:	120 VAC	120 VAC	120 VAC	120 VAC
Input Power	17 & 14 W	14 & 12 W	12 & 10 W	10 & 8 W
Input Line Frequency	50/60HZ	50/60HZ	50/60HZ	50/60HZ
Lamp Life (Rated)	25,000 hrs	25,000 hrs	25,000 hrs	25,000 hrs
Minimum Starting Temp	-30°C	-30°C	-30°C	-30°C
Maximum Operating Temp	40°C	40°C	40°C	40°C

PAR38 PAR30LN PAR30SN PAR20

5 YEAR WARRANTY* For the most up-to-date specs, please visit www.tcpi.com

TCP
325 Campus Dr | Aurora, Ohio 44202 | P: 1-800-324-1496 | tcpi.com

ENERGY STAR AWARD 2014 PARTNER OF THE YEAR

LED-8028 Post Top / Bollard / Wall Pack

LED for HID RETROFIT

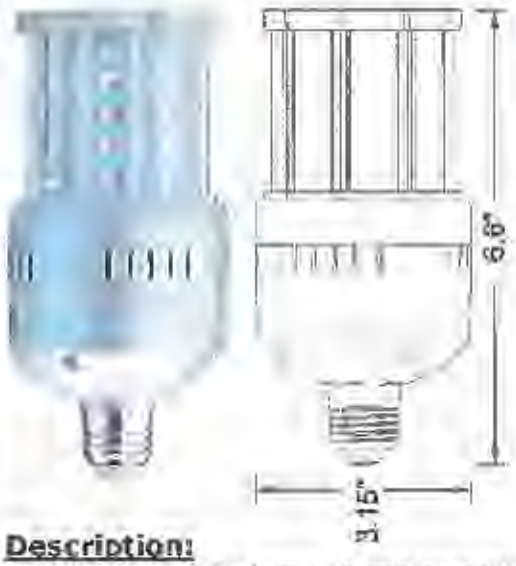
SKU (USA)	SKU (Canada)	Description
LED-8028E30	LED-8028E30C	21W 3000K
LED-8028E42	LED-8028E42C	21W 4200K
LED-8028E57	LED-8028E57C	21W 5700K

Technical Specifications

Models US/CAN	LED-8028E30/ LED-8028E30C	LED-8028E42/ LED-8028E42C	LED-8028E57/ LED-8028E57C
CCT	3000K	4200K	5700K
Power Consumption	21 watts		
Replaces	70w MH/HPS		
Mounting	E26		
Voltage	120-277VAC (USA) 120-347VAC (CANADA)		
LED Type	40 Samsung #5630 SMD		
Beam Angle	360		
Dimmable	No		
Operating Temp	-40°F - +122°F		
Rated R70 Life	Up to 50,000 Hrs.		
Warranty	5 Year Limited*		
LM79 Specifications	Yes	Yes	Yes
Power (W)	21.5	20.9	21.1
CCT	3300	4317	5718
Light Output	2058.9	2073	1991.2
Efficacy	95.77	99.19	94.37
THD @ 277V	19.45%	19.32%	19.23%
PF @ 277V	0.944	0.943	0.943
CRI:	0.845	84.4	85.5
R9	15	16	33
Duv	-0.0019	-0.0004	0.0026
Packaging	9 / Master Carton		
Unit	4.7" x 4.7" x 8.86" 1.14 lbs.		
Master	14.8" x 14.8" x 9.5" 11.2 lbs.		

Note: All specification information falls within a ± 2% range and is subject to change without notice.

NOTE: Light Efficient Design is providing this information to the general public. Please note that all products contained herein are trademarked, copyrighted, and/or have patents pending. Any use of these designs is strictly prohibited without prior written consent. Light Efficient Design protects its proprietary information vigorously in the courts of the United States of America.



21W LED for HID

Replaces 70W MH / HPS

UL LISTED c UL LISTED

FC

Description:
21W LED retrofit lamp to replace MH and HPS lamps up to 70w, E26 Medium base. Integrated insect/dust screen. UL damp rated approved for open or fully enclosed fixtures.

Features:
- Replaces 70w HID Lamps
- 120-277V or 120-347V (Canada)
- UL approved for open and fully enclosed fixtures within damp environments (USA & Can)
- Active Cooling Fan >70,000 hr. rated life
- 50,000 HR rated LED life
- 5 year limited warranty (see website for details)

Applications:

Wall Pack

Bollard

Post Top

Installation Notes:
- When installing LED-8000 series retrofit lamps within HID fixtures, **ballast must be bypassed** when present.
- 8000 series retrofits are UL damp rated, sealing the fixtures after installation will deliver best results.
- **Installing surge/lightning protectors is highly recommended** and helps to eliminate premature driver failure caused by surges and other power fluctuations.

Light Efficient Design
188 S. Northwest Highway • Cary, IL 60013
(847) 380-3540 • FAX: (847) 380-3542
www.led-llc.com

UCRM 2: POWER CONDITIONING

This document contains Performance Services Trade Secrets and Confidential Information to be used by the addressee for evaluating the PS proposal. Addressee shall not disclose the Confidential Information to third parties without written consent of Performance Services.

Powergy™

CLEAN POWER SYSTEMS

Clean, Safe, Efficient Power

- Suppresses surges and spikes
- Helps with brownouts
- Filters noise generated by switching power electronics

- Eliminates drastic voltage fluctuation
- Improves power factor and reduces system losses

Powerful Benefits

more hours of productive operation

- Significantly extends equipment life and performance by reducing machine downtime
- Prevents premature equipment replacement and maintenance
- Reduces demand and energy costs

Proven Applications

anywhere clean power is required

- EDM and Laser Systems
- CNC Machines
- AC Motors
- Water and Wastewater Treatment Plants (Pumps)
- Restaurants, Supermarkets, Convenience Stores and other light Commercial applications

"Power management" isn't some trendy new, heavy-handed management style. It's the strategic and successful management of incoming electrical power. Insuring power quality is just as important to successful EDM operations, because it prevents very expensive maintenance.

L. Rod Gaiera, EDM Today, September/October 2005

(Powergy) CPS is designed to eliminate unwanted bumps and spikes, and protect against voltage "transients", generally smoothing out the power, while also adjusting the phase of power to help inductive load machinery run more efficiently.

(UL)MC US Department of Energy, November 1995

c UL US LISTED

For more information or to locate an authorized distributor near you call 1-888-876-9374 or Visit www.powergy.com

185 Frances Avenue, Cranston, Rhode Island 02910 1-888-8-POWERGY WWW.POWERGY.COM

SPECIFICATIONS

Model	CPS-3Y208/240	CPS-3D208/240	CPS-3D380	CPS-3D480	CPS-3D600
Voltage (Vac)	208/240	208/240	380	480	600
Phase Configuration	3Φ Wye	3Φ Delta	3Φ Delta	3Φ Delta	3Φ Delta
Frequency (Hz)	50 ~ 60	50 ~ 60	50 ~ 60	50 ~ 60	50 ~ 60
Energy Absorption (J) (2 ms current wave)	3300	3300	5460	5760	6600
Surge Current (A) (8/20 µs current wave)	40K	40K	40K	40K	40K
Max. Clamping Voltage (V) (@ 300 A, 8/20 µs current wave)	710	710	1120	1500	1815
Line Wires (AWG)	10	10	8	8	6
Circuit Breakers (A)	30	30	40	40	50
Dimensions (WxDxH)	12" x 12" x 6"	12" x 12" x 6"	12" x 14" x 8"	12" x 14" x 8"	12" x 14" x 8"
Weight (lbs)	26	26	38	38	48

Easy Installation

- Simple, NEMA 12 enclosure, factory sealed, easily installed in under an hour
- Connect in parallel to AC power systems
- For whole facility protection, install at main power panel
- For point-of-use protection, install at the sub-panel upstream of equipment
- Use readily available industry-standard circuit breaker or fuse disconnect
- Maintenance free

Powergy has since 1993 earned a track record of boosting electrical efficiency for a broad spectrum of commercial and residential applications.

Powerful Company - Tyndall Engineering manufactures the Powergy™ Clean Power Systems. Powergy™ is available through a select network of electrical equipment distributors.

Call Tyndall Engineering for more information or to locate an authorized reseller near you.

The Powergy™ Clean Power Systems is designed to protect against unwanted bumps, spikes and transients by balancing the power and adjusting the phases helping your equipment run smoother and more efficiently.

Rev. 5.23.06

Powergy™
CLEAN POWER SYSTEMS

INSTALLATION GUIDE

For EDM Machine Tools

Model CPS-3Y208/240 & CPS-3D208/240

WARNING

- Opening the Powergy CPS without prior permission from Thielsch, will void its warranty coverage.
- Apply the CPS only to 3-phase, 208 or 240Vac, 50/60Hz, Wye or Delta power systems.
- The CPS must be mounted vertically, in a dry location, using the four mounting holes.
- The CPS must be installed by a licensed electrician, in compliance with national and local codes.
- **IMPORTANT:** THIS UNIT MUST BE CONNECTED DIRECTLY TO A DEDICATED CIRCUIT BREAKER. DO NOT, UNDER ANY CIRCUMSTANCES, HARD-WIRE INSTALL WITHOUT A DEDICATED BREAKER.

YOU WILL NEED:

1. A circuit breaker box with a 3-pole 30 Amp circuit breaker;
   OR
   A fuse disconnect box with three 30 Amp fuses.
   NOTE: Above items can be conveniently purchased through Thielsch.
2. Appropriate tools, wires and conduits.
3. A licensed electrician who is well versed with the national and local electrical codes.

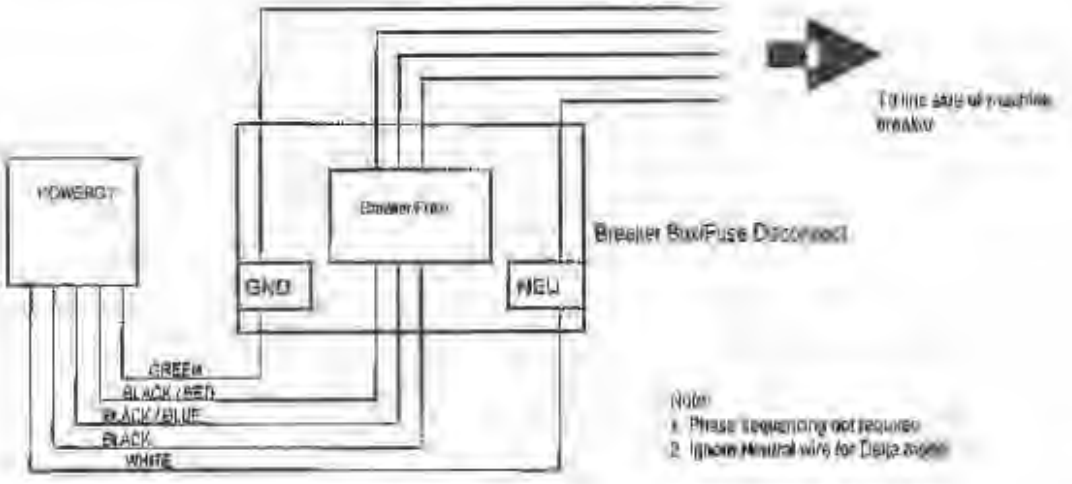
MOUNTING THE DEVICES:

1. Inspect the exterior of the CPS to ensure that it has not been damaged in transit. Ensure that the front label/overlay is still intact, that the warranty seals are intact, and that the cables protruding from the unit have not been damaged.
2. Locate the EDM/Laser machine breaker. Identify sufficient space near the machine breaker to locate the breaker box/fuse disconnect and the CPS.
3. Ensure that the CPS is on a clear and dry wall.
4. Mount the breaker box/fuse disconnect and the CPS. When mounted, the phase indication lights should be visible.

MOUNTING HOLES POSITION:

INSTALL PROCEDURES:

1. If possible, de-energize the power panel/breaker box/fuse disconnect prior to connecting all the devices.
2. According to the CODES, run wires and conduit between the machine breaker (line side) and the breaker box/fuse disconnect. Run conduit between the breaker box/fuse disconnect and the CPS. Feed the wires from the CPS through the conduit into the breaker box/fuse disconnect.
3. DO NOT UNDER ANY CONDITIONS SPLICE NEW CABLE ONTO THE CPS, OR OPEN THE CPS, TO EXTEND THE LENGTH OF THE CABLE PROVIDED.



TEST PROCEDURES:

1. Double check if all connections are correct.
2. If so, close the circuit breaker or fuse disconnect.
3. Check if all three lights on the CPS are on.
   YES - Proceed to next step.
   NO - De-energize the CPS and check if cables are correctly connected. Check the ground cable connection. If problem persists, call the distributor or Thielsch for technical assistance.
4. Use a clamp-on Ammeter to check if all line currents are about 14A (+/- 1A). Contact the distributor or Thielsch if the current reading is different.
5. Put this installation guide near the unit, for future use.

WARRANTY:

- Remember to fill and mail out the Warranty Registration Card within 10 days of installation.
- Powergy Clean Power Systems provide the original purchaser a 3-year limited product warranty. Refer to the product warranty sheet for more details.

THIELSCH ENGINEERING

395 FRANCES AVE.
CRANSTON, RI 02910
1-888-8-POWERGY
WWW.POWERGY.COM

UCRM 3&6: VARIABLE FREQUENCY DRIVES

This document contains Performance Services Trade Secrets and Confidential information to be used by the addressee for evaluating the PSI proposal. Addressee shall not disclose the Confidential information to third parties without written consent of Performance Services.

ACH550 Product Overview

Description

The ACH550 series is a microprocessor based Pulse Width Modulated (PWM) adjustable speed AC drive. The ACH550 drive takes advantage of sophisticated microprocessor control and advanced IGBT power switching technology to deliver high-performance control of AC motors for a wide range of HVAC applications.

With drives ranging from 1 to 550 HP, the ACH550 series features a universal full graphic interface that "speaks" to the operator in plain English phrases, greatly simplifying set-up, operation, and fault diagnosis. The ACH550 is also programmable in fourteen other languages.

Each ACH550 drive comes equipped with an extensive library of pre-programmed HVAC application macros which, at a touch of a button, allow rapid configuration of inputs, outputs, and performance parameters for specific HVAC applications to maximize convenience and minimize start-up time. The ACH550 series can handle the most demanding commercial applications in an efficient, dependable, and economic manner.

ACH550 Standard Features

UL, cUL labeled and CE marked, BTL listed
EMI/RFI Filter (1st Environment, Restricted Distribution)
Seismic Certificate of Compliance in accordance with
- IBC 2000 referencing ASCE 7-98 and ICC AC156
- IBC 2003 referencing ASCE 7-02 and ICC AC156
- IBC 2006 referencing ASCE 7-05 and ICC AC156
- IBC 2009 referencing ASCE 7-05 and ICC AC156

Start-Up Assistants
Maintenance Assistants
Diagnostic Assistants
Real Time Clock
- Includes Day, Date and Time

Operator Panel Parameter Backup (read/write)
Full Graphic and Multilingual Display
- for Operator Control, Parameter Set-Up and Operating Data Display
  - Output Frequency (Hz) / Motor Speed (RPM)
  - Motor Current
  - Calculated Energy Savings ($, kWh/MWh, CO2)
  - Calculated % Motor Torque
  - Calculated Motor Power (kW)
  - DC Bus Voltage
  - Output Voltage
  - Heatsink Temperature
  - Elapsed Time Meter (resettable)
  - KWh (resettable)
  - Input / Output Terminal Monitor
  - PID Actual Value (Feedback) & Error
  - Fault Text
  - Warning Text
  - Three (3) Scalable Process Variable Displays
  - User Definable Engineering Units

Two (2) Programmable Analog Inputs
Six (6) Programmable Digital Inputs
Two (2) Programmable Analog Outputs
Up to six (6) Programmable Relay Outputs (Three (3) Standard)
Adjustable Filters on Analog Inputs and Outputs
Mathematical Functions on Analog Reference Signals
All Control Inputs Isolated from Ground and Power
Four (4) Resident Serial Communication Protocols
- BACnet (MS/TP)
- Johnson Controls N2
- Siemens Building Technologies FLN (P1)
- Modbus RTU

Input Speed Signals
- Current 0 (4) to 20 mA
- Voltage 0 (2) to 10 VDC
- Increase/Decrease Reference Contacts (Floating Point)
- Serial Communications

Start/Stop
- 2 Wire (Dry Contact Closure)
- 3 Wire (Momentary Contact)
- Application of Input Power
- Application of Reference Signal (PID Sleep/Wake-Up)
- Serial Communications

Start Functions
- Ramp
  - Flying Start
  - Pre-magnetization (DC Braking) on Start
- Automatic Torque Boost
- Automatic Torque Boost with Flying Start
- Auto Restart (Reset) – Customer Selectable and Adjustable

Stop Functions
- Ramp or Coast to Stop
- Emergency Stop
- DC Braking / Hold at Stop
- Flux Braking

Accel/Decel
- Two (2) sets of independently Ramps
- Linear or Adjustable "S" Curve Accel/Decel Ramps

HVAC Specific Application Macros
Generic Satellites (2) and Run Permissive Input
Damper Control
Override Input (Fire Mode)
Timer Functions
- Four (4) Daily Start/Stop Time Periods
- Four (4) Weekly Start/Stop Time Periods
- Four Timers for Controlling Time Periods and Overrides

Seven (7) Preset Speeds
Supervision Functions
Adjustable Current Limit
Electronic Reverse
Automatic Extended Power Loss Ride Through (selectable)
Programmable Maximum Frequency to 500 Hz
PID Control
- Two (2) Integral Independent Programmable PID Setpoint Controllers (Process and External)
- External Selection between Two (2) Sets of Process PID Controller Parameters
- PID Sleep/Wake-Up

Motor Control Features
- Scalar (V/Hz) and Vector Modes of Motor Control
- V/Hz Shapes
  - Linear
  - Squared
- Energy Optimization
- IR Compensation
- Slip Compensation
- Three (3) Critical Frequency Lockout Bands

Preprogrammed Protection Circuits
- Overcurrent
- Short Circuit
- Ground Fault
- Overvoltage
- Undervoltage
  - Input Phase Loss
- Output Device (IGBT) Overtemperature
- Adjustable Current Limit Regulator
- UL508C approved Electronic Motor Overload (PT)

Programmable Fault Functions for Protection Include
- Loss of Analog Input
- Panel Loss
- External Fault
- Motor Thermal Protection
- Stall
- Underload
- Motor Phase Loss
- Ground Fault

Input Impedance
- 5% Equivalent Impedance with Internal Reactors (Patented Swinging Choke Design for Superior Harmonic Mitigation (R1... R6 Frames)
- 3% Equivalent Impedance (R8 Frame)

Optional Features

3 Relay Extension Module (ORELA-01)
115/230 V Digital Input Interface Card (OHDI-01)
Fieldbus Adapter Modules
- LonWorks
- BACnet IP to MS/TP Router
- Profibus
- DeviceNet
- Ethernet
- ControlNet

DriveWindow Light Start-Up, Operation, Programming and Diagnostic Tool
Fan Replacement Kit

ACH550 Specifications

Input Connection

Input Voltage (U_1)	208/220/230/240 VAC 3-phase +/-10% 208/220/230/240 VAC 1-phase +/-10% 380/400/415/440/460/480 VAC 3-phase +/-10%
Frequency:	48 - 63 Hz
Line Limitations:	Max +/-3% of nominal phase to phase input voltage
Fundamental Power Factor (cos	0.98 at nominal load
Connection:	U_1, V_1, W_1 (U_1, V_1 1-phase)

Output (Motor) Connection

Output Voltage:	0 to U_1, 3-phase symmetrical, U_2 at the field weakening point
Output Frequency:	-500 to 500 Hz
Frequency Resolution:	0.01 Hz
Continuous Output Current:	
Variable Torque:	1.0 * I_{2N} (Nominal rated output current, Variable Torque)
Short Term Overload Capacity	
Variable Torque:	1.1 * I_{2N} (1 min/10 min)
Peak Overload Capacity:	
Variable Torque:	1.35 * I_{2N} (2 sec/1 min)
Base Motor Frequency Range	10 to 500 Hz
Switching Frequency:	1, 4, 8 or 12 kHz
Acceleration Time:	0.1 to 1800 s
Deceleration Time:	0.1 to 1800 s
Efficiency:	0.98 at nominal power level
Short Circuit Withstand Rating:	100,000 AIC (UL) w/o fuses
Connection:	U_2, V_2, W_2

Enclosure

Style:	UL (NEMA) Type 1, Type 12, or Type 3R

Agency Approval

Listing and Compliance:	UL, cUL, CE

Ambient Conditions, Operation

Air Temperature:	-15° to 40°C (5° to 104°F), above 40°C the maximum output current is de-rated 1% for every additional 1°C (up to 50°C (122°F) maximum limit.
Relative Humidity:	5 to 95%, no condensation allowed, maximum relative humidity is 60% in the presence of corrosive gasses
Contamination Levels:	
IEC:	60721-3-1, 60721-3-2 and 60721-3-3
Chemical Gasses:	3C1 and 3C2
Solid Particles:	3S2
Installation Site Altitude:	0 to 1000 m (3300 ft) above sea level. At sites over 1000 m (3300 ft) above sea level, the maximum power is de-rated 1% for every additional 100 m (330 ft). If the installation site is higher than 2000 m (6600 ft) above sea level, please contact your local ABB distributor or representative for further information
Vibration:	Max 3.0 mm (0.12 in) 2 to 9 Hz, Max 10 m/s² (33 ft/s²) 9 to 200 Hz sinusoidal Seismic Certified referencing IBC 2000, 2003, 2006 and 2009

Ambient Conditions, Storage (In Protective Shipping Package)

Air Temperature:	-40° to 70°C (-40° to 158°F)
Relative Humidity:	Less than 95%, no condensation allowed
Vibration:	In accordance with ISTA 1A and 1B specifications
Shock (IEC 60068-2-29):	Max 100 m/s² (330 ft/s²) 11 ms

Ambient Conditions, Transportation (In Protective Shipping Package)

Air Temperature:	-40° to 70°C (-40° to 158°F)
Relative Humidity	Less than 95%, no condensation allowed
Atmospheric Pressure	60 to 106 kPa (8.7 to 15.4 PSI)
Vibration:	Max 3.5 mm (0.14 in) 2 to 9 Hz, Max 15 m/s² (49 ft/s²) 9 to 200 Hz sinusoidal
Shock (IEC 60068-2-29):	Max 100 m/s² (330 ft/s²) 11 ms
Free Fall:	R1 76 cm (30 in) R2 61 cm (24 in) R3 46 cm (18 in) R4 31 cm (12 in) R5 & 6 25 cm (10 in)

Cooling Information

Cooling Method:	Integral fan(s)
Power Loss:	Approximately 3% of rated power

ACH550 Specifications (continued)

Analog Inputs

Quantity	Two (2) programmable
Voltage Reference	0 (2) to 10 V, 312kOhm, single ended
Current Reference	0 (4) to 20 mA, 100Ohm, single ended
Potentiometer	10 VDC, 10 mA (1K to 10KOhms)
Input Updating Time	8 ms
Terminal Block Size	2.3mm² / 14AWG

Reference Power Supply

Reference Voltage	+10 VDC, 1% at 25°C (77°F)
Maximum Load	10 mA
Applicable Potentiometer	1 kOhm to 10 kOhm
Terminal Block Size	2.3mm² / 14AWG

Analog Outputs

Quantity	Two (2) programmable current outputs
Signal Level	0 (4) to 20 mA
Accuracy	+/- 1% full scale range at 25°C (77°F)
Maximum Load Impedance	500 Ohms
Output Updating Time	2 ms
Terminal Block Size	2.3mm² / 14AWG

Digital Inputs

Quantity	Six (6) programmable digital inputs
Isolation	Isolated as one group
Signal Level	24 VDC, (10V Logic 0)
Input Current	15 mA at 24 VDC
Input Updating Time	4 ms
Terminal Block Size	2.3mm² / 14AWG

Internal Power Supply

Primary Use	Internal supply for digital inputs
Voltage	+24 VDC, max 250 mA
Maximum Current	250 mA
Protection	Short circuit protected

Relay Outputs

Quantity	Three (3) programmable relay (Form C) outputs
Switching Capacity	8 A at 24 VDC or 250 VAC, 0.4 A at 120 VDC
Max Continuous Current	2A RMS
Contact Material	Silver Cadmium Oxide (AgCdO)
Isolation Test Voltage	4 kVAC, 1 minute
Output Updating Time	12 ms
Terminal Block Size	2.3mm² / 14AWG

Protections

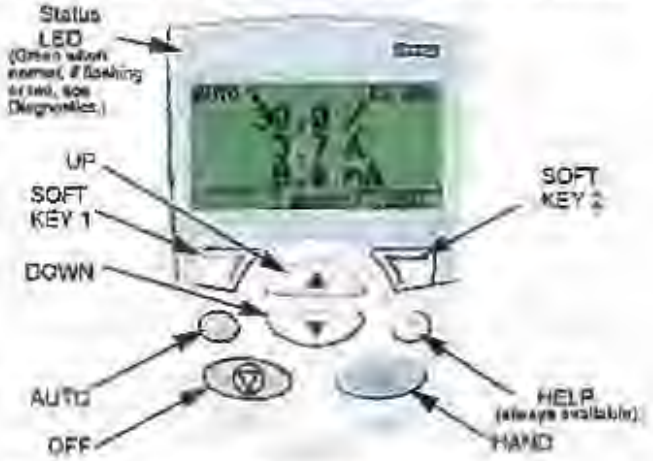
Single Phase	Protected (input & output)
Overcurrent Trip Limit	3.5 x I_{2N} instantaneous
Adjustable Current Regulation Limit	1.1 x I_{2N} (RMS) max.
Overvoltage Trip Limit	1.30 x U_N
Undervoltage Trip Limit	0.65 x U_N
Overtemperature (Heatsink)	+115°C (+239°F)
Auxiliary Voltage	Short Circuit Protected
Ground Fault	Protected
Short Circuit	Protected
Microprocessor fault	Protected
Motor Stall Protection	Protected
Motor Overtemperature Protection (1t)	Protected
Input Power Loss of Phase	Protected
Loss of Reference	Protected
Short Circuit Current Rating	100,000 RMS symmetrical Amperes
Input Line Impedance	Swinging choke 5% equivalent R1-R6, 3% equivalent R8

U_1 = Input Voltage
U_2 = Output Voltage
P_N = Power – Normal Duty (HP)
U_N = Nominal Motor Voltage
f_N = Nominal Motor Frequency
I_{2N} = Nominal Motor Current – Normal Duty

Specifications are subject to change without notice. Please consult the factory when specifications are critical.

ACH550 Control Panel

The ACH550 Control Panel is a multifunction control panel with full graphic LCD display and multiple language capability. The control panel can be connected to and detached from the ACH550 at any time. The panel can be used to upload and copy parameters to other ACH550 drives.



Run Indication and Shaft Direction ↻ **located in upper left corner of display.**

Control Panel Display	Significance
Rotating arrow (clockwise or counterclockwise)	Drive is running and at set point Shaft direction is forward or reverse
Rotating arrow blinking	Drive is operating but not at setpoint
Stationary arrow	Drive is stopped

LED Indicators

The green LED indicates that the power is on and the drive is operating normally. The red LED indicates a fault. A blinking green LED indicates an alarm condition. A blinking red LED indicates a fault that requires power to be cycled off and on to reset the drive.

Fault Indications

The ACH550 Control Panel can display over 20 alarm and fault messages. The last fault and previous faults (1 to 9) are retained in memory. The last fault and previous faults (1 & 2) also record important diagnostic information to assist in troubleshooting. Most faults can be reset by pressing the RESET key (Soft Key 1).

Parameters

Application specific parameters are immediately accessible through a selection of start-up "Assistants". A complete list of parameters is also available grouped by function in approximately 33 menu groups. One of the basic menu functions can be used to display the complete list of changed parameters.

Real Time Clock

The Operator Control Panel includes a real time clock which provides Day, Date and Time information, displayed in a choice of formats. The real time clock has a 10 year battery back up and provides time and date stamping of drive faults and other events. The clock is also used by the ACH550s internal timer functions, providing an integral time clock for start/stop control as well as other control operations.

Control Modes

When the HAND key is pressed, the drive starts and pressing the UP/DOWN keys can modify the reference frequency. The HAND (keypad) control mode is indicated.

When the OFF key is pressed, the drive stops and the OFF control mode is indicated.

When the AUTO key is pressed, the AUTO control mode is indicated. The drive can be started and stopped using whichever remote start/stop command has been configured, a contact closure applied to the start/stop input, a serial communication command or a process feedback signal. In AUTO mode the drive speed is typically controlled by the external speed reference input or by the PID controller.

If the HAND key is pressed while the drive is running in the AUTO control mode, the drive continues to run without changing speed, but ceases to respond to external input or PID speed reference changes. (Bumpless transfer) Pressing the UP/DOWN keys can modify the reference frequency.

If the AUTO key is pressed while the drive is running in the HAND control mode and an external start command is present, the drive continues to run and follows the acceleration or deceleration control ramp to the speed set by the external input or PID speed reference. (Bumpless transfer)

Cable Connections

Terminal	Description	Note
U1, V1, W1	3~ power supply input	Use of 1~ supply requires 50% derate of output current and is applicable for 208 to 240 VAC operation only.
PE / GND	Protective Ground	Follow local rules for cable size.
U2, V2, W2	Power output to motor	
Udc+, Udc-	DC bus	
X1 1 to 18	Control Wiring	Low voltage control – Use shielded cable
X1 19 to 27	Control Wiring	Low voltage or 115VAC
X1 28 to 32	Serial Communications	Use shielded cable

Follow local codes for cable size. To avoid electromagnetic interference, use separate metallic conduits for input power wiring, motor wiring, control and communications wiring. Keep these four classes of wiring separated in situations where the wiring is not enclosed in metallic conduit. Also, keep 115VAC control wiring separated from low voltage control wiring and power wiring.

Use shielded cable for control wiring.

Ampacity is based on the use of 60 °C rated power cable up to 100 Amps (75 °C over 100 Amps).

Refer to the included tables for current ratings, fuse recommendations and maximum wire size capacities and tightening torques for the terminals. The ACH550 is suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical amperes, 480 V maximum. The ACH550 has an electronic motor protection feature that complies with the requirements of the National Electric Code (NEC). When this feature is selected and properly adjusted, Additional overload protection is not required unless more than one motor is connected to the drive or unless additional protection is required by applicable safety regulations.

For CE installation requirements, see ABB publication CE-US-02 "CE Council Directives and Variable Speed Drives." Contact your local ABB representative for specific IEC installation instructions.

ACH550 Control Terminals - Main I/O Terminal X1

X1	Identification	Description
1	SCR	Terminal for signal cable screen. (Connected internally to chassis ground.)
2	AI 1	Analog input channel 1, programmable. Default[2] = External reference Resolution 0.1 % accuracy ±1 % 0 (4) - 20 mA (Ri = 312 kΩ) (J1:AI1 ON) 0 (2) - 10 V (Ri = 100 Ω) (J1:AI1 OFF)
3	AGND	Analog input common. (Connected internally to chassis ground through 1 MΩ)
4	10 V	10 V/10 mA reference voltage output for analog input potentiometer, accuracy ±2 % (1 kΩ ≤ R ≤ 10 kΩ)
5	AI 2	Analog input channel 2, programmable. Default[2] = PID Feedback Resolution 0.1 % accuracy ±1 % 0 (4) - 20 mA (Ri = 312 kΩ) (J1:AI2 ON) 0 (2) - 10 V (Ri = 100 Ω) (J1:AI2 OFF)
6	AGND	Analog input common. (Connected internally to chassis ground through 1 MΩ)
7	AO 1	Analog output channel 1, programmable. Default[2] = Output frequency 0 (4) - 20 mA (load < 500 Ω), accuracy ±3% full scale
8	AO2	Analog output channel 2, programmable. Default[2] = Output current 0 (4) - 20 mA (load < 500 Ω), accuracy ±3% full scale
9	AGND	Analog output common. Connected internally to chassis ground through 1 MΩ
10	24 V	Auxiliary voltage output 24 V DC / 250 mA (Reference to AGND) Short circuit protected.
11	GND	Common for digital input (DI) return signals.
12	DCOM	Digital input circuit common for all digital inputs (DIs). Connected internally as floating.
DI Configuration[1]		To activate a digital input, there must be ≥ +10 V (or ≤ -10 V) between that input and DCOM. The 24 V may be provided by the ACH550 (X1:10) or by an external 12-24 V source of either polarity.
13	DI 1	Digital input 1, programmable. Default[2] = Start/Stop (AUTO mode) Activation starts the drive
14	DI 2	Digital input 2, programmable. Default[2] = Not configured.
15	DI 3	Digital input 3, programmable. Default[2] = Constant (Preset) speed. Activation selects constant speed 1
16	DI 4	Digital input 4, programmable. Default[2] = Start enable 1 (safety interlock) Deactivation stops the drive.
17	DI 5	Digital input 5, programmable. Default[2] = Not configured.
18	DI 6	Digital input 5, programmable. Default[2] = Not configured.
19	RO1C	Common — Relay output 1, programmable (Default[2] = Ready - 19 connected to 21). 12 - 250 V AC / 30 V DC, 10 mA - 2 A
20	RO1A	Normally Closed (NC)
21	RO1B	Normally Open (NO)
22	RO2C	Common — Relay output 2, programmable (Default[2] = Running - 22 connected to 24). 12 - 250 V AC / 30 V DC, 10 mA - 2 A
23	RO2A	Normally Closed (NC)
24	RO2B	Normally Open (NO)
25	RO3C	Common — Relay output 3, programmable (Default[2] = Fault (-1)[3] - 25 connected to 27). 12 - 250 V AC / 30 V DC, 10 mA - 2 A
26	RO3A	Normally Closed (NC)
27	RO3B	Normally Open (NO)
28	Screen	Terminal for signal cable screen. (Connected internally to chassis ground.)
29	B	RS-485 Serial Communications Positive input connection
30	A	RS-485 Serial Communications Negative input connection
31	AGND	Analog input common. (Connected internally to chassis ground through 1 MΩ.)
32	Screen	Terminal for signal cable screen. (Connected internally to chassis ground.)

Notes: 1. Digital input impedance 1.5 kΩ. Maximum voltage for digital inputs is 30 V. Use multi-strand wire, size range: 20-16 AWG (0.5-1.5 mm²)
2. Default values depend on the macro used. Values specified are for the HVAC default macro.
3. For fail-safe reasons, the Fault (-1) Relay signals a "Fault", when the ACH550 is powered down.

ACH550 with ABB E-Clipse bypass – Overview

ABB E-Clipse bypass Standard Features

- Door Interlocked Disconnect or Circuit Breaker
- English Language Back-Lit LCD Display
- Operator Control Panel
- LED Status Pilot Lights
- Smoke Control
- Override Mode
- Serial Communications
- 3 Programmable Relay Outputs (Form C)
- 100% Functionality with Drive Removed
- Programmable Auto Transfer to Bypass
- Plain English Safety Annunciation
- UL & cUL Listed
- Seismic Zone 4 Certified (IBC 2006)
- UL Type 1, Type 12 or Type 3R Enclosure
- Programmable Class 10, 20, or 30 OL
- Automatic Restart
- 24 Month Parts and Labor Warranty (with Certified Start-up)
- Two Contactor Bypass
- System Status Display
- Bypass Diagnostics Display
- Drive Exclusive Fast-Acting Fuses
- Electronic Motor Overload Protection
- Damper Control - VFD and Bypass Modes
- 6 Digital Inputs (5 programmable)
- Single Phase Protection in VFD & Bypass Mode
- Bullet Proof Contactor Protection
- Serial Communications Pass Through I/O
- Proof-of-Flow Indication & Action
- Conformal Coated Circuit Boards
- +30%; -35% Input Voltage Tolerance
- Run Permissive Circuit
- Supervisory Control
- UL Listed PT Electronic Overload
- UL Listed and tested 100,000 Ampere SCCR (VCR and BCR Units)

The ACH550 with ABB E-Clipse bypass is an ACH550 HVAC Drive in an integrated UL Type 1, UL Type 12 or NEMA 3R enclosure with a bypass motor starter. The ACH550 with ABB E-Clipse bypass provides an input disconnect switch or circuit breaker with door mounted and interlocked operator (padlockable in the OFF position), a bypass starter, electronic motor overload protection, a local programming and operator keypad with indicating lights, provisions for external control connections, and serial communications capability. Certain configurations (+F257) also provide a drive service switch.

UL Type 1 (NEMA 1) and UL Type 12 (NEMA 12) E-Clipse units are available from 1 to 100 HP at 208/240V, 1 to 400 HP at 480V, and 2 to 150 HP at 600V. UL Type 1 and UL Type 12 units are wall mounted from 1 to 200 HP and floor mounted from 250 to 550 HP. The operator keypad is mounted on the door of the enclosure.

For outdoor applications, UL Type 3R (NEMA 3R) E-Clipse unit are available from 1 to 100 HP at 208/240V, 1 to 200 HP at 480V and 2 to 150 HP at 600V. Construction is sheet steel with a tough powder coat paint finish for corrosion resistance. A thermostatically controlled space heater and thermostatic control of the force ventilated cooling system are standard. The operator keypads are mounted on the enclosure door and covered by a hinged panel.

The ACH550 with ABB E-Clipse bypass includes two contactors. One contactor is the bypass contactor used to connect the motor directly to the incoming power line in the event that the ACH550 is out of service. The other contactor is the ACH550 output contactor that disconnects the ACH550 from the motor when the motor is operating in the Bypass mode. The drive output contactor and the bypass contactor are electrically interlocked to prevent "back feeding".

The ACH550 with ABB E-Clipse bypass is a microprocessor-controlled "intelligent" system which features programmable Class 20 or 30 overload curves, programmable underload (broken belt) and overload trip or indication. Also included as standard features are single-phase protection in bypass mode, programmable manual or automatic transfer to bypass, fireman's override, smoke control, damper control, no contactor chatter on brown-out power conditions and serial communications. Should a drive problem occur, fast acting fuses exclusive to the ACH550 drive path disconnect the drive from the line prior to clearing upstream branch circuit protection, maintaining bypass capability.

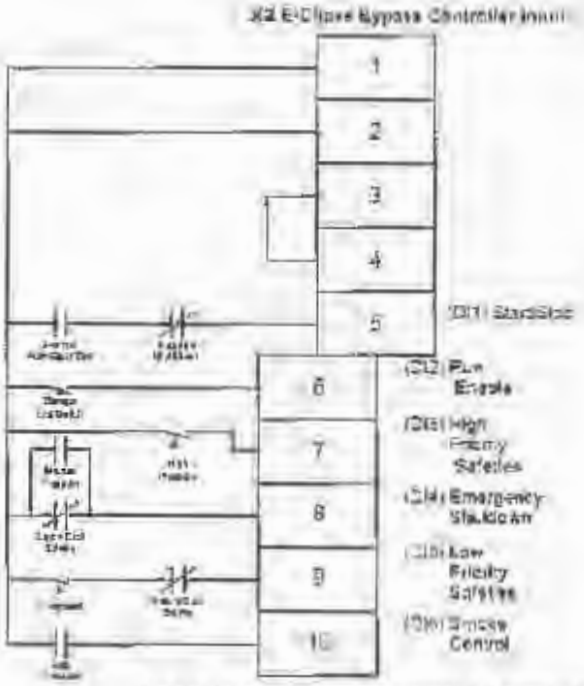
Damper Control Circuit (Run Permissive)

The damper control circuit closes a dry contact upon a start command to open a damper such as an outdoor air damper, fire damper, isolation damper, etc. before the motor is allowed to operate in drive mode or bypass mode regardless of the source of the run command. When the damper is fully open, a normally open dry contact from the damper end-switch closes and allows the motor to operate. Up to four dedicated inputs are provided for safety interlocks such as firestats, smoke detectors, etc.

The safety interlock inputs may also be linked to plain English keypad diagnostic indications to be displayed on the LCD. The unit may be set-up to display any of the following diagnostics upon opening of a digital input: Vibration Switch, Firestat, Freezestat, Over Pressure, Vibration Trip, Smoke Alarm; Safety Open; Low Suction; Start Enable; Run Enable, Damper End Switch, Valve Open Proof, or Pre-Lube Cycle. When any of these contacts open, the motor stops (in drive or bypass mode) and the damper is commanded to close. Although it is not a recommend sequence of operation, this run permissive circuit may also be controlled via serial communications.

Smoke Control and Override Modes

The ACH550 with ABB E-Clipse bypass has two Override modes of operation for critical control situations. The Smoke Control Override accepts a normally open dry contact that forces the motor to run in bypass and ignores all keypad inputs. In Smoke Control Override mode, the system acknowledges high priority digital inputs such as overpressure safeties and damper end-switch run permissive proofs, and disregards other, low priority digital inputs. See the attached sample wiring diagram for further details. Smoke Control Override (Override 1) response is not field programmable. The unit will go into smoke Override mode whenever DI8 is closed.



Normal Operation

- Close Start/Stop (K2:5)
- Fan starts, assuming that K2: 6, 7, 8, and 9 are all closed

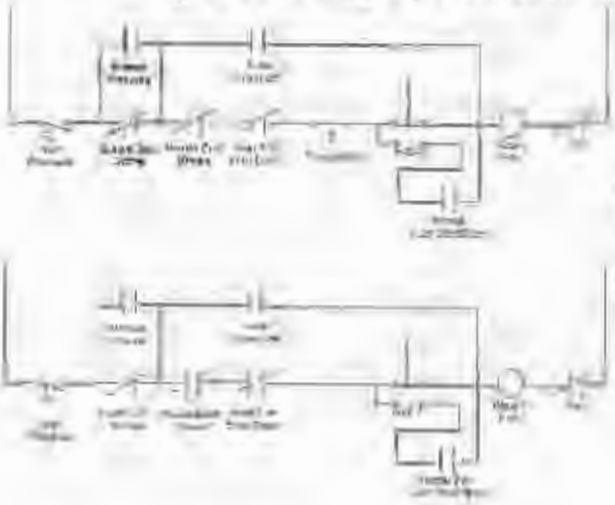
Emergency Shutdown

- Open auto fire shutdown, unit stops

Smoke Control Mode

- Close contact on K2:10
- Fan starts (again assuming position of internal HOA switch and inputs K2:5 and K2:9
- Inputs K2:6, 7, and 8 bypassed
- Internal overloads bypassed

Typical Starter Wiring for a Smoke Control Listed System Today



Notes:

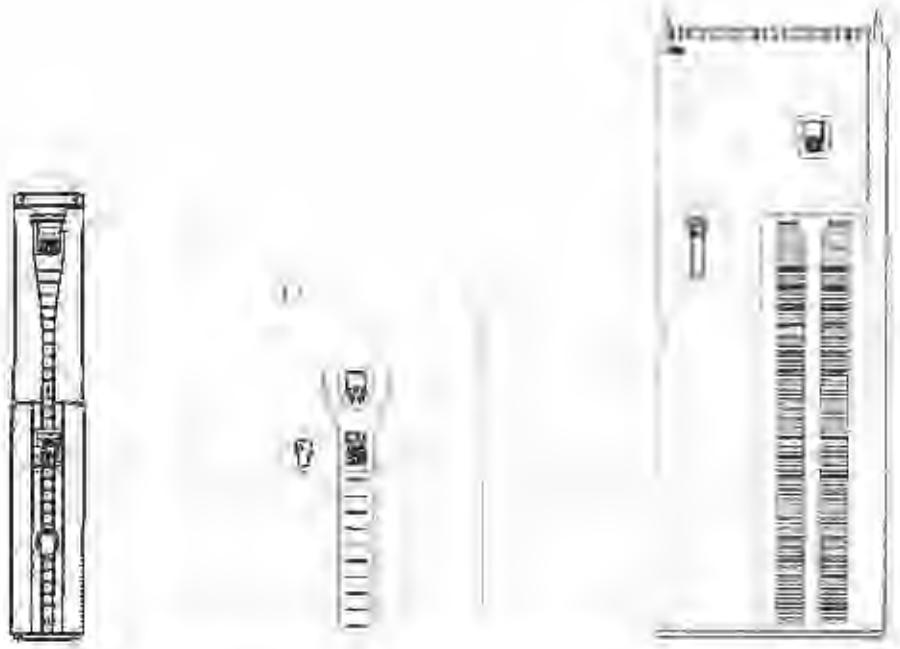
1. Pressure outputs, duct smoke detectors and auto shutdowns are 2-pole.
2. Manual control also activates "auto electric" relays.

The second mode, Override 2, is fully programmable. Override 2 default programming is designed for "Run to Destruction" operation. However, the end user can program the unit to acknowledge some external inputs while ignoring others, ignore all external inputs or acknowledge all external inputs. This mode is fully programmable to allow the user to program the response of the unit to match his local AHJ

Serial communications

All ABB E-Clipse bypass units have the following Embedded Fieldbus (EFB) protocols included as standard: Modbus RTU; Johnson Controls N2; Siemens Building Technologies FLN (P1); and BACnet (MS/TP).

The ACH550 with ABB E-Clipse bypass has the ability to monitor VFD/Bypass mode of operation, the status of the bypass H-O-A switch, bypass fault and override status over serial communication. In addition, the user can monitor and / or control over 45 points of bypass information via the communications protocols. Serial communication capabilities include - bypass run-stop control; the ability to force the unit to bypass; and the ability to control all relay outputs. The DDC system can monitor bypass feedback such as, current (in amps), kilowatt hours (resettable), operating hours (resettable), and bypass logic board temperature. The DDC system is also capable of monitoring the bypass relay output status, and all digital input status'. All bypass diagnostic warning and fault information is transmitted over the serial communications bus. Remote system (drive or bypass) fault reset is possible



Vertical & Standard ABB E-Clipse bypass Exterior Views

ABB E-Clipse bypass Operator Control

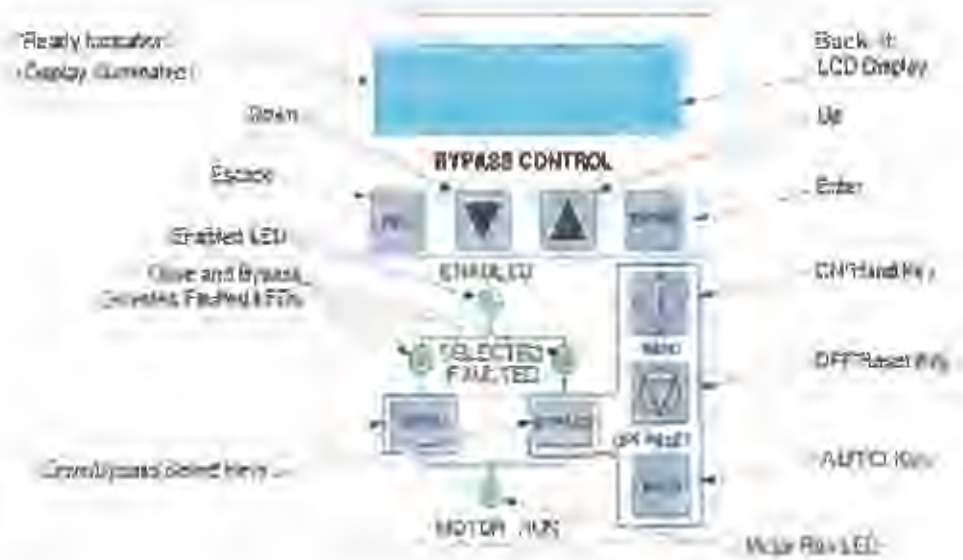
ACH550 Control Panel

The ACH550 Control Panel is a keypad with an LCD unit that provides status indication and operator controls for the ACH550 drive. In normal operation with the ABB E-Clipse bypass, the ACH550 should be placed in the *Auto* mode of operation by pressing the *Auto* key on the ACH550 Control Panel. Refer to the *ACH550 User's Manual* for additional information on the ACH550 Control Panel and other aspects of ACH550 operation.

Bypass Control Keypad

The ABB E-Clipse bypass has a separate keypad with an LCD unit that provides status indication and programming of the system. This keypad is also used for selecting the *Drive* or *Bypass* mode of operation and manually starting and stopping the motor in the *Bypass* mode. The bypass keypad has LED indicating lights that indicate the status of both the bypass and the drive as well as an LCD display that provides programming, status and warning/fault indications.

The illustration below shows the bypass control keypad and identifies the keys and LED indicating lights.



The functions of the various keys and LEDs are described in the following table.

Enabled LED	The *Enabled* LED is illuminated green under the following conditions: • Both the Safety Interlock(s) and Run Enable contacts are closed. • The Safety Interlock(s) contact are closed with no Start command present. The *Enable* LED flashes green if the Run Enable contact is open and when the Safety Interlock contact(s) are closed and a Start command is present. The Enable LED is illuminated red when the Safety Interlock contact(s) are open.
Drive Selected LED	The *Drive Selected* LED is illuminated green when the drive has been selected as the power source for the motor and no drive fault is present.
Bypass Selected LED	The *Bypass Selected* LED is illuminated green when the bypass has been selected as the power source for the motor and no bypass fault is present.
Motor Run LED	The *Motor Run* LED is illuminated green whenever the system is running. The *Motor Run* LED flashes green to indicate the system has been placed in an Override operating mode.
Drive Faulted LED	The *Drive Fault* LED is illuminated red when the bypass has lost its' communications link with the drive or when the motor or drive protection functions have shut down the drive.
Bypass Faulted LED	The *Bypass Faulted* LED is illuminated or flashes red when the motor or bypass protective functions have shut down the bypass.
Drive Key	The *Drive* Key selects the drive as the power source for the motor.
Bypass Key	The *Bypass* Key selects the bypass as the power source for the motor.
Auto Key	The *Auto* key selects the *Auto Start* contact or serial communications as the means for starting and stopping the motor in the bypass mode.
Off/Reset Key	The *Off/Reset* key may be used to manually stop the motor if the motor is running on bypass power. The *Off/Reset* Key also resets most bypass faults. It may take several minutes before the bypass can be reset after an overload trip. If a bypass fault condition is present, the second push of the *Off/Reset* key puts the bypass in the Off mode.
Hand Key	The *Hand* key can be used to manually start the motor when the bypass has been selected as the power source for the motor.
UP Key	Used to navigate through system programming steps.
Down Key	Used to navigate through system programming steps.

Control Modes

Drive mode

Under normal conditions the system is in the *Drive* mode. The ACH550 drive provides power to the motor and controls its speed. The source of the drive's start/stop and speed commands is determined by the *Auto* or *Hand* mode selection of the drive's keypad. Commands come from the control terminals or serial communications when the *Auto* mode has been selected or from the drive keypad when the *Hand* mode has been selected. The user can normally switch to the *Drive* mode by pressing the *Drive* key on the bypass keypad.

Bypass mode

In the *Bypass* mode, the motor is powered by AC line power through the bypass contactor. The source of the bypass start/stop commands is determined by the *Auto* or *Hand* mode selection of the bypass' keypad. Commands come from the control terminals or serial communications when the *Auto* mode has been selected or from the bypass keypad when the *Hand* mode has been selected. The user can normally switch to the *Bypass* mode by pressing the *Bypass* key on the bypass keypad.

Smoke Control mode

In the *Smoke Control (Override 1)* mode, the motor is powered by AC line power through the bypass contactor. The source of the Smoke Control command is DI 6 and is unaffected by external stop commands. The VFD Keypad and the Bypass Keypad will not accept user commands when the system is in Smoke Control mode (the keypad user inputs are disabled). The user can switch to the *Smoke Control* mode by closing the *Smoke Control* input contact (DI 6). When the *Smoke Control* input contact is closed, the system is forced to bypass and runs the motor. The Motor Run LED flashes green when the system is in override. While in *Smoke Control*, the system only responds to certain inputs. Normally when the *Smoke Control* input contact is switched from closed to open, the system returns to the operating mode that existed prior to entering *Smoke Control* and can once again be controlled using the *Drive* and *Bypass* keys. The exception to this is when the *Bypass Override (Override 2)* input contact is closed, in which case the system switches to *Bypass Override* operation.

Bypass Override mode

In the *Bypass Override (Override 2)* mode, the motor is powered by AC line power through the bypass contactor. The source of the start command is internal and unaffected by external stop commands. The VFD Keypad and the Bypass Keypad will not accept user commands when the system is in Bypass Override mode (the keypad user inputs are disabled). The user can switch to the *Bypass Override* mode by closing the *Bypass Override* input contact (DI 5-if programmed). When the *Bypass Override* input contact is closed, the system is forced to bypass and does not respond to the *Drive* and *Bypass* keys. The Motor Run LED flashes green when the system is in override. While in *Bypass Override* the system responds to bypass overloads and programmed faults. The system may be custom programmed to acknowledge or disregard certain faults, safeties and enables. The unit is default programmed to ignore all external safeties and run enables. See Group 17 for programmability of the digital input and fault functions. Normally when the *Bypass Override* input contact is switched from closed to open, the system switches to the *Drive* mode and can be controlled using the *Drive* and *Bypass* keys. The exception to this is when the *Smoke Control (Override 1)* input contact is closed, in which case the system remains in *Smoke Control* operation.

Hand mode

When the system is in the *Bypass* mode, the operator can manually start the motor by pressing the *Hand* key. The motor will run and the *Hand* LED will be illuminated green. In order to run the motor, the *Safety Interlock* and *Run Enable* contacts must be closed (green *Enable* LED) and any bypass fault must be reset.

Auto mode

In the *Auto* mode the bypass start/stop command comes from the *Start/Stop* input terminal on the bypass control board or from serial communications – if programmed. The *Auto* mode is selected by pressing the

Auto key on the bypass keypad. The *Auto* LED is illuminated green when the bypass is in the *Auto* mode. If the system is in the *Bypass* mode, the motor will run across the line if the *Auto* mode is selected, the *Start/Stop*, *Safety Interlock* and *Run Enable* contacts are closed and any bypass fault is reset.

Off Mode

If the motor is running in the *Bypass* mode, the operator can manually stop the motor by pressing the *OFF* key. The *Motor Running* LED will go out. The motor can be restarted by pressing the *Hand* key or the bypass can be returned to the *Auto* mode by pressing the *Auto* key. If the system is in the *Drive* mode, pressing the *OFF* key will take the bypass out of the *Auto* mode, but will not affect motor operation from the drive. If the system is switched to the *Bypass* mode, a motor that is running will stop.

Programmable Relay Contact Outputs

The ABB E-Clipse bypass has five programmable relay outputs as standard. The default programming descriptions for these relay outputs is described below.

Bypass Not Faulted

The *Bypass Not Faulted* relay is energized during normal operation. The *Bypass Not Faulted* relay is de-energized when a bypass fault has occurred.

System Running

The *System Running* relay is energized when the ABB E-Clipse bypass System is running. The *System Running* relay provides an output when the motor is running whether powered by the ACH550 drive or the bypass.

System Started

The *System Started* relay is energized when the ABB E-Clipse bypass system is started. Three conditions must be met in order for the relay to energize. 1) a *Start* command must be present, 2) the *Safety Interlock* input contact must be closed and 3) there can be no fault present in the system. The *Start* command can come from the bypass control board terminal block, the ACH550 keypad, the bypass keypad, or serial communications depending on the operational mode selected. The *System Started* relay is ideal for use in damper actuator circuits, opening the dampers only under those conditions where the system is preparing to run the motor. The *System Started* relay will de-energize, closing the dampers if the safeties open, the system faults, or when a *Stop* command is issued.

Bypass Selected

Relay output four is factory default programmed for Bypass Selected. The relay will be energized anytime the user has placed the system in Bypass mode.

Bypass Auto

Relay Output five is factory default programmed for *Bypass Auto*. The relay will be energized anytime the user has placed the bypass in the Auto mode.

The complete list of programmable relay output functions follows:

0 = NOT SEL	10 = DRV NOT FLT	20 = BYP UNDERLD
1 = SYS READY	11 = DRIVE ALARM	21 = PCB OVERTMP
2 = SYS RUNNING	12 = OVERRIDE	22 = SYS UNDERLD
3 = SYS STARTED	13 = BYPASS HAND	23 = SYSTEM FLT
4 = BYPASS SEL	14 = BYPASS OFF	24 = SYS FLT/ALM
5 = BYPASS RUN	15 = BYPASS AUTO	25 = SYS EXT CTL
6 = BYPASS FLT	16 = COM CTRL	26 = SYS OVERLD
7 = BYP NOT FLT	17 = SYS ALARM	27 = CONTACT FLT
8 = BYPASS ALRM	18 = BYPASS FLT/ALM	
9 = DRIVE FAULT	19 = BYP OVERLD	

Cable Connections

The following illustrations show the ACH550 with ABB E-Clipse bypass cable connection points for the various enclosure styles. The illustrations indicate the location of input and output power connections as well as equipment and motor grounding connection points.

ACH550 drives are configured for wiring access from the bottom only on Vertical ABB E-Clipse bypass units and from the top only on Standard ABB E-Clipse bypass units. At least three separate metallic conduits are required, one for input power, one for output power to the motor and one for control signals.

All ABB E-Clipse bypass units provided with a circuit breaker input - VCR and BCR configurations have a panel short circuit current rating of 100,000 RMS symmetrical Amperes. Units provided with a disconnect input - VDR and BDR configurations require separate external low peak fuses (supplied by others) to obtain the 100,000 KAIC SCCR.

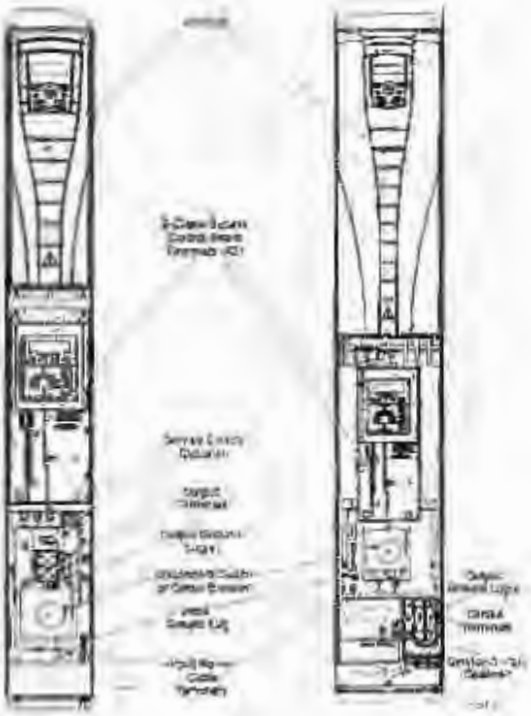
Terminal Sizes

Power and motor cable terminal sizes are shown in the *Submittal Schedule Details* and in the *Wire Size Capabilities of Power Terminals* Table. The information provided is for connections to an input circuit breaker or disconnect switch, a motor terminal block, overload relay and ground lugs. The table also lists torque that should be applied when tightening the connections.

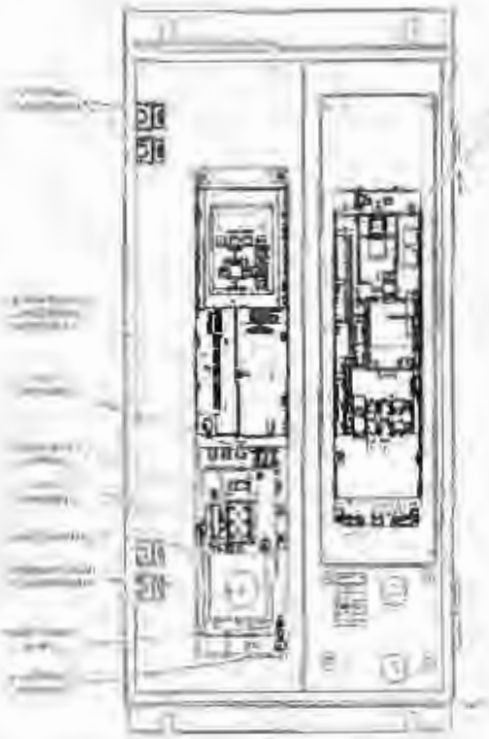
Protections

All ABB E-Clipse bypass units include the following protective features: single phase input and output; motor open phase; motor overload (UL Listed); stuck contactor; contactor coil open; undervoltage; motor underload (proof-of-flow / broken belt); serial communications loss; and overtemperature. All printed circuit boards are conformally coated as standard.

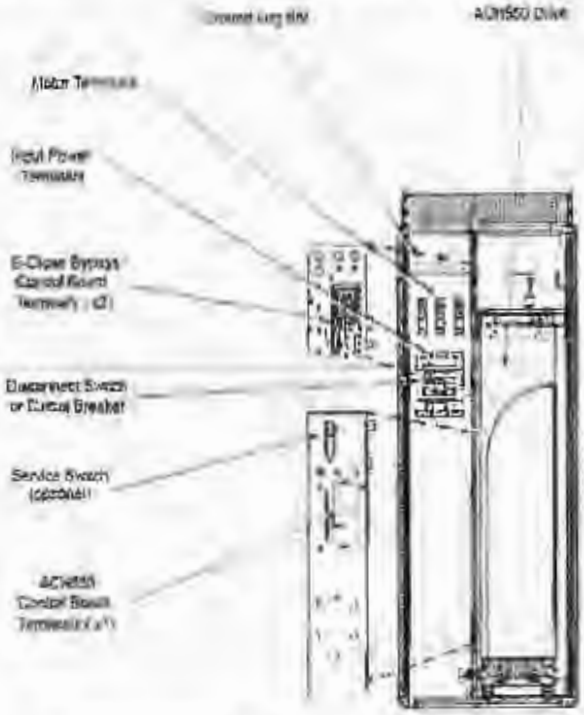
Internal Layout Drawings



Vertical ABB E-Clipse Bypass
(UL Type 1 / 12)



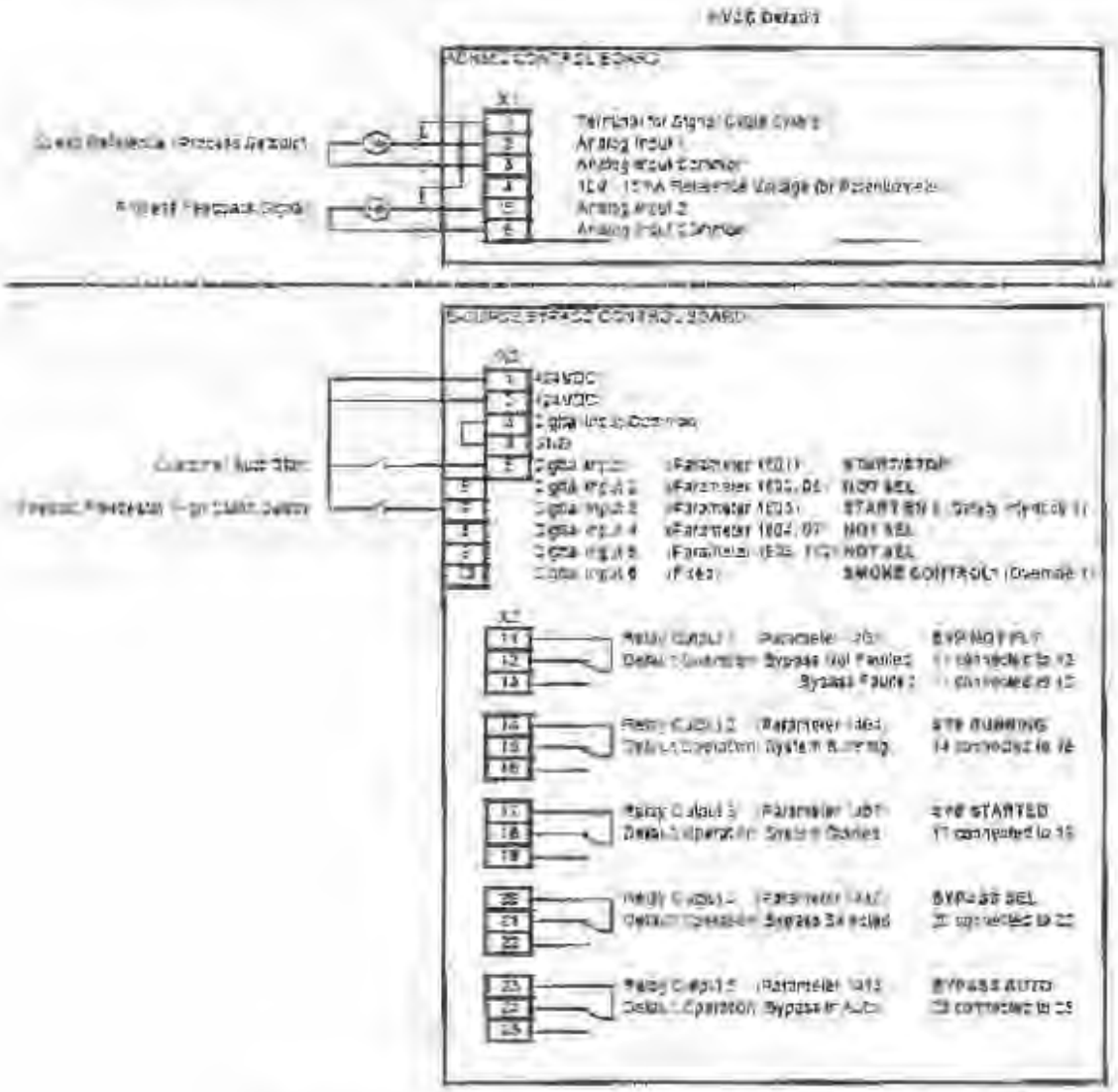
Standard Wall Mount ABB E-Clipse Bypass



Standard Floor Mount ABB E-Clipse Bypass

Control Terminals

The control wiring includes connections to an analog speed command signal and a start/stop relay contact for controlling the motor in the AUTO mode. There may also be connections to external run enable interlock contacts and a connection from the Motor Run contact to an external status indication circuit. For a detailed description of the control circuit functions and alternate Control Connection diagrams, refer to the *ACH550 with ABB E-Clipse bypass Users Manual*.



Basic Control Connections for Damper Actuator Control

Engineering Data and Ratings Tables

Fuses

Drive input fuses are recommended to disconnect the drive from power in the event that a component fails in the drive's power circuitry. Recommended drive input fuse specifications are listed in the *Submittal Schedule Details* and in the *Fuse Ratings* Table. Fuse rating information is provided for customer reference.

Item	Catalog Number	Drive Input Fuse Ratings Amps (600V)	Bussmann Type
1	ACH550-VCR-059A-4+F267	100	JJS-100
2	ACH550-VCR-038A-4+F267	50	JJS-50
3	ACH550-VCR-072A-4+F267	100	JJS-100

Terminal Sizes / Cable Connection Requirements

Power and motor cable terminal sizes and connection requirements are shown in the *Submittal Schedule Details* and in the *Terminal Sizes / Cable Connection Requirements* Table. The information provided below is for connections to input power and motor cables. These connections may be made to an input circuit breaker or disconnect switch, a motor terminal block, overload relay, and/or directly to bus bars and ground lugs. The table also lists torque that should be applied when tightening terminals and spacing requirements where multiple mounting holes are provided in the bus bar.

Item	Catalog Number	Circuit Breaker	Disconnect Switch	Terminal Block	Overload Relay	Ground Lug
1	ACH550-VCR-059A-4+F267	#1 50 in-lbs	N/A N/A	#2/0 120 in-lbs	N/A N/A	#2 50 in-lbs
2	ACH550-VCR-038A-4+F267	#3 50 in-lbs	N/A N/A	#2 50 in-lbs	N/A N/A	#2 50 in-lbs
3	ACH550-VCR-072A-4+F267	#1 50 in-lbs	N/A N/A	#2/0 120 in-lbs	N/A N/A	#2 50 in-lbs

Heat Dissipation Requirements

The cooling air entering the drive must be clean and free from corrosive materials. The *Submittal Schedule Details* and the *Heat Dissipation Requirements* table below give the heat dissipated into the hot air exhausted from the drives. If the drives are installed in a confined space, the heat must be removed from the area by ventilation or air conditioning equipment.

Item	Catalog Number	Power Losses Watts	Power Losses BTU/Hr	Airflow CFM	Airflow CM/Hr
1	ACH550-VCR-059A-4+F267	907	3096	165	280
2	ACH550-VCR-038A-4+F267	562	1918	79	134
3	ACH550-VCR-072A-4+F267	1120	3820	165	280

Dimensions and Weights

Dimensions and weights of the drives provided are given in the *Submittal Schedule Details* and in the *Dimensions and Weights* Table. The table also lists the applicable dimension drawings that include additional detail. Dimension drawings may be provided in the back of the submittal.

Item	Catalog Number	Height mm / in	Width mm / in	Depth mm / in	Weight kg / lbs	Dimension Drawing
1	ACH550-VCR-059A-4+F267	1315 / 51.8	214 / 8.4	307 / 12.1	42 / 92	3AUA0000016374 Sheet 1

Item	Catalog Number	Height mm / in	Width mm / in	Depth mm / in	Weight kg / lbs	Dimension Drawing
2	ACH550-VCR-038A-4+F267	1211 / 47.7	214 / 8.4	278 / 10.9	32 / 70	3AUA0000016373 Sheet 1
3	ACH550-VCR-072A-4+F267	1318 / 51.8	214 / 8.4	307 / 12.1	42 / 92	3AUA0000016374 Sheet 1

Schematics and Wire Diagrams

Detailed wiring diagrams and schematics may be included for the products covered in this submittal. Please reference the following ABB part numbers for the drawings included with this submittal:

Item	Catalog Number	Power Wiring	Connection Diagram	Dimension Detail
1	ACH550-VCR-059A-4+F267	00VCR024PW-C	VCVDR014CC-A	3AUA0000016374 Sheet 1
2	ACH550-VCR-038A-4+F267	00VCR024PW-C	VCVDR014CC-A	3AUA0000016373 Sheet 1
3	ACH550-VCR-072A-4+F267	00VCR024PW-C	VCVDR014CC-A	3AUA0000016374 Sheet 1

Product short Circuit Current Rating

Short circuit ratings shown below are as show on the device rating label.

Item	Catalog Number	Short Circuit Current Rating
1	ACH550-VCR-059A-4+F267	100 kA
2	ACH550-VCR-038A-4+F267	100 kA
3	ACH550-VCR-072A-4+F267	100 kA

UCRM 4: WATER CONTROLS

This document contains Performance Services Trade Secrets and Confidential information to be used by the addressee for evaluating the PSI proposal. Addressee shall not disclose the Confidential information to third parties without written consent of Performance Services.

SLOAN.

Efficiency Series

Model

ST-2029-A Universal Closet

Top Spud ADA Compliant Vitreous China Water Closet

DESCRIPTION

Complete vitreous china water closet

Flush Cycle

Model ST-2029-A* Universal Closet

Tri 1.6 to 1.6 gpf/4.2 to 6.0 Lpf

Code: 2102028

Flush volume is determined by the flushometer used with toilet.

SPECIFICATIONS

Fixtures

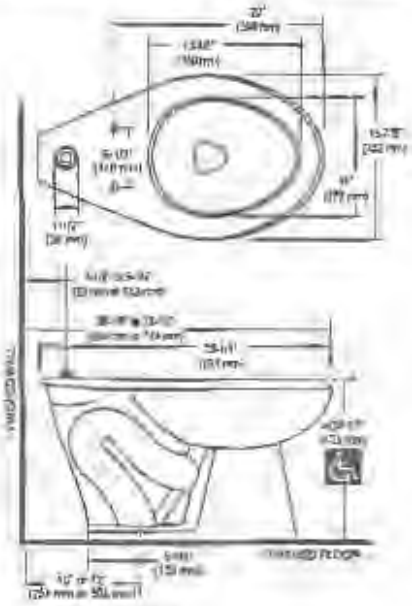
- Vitreous China
- Floor Mounted
- ADA Compliant
- Siphon Jet Flushing Action
- 1-1/2" IPS top spud inlet
- 2-1/8" trapway diameter
- Fully Glazed Trapway
- Integral Flushing Rim
- Elongated Bowl
- Water Spot Area 10" x 7 1/2"
- Closet bolts and caps included
- Water closet complies to the applicable sections of ASME A112.19.2/CSA B45.1
- Toilet Seat Not Included

Colors/Finishes

- White

Recommended Seats

- Bemis: 1955CT/1955SSCT & 2155CT/2155SSCT
- Church: 295CT/295SSCT & 2195CT/2195SSCT



NOTE: All vitreous china dimensions shown in these drawings are nominal. Dimensions can vary within the tolerance established in the governing ASME A112.19.2/CSA B45.1 standard. Please take this into consideration when planning rough-in and plumbing layouts.

* Please note that this model is fully interchangeable with models: ST-2020-A, ST-2022-A, ST-2020-W and matches all dimensional and performance parameters.

**This model meets the requirements for a Non Efficiency toilet when used with a high efficiency flushometer (1.28 gpf/4.8 Lpf or 1.1/1.6 gpf/4.2/6.0 Lpf dual flush).

Product Specification

Elongated water closet shall be made of vitreous china with a 1-1/2" top spud. Bowl shall be ADA Compliant when installed at required height of 17" from floor to top of bowl. Water Closet shall be Sloan Model ST-2029-A.

GREEN

NOTE: Plumbing System Requirements

√ Minimum Flowing Pressure: 25 PSI

√ Maximum Static Pressure: 80 PSI

√ Maximum Flow Rate: 18 GPM

This space for Architect/Engineer approval

Job Name _____ Date _____

Model Specified _____ Quantity _____

Variations Specified _____

Customer/Wholesaler _____

Contractor _____

Architect _____

The information contained in this document is subject to change without notice.

SLOAN.

Sloan

10500 Seymour Avenue

Franklin Park, IL 60131

Phone: 1-800-982-5689

Fax: 1-9001-447-0329

www.sloanvalve.com

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SLOAN.

Efficiency Series

Model

ST-2059-A Universal Closet

Top Spud Vitreous China Elongated Water Closet

DESCRIPTION

Complete vitreous china water closet

Flush Cycle

Model ST-2059-A Universal Closet
(1.1 to 1.6 gpf/4.2 to 6.0 Lpf)

Flush volume is determined by the flushometer used with closet.

HET
HIGH EFFICIENCY TOILET

SPECIFICATIONS

Water Closet

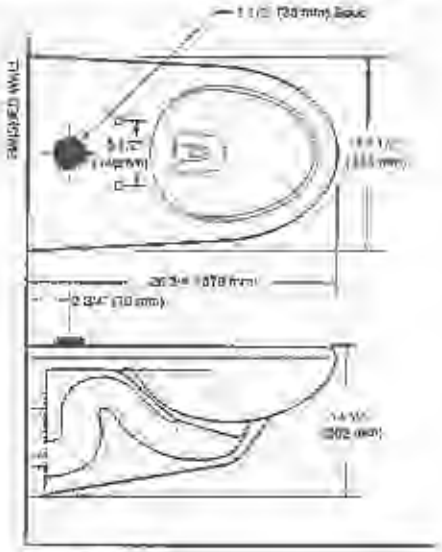
- Wall hung vitreous china elongated bowl
- Siphon jet flushing action
- 1-1/2" I.P.S. top spud inlet
- 2-1/8" fully glazed trapway diameter
- Mounting hardware, carrier and toilet seat not included
- Integral flushing rim
- Water seal area 9 1/2" x 8 1/4"
- ASME A112.19.2/CSA B45.1

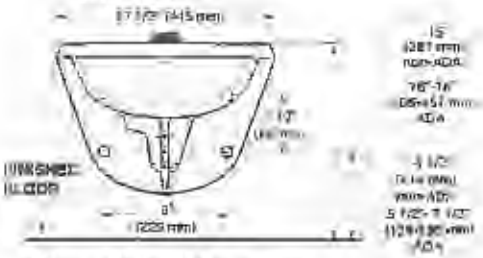
Colors/Finishes

- White

Recommended Accessories

- Compatible with toilet seat models:
  Olympia 1100T
  Serrie 1985 CT
  Church Commercial 29500T





Designed to Meet ADA standards
(when bowl is 17" - 19" high including seat)

* Please note that this model is fully interchangeable with Models: ST-2050-A, ST-2052-A, ST-2053-A and matches all dimensional and performance parameters.

** This model meets the requirements for a High Efficiency Toilet when used with a high efficiency flushmeter (1.28 gpf/4.8 Lpf or 1-1/1.6 gpf/4.2/6.0 Lpf dual-flush).

Meets the American Disabilities Guidelines and ANSI A117.1 requirements when installed according to these requirements.

NOTE:
Plumbing System Requirements
√ Minimum Flowing Pressure: 25 PSI
√ Maximum Static Pressure: 80 PSI
√ Minimum Flow Rate: 18 gpm

NOTE: All vitreous china dimensions shown in these drawings are nominal. Dimensions can vary within the tolerances established in the governing ASME A112.19.2/CSA B45.1 standard. Please take this into consideration when planning rough-in and plumbing layouts.

Product Specification

Elongated water closet shall be made of vitreous china with a 1-½" top spud inlet. Bowl shall be ADA compliant when installed at required height of 17"-19" from floor to top of fixture (including seat). Water Closet shall be Sloan Model ST-2059-A.

This space for Architect/Engineer approval

Job Name: _____ Date: _____

Model Specified: _____ Quantity: _____

Variations Specified: _____

Customer/Wholesaler: _____

Contractor: _____

Architect: _____

SLOAN.
Sloan Headquarters
10500 Seymour Avenue
Franklin Park, IL 60131
Phone: 1-800-982-5839
Fax: 1-800-447-8329
www.sloanvalve.com

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SLNSS-VF-ST2059A – Rev. 15 (05/13)

Church. COMMERCIAL

COMMERCIAL HEAVY-DUTY PLASTIC TOILET SEAT

MODEL #	COLOR #
295CT/295SSCT	_____

PLASTIC HINGES WITH STAINLESS STEEL POSTS AND PINTLES

STA-TITE® COMMERCIAL FASTENING SYSTEM™

DESCRIPTION:

Open front less cover, elongated, heavy-duty, injection molded solid plastic toilet seat. Features four molded-in bumpers, non self-sustaining (295CT) or self-sustaining (295SSCT) check hinges with non-corrosive 300 Series stainless steel posts and pintles and STA-TITE® Commercial Fastening System™. This seat complies with IAPMO/ANSI Z124.5-2013 Plastic Toilet Seats as a class Commercial Heavy Duty.

SPECIFICATIONS:

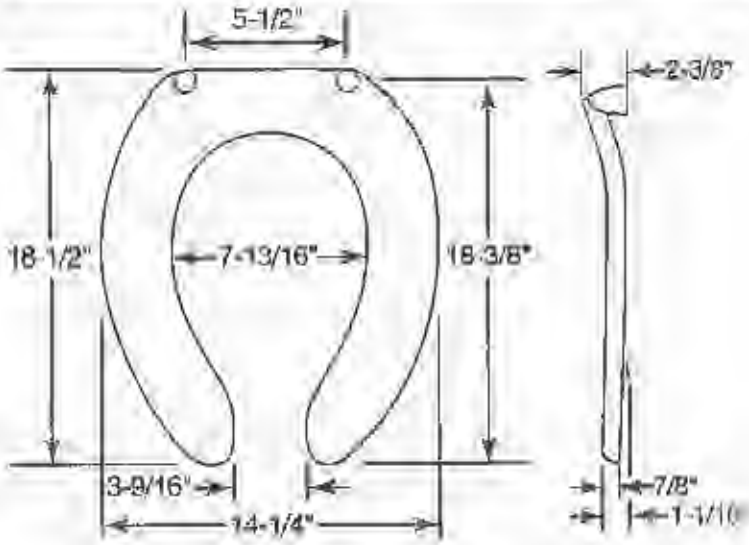
Size:	Elongated
Material:	Plastic
Style:	Open Front less Cover
Bumpers:	Four
Hinges:	Plastic Non Self-Sustaining (295CT) or Self-Sustaining (295SSCT) with 300 Series Stainless Steel Posts and Pintles
Fastening System:	STA-TITE® Commercial Fastening System™

FEATURES:

STA-TITE® Commercial Fastening System™

Non-Corrosive 300 Series Stainless Steel Posts and Pintles

DIMENSIONS:



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HIGH-EFFICIENCY TOILET

Sloan® Model Flushometer 111-1.28

Description
Exposed Water Closet Flushometer for floor mounted or wall hung top spud bowls.

Flush Cycle
Model 111-1.28 High Efficiency (1.28 gpf/4.8 Lpf)

Specifications
Quiet, Exposed, Diaphragm Type, Chrome Plated Closet Flushometer with the following features:

- High Chloramine Resistant PERMEX® Synthetic Rubber Diaphragm with Linear Filtered Bypass and Vortex Cleansing Action™
- ADA Compliant Metal Oscillating Non-Hold-Open Handle with Triple Seal Handle Packing
- 1" I.P.S. Screwdriver Bak-Chek® Angle Stop
- Vandal Resistant Stop Cap
- Adjustable Tailpiece
- Vacuum Breaker with Flush Connection
- Spud Coupling and Spud Flange for 1½" Top Spud
- Sweat Solder Adapter with Cover Tube and Cast Wall Flange
- High Copper, Low Zinc Brass Castings for Dezincification Resistance
- Non-Hold-Open Handle and No External Volume Adjustment to Ensure Water Conservation
- Low Consumption flush accuracy
- Handle Packing, Stop Seat and Vacuum Breaker Molded from PERMEX® Rubber Compound for Chloramine Resistance

Valve Body, Cover, Tailpiece and Control Stop shall be in conformance with ASTM Alloy Classification for Semi-Red Brass. Valve shall be in compliance to the applicable sections of ASSE 1037 and ANSI/ASME A112.19.2.

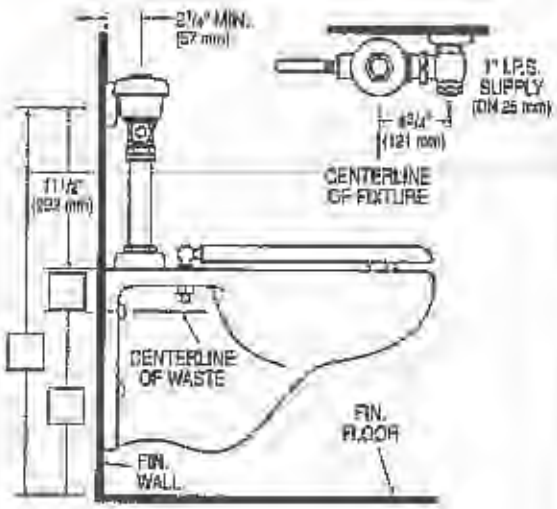
Variations

- ☐ YO — Bumper on Angle Stop
- ☐ DFB — Dual Filtered Fixed Bypass Diaphragm
- ☐ SG — Sanguard® Antimicrobial Coating Protects Handle and Socket*
- ☐ HL-3 — 3" Metal Oscillating Push Button on front of valve (does not meet ADA requirements)

*Sanguard is used to protect users of the product against disease causing bacteria.

Accessories
See Accessories Section of the Sloan catalog for details on these and other Flushometer variations.

Fixtures
Consult Sloan for Sloan brand matching fixture options.



This space for Architect/Engineer approval

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www.sloanvalve.com

Sloan 111-1.28 11-14
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SLOAN.

Efficiency Series

Model
SU-1200 Series
Vitreous China Retrofit Top Spud Urinal

DESCRIPTION

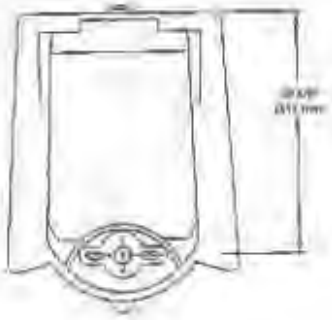
Complete HEU vitreous china retrofit top spud urinal fixture.

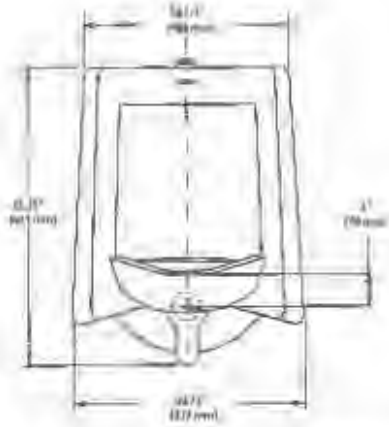
Flush Cycle
- ☐ Model SU-1200-0.125 (0.125 gpf/0.5 Lpf)
  Code: 1101200
- ☐ Model SU-1202-0.25 (0.25 gpf/1.0 lpf)
  Code: 1101202
- ☐ Model SU-1205-0.5 (0.5 gpf/1.9 lpf)
  Code: 1101205

HEU

SPECIFICATIONS

Urinal Fixture
- Wall hung vitreous top spud china
- Large footprint to cover old caulk lines
- Washdown flushing action
- 3/4" I.P.S. top spud inlet
- 2" NPT outlet flange
- All mounting hardware included
- Integral flushing rim
- 100% factory high tested
- Compliant to the applicable sections of ASME A112.19.2/CSA B45.1
- Carrier not included





NOTE: All vitreous china dimensions shown in these drawings are nominal. Dimensions can vary within the tolerances established in the governing ASME A112.19.2/CSA B45.1 standard. Please keep this into consideration when planning rough-in and plumbing layouts.

Meets the American Disabilities Guidelines and ANSI A117.1 requirements when installed at the proper height requirements for accessibility.

NOTE: Plumbing System Requirements
√ Minimum Flowing Pressure: 25 PSI
√ Maximum Static Pressure: 80 PSI

GREEN

Product Specification

Washdown urinal shall be made of vitreous china with a 3/4" top spud. Urinal shall have a 1/4" rim. Urinal shall include a removable strainer, inlet spud and hanger. Urinal shall be Sloan Model SU-12_____ gpf.

This space for Architect/Engineer approval

Job Name _____ Date _____

Model Specified _____ Quantity _____

Variations Specified _____

Customer/Wholesaler _____

Contractor _____

Address _____

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or 1-847-671-4300
Fax: 1-800-447-8329 or 1-847-671-4380
www.sloanvalve.com

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SU-1200 09-13

HEU
HIGH-EFFICIENCY URINAL

Royal® Model Flushometer 186

Buy American Act Compliant

Description
Exposed Urinal Flushometer, for ¾" top spud urinals.

Flush Cycle
- ☐ Model 186-0.125 (0.125 gpf/0.5 Lpf)
- ☐ Model 186-0.25 (0.25 gpf/1.0 Lpf)
- ☐ Model 186-0.5 (0.5 gpf/1.9 Lpf)

Specifications
Quiet, Exposed, Diaphragm Type, Chrome Plated Urinal Flushometer with the following features:

- For Flushing Volumes 0.125 and 0.25: Dual Linear Filtered Bypass Diaphragm
- For Flushing Volume 0.5: Dual Filtered Bypass Diaphragm
- ADA Compliant Metal Oscillating Non-Hold-Open Handle with Triple Seal Handle Packing
- ¾" I.P.S. Screwdriver Bak-Chek® Angle Stop
- Free Spinning Vandal Resistant Stop Cap
- Adjustable Tailpiece
- High Back Pressure Vacuum Breaker Flush Connection with One-piece Bottom Inlet Coupling Nut
- Spud Coupling and Flange for ¾" Top Spud
- Sweat Solder Adapter w/Cover Tube & Cast Wall Flange w/Set Screw
- High Copper, Low Zinc Brass Castings for Dezincification Resistance
- Non-Hold-Open Handle, Fixed Metering Bypass and No External Volume Adjustment to Ensure Water Conservation
- Flush Accuracy Controlled by CIU Technology
- Diaphragm, Handle Packing, Stop Seat and Vacuum Breaker molded from PERMIT® Rubber Compound for Chloramine Resistance

Valve Body, Cover, Tailpiece and Control Stop shall be in conformance with ASTM Alloy Classification for Semi-Red Brass. Valve shall be in compliance to the applicable sections of ASSE 1037 and ANSI/ASME A112.18.2.

Variations
- ☐ HL-3 3" Metal Oscillating Push Button on front of valve (does not meet ADA requirements) _____
- ☐ SG SemiGuard® Antimicrobial Handle and Socket

Accessories
See Accessories Section of the Sloan catalog for details on these and other Flushometer variations.

Fixtures
Consult Sloan for Sloan brand matching fixture options.

WaterSense

EPA GREEN POWER PARTNER

Sloan Valve Company is using renewable energy certificates to meet 100% of the company's purchased electricity use at its Franklin Park, Illinois facility.

This space for Architect/Engineer approval

Job Name		Date	
Model Specified		Quantity	
Variations Specified			
Customer/Wholesaler			
Contractor			
Architect			

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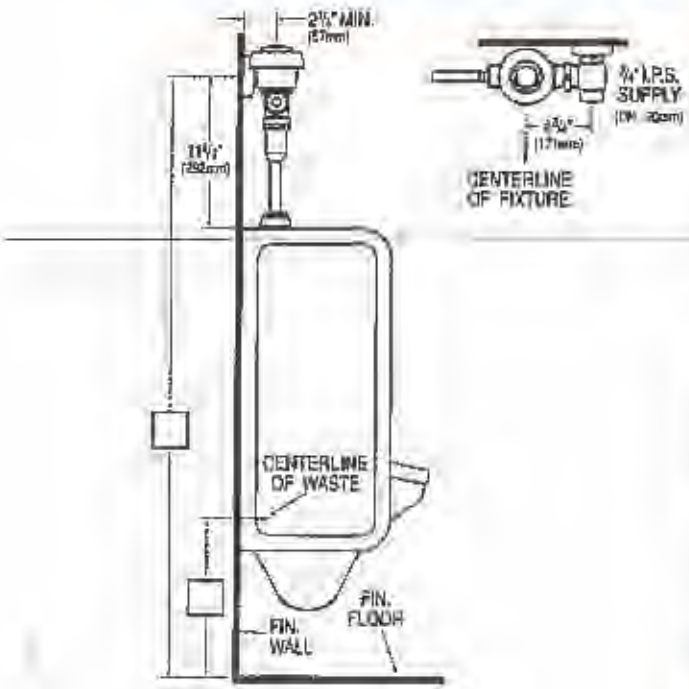

Royal 186 HEU S.S. — Rev. 0d (03/12)
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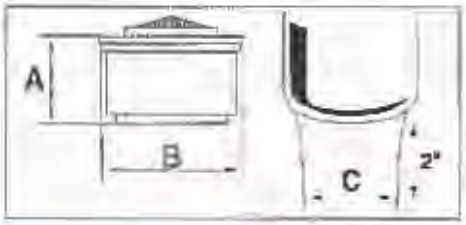
PCA® Spray
Faucet Attachment - 0.5 gpm max
Pressure compensating Regular Size

Features and Benefits

- Pressure compensating for constant flow from 20 to 80 psi.
- Provides non-splashing, non-aerated spray.
- Anti-clogging dome screen filters sediment and particles.
- Color-coded to identify flow rate.
- Virtually unbreakable single piece insert ensures a longer usable life.
- Compatible with all NEOPERL® regular male and female housings, vandal proof and metric size housings.
- Available housing finishes: chrome.
- Laser marked housings: statutory mark and custom logo.
- Rubber washer.

Dimensions

No	mm	in
A	13.00	.512
B	19.95	.785
C	≈ 25	≈ 1



Certification

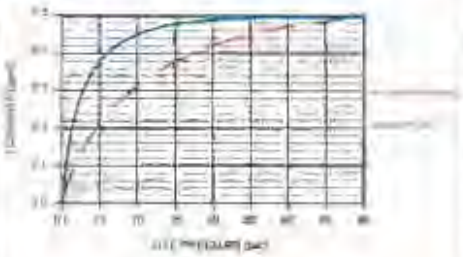
ANSI/NSF 61
ASME A112.18.1M
CSA B125

Designation & Thread Sizes

Designation	Thread Size
Insert only	
Regular male	15/16"-27
Regular female	55/64"-27
Regular dual thread	15/16"-27 x 55/64"-27
Regular male vandal proof	15/16"-27
Regular female vandal proof	55/64"-27
Regular dual thread vandal proof	15/16"-27 x 55/64"-27
Vandal key	

*Other combinations also available

Flow Rate Curve



Housings

Regular Male

Regular Male VP

Regular Female

Regular Female VP

Insert Color Code

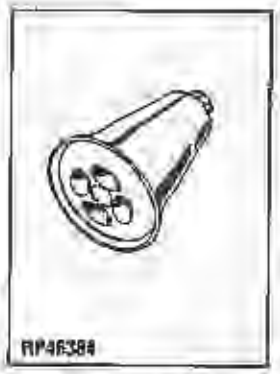
Dome: White	Diffuser: Lime Green	Basket: Gray

Technical Data

Material:

Body	Acetal
O-ring	EPDM
Washer	EPDM

Working temperature: 150°F
Working pressure: 125 psi



RP46384

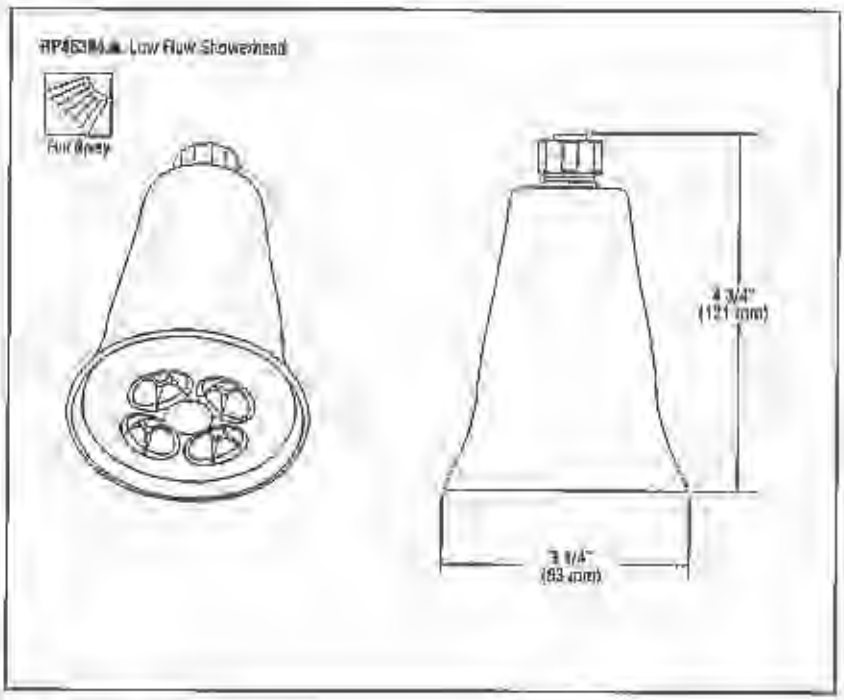
DELTA

LOWFLOW SHOWERHEAD

- Full spray function
- H_2Okinetic Technology®

Submitted Model No.: _____

Specific Features: _____



▲ Designers prefer finish suits

STANDARD SPECIFICATIONS:

- Full spray function
- 1.3 GPM, 5.3 L/Min. @ 45 PSI (310kPa)
- 1.5 GPM, 5.7 L/Min. @ 80 PSI (550kPa)
- H_2Okinetic Technology®

WARRANTY

- Lifetime limited warranty on parts (other than electronic parts and batteries) and finishes; or, for commercial users, for 5 years from date of purchase
- 5 year limited warranty on electronic parts (other than batteries); or, for commercial users, for 1 year from the date of purchase. No warranty is provided on batteries.

COMPLIES WITH:

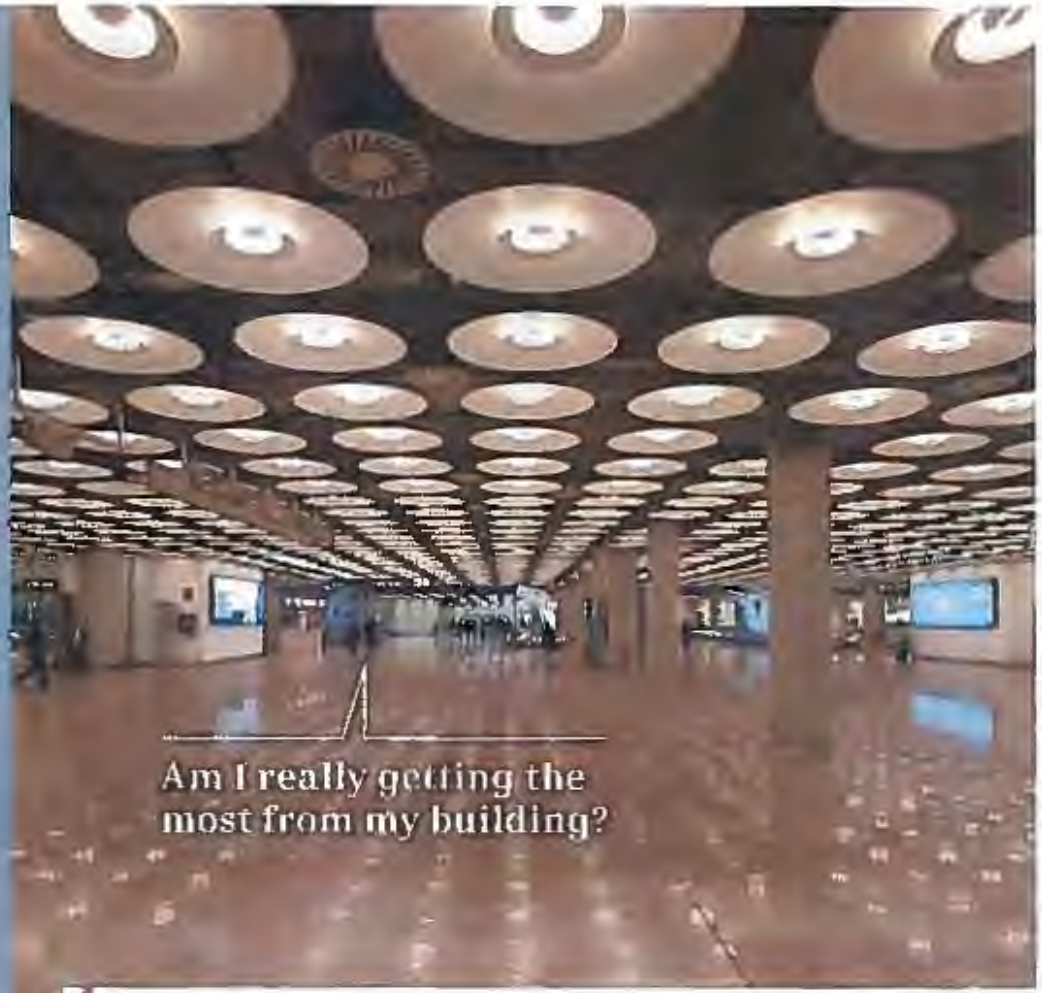
- ASME A112.18.1 / CSA B125.1
- EPA WaterSense®

DELTA FAUCET COMPANY

Delta reserves the right (1) to make changes in specifications and materials, and (2) to change or discontinue models, both without notice or obligation. Dimensions are for reference only. See current full line price book or www.deltafaucet.com for finish options and product availability.

UCRM 5: BUILDING AUTOMATION SYSTEM

This document contains Performance Services Trade Secrets and Confidential Information to be used by the addressee for evaluating the PSI proposal. Addressee shall not disclose the Confidential Information to third parties without written consent of Performance Services.



TALON® building automation offers the best integration of today's technology while staying open to future developments, so you will always get the most from your building.

Answers for infrastructure.™

222

SIEMENS

http://www.usa.siemens.com/talon

Complex problems. Easy solutions.

Smart advancements

With BACnet, TALON building automation gives you the tools to integrate other systems. But we didn't stop there.

We developed a series of software drivers that makes integration as simple as possible. You won't find these drivers on any other system, and that's part of why the TALON system is a smarter choice.

TALON does more than simply integrate your systems, it makes them easy to operate. You'll control everything through a single workstation featuring an elegant but robust user interface. You'll also be able to access your system from anywhere with TALON web technology.

TALON can integrate with a wide range of other building automation products. It works with existing building systems to make upgrades cost efficient. Plus with wireless technology, you can easily handle retrofits or new construction without significant cost. And in the future, you'll keep up with technology. With its integration power, open architecture and BACnet software, the TALON system is an investment that will pay you back for years.

Smarter Better

Whether you are installing new BACnet or LonTalk systems, trying to unify legacy systems that operate on proprietary protocols or are simply trying to get the best performance out of your building, TALON offers great flexibility, power and ease of use. And TALON is available exclusively through your local, independent Siemens Solution Partner, so you'll get service that matches the quality of your investment.

Open communication provides more options

The TALON system is able to seamlessly link BACnet, LonTalk, Modbus and other standard communication devices into a single, robust control system.

TALON View plant layout

TALON View Workstation

This straightforward dual screen system interface provides efficient facility monitoring and control.

- Graphically monitor and control the facility environment
- Schedule and review mechanical equipment operations
- Run reports on various system conditions
- Collect and view trend information

TC Compact

The TC Compact is a 16 or 24 universal I/O point-count controller to be used for mechanical equipment or to implement complex control applications.

- Native BACnet/IP communications over 10/100Mb Ethernet networks
- Native BACnet MS/TP on RS-485
- Energy management applications and DDC programs for complete facility management
- Comprehensive alarm management, historical data trend collection, operator control and monitoring functions
- Message control for terminals, printers, pagers and workstations
- Increased flexibility through highly configurable I/O models with either 16 or 24 I/O to cost-effectively match the needs of the application

TC-1000 Controller

The controller is a high-performance Direct Digital Control (DDC) supervisory equipment controller and is an integral part of the TALON building automation system.

- Native BACnet/IP communications over 10/100Mb Ethernet networks
- Native BACnet MS/TP on RS-485
- Energy management applications and DDC programs for complete facility management
- Comprehensive alarm management, historical data trend collection, operator control and monitoring functions
- Message control for terminals, printers, pagers and workstations

TC-1000 Controller

TALON connects every part of a building

HC Controller application

HC Controller Applications

These controllers are BACnet certified and compliant. They provide full-featured control of a wide variety of HVAC equipment and are available for a growing list of applications.

- Heat pump applications
- Fan coil applications
- VAV applications

Advanced Application Controller

These versatile remote application servers provide system-level control of data or building functions as well as global applications, such as alarming, handling, scheduling and total system information.

- Manages networks with BACnet, LonWorks or other controllers
- Internet ready, right from the box
- Acts as web server for access to graphics, schedules and logs
- Provides a clear upgrade path
- Preserves existing customer investment
- Provides existing customers with the latest control technology

Siemens Variable Frequency Drives

Siemens SED2® variable frequency HVAC drives feature an intuitively low-harmonics design. Power range is from 0.5 HP to 125 HP and options include conformal and electronic bypass with enhanced functionality. LonMark® and Modbus® compatible interfaces are available, and an advanced keypad makes for easy field programming.

Siemens Valve Products

Siemens provides seven diffusion valve product lines for applications from terminal units to central equipment. Siemens valves range from 1/2-inch globe and ball valves to 48-inch butterfly valves and are matched with direct-coupled electronic, hydraulic, mechanical or pneumatic actuators. Globe valves with metal-to-metal seating, low leakage and 100:1 rangeability ensure a high level of controllability in a wide variety of system applications.

OpenAir Damper Actuators

The complete line of OpenAir direct-coupled damper actuators provides long lasting and powerful performance for low to high torque applications. The self-centering shaft adapter, plenum ratings and built-in control options enable quick installation and maintenance-free operation.

Siemens Sensors

Siemens offers a wide range of temperature, relative humidity, air quality, air velocity and pressure as well as wireless room temperature sensors for the TALON system.

- Wide range of space and duct applications
- Featuring fast response LCD display
- Set point adjustment and occupant override capability

- Wide range of space, duct and outdoor air humidity
- Includes various voltage or LCD display

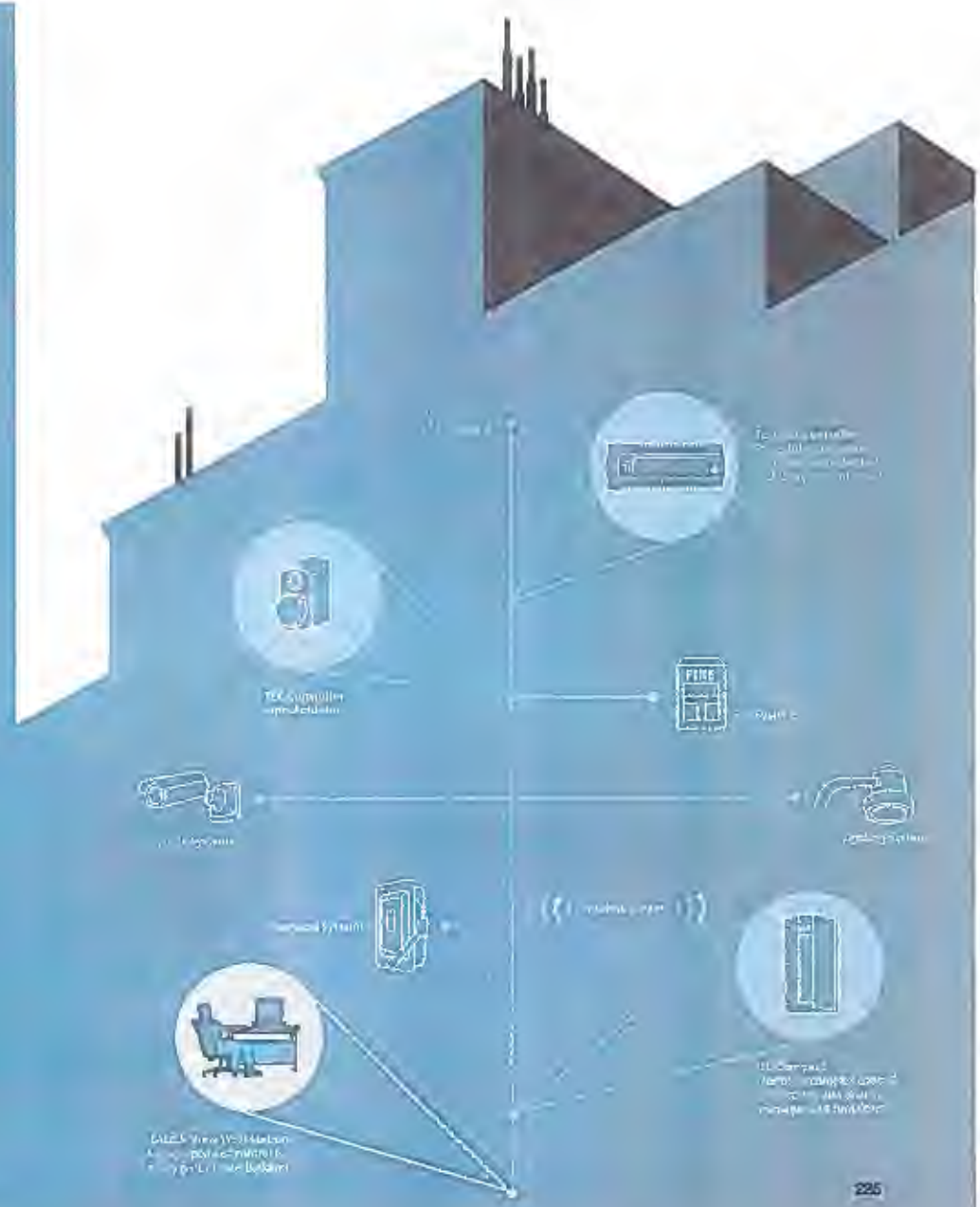
- Power and dual output
- Sense temperature and humidity in addition to CO and VOCs

- 1" to 5" water column

- Digital display
- Full range of settings
- 5-year battery life

At home in any building

With the TAC IT View Workstation, it's simple to install a dedicated workstation to manage and control a building. From here, you can monitor equipment, schedule and manage operations, run reports and link to other workstations. All accessed through a PC browser interface.



Smart service

Your local, independent Siemens Solution Partner is your source for a complete TALON system.

And, as an authorized TALON dealer, they are also your source for the full line of high quality Siemens valves, sensors, actuators, controllers and variable frequency drives.

Siemens Solution Partners offer unparalleled customer service, training for your staff and technical support. Each has completed extensive training to become a Siemens Solution Partner.

When you choose TALON, you don't just get the best technology, you get confidence backed by the resources of Siemens.

SIEMENS

D. TEST DATA

- None available

This document contains Performance Services Trade Secrets and Confidential Information to be used by the addressee for evaluating this PSI proposal. Addressee shall not disclose the Confidential Information to third parties without written consent of Performance Services.

E. SYSTEM SCHEMATICS

- None available

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F. DETAILED AUDIT/SURVEY FORMS

- Detailed lighting audit is included within the lighting savings portion of this appendix

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G. DETAILED IMPLEMENTATION PLAN

- Preliminary Project Schedule

This document contains Performance Services Trade Secrets and Confidential Information to be used by the addressee for evaluating the PS/ proposal. Addressee shall not disclose the Confidential Information to third parties without written consent of Performance Services.

TFC Energy Project Schedule

	Task Name	Duration	Start	Finish
1	TFC Energy Project	398 days	Tue 9/15/15	Tue 3/21/17
2	Preliminary Utility Audit	65 days	Tue 9/15/15	Mon 12/14/15
3	SECO Preliminary Project Approv	28 days	Tue 12/15/15	Thu 1/21/16
4	Utility Assessment Report	17 days	Fri 1/22/16	Mon 2/15/16
5	3rd Party Review & Approval	18 days	Tue 2/16/16	Thu 3/10/16
6	TFC Project Approval / Contract	95 days	Fri 3/11/16	Thu 7/21/16
7	Engineering	35 days	Fri 7/22/16	Thu 9/8/16
8	LED Lighting	77 days	Fri 9/23/16	Mon 1/9/17
9	Power Conditioning	10 days	Fri 9/9/16	Thu 9/22/16
10	Building Automation System	100 days	Fri 9/23/16	Thu 2/9/17
11	Variable Flow CHW	10 days	Fri 9/9/16	Thu 9/22/16
12	Water Conservation	15 days	Fri 9/9/16	Thu 9/29/16
13	Project Commissioning	5 days	Fri 2/10/17	Thu 2/16/17
14	Substantial Completion	1 day	Fri 2/17/17	Fri 2/17/17
15	Punch List Items	20 days	Mon 2/20/17	Fri 3/17/17
16	Final Completion	2 days	Mon 3/20/17	Tue 3/21/17

Project: TFC Energy Project
Date: Tue 7/19/16

H. OPERATION AND MAINTENANCE RECOMMENDATIONS

- No recommendations provide

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I. SPECIFICATIONS

- None available

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J. OTHER SUPPORTING DOCUMENTS

- Measurement & Verification Plan
- Measurement & Verification Professional
- Sample Annual M&V Report
- Austin Energy Utility Rebate Letter

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MEASUREMENT AND VERIFICATION PROVIDER CERTIFICATION

State Agency/Owner: Texas Facilities Commission

ESCO/Contractor: Performance Services, Inc.

Contract Name/Number: Energy Savings Performance Contracting/15-020-0802

Date of Review: July 19, 2016
SECO requires the use of the International Performance Measurement and Verification Protocol (IPMVP), latest edition, which is administered by the Efficiency Valuation Organization (EVO).

Does the Measurement and Verification (M&V) plan contain, at a minimum, the following information?

Yes	No		
☒	☐	1)	A detailed scope of work and deliverables that clearly define the outputs and service levels provided after the installation of equipment. Document: M&V Plan Page reference(s): Exhibit H - Pages 1-34
☒	☐	2)	Name and qualifications of the M&V firm and individual technical analyst that will perform the M&V? Document: M&V Plan Page reference(s): Exhibit H - Page 33
☒	☐	3)	A list of what will be measured. Document: M&V Plan Page reference(s): Exhibit H - Pages 10-15
☒	☐	4)	Time interval(s) to be used for the measurements. Document: M&V Plan Page reference(s): Exhibit H - Page 34
☒	☐	5)	Total cost of the M&V Plan over the term of the Contract. Document: M&V Plan Page reference(s): Exhibit H - Page 3 Contract Page 16, Article 5.1.3

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Yes	No		
☒	☐	6)	Instruments that will be used for measurement, method of installation, how the instruments will be calibrated and the frequency of calibration. Document: M&V Plan Page reference(s): Exhibit H - Page 32
☒	☐	7)	What baseline and post-retrofit analysis will be performed on the data that are collected. Document: M&V Plan Page reference(s): Exhibit H - Pages 7-9 & 15-24
☒	☐	8)	A sample calculation of the savings analysis including format. Document: M&V Plan & UAR Page reference(s): Exhibit H-pages 15-24, Appendix B pages 38-125
☒	☐	9)	What baseline and post-retrofit analysis will be performed on the data that are collected. Document: M&V Plan Page reference(s): Exhibit H - Pages 15-24
☒	☐	10)	A table that shows M&V approach to measure each UCRM or O&M measure. Document: M&V Plan Page reference(s): Exhibit H - Page 15
☒	☐	11)	A Sample Periodic Utility Savings Report including examples of all required documents and showing all data elements, calculations and results Document: Sample Annual Savings Report Page reference(s): Exhibit J, Pages 1-13
☒	☐	12)	Certification of review by a licensed engineer. Document: M&V Provider Certification Page reference(s): Exhibit R, Page 40

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I certify that this Measurement & Verification Plan has been prepared in accordance with the requirements of the Performance Contracting technical Guidelines for state agencies and that this knowledge is based on my study of the proposed projects and on-site investigation of the facilities involved.

Additionally, I certify that the Measurement and Verification approaches, plans, and specifications presented are factual, accurate, reasonable, and in accordance with generally accepted engineering practices to the best of my knowledge and in my best professional judgment.

signature

David M. Temming
(printed name)

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title or position

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STATE OF TEXAS
DAVID M. TEMMING
95384

7/29/2016

Affix Official P. E. Seal

(Only if signed by Engineer)

FOR SECO USE ONLY

Date Received: 11/4/16

Approved By: Fred Tubre

Date Approved: 11/7/16

Or

Date Returned to Agency: _____

Comments: _____

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Exhibit H

Measurement and Verification Plan

Pursuant to the terms of that certain Energy Performance Contract between The Texas Facilities Commission ("TFC") and Performance Services, Inc. ("ESCO") dated _____ (the "Contract"), ESCO shall perform the energy and water savings measurement and verification as defined within this Measurement and Verification Plan (the "Plan"). ESCO shall also coordinate the Plan with the M&V Consultant, as defined in the Contract. ESCO and the M&V Consultant shall work to resolve any issues with respect to the Plan to the reasonable satisfaction of TFC.

M&V Consultant

The M&V Consultant will be hired by TFC and will provide the following services:

1. Review and develop a comprehensive understanding of the Plan.
2. Coordinate with ESCO annually to confirm that field measurements are being taken and recorded as well as all necessary trend data.
3. Review the Periodic Savings Report, as defined in the Contract (the "Report"). This task will be completed within two (2) weeks from the date the Report is received by TFC. M&V Consultant shall submit their review comments to TFC and ESCO in writing.
4. Work with ESCO and TFC to ensure that TFC's measurement and verification concerns are addressed to the reasonable satisfaction of TFC.

GUARANTEED SAVINGS ESCO shall guarantee energy savings ("Energy Savings") pursuant to the terms of Exhibit I to the Contract, the Performance Guarantee Agreement (the "Guarantee"). The term of the Plan shall equal the term of the Guarantee. Energy Savings are calculated based on the installation of Utility Cost Reduction Measures ("UCRMs") which are designed to reduce electric consumption (kWh), reduce natural gas consumption (CCF), and reduce water/sewer usage (kgal).

Operational savings ("Operational Savings") for maintenance, as identified and calculated in Exhibit E to the Contract, Utility Assessment Report (the "UAR"), are agreed to and stipulated by TFC for the term of the Guarantee. ESCO and TFC agree for the term of the Guarantee that the annual Utility Rate escalation factor will be 0% for electricity, natural gas, water and sewer.

Energy Savings and Operational Savings shall be collectively referred to herein as "Guaranteed Savings".

Schedule A of the Plan contains the methodology and calculations used to determine Guaranteed Savings achieved as a result of the installation of the UCRMs, as well as the methodology that ESCO will use to measure, verify, and report on Guaranteed Savings achieved annually during the term of the Guarantee.

Pursuant to the Guarantee, Guaranteed Savings are as follows:

TABLE 1 – GUARANTEED SAVINGS

UCRM No.	UCRM Title	ANNUAL SAVINGS							Total Savings
		Electric Energy (kWh/yr)	Electric ($/yr)	Natural Gas (CCF/yr)	Natural Gas ($/yr)	Water/Sewer (gal/yr)	Water/Sewer ($/yr)	Other Savings	
1	LED Lighting w/ 1,326 Sensors	3,379,335	$263,105					$55,677	$318,782
2	Power Conditioning	655,504	$45,817					$7,256	$53,073
3	Variable CHW Flow	116,928	$8,093					$0	$8,093
4	Water Controls	99,456	$7,047			4,453,617	$67,650	$0	$74,698
5	Building Automation System	315,945	$20,925	10,391	$4,988			$0	$25,913
6	Variable Air Volume	35,607	$2,925						$2,925
7	Load Coop Demand Response	1,139	$1,652						$1,652

TABLE 2 – ANNUAL SAVINGS

Year	Annual Savings				
	Electricity (kWh) $	Natural Gas (Therm) $	Water/ Sewer $	Other Savings $	Total Savings $
1	$349,563	$4,988	$67,650	$62,933	$485,135
2	$349,563	$4,988	$67,650	$62,933	$485,135
3	$349,563	$4,988	$67,650	$62,933	$485,135
4	$349,563	$4,988	$67,650	$62,933	$485,135
5	$349,563	$4,988	$67,650	$62,933	$485,135
6	$349,563	$4,988	$67,650	$62,933	$485,135
7	$349,563	$4,988	$67,650	$62,933	$485,135
8	$349,563	$4,988	$67,650	$62,933	$485,135
9	$349,563	$4,988	$67,650	$62,933	$485,135
10	$349,563	$4,988	$67,650	$62,933	$485,135
Total	$3,495,633	$49,876	$676,504	$629,331	$4,851,345

Note: No escalation factor has been applied.

In addition to the savings defined in the above tables, ESCO is guaranteeing that the project utility rebate paid to TFC will be at least $175,000. TFC shall submit all required rebate documentation and fully support the rebate process. If the rebate does not amount to at least $175,000, TFC shall have the same remedies as annual savings listed in Table 2 above.

Table 3 below provides the annual fees for the Plan.

TABLE 3 – ANNUAL M&V FEE

Year	Annual Costs		
	PSI M&V Cost	3rd Party M&V Cost	Total M&V Cost
1	$29,000	$11,000	$40,000
2	$29,000	$11,000	$40,000
3	$29,000	$11,000	$40,000
4	$29,000	$11,000	$40,000
5	$29,000	$11,000	$40,000
6	$29,000	$11,000	$40,000
7	$29,000	$11,000	$40,000
8	$29,000	$11,000	$40,000
9	$29,000	$11,000	$40,000
10	$19,000	$11,000	$30,000
Total	$280,000	$110,000	$390,000

INFORMATION AND ITEMS TO BE FURNISHED BY TFC:

TFC shall furnish to ESCO any design, construction, maintenance or operating documents/manuals; utility billing data for electricity and natural gas consumption, bills and other information necessary to provide services under the Plan. To the fullest extent possible, information shall be delivered or made available in electronic media form and universal file formats (Text, comma delimited files, PDF, JPEG).

During the term of the Plan, TFC shall furnish a secure area for the storage of required materials and provide and arrange access for ESCO to such secure area as may be necessary for expeditious and orderly performance of the services under the Plan.

UTILITY RATES AND BASELINE ASSUMPTIONS:

The Guaranteed Savings shall be based on the utility cost per unit established and agreed to by both parties which is defined in the Energy, Water and O&M Rate Data section of the Plan. For each year, the dollar savings shall be calculated based on the baseline unit cost of electricity and natural gas as defined within Schedule A of the Plan. These and other baseline assumptions used to calculate the Guaranteed Savings are documented in the UAR and Schedule A of the Plan. This includes, but is not limited to, assumptions about facility usage, occupancy, operating schedules, standards of comfort and continuance of the current physical plant and facility layout,

configuration and equipment. Changes to any or all of these assumptions will be cause for adjustment of the Guaranteed Savings baseline as agreed to by both parties.

BASELINE CONDITIONS:

The baseline conditions for calculation of the Guaranteed Savings are set forth in Schedule A of the Plan. In the event that the actual conditions vary from the baseline conditions during the term of the Guarantee, the Guaranteed Savings calculations shall be adjusted to reflect the new baseline conditions.

ANNUAL REPORT:

ESCO will prepare and submit to TFC an annual report within ninety (90) days of the anniversary of commencement date of the Plan. A sample annual report has been included within the Appendix of the UAR.

FEES AND PAYMENTS:

TFC shall pay ESCO an annual fee for the performance of the services described in the Plan, pursuant to Table 3 above (the "M&V Fee"). ESCO shall invoice TFC for the M&V Fee semi-annually for the previous six months of documented work. Failure to pay the M&V Fee shall be grounds for termination of the Guarantee by ESCO.

MANNER AND TIME OF PAYMENT:

The invoice shall be supported by such documents as TFC shall reasonably require. Payment shall be due thirty (30) calendar days after the invoice date.

In the event that TFC, in good faith, disputes any portion of the invoice, TFC shall advise ESCO in writing of the disputed portion and the undisputed portion of the invoiced amount shall be due thirty (30) calendar days after the invoice date. TFC's liability for non-payment shall be governed in accordance with the Texas Prompt Payment Act.

SHORTFALL PAYMENT:

Within ninety (90) days after the completion of each annual period and receipt by ESCO of all required information, ESCO shall submit to TFC an annual Report verifying and supporting the actual savings achieved for the preceding annual period and comparing it to the Guaranteed Savings. The Report shall include measurements, documentation and savings calculations used to support the reported savings for the period. Any shortfall in savings for an annual period shall be specifically identified in the Report, and any shortfall amount shall be paid by ESCO to TFC within thirty (30) days of the submission of the annual Report. The maximum shortfall in any one-year period is limited to the annual guaranteed energy savings amount identified in Table 2.

EARLY TERMINATION OF M&V:

TFC, at its sole discretion, may elect to terminate the Plan and the Guarantee after the end of the first year. Any such termination of the Plan and the Guarantee shall be submitted in writing by an authorized agent of TFC to ESCO. Upon receipt of such termination, ESCO shall have no further obligations or liability with respect to the Plan or the Guarantee.

MATERIAL CHANGES TO UCRM:

From time to time, TFC may need to make changes or modifications to its facilities, which may affect the Plan and/or the Guarantee. Minor changes to facilities can be accommodated by means of a baseline and or savings adjustment, subject to agreement by both parties. Any major change affecting more than 25% of the Guaranteed Savings for any given UCRM or facility or more than 10% of the total Guaranteed Savings shall be classified as a "Material Change" and shall be cause for full or partial termination of the Plan and Guarantee.

Upon formal notification of a qualifying Material Change by TFC, ESCO will prepare and submit, within 30 days, a termination proposal for the Guarantee and the Plan, which shall be reasonably agreed to by the parties.

EQUIPMENT MAINTENANCE AND OPERATION RESPONSIBILITY:

TFC agrees to maintain its facilities, including the physical plant and all existing equipment / systems affecting energy efficiency, such that the condition of the facilities during the term of the Guarantee is at least equal to their condition at the completion of this Contract. TFC also agrees to properly maintain (in accordance with manufacturer's guidelines and specifications) all new and existing equipment and operate all new and existing systems as described in the Proposal, Contract and Guarantee. If TFC fails to operate its facilities as described herein and such failure results in reduced Energy Savings or Operational Savings, then the Guarantee and the Plan shall be adjusted accordingly.

BASELINE ENERGY CONSUMPTION & METHODS TO ADJUST

The Baseline for Energy and Water/Sewer annual consumption has been established through analysis of utility billing data and analysis of data trends acquired by Performance Services during the UAR. The following table contains the agreed upon baselines for this project.

TABLE 4 - ENERGY AND WATER/SEWER BASELINE

Building		Baseline Consumption - 12 months			
Name	Gross sq. ft.	Electricity (kWh)	Natural Gas (CCF)	Sewer (kgal)	Water (kgal)
Brown Heatly	259,224	8,645,053	175,332	6,783	6,783
Central Services	111,935	2,084,400	50,873	2,236	2236
Thomas J. Rusk	99,971	1,663,000	22,703	956	956
William P. Hobby	419,276	9,148,000	433	7,367	7367

Methods to Adjust Energy Consumption

Adjustments

In the basic equation used to determine savings shown below (General Savings Equation), adjustments are sometimes required to account for changes unrelated to the UCRM that affect energy use. Such adjustments may account for changes in weather, occupancy, or other factors between the baseline and performance periods.

General Savings Equation:

Savings = (Baseline Energy – Post Installation Energy) ± Adjustments

The purpose of adjustments is to express both baseline and post-installation energy under the same set of conditions. The modifications to the savings can be further distinguished as routine and non-routine adjustments, as shown in the Expanded Energy Savings Equation.

Energy Savings Equation:

Savings = (Baseline Energy – Post Installation Energy) ±Routine Adjustments ± Non Routine Adjustments

Routine Adjustments

Routine adjustments are used to account for expected variations in independent variables and energy use. These adjustments often use regression analysis to correlate and adjust energy use

to independent variables such as weather, but simple comparisons may also be employed. Routine adjustments are used to normalize energy use as a function of one or more independent parameters such as temperature, humidity, or meals served.

Normalizing energy savings to a prescribed set of conditions is a very important technique used in ESPC projects. Using a fixed set of conditions for both the baseline and performance period cases, such as average weather conditions and the corresponding cooling load profile, allows the risks associated with these operational factors to be reduced.

Alternatively, baseline and performance period conditions could be normalized to either baseline or performance period conditions. If performance period conditions are used to adjust the baseline case, the savings calculated will estimate the actual avoided energy use for that period.

One of the key assumptions made when normalizing savings is that the performance period energy use will have a predictable relationship to the independent variables to be standardized. The baseline model will be completely defined in the contract, but the performance period model will need to be developed from measured data collected during the performance period. Typically, a valid baseline model indicates that a similar performance period model can be successfully developed.

Once the baseline and performance period models of the equipment's energy consumption and the parameter(s) are established and validated, the standardized values of the independent parameters can be used to drive the both models and calculate savings.

Therefore, a project-specific M&V Plan should identify critical independent variables, explain how these variables will be measured or documented, and discuss how they will be used in the empirical models. Additionally, assumptions and mathematical formulas used in the M&V Plan must be clearly stated, and the validity of any mathematical model used should be verified.

Non-Routine Adjustments

Non-routine adjustments are used to compensate for unexpected changes in energy driving factors, such as facility size, operating hours, and facility use. These factors must be monitored for change to ensure that they are not affecting the performance of the energy conservation measure. Tracking these factors is primarily a concern for projects using whole-building options (Options C & D). Option A approaches typically avoid these types of adjustments as many of the factors that could change are stipulated. If future changes are expected, the M&V Plan should incorporate methods for making these non-routine adjustments.

Interactive Effects

It is commonly understood that UCRMs and energy systems interact with one another. Reduced lighting loads, for example, can reduce air conditioning energy consumption (a cooling bonus), but increase heating consumption (a heating penalty).

Whole-building M&V approaches such as building simulation or utility billing analysis account for these types of interactive effects, whereas retrofit isolation M&V approaches do not.

When using retrofit isolation M&V Options A and B, careful consideration must be given to dealing with interaction between UCRMs. One must properly account for interactive effects and avoid double-counting of savings, which can occur inadvertently if interactions are not carefully considered.

Care must be taken to account for the reduced cooling loads on both the new and existing chillers due to the change in lighting. In addition, the cooling bonus should be based on the efficiency of the new chiller. In general, the possibility of double-counting energy savings can be reduced by considering one UCRM at a time.

The later UCRMs should start (the baseline condition) from the performance period condition of the previous UCRMs. For related UCRMs, such as lighting efficiency and lighting controls, double-counting can sometimes be avoided by using a single equation to determine savings from both measures.

Methodologies for determining some of the more common interactions, such as lighting and HVAC, have been developed. However, detailed relationships between many dissimilar but interactive UCRMs are not known, and the methods for measuring interactive effects are not cost-effective for many applications. For projects using retrofit isolation approaches (Options A or B), one of three approaches can be taken to account for savings associated with interactive effects between UCRMs. These approaches are as follows:

- Ignore interactive effects.
- Use mutually agreed-upon values that are based on the site-specifics of the building and HVAC equipment types. The values can be developed on the basis of computer model simulations for typical building conditions or assigned on the basis of available information for typical buildings.
- Develop a site-specific method to measure and estimate interactive effects. The federal agency and/or ESCO will need to agree on the merit and reasonableness of the proposed approach, which may include directly measuring the effects.

SCHEDULE A – MEASUREMENT & VERIFICATION

The purpose of the Measurement and Verification (M&V) Plan is to establish the method by which the calculated energy savings for the project are proven. Texas Facilities Commission shall provide Performance Services with the necessary data, including utility bills, and access to buildings and equipment proposed to be installed under the Scope of Work. Texas Facilities Commission will also provide access to building automation system information and any other facility Operating and Maintenance data as needed in order for Performance Services to perform the M&V as described herein. Preferably, all requested building automation system data will be pushed electronically to Performance Services ftp site for this project.

For this energy conservation project, Performance Services proposes to use a combination of M&V methodologies based on end use measurement (retrofit isolation) and building energy simulation to verify the estimated savings set forth in the proposal for this project. Performance Services has during the UAR, and will continue to make use of a variety of building environment and equipment end use measurement options including one-time instantaneous and short-term continuous measurements as a means to verify specific performance criteria set forth in this M&V plan. If performance test conditions do not allow for certain prescribed measurements to be made, then alternative M&V methods may be proposed for agreement by the parties. Performance Services utilizes the DOE sponsored International Performance Measurement & Verification Protocol (IPMVP EVO 10000.1 January 2012), and the FEMP M&V Guidelines: Measurement and Verification for Federal Energy Projects Version 3.0 (2008) as references for this M&V plan.

There are essentially two types of measurement procedures: retrofit isolation methods and whole building analysis methods. The retrofit isolation methods are called Option A - Retrofit Isolation with Key Parameter measurement and Option B - All Parameter Measurement options, respectively. The building analysis options are called: Option C, Utility Bill Analysis, and Option D, Calibrated Simulation, respectively. The last two options could be used to measure specific pieces of equipment and hence specific retrofits, if the meter being used in the analysis serves only the impacted piece of equipment. The following are summary descriptions of these M&V approaches based on the reference documents.

OPTION A – Retrofit Isolation with Key Parameter Measurement

Option A is an approach designed for projects in which the potential to generate savings must be isolated and verified, but the actual savings can be determined from short-term measurements, estimates, and engineering calculations. Performance period energy use is not measured throughout the term of the contract. Performance period energy use and baseline energy use are predicted using an engineering or statistical analysis of information that does not involve long-term measurements.

Option A savings are determined by field measurement of the key performance parameter(s) which define the energy use of the energy conservation measure's (ECM) affected system(s) and/or the success of the project. Parameters not selected for field measurement are estimated. Estimates can be based on historical data, manufacturer's specifications, or engineering judgment. Documentation of the source or justification of the estimated parameter is required.

Typical applications may include a lighting retrofit, where the power drawn can be monitored and hours of operation can be estimated.

OPTION B - Retrofit Isolation with All Parameter Measurement

M&V Option B is a retrofit isolation or system-level approach. The approach is intended for retrofits with performance factors (e.g., end-use capacity, demand, power) and operational factors (lighting operational hours, cooling ton-hours) that can be measured at the component or system level and where long-term performance needs to be verified. It is similar to Option A, but uses periodic or continuous metering of all energy quantities, or all parameters needed to calculate energy, during the performance period. This approach provides the greatest accuracy in the calculation of savings, but increases the performance-period M&V cost.

The Option B approach ensures the same items as Option A, but also:

- Determines energy savings using periodic or continuous measurement of energy use or all parameters needed to calculate energy use during the term of the contract.
- Option B is typically used when any or all of these conditions apply:
- For simple equipment replacement projects with energy savings that are less than 20% of total facility energy use as recorded by the relevant utility meter or sub-meter (Option C is not applicable)
- When energy savings values per individual measure are desired
- When interactive effects can be estimated using methods that do not involve long-term measurements
- When the independent variables that affect energy use are not complex and excessively difficult or expensive to monitor
- When operational data on the equipment is available through control systems
- When sub-meters already exist that record the energy use of subsystems under consideration (e.g., a separate sub-meter for heating ventilation and air-conditioning (HVAC) systems)

OPTION C – Whole Building Data Analysis

M&V Option C involves whole-facility utility or sub-meter data analysis procedures to verify the performance of retrofit projects in which whole-facility baseline and performance period data are available. Option C usually involves collecting historical whole-facility baseline energy use and related data and continuously measuring whole-facility energy use after UCRM installation.

Baseline and periodic inspections of the equipment are also needed. Energy savings under Option C are estimated by developing statistically representative models of whole-facility or sub-metered energy consumption (i.e., therms and/or kWh). This method confirms total energy savings, but does not measure the savings from individual components.

In general, Option C is used with complex equipment replacement and controls projects for which predicted savings are relatively large, i.e., greater than about 10% to 20% of the site's energy use, on a monthly basis. Option C regression methods are valuable for measuring interactions between energy systems or determining the impact of projects that cannot be measured directly, such as insulation or other building envelope measures.

Regression analysis requires experienced, qualified analysts, and Option C methods should be employed only for projects that meet the following requirements:

- Savings are predicted to be greater than about 10% to 20% of the overall consumption measured by the utility or sub-meter.
- At least 12 and preferably 24 months or more of pre-installation data are used to calculate a baseline model.
- At least 9 and preferably 12 months of performance period data are used to calculate annual savings.
- Adequate data on independent variables are available to generate an accurate baseline model, and procedures are in place to track the variables required for performance period models.
- Significant operational or other changes are not planned for the facility during the performance period, and procedures are in place to document changes that do occur at the site.

Performance Services uses regression analysis software to compile, analyze and compute the pre-retrofit baseline from the electricity, fuel and water bills. The post-retrofit utility consumption data from these meters will be obtained subsequently and compiled, analyzed, normalized for weather, occupancy and other variables and compared to the pre-retrofit baseline to determine the savings (savings = baseline – post-retrofit usage) for each annual performance period in the contract. A baseline utility bill analysis report for each of the energy meters (electric and natural gas) for each facility covered by this UAR report is included in the appendix of this report.

OPTION D – Calibrated Simulation

Option D involves whole facility or system analysis procedures to verify the performance of retrofit projects using calibrated computer simulation models. Computer simulation is a powerful tool that allows an experienced user to model the building and mechanical systems in order to predict building energy use both before and after the installation of UCRMs. The accuracy of the models is ensured by using metered site data to describe baseline and/or performance period

conditions. Carefully constructed models can provide savings estimates for the individual UCRMs on a project.

More elaborate models generally improve the accuracy of savings calculations, but increase costs. A calibrated simulation of a building, however, can be utilized to easily evaluate savings from other potential improvements.

Building simulation requires experienced, qualified analysts, and Option D methods should be used only for projects that meet any or all of the following requirements:

- For complex equipment replacement and controls projects with too many UCRMs to cost-effectively use retrofit isolation methods A or B
- When interactive effects between UCRMs are too complex for retrofit isolation approaches, but need to be quantified
- When the Option C utility data analysis approach is not viable due to the overall level of savings being less than 20% of metered use
- When complex baseline adjustments are expected during the performance period
- When energy savings values per individual measure are desired
- When new construction projects are involved
- When savings levels are sufficient to warrant the cost of simulation
- When either baseline or performance period energy data, but not both, are unavailable or unreliable.

Each method is appropriate for certain types of energy conservation projects, and has its associated benefits, risks and costs. The recommended site and UCRM specific M&V methodologies for verifying the project savings are presented below in section "Recommended M&V Options."

Selecting an M&V Approach

Since the primary purpose of measurement and verification is to validate payments or performance guarantees, the cost of M&V should be less than the payment amount or guarantee that is at risk. Consequently, the objective of M&V should not necessarily be to derive a precise energy savings number, but rather to ensure that energy services companies (ESCOs) properly complete their projects and that the resulting energy savings are reasonably close to the claimed savings. The appropriate level of M&V rigor and accuracy is a level that protects the project investment and fulfills the intent of any legislative requirements. Careful consideration of the M&V level, type, and rigor benefits both parties and can help mitigate potential problems during the performance period.

In general, the selection of a project specific M&V method is based upon:

- Project costs and expected savings

- Complexity of the UCRM
- Number of interrelated UCRMs at a single facility
- Uncertainty or risk of savings being achieved
- Risk allocation between the parties
- Other uses for M&V data and systems

The scale of a project, energy rates, term of the contract, comprehensiveness of energy conservation measures (UCRMs), the benefit-sharing arrangement, and the magnitude of savings can all affect the value of the UCRM or project.

The M&V effort for this project has been scaled to the value of the project so that the value of the information provided by the M&V activity is appropriate to the value of the UCRM and the project itself.

Descriptions of power measurements and the methods used to log (trend) data

The use of power measurements to validate our engineering assumptions is paramount to the success of our performance contract projects. Performance Services invested substantially in high-quality multi-phase and true-RMS metering equipment as well as industrial grade, portable BTU measurement equipment.

Table at the end of the section contains a summary listing of the logging and metering equipment Performance Services uses in developing projects, in validating baseline equipment performance assumptions and post-installation verification of performance. Power, combustion, and BTU metering equipment are checked for calibration regularly by the manufacturer of the equipment. If any element(s) are beyond tolerances, the meter and the associated elements are re-calibrated.

RECOMMENDED M & V OPTIONS

Each method is appropriate for certain types of energy conservation projects, and has its associated benefits, risks and cost. Due to the interconnections of many of the UCRMs savings, PSI proposes to use primarily two M&V Options for this project: 1) Option A – Retrofit Isolation with Key Parameter measurement (instantaneous or short term) and 2) Option B – Retrofit Isolation with All Key Parameter measurements. These methods will verify with a high degree of confidence that the savings are being achieved without adding excessive cost to the project. These Options will be used to verify the savings for the proposed UCRMs. Details are as follows:

TABLE 5 – M&V METHOD PER UCRM

UCRM	ECM Description	Percent of Project	Total Savings	M&V Method
1	LED Lighting w/ 1,326 Sensors	65.7%	$318,782	A
2	Power Conditioning	10.9%	$53,073	B
3	Variable CHW Flow	1.7%	$8,093	A
4	Water Controls	15.4%	$74,698	A
5	Building Automation System	5.3%	$25,913	C
6	Variable Air Volume	0.6%	$2,925	A
7	Load Coop Demand Response	0.3%	$1,652	Deemed

THE BUILDINGS INCLUDED IN THIS PROJECT ARE:

1. Brown Heatly
2. Central Services
3. Thomas J. Rusk
4. William P. Hobby

Option A - Retrofit Isolation: Key Parameter Measurement

Performance Services has selected Option A for the following UCRMs:

UCRM 1 – LED Lighting

Performance Services proposes to retrofit to replace incandescent and fluorescent lightings with LED lighting that would:

- Reduce the energy consumption of the existing lighting system by implementing innovative, improved lighting technologies and by applying creative design and problem solving measures to existing inefficient lighting situations
- Reduce existing lighting maintenance requirements
- Maintain existing light levels or attain light levels established by the Illuminating Engineering Society (IES) based upon best energy savings
- Improve the levels and quality of lighting experienced by Texas Facilities Commission

The key measurement parameters will be the instantaneous power in watts used by each pre and post-retrofit lighting fixture lamp and hours of operation during occupied and unoccupied periods. The measurements will be performed on a statistically significant quantity (sample) of pre and post-retrofit fixtures. Lighting power measurements will be made with a true-RMS watt meter to identify the instantaneous power draw of fixtures or circuits. Fixtures will typically be measured at either the last point of control (switch or circuit breaker), or at the fixture itself, whichever is safest to employ to achieve the readings. When lighting power is measured at the switch or circuit breaker, the number operating and non-operating fixtures is counted in order to accurately describe the average power draw for a particular fixture type. If a mixture of fixture types is on the last point of control or on a power circuit, then the individual fixtures should be measured. Finally, it may not be feasible or cost effective to measure individual fixtures prior to contract execution (e.g., pre- measurements). These are typically for high ceiling-mounted fixtures, and, consequently, these fixtures may be measured during construction for both the pre- and post-installation condition as follows: baseline condition is measured, fixture is retrofitted, and fixture is measured for post-installation condition.

The number of fixtures and usage groups to be selected for measurement is based on the use of statistical sampling method (described below) to ensure reasonable sample populations and confidence level (CL) in the results of the samples.

- Performance Services uses lighting audit to identify the fixtures to measure pre and post implementation and the hours of operation groups.
- For measuring power, Performance Services identified the top 70% or greater of the total connected electric load (kW) based on the lighting audit. Each fixture connected load is calculated by (fixture quantity) X (watts per fixture). Total connected load (Watts) is the sum of all (fixture quantity) X (watts per fixture). The remaining percent of total

connected load have a lesser effect on the savings results and these fixtures will not be measured.

- Performance Services will use Coefficient of Variation (CV) of 20% for pre and post-retrofit
- Performance Services will use Confidence Level (CL) to be 90%
- Performance Services will use Precision to be 10%.
- Based on the fixture quantity an expected sample size will be selected. Minimum sample size per fixture type will be 3 pre-retrofit samples and 3 samples post-retrofit. Additional samples might be required to meet the expected statistical parameters described above.

Savings Formulae

$$ES = \frac{(W_{BASE} \times HRS_{BASE}) - (W_{POST} \times HRS_{POST})}{1000}$$

Where:

ES	=	Total energy savings (kWh)
W_{BASE}	=	Measured baseline watt per fixture (W)
W_{POST}	=	Measured post-implementation watt per fixture (W)
HRS_{BASE}	=	Measured baseline operating hours (Hours)
HRS_{POST}	=	Measured post-implementation operating hours (Hours)

Energy savings was calculated using manufacture data and spreadsheet calculations. Savings include fixture maintenance savings which are consistent with actual cost according to Texas Facilities Commission. The lighting maintenance savings was determined by the reduction of material cost during the warranty period and is based on information collected during interviews with Texas Facilities Commission staff and accepted industry standards. The savings is agree-to for the life of the project, and will not be verified under the annual energy savings report.

Measured Baseline Operational Hours

During the energy audit, Performance Services used available loggers (28) to determine baseline hours of operation for lighting within primary spaces. Also, Performance Services measured fixture wattages for the most common fixture types. The results (baselines) follow:

Operational Hours per Space Type - Logged

Space Type	Avg Hrs/Wk	Avg Hrs/Yr
General Offices	126	6,576
Private Offices	45	2,358
Hallways	168	8,736
Restrooms	121	6,292
Conference Rooms	45	2,318

Operational Hours per Space Type - Established

Space Type	Avg Hrs/Wk	Avg Hrs/Yr
Private Offices w/ OCC	42	2,184
Restrooms w/ OCC	35	1,820
Conference Rooms w/ OCC	42	2,184
Lobby	168	8,736
Break Room	60	3,120
Server Rooms	50	2,600
Mechanical/Electrical	20	1,040
Closets	15	780
Exterior	77	4,004
Parking Garage	168	8,736

Baseline Existing Fixture Wattages

Fixture Type	Wattage
4' 2 Lamp T8	59
4' 3 Lamp T8	88
4' 2 Lamp T12	58
4' 3 Lamp T12	92
4' 4 Lamp T12	115

Lighting Submetering – Performance Services will install submetering to monitor amp draw and voltage on various LED lighting circuits within a project building. This information will be used to confirm post retrofit energy usage.

UCRM 4 – Water Controls

Performance Services proposes to replace high flow toilets and urinals with low flow toilets and urinals as well as replace high flow aerators with low flow aerators. Benefits include:

- Reduce the water consumption of the plumbing system by implementing innovative, improved plumbing technologies
- Reduce hot water usage
- Reduce existing plumbing maintenance requirements

The key measurement parameters will be the water used by each pre and post-retrofit water fixture. The measurements will be performed on a statistically significant quantity (sample) of pre and post-retrofit fixtures. Water use and flow measurements will be made with approved equipment. Fixtures will be measured individually. Finally, it may not be feasible or cost effective to measure individual fixtures prior to contract execution (e.g., pre- measurements). Typically, measurements of pre- and post-installation condition will be as follows: baseline condition is measured, fixture is retrofitted, and fixture is measured for post-installation condition.

The number of fixtures and usage groups to be selected for measurement is based on the use of statistical sampling method (described below) to ensure reasonable sample populations and confidence level (CL) in the results of the samples.

- Performance Services used a water audit to identify the fixtures to measure pre and post implementation and the usage.
- For measuring water usage, Performance Services identified the top 70% of the total domestic water load based on the water audit. Savings will be measured using a sampling of these fixtures. The remaining percent of total connected load have a lesser effect on the savings results and these fixtures will not be measured.
  - Performance Services will use Coefficient of Variation (CV) of 10% for pre and post-retrofit
  - Performance Services will use Confidence Level (CL) to be 90%
  - Performance Services will use Precision to be 20%.
  - Based on the fixture quantity an expected sample size will be selected. Minimum sample size per fixture type will be 3 pre-retrofit samples and 3 samples post-retrofit. Additional samples might be required to meet the expected statistical parameters described above.

SAVINGS FORMULAS

$$WS = \frac{(W_{BASE} \times USG_{BASE}) - (W_{POST} \times USG_{POST})}{1000}$$

Where:

WS	=	Total water savings (kgal)
W_{BASE}	=	Measured baseline gallons per fixture (gal)
W_{POST}	=	Measured post-implementation gallons per fixture (gal)
USG_{BASE}	=	Calculated annual baseline usage (Quantity)
USG_{POST}	=	Calculated post-implementation usage (Quantity)

Savings baselines values are based on the following:

Water Usage Baselines	BHB	CSB	TJR	WPH
Typical Bldg Occupancy Including Visitors	1,200	515	288	1,550
Male/Female Ratio	45/55	45/55	45/55	45/55
# of Toilet Flushes Per Year	685,938	319,375	174,441	890,547
Average gallons/flush	2.63	2.31	3.50	3.43
# of Urinal Flushes Per Year	351,563	163,125	89,184	456,328
Average gallons/flush	1.00	1.00	1.44	2.14
# of Times Lavatory Uses Per Year	1,037,500	482,500	263,625	1,346,875
Average gallons/minute	2.10	2.20	2.20	2.10

Quantity of flushes per year based on the following:

- Employee women using toilets four times per day
- Employee men using toilets one time per day and urinal three times per day
- Visitors using toilet or urinal every two hours

Water savings was calculated using manufacture data and spreadsheet calculations. Savings include a reduction in hot water usage (electric water heater savings) which are consistent with actual cost according to Texas Facilities Commission. Hot water energy savings were determined by using 80 percent of industry standard calculations. The savings is agree-to for the life of the project, and will not be verified under the annual energy savings report.

UCRM 3 Variable Chilled Water Flow

Performance Services proposes to implement variable chilled water flow at both the Brown Heatly and Central Services buildings. This measure will modulate the flow of chilled water based on building demand.

Guaranteed electrical energy savings generated by the fan motor VFD changes shall be based on motor horsepower and baseline hours identified herein. These saving shall be considered variable savings such that the actual savings will vary monthly based on actual motor runtime as measured by the energy management system. The following calculations shall be used in determining the amount of actual electric savings.

SAVINGS FORMULAE

$$ES = \frac{(W_{BASE} \times HRS_{BASE}) - (W_{POST} \times HRS_{POST})}{1000}$$

Where:

ES	=	Total energy savings (kWh)
W_{BASE}	=	Measured baseline watt per motor (W)
W_{POST}	=	Measured post-implementation watt per motor (W)
HRS_{BASE}	=	Measured baseline operating hours (8,760 Hours)
HRS_{POST}	=	Measured post-implementation operating hours (8,760 Hours)

Pre baseline motor power draw measurements will be made using a true RMS power meter. Post VFD installation motor power draw will be tracked through the building automation system with

input from the VFDs. The post-implementation watts per motor will be the average motor power draw taken over a one-week period. For energy savings purposes, pre and post baseline operational hours will be considered equal at 8,760.

UCRM 6 Variable Air Volume

Performance Services proposes to implement variable air flow for air handling unit 16 at the Central Services buildings. This measure will modulate air flow based on space demand. This measure includes installing variable speed drives on both the cold and hot deck supply fan motors.

Guaranteed electrical energy savings generated by the fan motor VFD changes shall be based on motor horsepower and baseline hours identified herein. These saving shall be considered variable savings such that the actual savings will vary monthly based on actual motor runtime as measured by the energy management system. The following calculations shall be used in determining the amount of actual electric savings.

SAVINGS FORMULAE

$$ES = \frac{(W_{BASE} \times HRS_{BASE}) - (W_{POST} \times HRS_{POST})}{1000}$$

Where:

ES	=	Total energy savings (kWh)
W_{BASE}	=	Measured baseline watt per motor (W)
W_{POST}	=	Measured post-implementation watt per motor (W)
HRS_{BASE}	=	Measured baseline operating hours (8,760 Hours)
HRS_{POST}	=	Measured post-implementation operating hours (8,760 Hours)

Pre baseline motor power draw measurements will be made using a true RMS power meter. Post VFD installation motor power draw will be tracked through the building automation system with input from the VFDs. The post-implementation watts per motor will be the average motor power draw taken over a one-week period. For energy savings purposes, pre and post baseline operational hours will be considered equal at 8,760.

OPTION B - Retrofit Isolation with All Parameter Measurement

Performance Services has selected IPMVP Option B for the following UCRMs and associated maintenance savings:

UCRM 2 – Power Conditioning

The installation of power conditioners with modular capacitance to improve power factor will make motors run cooler and more efficiently. Thus results in a reduction in energy consumption and an extension of the useful life of motor loads. Also power conditioning system will provide

harmonic filtration to mitigate harmonic distortion and recycle waste energy resulting in reduced energy consumption which prolongs the longevity of electrical equipment.

PSI will perform Pre & Post electrical measurements including harmonics using calibrated Hi-Power metering equipment.

Savings were calculated using on-line harmonic reduction spreadsheet calculators. The savings calculation was also performed by the manufacturer's representative. Savings will be evaluated based on the following changes being made to the existing electrical systems:

1. Building Power Factor between 95% and 100%
2. Building total harmonics distortion of 1.8% or less

Power factor will be tracked monthly by Austin Energy's existing electric meter and removal of power factor charges documented via Austin Energy electric billing. Performance Services will use a power quality meter to verify total harmonic distortion levels annually.

OPTION C - Whole Building Data Analysis

Performance Services has selected IPMVP Option C for the following UCRMs:

- Building Automation System

In general, Option C is used with complex equipment replacement and controls projects for which predicted savings are relatively large, i.e., greater than about 10% to 20% of the site's energy use on a monthly basis. Option C regression methods are valuable for measuring interactions between energy systems or determining the impact of projects that cannot be measured directly, such as insulation or other building envelope measures.

Performance Services uses engineering calculations to compute the pre-retrofit baseline from the electricity and fuel bills. The post-retrofit utility consumption data from these meters will be obtained and subsequently compiled, analyzed, normalized for weather, occupancy and other variables and compared to the pre-retrofit baseline to determine the savings for each annual performance period in the contract.

SAVINGS FORMULAE

The savings are defined by the formula:

$$Savings = Baseline\ Energy - Option\ A\&B\ UCRM\ Savings - Post\ Installation\ Energy_{Normalized} \pm Adjustments$$

Where

Baseline Energy	=	Energy consumption calculated from utility bill analysis prior to retrofit and adjusted for other measures at this building for which savings are being measured using Option A and/or B
Option A&B UCRM Savings	=	*Energy and maintenance savings from Option A and Option B measured UCRMs within building*
Post Installation Energy$_{normalized}$	=	*Performance period energy use (customer provided post-retrofit electricity, natural gas and fuel oil billing data) that will be adjusted to the baseline load conditions to determine the savings*
Adjustments	=	*Routine and non-routine changes made to the baseline or performance period energy use to account for variations in conditions*

UCRM 5 – Building Automation System

Performance Services will replace existing obsolete controls, thermostats and pneumatic controls with BACnet, direct digital controls (DDC) building automations system (BAS). Scope of work includes replacing existing pneumatic valves and damper actuators with electric actuators. Energy savings will be realized through temperature set-points adjustments and optimized equipment operation according to occupancy and load conditions.

Performance Services will utilize the new BAS to trend available data, such as equipment run times, temperature set points, air flow (CFM), damper position, carbon dioxide (CO_2) level, etc. Savings are calculated using spreadsheet based engineering calculations. Savings result from:

- Reduced run hours - Optimal scheduling of HVAC equipment
- Temperature setbacks
- Cold & hot deck reset
- Optimizing outdoor air usage as appropriate
- Minimize simultaneous heating and cooling

Other Savings

Performance Services has provided documentation for the following Other Savings within the Appendix of the UAR. Due to these savings being small and/or not readily documentable, Performance Services believes that it is not cost effective to measure and verify these savings. Other Savings included in this project are as follows:

UCRM 7 Load Coop Demand Response

Performance Services proposes to install BAS programming for short term load curtailment that will allow the Texas Facilities Commission to participate in the Load Cooperative program through Austin Energy. This measure includes automated load curtailment at the Central Services building that can be used to curtail electrical demand/usage during curtailment events.

The Austin Energy load curtailment program typically includes 15 curtailment events per year which occur between the months of June and September. For participating, Austin Energy pays $1.45 per kWh saved during curtailment events.

Lighting Material Savings

The TFC will realize lighting material savings during the 10 warranty on linear LED retrofits and new fixtures. This savings has been calculated based on current TFC maintenance practices and material costs. This savings analysis is included in the Appendix of the UAR. To help assure that TFC achieves projected warranty period savings, PSI will training TFC staff on the warranty process and annually meet with TFC staff to review the procedures. The following annual lighting material savings have been reviewed and approved by TFC: $55,677.

Domestic Water Heating Savings

Retrofitting faucets with low flow aerators will reduce the demand and usage of domestic hot water. These savings are relatively small and as such, it is not cost effect to measure and verify the savings associated with this UCRM.

ENERGY, WATER AND O&M RATE DATA

For the purpose of calculation the energy dollar savings Performance Services in collaboration with Texas Facilities Commission, have agreed to the data below as the baseline year utility rates. Performance Services and Texas Facilities Commission agree for the term of this Agreement that the annual Utility Rate escalation factor will be 0% for electricity, natural gas, sewer and water. This escalation rate is based on the historical average rise in electric rates since 2011.

TABLE 7 – UTILITY RATES

Electric Rate for BHB & WPH

[illegible]	[illegible]	[illegible]
Summer (6 months):	$12.54	$0.05117
Winter (6 months):	$11.40	$0.05117

Summer - April through September

Electric Rate for CSB & TJR

[illegible]	[illegible]	[illegible]
Summer (4 months):	$14.95	$0.06599
Winter (8 months):	$13.95	$0.06099

Summer - June through September

Building		Rate ($/Unit)		
Name	Gross sq. ft.	Natural Gas (CCF)	Sewer (kgal)	Water (kgal)
Brown Healty	259,224	$0.48	$6.37	$8.82
Central Services	111,935	$0.48	$6.37	$8.82
Thomas J. Rusk	99,971	$0.48	$6.37	$8.82
William P. Hobby	419,276	$0.48	$6.37	$8.82

M&V SAMPLING GUIDELINES

This appendix introduces the statistical background, theory and formulas used to select, analyze and validate samples for project monitoring and evaluation. It also provides guidelines and procedures for the design and implementation of sampling.

The purpose of monitoring a sample, as an alternative to monitoring an entire population is to; (a) characterize particular attributes of a population from which a sample is drawn with adequate accuracy and reliability, while (b) reducing monitoring costs and effort.

As shown in figure below, sampling involves selecting several members from a population for monitoring and evaluation. The measured characteristics or behavior of the sample group is then used to infer the characteristics and/or behavior of the entire population. As expected, the assumption is that the sample is representative of the population. To ensure that the sample is indeed representative, calculations must be performed to assess and quantify the statistical validity of the sampled data. These calculations are presented later in this Appendix.

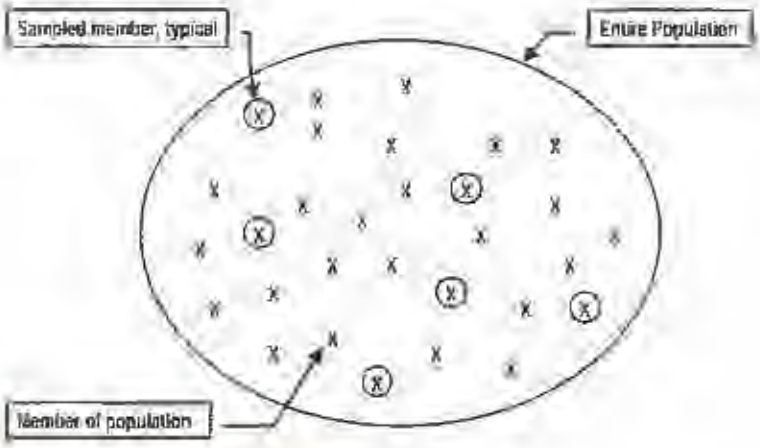

Figure 1 – Population and Sample

Sampling is applicable to projects such as lighting retrofits, energy efficient motor replacements, HVAC unit replacement, water retrofits, or any other project in which a number of similar pieces of equipment are affected by the same type of UCRM.

In the most common applications, sampling strategies are used to characterize the hours of operation and the instantaneous power draw of a constant-load device. A separate sample set is required for each item evaluated.

When selecting a sample from a population to determine hours of operation, it is necessary to ensure that the load is or device being sampled is monitored at or down-stream of its last point of control (LPC).

The last point of control (LPC) is the portion of an electrical circuit (or other source of energy), that serves a set of equipment that is controlled on a single switch. As a result, all of the fixtures or pieces of equipment on that LPC are typically operated the same number of hours per year.

For metering purposes, it is assumed that measurements taken of a single piece of equipment on an LPC captures the operating hours for all of the equipment served on the same circuit.

Mathematical Methods for Sampling

Sampling must be conducted using accepted methods and use an appropriate level of care to ensure that the M&V results that rely on the sampling and analysis are sufficiently accurate. This section provides a summary of the concepts, methods and equations to be used.

Although various assumptions regarding the distribution of the sampled data can be made, the large majority of sampling statistical analysis assumes that the data is normally distributed about the mean and in this Appendix, this assumption is made.

Statistical validity requires that the samples be randomly selected. Use of a random number generator, such as that found in MS Excel™ is convenient for ensuring the sample is randomly selected.

Point Estimation – Confidence and Precision

When we use sampling to estimate an average value of an entire population, we are performing an activity know as point estimation. A value or 'point' that is estimated based on a sample is not the actual average value but rather, is a value that is "reasonably close" to the actual average value. The question, then, for the M&V practitioner is: "What do we mean when we say 'reasonably close'?" The question is answered using the following statistical terms.

- Confidence: Confidence is fundamentally the same as probability, except that confidence refers to data already obtained, while probability refers to a future value. A confidence of 90% is commonly used in M&V. So, using our 90% example, when we refer to a confidence level, we are saying "I am 90% confident that the measured value is within my stated confidence interval."
- Confidence Interval (or Precision): Because the value estimated by sampling cannot be expected to be the actual value, it is useful to state an interval in which we have confidence the true value lies. Confidence interval is also often referred to as precision. An M&V practitioner may state that they know the value has a precision of 20%, which would mean that the "The estimate is within 20% of the true value."

Confidence and precision, then, are the values referred to when a 90/20 (or 80/20 or any other) criteria is specified.

EXAMPLE

Imagine that we wish to measure the run-hours of a sample of equipment for a month. Imagine now that we measure 200 'on' hours. If we are hoping to meet a 90/20 criteria, we are hoping that we can say, with a 90% probability, that our estimate is within 20% of the actual average run hours – that is, we are 9/10th sure the actual runtime is between 180 and 220 hours.

To graphically illustrate the concepts of normal distribution, confidence, and precision, shows a normal distribution with a confidence interval. Note that the confidence interval in the figure is defined by the error (+/- E). This error figure is discussed further below and is defined in Equation 1.

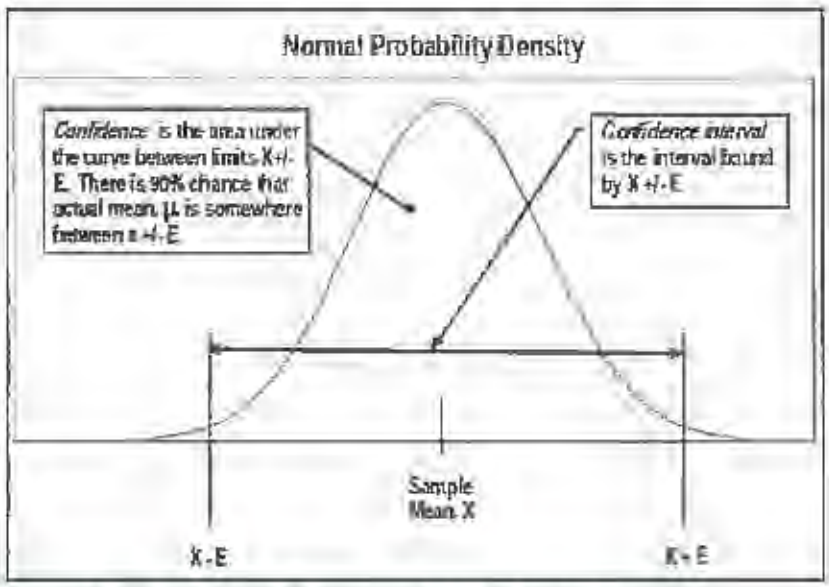

Figure 2 – Normal distribution with confidence interval

The confidence interval (or precision) and the confidence level are positively linked; for any sample, as the confidence interval increases (that is, the precision is reduced, and the range of possible values of the true mean increases) the confidence level increases. Or, looking at it another way, as the confidence interval is reduced, the confidence level is also reduced.

Application of Sampling to Projects

In the next sections considerations for the design and application of sampling are explored. The analysis steps to be used in conducting sampling are as follows:

These steps are discussed below.

Compile Project/UCRM and M&V Plan Information

In this step, the goal is to fully understand several things, including: the measure scope, the savings calculations quantifying the intended performance, the M&V method to be used and the data to be collected. Once the project is understood, an M&V practitioner can identify the calculation method and select variables to be sampled.

In many energy conservation projects, it is often necessary to conduct both pre and post installation sampling. Regardless of whether the sampling is for evaluating the baseline or the post-retrofit conditions, the following information is typically required to properly assign usage groups and determine sample sizes.

- ***Number of circuits, devices or LPCs.*** Identify and document the LPCs that are affected by the installation of UCRMs. This should be provided in the form of an equipment inventory survey in which each line in the survey represents an LPC that includes descriptions of affected and proposed UCRM nameplate data and quantity as well as location information.
- ***Actual or change in load or wattage.*** Using the equipment inventory survey, the total change in load or wattage of the affected equipment by usage group can be computed.
- ***Hours of operation.*** Sampling can be used to estimate the average hours of operation of the equipment. After the first sampling period (whether it is a year, month or week) of monitoring, the sampling result (actual C_v, Equation 3) should be used to compute the sample size. If it is expected that the equipment will be used in a significantly different in the current period than it was in the previous period, the estimate may be adjusted. Lighting hours of operation have already been established and defined herein.

Designate Sampling Groups

Each device or LPC should be assigned to a usage group based on similarities in the parameter being determined, such as operating hours or connected load. If differences are expected, but there are too few usage groups, the resulting variance of the data may result in unsatisfactory confidence and precision levels. However, if too many usage groups are created, then excessive monitoring and too small of populations may occur. So, while considering the tradeoffs, usage groups should be developed from criteria such as:

- Area type (for example; office, hallway, meeting room)
- Annual operating hours

- Timing / usage patterns of the operating hours, load, or other variable
- Variability of operating hours, load, or other variable
- Similar functional use

Usage groups should be selected so that equipment or LPC's are similar in that the sampled value (for example, hours or kW or kW/unit) is clustered around a specific estimate. When possible, avoid designating usage groups with populations that will yield less than 10 sample points.

Examples of standard usage groups for fan motors with similar operating hours are HVAC ventilation supply fans, return fans, and exhaust fans.

Examples of standard usage groups to determine lighting operating hours are fixtures with similar operating characteristics in offices, laboratories, hallways, stairwells, common areas, perimeters, storage areas, etc.

Usage groups may be defined for the population on a building-by-building basis or across a number of buildings with similar usage areas. Monitoring can be done for a single or multiple buildings provided the usage groups are similar. Defining populations for multiple buildings is acceptable and usually results in fewer monitoring points than if each building were considered separately.

SELECT SAMPLES

Select desired confidence and precision levels. A 90/20 confidence/precision level is commonly used in M&V and is suggested.

Establishing the Coefficient of Variation. Prior to selecting a sample, an estimate of the sampled coefficient of variation (C_v) must be made. A C_v of 0.5 has been historically recommended, and numerous projects have shown this to be reasonable guess for most applications. After the first year of monitoring, the coefficient of variation for each usage group can be projected from the results of the metering in the previous year.

Having selected a confidence and precision level (90/20) and a C_v (perhaps 0.5), use Equation 6 and 7, above, to calculate a sample size for each sampling group. Then, randomly select that number of samples from the population.

It is strongly recommended that oversampling (at a 10% or greater level) be included in case of data collection device failure or unexpectedly high data scatter.

Table 3 illustrates the effect of confidence interval and precision on sample size.

TABLE 6 – FIRST-YEAR (C_v=0.5) SAMPLE SIZE TABLE BASED ON USAGE GROUP SAMPLING[1]

Precision	20%	20%	10%
Confidence	80%	90%	90%
Z-Statistic	1.282	1.645	1.645
Population Size, N	Sample Size, n*		
4	3	4	4
8	5	6	8
12	6	8	11
16	7	9	13
20	8	10	16
25	8	11	19
30	9	11	21
35	9	12	24
40	9	12	26
45	9	13	28
50	10	13	29
60	10	14	32
70	10	14	35
90	10	15	39
100	10	15	41
125	11	15	45
200	11	16	51
300	11	17	56
400	11	17	59
500	11	17	60
Infinite	11	17	68

The samples in each usage group should be drawn at random[2], so that each member has an equal probability of being selected.

If there is reason to believe that there are significant seasonal variations in the operation of the equipment, sufficient monitoring will need to be conducted to capture these variations.

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1 Table does not reflect oversampling. However, because data collection problems are very, very common and because of the departure from normal distribution for small samples (less than 30), over-sampling is critical.

2 Random selection of monitoring points is critical to avoid bias in the sample. Spreadsheet or other computer software should be used to generate a list of random numbers that may be used to place loggers on a given LPC.

TABLE 9 – REPRESENTATIVE MONITORING EQUIPMENT USED FOR MEASUREMENT & VERIFICATION

	Manufacturer	Model	Measurement	Range	Accuracy
Lighting & Occupancy Time of Use	Hobo	Datalogger	-	-	-
Temperature & Relative Humidity	Hobo	U10-003	Temperature	-4°Fto 158°F	± 0.72°F
			Relative Humidity	25% to 95%	± 3.5%
Temperature & Relative Humidity + 2 external inputs	Hobo	U12-013	Temperature	-4°F to 158°F	± 0.72°F
			Relative Humidity	25% to 95%	± 3.5%
4 external inputs	Hobo	U12-006	-	-	-
Carbon Dioxide external input	Telaire	7001	Carbon Dioxide	0-4000 ppm	± 50 ppm
Current Transformer external input	Hobo	CTV-A	Amperage	0-20 A	± 4.5%
Current Transformer external input	Hobo	CTV-C	Amperage	0-100 A	± 4.5%
Boiler Horsepower / BTU's / Chiller kW per Ton	GE Panametrics	PT878	Flow	-17950 to 179500 gpm	± 1.5%
			Temperature	-4°F to 500°F	± 0.83°F
Multi-Phase Power	Hioki	3169-20	Voltage	0-600 V	± 0.2%
			Amperage	0-500 A	± 0.5%
Multi-Phase Power	Hioki	3169-20	Voltage	0-600 V	
			Amperage	0-500 A	
True-RMS Power	FLUKE	345 or 1735	Voltage	0-600 V	± 0.3%
			Amperage	0-1400 A	± 0.3%
Combustion	Bacharach	PCA-265	Oxygen	0.1% to 20.9%	± 0.3%
			Temperature	-4°F to 2192°F	± 6°F
			Carbon Monoxide	0-4000 ppm	±5%
			Nitric Oxides	1-3000 ppm	±5%
			Pressure	± 72 inches WC	± 2%

Performance
Services

Corey Haggard
Performance Assurance Administrator

Biography

With over 13 years of experience in the energy and industrial markets, Corey served in a variety of roles during his 11 years with Indianapolis Power & Light, including Journeyman Lineman and Transmission Systems Operator. While working at IPL, Corey experienced NERC, FERC, and OSHA operating guides and requirements first hand.

In 2012 Corey formed EnerCore LLC, where his focused operations included the installation and maintenance of energy producing assets designed specifically for small business and residential areas. He also developed a strategic business plan necessary for a competitive energy portfolio management and supply chain consulting company. Corey joined Performance Services in 2014.

Education

B.S. Business, Finance and Operations, Kelley School of Business at Indiana University Indianapolis, 2009

Associations

Six Sigma Green Belt Certification
Journeyman High Voltage Lineman – Indianapolis Power & Light

Confidential and Proprietary

Hamilton Southeastern Schools

Geist Elementary School

Year 4 – Quarter 4 Review

Performance Services

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Performance Services

Executive Summary

This Year 4 – Quarter 4 Guarantee Report contains the savings results for the period of time between October 1, 2014 and September 30, 2015. This report is intended to provide an update on the savings performance to date and to help uncover potential operating problems.

ENERGY SAVINGS:

Actual Measured Energy Savings:	$66,456	(electric)
	$22,904	(gas)
	$89,360	
Guarantee Savings (12 months)	$66,288	

Actual energy savings for the fourth guarantee year exceeded guaranteed energy savings by $23,072 after adjusting for utility rate changes, operating schedule variations, and owner overrides. The Guarantee is based on a combination of measured, verified, and calculated savings that are the most accurate methods of determining actual savings.

NEXT REPORT:

We will provide the Year 5 – Quarter 1 Guarantee Report in February 2016. Please feel free to contact us at 888-390-2700 with any questions or comments.

CONTACTS:

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- Chris Rainey, Engineering Manager
- Scott Morris, Operations Vice President
- Scott Zigmond, Sales and Marketing Vice President
- Tim Thoman, President
- Office: 888-390-2700

Performance Services

Annual Guaranteed Savings Report Summary

Year 4 - Quarter 4 (October 1, 2014 - September 30, 2015)

Description	Guaranteed Savings	Actual Savings	Net Difference
ENERGY SAVINGS			
Geist Elementary			
* Electric	48,202	66,456	18,254
* Gas	18,085	22,904	4,818
SAVINGS	**66,288**	**89,360**	**23,072**

Energy Savings Summary

Year 4 Quarter 4 (October 1, 2014 - September 30, 2015)

Improvement	Utility Tracking Savings			Measured and Verified Savings			Fixed Savings			Total Savings
	Guaranteed YTD	Actual YTD	Difference YTD	Guaranteed YTD	Actual YTD	Difference YTD	Guaranteed YTD	Actual YTD	Difference YTD	Actual YTD
GEIST ELEMENTARY										
GES-1 Jockey Boiler Installation & GES-2 AHU VFD & Control Modifications										
* Savings due to replacement of old boilers with high efficiency units	5,646		(5,646)							
* Savings due to elimination of summer boiler reheat	5,351		(5,351)				-	-	-	-
* Savings due to fan replacement and runtime reduction							495	661	166	661
* Adjustment for additional oil pump with new boiler			-	(653)	(898)	(245)			-	(898)
* Savings due to reduced OA resulting from less fan runtime	4,186		(4,186)				3,547	4,729		4,729
* Savings due to controlling outside air with CO2 sensors	3,102		(3,102)				294	392		392
Gas Savings - Utility Tracking Savings from Bills (Sub total Utility Tracking)	18,085		(18,085)							-
* Savings due to fan replacement and runtime reduction				6,911	9,603	2,692				9,603
* Savings due to reducing speed on AHUs and pumps							5,119	6,825	1,706	6,825
* Savings due to pumping changes				20,568	29,785	9,217				29,785
* Savings due to reduced compressor runtime							11,519	15,358	3,839	15,358
Geist Elementary School Total Savings (not including adjustments)	18,085	23,904	4,818	27,226	38,490	-	20,976	27,967	5,710	66,856
BASELINE ADJUSTMENTS										
* Base year adjustment to provide 15 CFM/person outside air per current code	(2,278)	(2,278)	-				(156)	(187)	(31)	(2,465)
Subtotal of adjustments	*(2,278)*	*(2,278)*	-	-	-	-	*(156)*	*(187)*	*(31)*	*(2,465)*

No. of summer months into guarantee: 7
No. of summer months into guarantee: 5
Total: 12

Utility Bill VS. Actual Savings Comparison

Year 4

Description	Utility Bill Savings	Outside Air & Motor Adjustments	Owner Override Impact	Anticipated Utility Bill Change
UTILITY SAVINGS				
Geist Elementary				
* Electric (not weather adjusted)	32,721	187	20,632	53,541
* Gas (weather adjusted)	22,904		(5,747)	17,157
SAVINGS	55,625		14,886	70,698

NOTE:

1 Actual savings are calculated as defined in the Performance Guarantee Agreement, not based on raw utility data. Raw utility data is not used to measure actual energy savings because it is inaccurate and very time consuming. However, we feel it is important to compare raw utility data to the actual savings as a cross check. Therefore, we have provided raw utility data with this report. After adjusting for utility rate changes, weather, increased fresh air, air-conditioning additional areas and owner overrides the raw utility data corresponds to within 21% or $18,662 of the actual savings.

Performance Services

Weather Adjusted Utility Bill Savings

Buildings:

Geist Elementary

ELECTRIC

Utility: Central Indiana Power
Meter #

Timeframe			Current Year			Base Year			Savings		
Previous Year	Current Year	Month	Usage (kWh)	Rate ($ / kWh)	Raw Costs ($)	Raw Usage (kWh)	Rate ($ / kWh)	Raw Costs ($)	Usage (kWh)	Rate ($ / kWh)	Savings ($)
2008	2014	Oct	99,600	$ 0.1078	$ 10,733	147,900	$ 0.0949	$ 14,039	48,300	$ 0.1078	$ 5,305
2008	2014	Nov	108,000	$ 0.1077	$ 11,631	139,200	$ 0.0985	$ 13,718	31,200	$ 0.1077	$ 3,358
2008	2014	Dec	93,300	$ 0.1078	$ 10,060	99,900	$ 0.0991	$ 9,900	6,600	$ 0.1078	$ 712
2008	2015	Jan	102,000	$ 0.1077	$ 10,990	109,200	$ 0.0865	$ 9,865	7,200	$ 0.1077	$ 776
2008	2015	Feb	115,800	$ 0.1076	$ 12,464	107,700	$ 0.0907	$ 9,765	(8,100)	$ 0.1076	$ (872)
2008	2015	Mar	108,300	$ 0.1077	$ 11,663	125,100	$ 0.0904	$ 11,313	16,800	$ 0.1077	$ 1,809
2008	2015	Apr	94,500	$ 0.1078	$ 10,189	105,000	$ 0.0907	$ 9,575	10,500	$ 0.1078	$ 1,132
2008	2015	May	107,000	$ 0.1028	$ 11,000	131,100	$ 0.0904	$ 11,846	24,100	$ 0.1028	$ 2,476
2008	2015	Jun	90,000	$ 0.1111	$ 10,000	143,700	$ 0.0902	$ 12,963	53,700	$ 0.1111	$ 5,967
2008	2015	Jul	90,000	$ 0.1111	$ 10,000	112,500	$ 0.0909	$ 10,169	22,500	$ 0.1111	$ 2,499
2008	2015	Aug	107,100	$ 0.1077	$ 11,535	150,000	$ 0.0904	$ 13,565	42,900	$ 0.1077	$ 4,620
2008	2015	Sep	117,300	$ 0.1076	$ 12,625	164,700	$ 0.0924	$ 15,365	47,400	$ 0.1076	$ 5,102
Total			1,234,900	$ 0.1078	$ 132,990	1,535,400	$ 0.0913	$ 140,098	300,500	$ 0.1078	$ 32,381

$ 0.1078

GAS

Utility: Vectren/ProLiance
Meter #

Timeframe			Current Year				Base Year						Savings		
Previous Year	Current Year	Month	Weather (HDD)	Usage (Therms)	Rate ($ / Therm)	Raw Costs ($)	Weather (HDD)	Raw Usage (Therms)	Rate ($ / Therm)	Raw Costs ($)	Weather Adjustment	Adj. Usage (Therms)	Usage (Therms)	Rate ($ / Therm)	Savings ($)
2008	2014	Oct	885	374	$ 1.3567	$ 313	298	1,623	$ 1.3332	$ 1,986	1.92	1,715	1,464	$ 1.3922	$ 2,011
2008	2014	Nov	885	629	$ 0.8467	$ 540	692	2,274	$ 1.1628	$ 2,644	1.25	5,100	3,461	$ 1.1628	$ 2,862
2008	2014	Dec	974	1,323	$ 0.7875	$ 1,148	1,165	4,091	$ 0.9980	$ 4,083	0.92	4,171	1,448	$ 0.9980	$ 1,446
2008	2015	Jan	1,234	3,602	$ 0.7065	$ 2,545	1,128	4,605	$ 1.2417	$ 5,485	1.09	5,675	2,073	$ 1.2417	$ 2,567
2008	2015	Feb	1,249	3,877	$ 0.6996	$ 2,712	1,015	3,330	$ 1.0146	$ 3,379	1.23	4,477	600	$ 1.0146	$ 608
2008	2015	Mar	790	711	$ 0.7608	$ 543	755	4,117	$ 1.1207	$ 4,614	1.05	4,590	3,879	$ 1.1207	$ 4,347
2008	2015	Apr	313	838	$ 0.7759	$ 638	342	3,456	$ 1.2237	$ 4,229	0.92	3,291	2,473	$ 1.2237	$ 3,026
2008	2015	May	79	639	$ 0.8436	$ 539	179	1,888	$ 1.3497	$ 2,548	1.00	1,888	1,249	$ 1.3497	$ 1,685
2008	2015	Jun	16	418	$ 0.9511	$ 398	–	1,530	$ 1.1825	$ 1,809	1.00	1,530	1,112	$ 1.1825	$ 1,315
2008	2015	Jul	–	333	$ 1.0285	$ 343	–	1,017	$ 1.5327	$ 1,559	1.00	1,017	684	$ 1.5327	$ 1,048
2008	2015	Aug	2	322	$ 1.0311	$ 332	–	945	$ 1.3073	$ 1,235	1.00	945	623	$ 1.3073	$ 814
2008	2015	Sep	19	390	$ 0.9846	$ 384	9	1,686	$ 1.0602	$ 1,788	1.00	1,686	1,296	$ 1.0602	$ 1,374
Total			5,866	14,343	$ 0.7753	$ 11,429	5,463	30,563	$ 1.1569	$ 35,357	1.04	34,905	20,342	$ 1.1569	$ 23,209

$ 0.8869

Performance
Services

Actual Equipment Usage

Year 4 - Quarter 1 (October 1, 2014 - December 31, 2014)

Building	System ID	Groover					Rosenbaum					Gastmeier					All Operating Savings							
		Base Yr. (Hours)	Base (Hours)	Actual (Hours)	Adjusted (Hours)	Saved (Hours)	Base Yr. (Hours)	Base (Hours)	Actual (Hours)	Adjusted (Hours)	Saved (Hours)	Base Yr. (Hours)	Base (Hours)	Actual (Hours)	Adjusted (Hours)	Saved (Hours)	Base Yr. (Hours)	Base (Hours)	Actual (Hours)	Adjusted (Hours)	Saved (Hours)	Power (kW)	Unit Cost ($/kW-Hr)	Savings ($)
		13	13				42	35				17	13				72	61							
Geist Elementary	VU-01	271	153	[illegible]	(126)	66	214	150	[illegible]	(119)	94	121	155	[illegible]	(189)	26	557	460	91	(169)	197	7.0	$ 0.109	$ 151
Geist Elementary	VU-02	323	153	[illegible]	99	64	214	150	[illegible]	47	94	121	155	[illegible]	(10)	66	557	460	604	149	197	7.0	$ 0.109	$ 151
Geist Elementary	VU-03	323	153	[illegible]	(1)	42	214	150	[illegible]	(73)	62	121	155	[illegible]	(154)	14	557	460	777	(278)	197	4.7	$ 0.109	$ 101
Geist Elementary	VU-04	323	153	[illegible]	(14)	95	214	150	[illegible]	(158)	64	121	155	[illegible]	(69)	54	557	460	777	(314)	197	16.7	$ 0.109	$ 400
Geist Elementary	Tower Fan	140	241	[illegible]	0	69	290	272	272	0	19	306	280	280	0	39	890	834	834	0	56	7.0	$ 0.109	$ 43
Geist Elementary	Intrusion Alarm (10 Years)	100	566	[illegible]	(34)	154	290	461	[illegible]	(6)	135	306	414	[illegible]	(1)	134	894	413	334	(159)	481	1.7	$ 0.109	$ 152
Geist Elementary	Heat Pumps (75 Years)	100	153	[illegible]	(23)	43	290	341	[illegible]	(68)	45	306	253	[illegible]	(184)	47	890	750	521	(123)	140	32.8	$ 0.109	$ 500
Geist Elementary	Office HVAC (3 Total)	100	241	[illegible]	(50)	19	290	272	[illegible]	(115)	18	306	280	[illegible]	(155)	28	890	834	921	(123)	56	1.0	$ 0.109	$ 6
Geist Elementary	Office HVAC (3 Total)	100	196	[illegible]	(26)	4	290	361	[illegible]	(97)	4	306	256	[illegible]	(103)	4	890	873	921	(211)	18	4.0	$ 0.109	$ 5
Geist Elementary	Aeration Boiler Pumps		650	[illegible]	(127)	100		637	[illegible]	(128)	(127)	-	658	[illegible]	(134)	(134)	—	1,953	251	(1,702)	(1,351)	3.0	$ 0.109	$ (440)
Geist Elementary	Hot Water Pumps	784	343	[illegible]	(340)	403	710	773	[illegible]	(81)	386	720	343	[illegible]	(41)	177	2,194	1,061	544	(483)	1,067	13.2	$ 0.109	$ 1,411
Geist Elementary	Heat Pumps (one Pump)	286	153	[illegible]	456	403	710	773	[illegible]	44	446	720	283	[illegible]	483	475	2,194	1,061	2,710	1,402	1,276	15.1	$ 0.109	$ 1,391
Geist Elementary	Toilet Pumps		-	[illegible]	546	-			[illegible]	155				[illegible]	150				981	981		22.4	$ 0.109	$ -
Total																								$ 7,[illegible]

Shaded in yellow: Geographical zones which were used to see how fuel consumption varies from one year to the next for the same building and the equipment serves a similar number of square feet. Guaranteed savings are the best estimate to date.

Performance
Services

Actual Equipment Usage

Year 4 - Quarter 2 (October 1, 2014 - March 31, 2015)

Building	System ID	January					February					March					2nd Quarter Savings							
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total																								

[illegible]

Actual Equipment Usage

Year 4 - Quarter 3 (October 1, 2014 - June 30, 2015)

Building	Equipment ID	April					May					June					4th Quarter Savings							
		[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] (Hours)	[illegible] ($)
		30	30				31	31				30	30				92	92						
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	(151)	64	[illegible]	[illegible]	[illegible]	(276)	[illegible]	[illegible]	[illegible]	[illegible]	119	[illegible]	[illegible]	[illegible]	[illegible]	(116)	346	2.0	$ 0.309	$ 264
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]		64	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	0	345	1.0	$ 0.309	$ 106
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]		64	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	0	346	4.7	$ 0.309	$ 176
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	0	345	18.7	$ 0.309	$ 704
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	0	18	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	0	18	[illegible]	[illegible]	[illegible]	0	55	7.0	$ 0.309	$ 40
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	(1,121)	179	[illegible]	[illegible]	[illegible]	91	[illegible]	[illegible]	[illegible]	[illegible]	40	[illegible]	[illegible]	[illegible]	[illegible]	7	445	3.7	$ 0.309	$ 182
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	46	[illegible]	[illegible]	[illegible]	(61)	49	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	(153)	175	37.9	$ 0.309	$ 990
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.0	$ 0.309	$ 34
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.0	$ 0.309	$ 49
Geist Elementary	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	—			[illegible]	—		[illegible]	[illegible]	[illegible]	[illegible]	1.6	$ 0.309	$ [illegible]
Geist Elementary	Hot Water Pumps	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]				[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$ 0.309	$ [illegible]
Geist Elementary	Heat Pump Loop Pumps	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$ 0.309	$ [illegible]
Geist Elementary	Tower Pumps		—	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$ 0.309	$ [illegible]
Total																								$ 38,738

Hours in bold are Guaranteed Savings which were made as we have identified the measure. For this point and this equipment has no example in the [illegible] of equipment hours. Guaranteed hours are the best estimate we have.

Performance Services

Actual Equipment Usage

Year 4 - Quarter 4 (October 1, 2014 - September 30, 2015)

Building	System ID	July					August					September					All Quarter Savings							
		Baseline (Hours)	Gas (Hours)	Actual (Hours)	Adjusted (Hours)	Savings (Hours)	Baseline (Hours)	Gas (Hours)	Actual (Hours)	Adjusted (Hours)	Savings (Hours)	Baseline (Hours)	Gas (Hours)	Actual (Hours)	Adjusted (Hours)	Savings (Hours)	Baseline (Hours)	Gas (Hours)	Actual (Hours)	Adjusted (Hours)	Savings (Hours)	Power (kW)	kWh Rate (kWh/Yr)	Savings ($)
		40	41				1	11				40	41				41							
Geist Elementary	VU-A1	231	-	189	189	231	231	90	154	94	141	149	450	621	(59)	464	611	590	965	181	467	7.0	$ 0.109	$ 351
Geist Elementary	VU-B1	231	-	0	0	231	231	80	80	-	141	149	450	450	-	65	611	590	590	0	467	7.0	$ 0.109	$ 351
Geist Elementary	VU-C1	231		0	0	231	231	80	80		141	149	450	450		65	611	590	590	0	467	4.7	$ 0.109	$ 238
Geist Elementary	VU-E1	231	-	0	0	231	231	40	113	73	141	149	450	446	4	63	611	590	559	36	457	18.7	$ 0.109	$ 932
Geist Elementary	Bowers Fan	300	197	497	497	103	300	189	189	0	111	290	279	279	0	11	890	710	710	0	124	7.0	$ 0.109	$ 137
Geist Elementary	Exhaust Fans (10 Total)	300	-	300	300	300	300	85	85	150	215	290	167	167	42	149	890	504	464	243	664	3.7	$ 0.109	$ 360
Geist Elementary	Heat Pumps (75 Total)	300	162	462	13	188	300	146	146	66	153	290	245	1,167	(174)	45	890	554	1,775	(84)	1,691	37.4	$ 0.109	$ 3,389
Geist Elementary	Chiller 10" (1 Total)	300	159	441	(141)	17	300	101	154	47	13	290	237	318	(198)	16	890	536	913	(231)	682	1.0	$ 0.109	$ 67
Geist Elementary	Gym HP's (12 Total)	300	127	127	0	168	300	119	260	134	141	290	127	127	0	4	890	557	687	134	331	4.0	$ 0.109	$ 143
Geist Elementary	Military Boiler Pumps	-	-	0	0	-	-	-	0	0	-	-	-	0	0	-		-	14	14	-	1.0	$ 0.109	$ -
Geist Elementary	Hot Water Pumps	-		11	11		-	-	38	38	-	240	-	40	40	200	240	-	79	79	240	11.0	$ 0.109	$ 174
Geist Elementary	Heat Pump Loop Pumps	788	170	958	958	467	788	231	744	513	463	720	243	718	414	425	2,308	703	3,207	1,514	1,575	35.1	$ 0.109	$ 5,783
Geist Elementary	Tower Pumps	794	440	1,234	(242)	104	734	440	1,174	(1,513)	104	720	476	1,196	(234)	234	2,208	1,356	3,603	(984)	962	17.4	$ 0.109	$ 2,109
Total																								$ 12,148

[illegible]

Hours in Series Alternative Hours which were used in the final savings table for the point and the equipment has remained in place of actual hours. Estimated hours are the best estimate hours.

FAN MOTOR RUNTIME SAVINGS

Building	System ID	Motor HP	Break HP / Motor HP	kW / HP	Fan Speed	Fan kW	Saved Hrs / Yr	Motor Efficiency	Savings (kWh)	Rate (kWh)	Savings ($)
GES-1 Jockey Boiler Installation											
Geist Elementary	Boiler Fan	5.00	1.00	0.746	100%	4.663	1,300	80%	6,061	$ 0.109	$ 663
Subtotal for GES-1									**6,061**		**$ 663**

Note: Heat pump fan HP's are the total for all of the fan horsepowers.

Note: Tower Fan has 2-stage HP motor, assume lower motor hp of the 2 stages.

Constant Volume to Variable Speed Fan Conversion

Electric Fan Savings

Description	Full Load Power		Fan Speed		Average kW Savings (kWh)	Future Operating Hours	Savings (kWh)	Composite Consumption Rate ($)	Utility Savings ($)
	(HP)	(kW)	Current Average Amount	Future Average Amount					
GES-2 AHU VFD and CO_2 Sensor Installation and Control System Optimization									
VU-A1	7.50	5.266	100%	60%	4.13	1,400	5,780	$ 0.109	$ 633
VU-D1	7.50	5.266	100%	60%	4.13	1,400	5,780	$ 0.109	$ 633
VU-E1	5.00	3.511	100%	60%	2.75	1,400	3,853	$ 0.109	$ 422
VU-F1	20.00	14.042	100%	55%	11.71	1,400	16,388	$ 0.109	$ 1,794
Hot Water Pumps	15.00	10.532	100%	65%	7.64	4,000	30,558	$ 0.109	$ 3,344
Total for GES-2							**33,801**		**$ 6,825**

Heating and Air-conditioning Savings Due to CO_2 Control

Building	Unit Type	Quantity	Occupied Hours		Heating OA		Air-conditioned OA		Occupied Energy Change		Savings	
			Winter (Hours)	Summer (Hours)	Current (CFM)	Future (CFM)	Current (CFM)	Future (CFM)	Heating (BTU)	Cooling (BTU)	Heating $	Cooling $
Geist Elementary	VU-A1	1	1,260	140	3,860	2,500	3,860	2,500	(65,073,960)	(7,261,190)	$ 809	$ 67
Geist Elementary	VU-D1	1	1,260	140	4,105	3,500	4,105	3,500	(28,948,343)	(3,230,162)	$ 360	$ 30
Geist Elementary	VU-E1	1	1,260	140	3,550	3,000	3,550	3,000	(26,316,675)	(2,936,511)	$ 327	$ 27
Geist Elementary	VU-F1	1	1,260	140	9,000	5,000	9,000	5,500	(191,394,000)	(29,365,105)	$ 2,381	$ 269
Total for GES-2					20,515	14,000			(311,732,878)	(42,792,967)	$ 3,878	$ 392

Outside Air Heating & Cooling Savings Resulting From Reduced Runtimes

Building	Unit Type	Quantity	Future Hours		Reduced Hours		Current OA		Energy Savings/Penalties		Savings/Costs	
			Winter (Hours)	Summer (Hours)	Winter (Hours)	Summer (Hours)	Heating (CFM)	Cooling (CFM)	Heating (BTU)	Cooling (BTU)	Heating (BTU)	Cooling (BTU)
Geist Elementary	VU-A1	1	1,260	140	540	660	3,860	3,860	(79,155,090)	(97,156,547)	$ 985	$ 890
Geist Elementary	VU-D1	1	1,260	140	540	660	4,105	4,105	(84,179,183)	(103,323,239)	$ 1,047	$ 946
Geist Elementary	VU-E1	1	1,260	140	540	660	3,550	3,550	(72,798,075)	(89,353,820)	$ 906	$ 818
Geist Elementary	VU-F1	1	1,260	140	540	660	9,000	9,000	(184,558,500)	(226,530,810)	$ 2,296	$ 2,075
Total for GES-2									(420,690,848)	(516,364,396)	$ 5,233	$ 4,729

Increased Heating and Cooling Costs Due to Increased Fresh Air Amounts

Building	Unit Type	Quantity Qty	Occupied Hours		Heating OA		Air-conditioned OA		Occupied Energy Change		Dollars Change	
			Winter (Hours)	Summer (Hours)	Current (CFM)	Future (CFM)	Current (CFM)	Future (CFM)	Heating (BTU)	Cooling (BTU)	Heating $	Cooling $
Geist Elementary	VU-D1	1	1,260	140	2,053	4,105	2,053	4,105	98,209,046	10,958,523	($1,227)	($100)
Geist Elementary	VU-E1	1	1,260	140	1,775	3,550	1,775	3,550	84,931,088	9,476,920	($1,056)	($87)
Subtotal					3,828	7,655	3,828	7,655	183,140,134	20,435,444	($2,278)	($187)

Notes:

1. Minimum OA is based upon an occupancy of 25 persons in each classroom

Chiller Runtime Savings

System ID	Quantity	Efficiency (kW / Ton)	Tonage per unit	Total kW	Average Output	Average kW	Average Tonage	Saved Hours / Year	Usage (kWh/yr)	Rate ($/kWh)	Savings ($/yr)
GES-2 AHU VFD and CO_2 Sensor Installation and Control System Optimization											
VU-A1	1	1.41	30.50	42.94	50%	21.47	15.25	720	15,460	$ 0.109	$ 1,692
VU-D1	1	1.41	30.50	43.01	50%	21.50	15.25	720	15,482	$ 0.109	$ 1,694
VU-E1	1	1.41	26.70	37.59	50%	18.80	13.35	720	13,534	$ 0.109	$ 1,481
VU-F1	1	1.41	88.50	124.61	50%	62.30	44.25	720	44,859	$ 0.109	$ 4,909
Heat Pumps (75 Total)	75	0.85	3.40	216.75	40%	86.70	1.36	510	44,217	$ 0.109	$ 4,839
Office HP's (3 Total)	3	0.85	2.50	6.38	35%	2.23	0.88	319	711	$ 0.109	$ 78
Gym HP's (2 Total)	2	0.85	20.00	34.00	35%	11.90	7.00	510	6,069	$ 0.109	$ 664
Total Savings for GES-2									**140,331**		**$ 15,358**

Note:

1. Average Output is calculated based on existing tonnage installed and calculated load.
   AO = (calculated load / installed tons) * (60% average annual loading)

2. Efficiency based on part load operation of 19 year old equipment, used 1.28 kW/ton x 1.10 fouling factor

City of Austin
Austin Energy
Town Lake Center • 721 Barton Springs Road • Austin, Texas 78704 - 1145

July 7, 2016

Farshad Shahsavary, P.E., CEM
Energy and Engineering Manager
Office of Energy Management
Texas Facilities Commission

Dear Mr. Shahsavary,

Thank you for your interest in participating in Austin Energy's Commercial Rebate Program. We have worked with Texas Facilities Commission on many energy efficiency projects over the years and look forward to continuing this relationship in the future.

From the information on new efficient lighting, lighting controls, and variable frequency drives submitted by PSI for Brown Heatly, Central Services, Thomas J. Rusk, and William P. Hobby buildings, we estimate that the rebates provided by Austin Energy would be approximately $257,100. These are only estimates because Austin Energy conducts pre and post verification site visits to verify that the numbers and type of lighting, controls and equipment are consistent with the submittals. Often times during these verification visits, we find additional energy efficiency opportunities that AE can rebate.

If you have further questions, please let me know.

Sincerely,

David Hood, P.E.
Manager, Commercial Energy Efficiency

Estimated Rebates for Texas Facilities Commission Energy Efficiency Projects

Measures	Brown Heatly	Central Services	Thomas J. Rusk	William P. Hobby	Totals
Lighting	$ 90,812.58	$ 13,390.65	$ 25,991.49	$ 107,247.56	$ 237,442.28
Lighting Controls	$ 3,260.12	$ 1,261.78	$ 604.73	$ 4,115.95	$ 9,242.58
VFDs	$ 5,096.16	$ 5,317.44	$ -	$ -	$ 10,413.60
TOTALS	**$ 99,168.86**	**$ 19,969.87**	**$ 26,596.22**	**$ 111,363.51**	**$ 257,098.46**

EXHIBIT F

EXHIBIT F - PROJECT IMPROVEMENT LIST

PROJECT SCOPE

The following project scope matrix defines the project improvements being made at each building:

Matrix of UCRMs							
	1	2	3	4	5	6	7
Building	LED Lighting w/ 1,326 Sensors	Power Conditioning	Variable CHW Flow	Water Controls	Building Automation System	Variable Air Volume	Load Coop Demand Response
Thomas Jefferson Rusk	◆	◆		◆			
William P. Hobby	◆	◆		◆			
Central Service	◆	◆	◆	◆	◆	◆	◆
Brown-Heatly	◆	◆	◆	◆			

UTILITY COST REDUCTION MEASURE SUMMARIES

LED Lighting

This measure considers replacement of the fluorescent, incandescent and HID lighting with LED lighting. Benefits include:

- High efficacy, low energy usage
- 70,000+ hour lamp life typically
- Ten year warranty on most product
- Improved illumination levels
- Improved lighting controls to reduce operational hours

A detailed scope of work for this measure follows:

- Retrofit and/or replace 4,789 fixtures at Brown Heatly
- Install approximately 490 occupancy sensors at Brown Heatly
- Retrofit and/or replace 1,561 fixtures at Central Services
- Install approximately 188 occupancy sensors at Central Services
- Retrofit and/or replace 1,199 fixtures at Thomas J. Rusk
- Install approximately 59 occupancy sensors at Thomas J. Rusk
- Retrofit and/or replace 7,147 fixtures at William P. Hobby
- Install approximately 589 occupancy sensors at William P. Hobby
- Provide one percent spare lamps and/or drivers
- All material made obsolete during this work will be disposed of according to state and local requirements.

Power Conditioning

This measure considers installation of a total of 31 power conditioners with modular capacitance (where applicable) to improve power factor making your motor load run cooler and more efficiently. This results in a reduction in energy consumption and an extension of the useful life of your motor load. The Power Conditioning System will also provide harmonic filtration to mitigate harmonic distortion and recycle waste energy resulting in reduced energy consumption which prolongs the longevity of electrical equipment.

Lastly, the Power Conditioning System with its industrial grade metal oxide varistors (MOVs) protects electrical equipment from transient electrical equipment.

A detailed scope of work for this measure follows:

- Installation of 11 (or less units with equivalent capacity) power conditioning panels at Brown Heatly
- Installation of 4 (or less units with equivalent capacity) power conditioning panels at Central Services
- Installation of 4 (or less units with equivalent capacity) power conditioning panels at Thomas J. Rusk
- Installation of 12 (or less units with equivalent capacity) power conditioning panels at William P. Hobby

Building Automation System

The scope of this upgrade includes replacing the existing pneumatic control system at CSB with a DDC control system that will provide for scheduling, trending, alarms and graphics of the equipment in the building. The scope of this upgrade includes the installation of DDC control for the equipment listed below:

- Chilled Water and Heating Water Central Plants
- (6) Variable Air Volume Air Handling Units
  - AHU-1, AHU-1A, AHU-2A, AHU-1C, AHU-2C, AHU-3B
- (1) Dual Duct Variable Air Volume Air Handling Unit
  - AHU-1B
- (1) Single Zone Air Handling Unit
  - AHU-4
- (1) Packaged Rooftop Unit
- RTU-1
- (43) VAV Boxes with Reheat coils
- (39) VAV Boxes – Cooling Only
- (11) Dual Duct VAV Boxes
- (4) Exhaust Fans

Energy savings will be realized through temperature set-point adjustments and optimized equipment operation according to occupancy and load conditions. The proposed BAS system will be capable of providing all commonly used energy conservation control strategies.

Variable CHW Flow

The following is a summary of the scope of this measure:

- Install and commission variable speed drives to serve chilled water pump motors CH-1, CH-2 and CH-3 at Brown Heatly and chilled water pump motors CH-1 and CH-2 at Central Services
- Coordinate with controls contractor to integrate variable speed drives into building automation system and provide necessary graphics.
- Install differential pressure sensor in chilled water loop
- Verify minimum flow through chiller
- Commission variable flow chilled water pumping system. Control system to vary speed of chilled water pump motors based on system pressure differential.

Water Controls

A detailed scope of work for this measure follows:

High Efficiency Toilet (HET) Retrofit

Recommendation: HETs use a maximum of 1.28 gpf, or 20% less water than standard 1.6 gpf toilets. With the passage of the 1992 Energy Policy Act, 1.6 gpf toilets became the standard in the United States. The State of Texas now requires all toilets sold on or after January 1, 2014 to operate at 1.28 gpf or less.

The recommendation involves removal of all existing toilets with flush volumes of 1.6 gpf or greater and replacement with HETs (a total of 203 toilets). This recommendation includes replacing all porcelain and flush valves, which is necessary to ensure that the fixtures work with maximum efficiency.

High Efficiency Urinal (HEU) Retrofit

Recommendation: HEUs are available that use a maximum of one pint per flush (0.125 gpf), or 87.5% less water than standard 1.0 gpf urinal. With the passage of the 1992 Energy Policy Act, 1.0 gpf urinals became the standard in the United States. New Standards developed by the EPA WaterSense Program are being adopted by the majority of plumbing manufacturers. PSI recommends 0.125 gpf over waterless toilets because of possible sediment and other maintenance issues that arise with waterless toilets.

The recommendation involves removal of 71 high flow urinals with a flush volume of 1.0 gpf. This recommendation includes replacing all porcelain and flush valves, which is necessary to ensure that the fixtures work with maximum efficiency. Failure to install the correct and compatible combination can result in sedimentation of the drain line and other components.

High Efficiency Lavatory Faucet Aerator Retrofit

Recommendation: High efficiency aerators for lavatories typically use 0.5 gpm or less. The recommended action involves replacing 220 lavatory faucet aerators that have a

flow rate of 2.2 gpm or greater with new high efficiency aerators having flow rates of 0.5 gpm or less.

High Efficiency Hand Wash Faucet Aerator Retrofit
Recommendation: High efficiency aerators for hand wash faucets typically use 0.5 gpm or less. The recommended action involves installing two high efficiency aerators on kitchen/break room faucets. It is recommended that the faucets be fitted with high efficiency aerators with flow rates not to exceed 0.5 gpm.

High Efficiency Kitchen/Break Room Faucet Aerator Retrofit
Recommendation: High efficiency aerators for kitchens and break rooms typically use 1.5 gpm or less. The recommended action involves installing 41 high efficiency aerators on kitchen/break room faucets. It is recommended that the faucets be fitted with high efficiency aerators with flow rates not to exceed 1.5 gpm

High Efficiency Showerhead Retrofit
Recommendation: High efficiency showerheads typically use 1.5 gpm or less. The recommended action involves installing five high efficiency showerheads. It is recommended that the showerhead flow rate not to exceed 1.5 gpm.

Variable Air Volume
The following is a summary of the scope of this measure:

- Install and commission variable speed drives to control the cold and hot deck supply fan motors for AHU-1B
- Coordinate with controls contractor to integrate variable speed drives into building automation system and provide all graphics.
- Commission variable air volume conversion of air handling units. Control system to vary speed of supply fans based on difference between actual space temperature and set point space temperature as well as outdoor air temperature. Fan shall be scheduled off during unoccupied periods.

Load Coop Demand Response
The following is a summary of the scope of this measure:

- Add a Load Coop setting to the building automation systems at the Central Services building
- The Load Coop setting will reduce building electrical demand by reducing the load on the central plant and air handling units
- The Load Coop setting will raise space temperature set points between 4:00 pm and 5:00 pm and then further raise these set points after 5:00 pm

EXHIBIT G

Exhibit G – Specifications

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Design Build Project

EXHIBIT H

Exhibit H

Measurement and Verification Plan

Pursuant to the terms of that certain Energy Performance Contract between The Texas Facilities Commission ("TFC") and Performance Services, Inc. ("ESCO") dated _____ (the "Contract"), ESCO shall perform the energy and water savings measurement and verification as defined within this Measurement and Verification Plan (the "Plan"). ESCO shall also coordinate the Plan with the M&V Consultant, as defined in the Contract. ESCO and the M&V Consultant shall work to resolve any issues with respect to the Plan to the reasonable satisfaction of TFC.

M&V Consultant

The M&V Consultant will be hired by TFC and will provide the following services:

1. Review and develop a comprehensive understanding of the Plan.
2. Coordinate with ESCO annually to confirm that field measurements are being taken and recorded as well as all necessary trend data.
3. Review the Periodic Savings Report, as defined in the Contract (the "Report"). This task will be completed within two (2) weeks from the date the Report is received by TFC. M&V Consultant shall submit their review comments to TFC and ESCO in writing.
4. Work with ESCO and TFC to ensure that TFC's measurement and verification concerns are addressed to the reasonable satisfaction of TFC.

GUARANTEED SAVINGS ESCO shall guarantee energy savings ("Energy Savings") pursuant to the terms of Exhibit I to the Contract, the Performance Guarantee Agreement (the "Guarantee"). The term of the Plan shall equal the term of the Guarantee. Energy Savings are calculated based on the installation of Utility Cost Reduction Measures ("UCRMs") which are designed to reduce electric consumption (kWh), reduce natural gas consumption (CCF), and reduce water/sewer usage (kgal).

Operational savings ("Operational Savings") for maintenance, as identified and calculated in Exhibit E to the Contract, Utility Assessment Report (the "UAR"), are agreed to and stipulated by TFC for the term of the Guarantee. ESCO and TFC agree for the term of the Guarantee that the annual Utility Rate escalation factor will be 0% for electricity, natural gas, water and sewer.

Energy Savings and Operational Savings shall be collectively referred to herein as "Guaranteed Savings".

Schedule A of the Plan contains the methodology and calculations used to determine Guaranteed Savings achieved as a result of the installation of the UCRMs, as well as the methodology that ESCO will use to measure, verify, and report on Guaranteed Savings achieved annually during the term of the Guarantee.

Pursuant to the Guarantee, Guaranteed Savings are as follows:

TABLE 1 – GUARANTEED SAVINGS

UCRM No.	UCRM Title	ANNUAL SAVINGS							Total Savings
		Electric Energy (kWh/yr)	Electric ($/yr)	Natural Gas (CCF/yr)	Natural Gas ($/yr)	Water/Sewer (kgal/yr)	Water/Sewer ($/yr)	Other Savings	
1	LED Lighting w/ 1,326 Sensors	3,979,335	$263,105					$55,677	$318,782
2	Power Conditioning	655,504	$45,817					$7,256	$53,073
3	Variable CHW Flow	116,928	$8,093					$0	$8,093
4	Water Controls	99,456	$7,047			4,453,617	$67,650	$0	$74,698
5	Building Automation System	315,945	$20,925	10,391	$4,988			$0	$25,913
6	Variable Air Volume	35,607	$2,925						$2,925
7	Load Coop Demand Response	1,139	$1,652						$1,652

TABLE 2 – ANNUAL SAVINGS

Year	Annual Savings				
	Electricity (kWh) $	Natural Gas (Therm) $	Water/ Sewer $	Other Savings $	Total Savings $
1	$349,563	$4,988	$67,650	$62,933	$485,135
2	$349,563	$4,988	$67,650	$62,933	$485,135
3	$349,563	$4,988	$67,650	$62,933	$485,135
4	$349,563	$4,988	$67,650	$62,933	$485,135
5	$349,563	$4,988	$67,650	$62,933	$485,135
6	$349,563	$4,988	$67,650	$62,933	$485,135
7	$349,563	$4,988	$67,650	$62,933	$485,135
8	$349,563	$4,988	$67,650	$62,933	$485,135
9	$349,563	$4,988	$67,650	$62,933	$485,135
10	$349,563	$4,988	$67,650	$62,933	$485,135
Total	$3,495,633	$49,876	$676,504	$629,331	$4,851,345

Note: No escalation factor has been applied.

In addition to the savings defined in the above tables, ESCO is guaranteeing that the project utility rebate paid to TFC will be at least $175,000. TFC shall submit all required rebate documentation and fully support the rebate process. If the rebate does not amount to at least $175,000, TFC shall have the same remedies as annual savings listed in Table 2 above.

Table 3 below provides the annual fees for the Plan:

TABLE 3 – ANNUAL M&V FEE

Year	Annual Costs		
	PSI M&V Cost	3rd Party M&V Cost	Total M&V Cost
1	$29,000	$11,000	$40,000
2	$29,000	$11,000	$40,000
3	$29,000	$11,000	$40,000
4	$29,000	$11,000	$40,000
5	$29,000	$11,000	$40,000
6	$29,000	$11,000	$40,000
7	$29,000	$11,000	$40,000
8	$29,000	$11,000	$40,000
9	$29,000	$11,000	$40,000
10	$19,000	$11,000	$30,000
Total	$280,000	$110,000	$390,000

INFORMATION AND ITEMS TO BE FURNISHED BY TFC:

TFC shall furnish to ESCO any design, construction, maintenance or operating documents/manuals; utility billing data for electricity and natural gas consumption, bills and other information necessary to provide services under the Plan. To the fullest extent possible, information shall be delivered or made available in electronic media form and universal file formats (Text, comma delimited files, PDF, JPEG).

During the term of the Plan, TFC shall furnish a secure area for the storage of required materials and provide and arrange access for ESCO to such secure area as may be necessary for expeditious and orderly performance of the services under the Plan.

UTILITY RATES AND BASELINE ASSUMPTIONS:

The Guaranteed Savings shall be based on the utility cost per unit established and agreed to by both parties which is defined in the Energy, Water and O&M Rate Data section of the Plan. For each year, the dollar savings shall be calculated based on the baseline unit cost of electricity and natural gas as defined within Schedule A of the Plan. These and other baseline assumptions used to calculate the Guaranteed Savings are documented in the UAR and Schedule A of the Plan. This includes, but is not limited to, assumptions about facility usage, occupancy, operating schedules, standards of comfort and continuance of the current physical plant and facility layout,

configuration and equipment. Changes to any or all of these assumptions will be cause for adjustment of the Guaranteed Savings baseline as agreed to by both parties.

BASELINE CONDITIONS:

The baseline conditions for calculation of the Guaranteed Savings are set forth in Schedule A of the Plan. In the event that the actual conditions vary from the baseline conditions during the term of the Guarantee, the Guaranteed Savings calculations shall be adjusted to reflect the new baseline conditions.

ANNUAL REPORT:

ESCO will prepare and submit to TFC an annual report within ninety (90) days of the anniversary of commencement date of the Plan. A sample annual report has been included within the Appendix of the UAR.

FEES AND PAYMENTS:

TFC shall pay ESCO an annual fee for the performance of the services described in the Plan, pursuant to Table 3 above (the "M&V Fee"). ESCO shall invoice TFC for the M&V Fee semi-annually for the previous six months of documented work. Failure to pay the M&V Fee shall be grounds for termination of the Guarantee by ESCO.

MANNER AND TIME OF PAYMENT:

The invoice shall be supported by such documents as TFC shall reasonably require. Payment shall be due thirty (30) calendar days after the invoice date.

In the event that TFC, in good faith, disputes any portion of the invoice, TFC shall advise ESCO in writing of the disputed portion and the undisputed portion of the invoiced amount shall be due thirty (30) calendar days after the invoice date. TFC's liability for non-payment shall be governed in accordance with the Texas Prompt Payment Act.

SHORTFALL PAYMENT:

Within ninety (90) days after the completion of each annual period and receipt by ESCO of all required information, ESCO shall submit to TFC an annual Report verifying and supporting the actual savings achieved for the preceding annual period and comparing it to the Guaranteed Savings. The Report shall include measurements, documentation and savings calculations used to support the reported savings for the period. Any shortfall in savings for an annual period shall be specifically identified in the Report, and any shortfall amount shall be paid by ESCO to TFC within thirty (30) days of the submission of the annual Report. The maximum shortfall in any one-year period is limited to the annual guaranteed energy savings amount identified in Table 2.

EARLY TERMINATION OF M&V:

TFC, at its sole discretion, may elect to terminate the Plan and the Guarantee after the end of the first year. Any such termination of the Plan and the Guarantee shall be submitted in writing by an authorized agent of TFC to ESCO. Upon receipt of such termination, ESCO shall have no further obligations or liability with respect to the Plan or the Guarantee.

MATERIAL CHANGES TO UCRM:

From time to time, TFC may need to make changes or modifications to its facilities, which may affect the Plan and/or the Guarantee. Minor changes to facilities can be accommodated by means of a baseline and or savings adjustment, subject to agreement by both parties. Any major change affecting more than 25% of the Guaranteed Savings for any given UCRM or facility or more than 10% of the total Guaranteed Savings shall be classified as a "Material Change" and shall be cause for full or partial termination of the Plan and Guarantee.

Upon formal notification of a qualifying Material Change by TFC, ESCO will prepare and submit, within 30 days, a termination proposal for the Guarantee and the Plan, which shall be reasonably agreed to by the parties.

EQUIPMENT MAINTENANCE AND OPERATION RESPONSIBILITY:

TFC agrees to maintain its facilities, including the physical plant and all existing equipment / systems affecting energy efficiency, such that the condition of the facilities during the term of the Guarantee is at least equal to their condition at the completion of this Contract. TFC also agrees to properly maintain (in accordance with manufacturer's guidelines and specifications) all new and existing equipment and operate all new and existing systems as described in the Proposal, Contract and Guarantee. If TFC fails to operate its facilities as described herein and such failure results in reduced Energy Savings or Operational Savings, then the Guarantee and the Plan shall be adjusted accordingly.

BASELINE ENERGY CONSUMPTION & METHODS TO ADJUST

The Baseline for Energy and Water/Sewer annual consumption has been established through analysis of utility billing data and analysis of data trends acquired by Performance Services during the UAR. The following table contains the agreed upon baselines for this project.

TABLE 4 - ENERGY AND WATER/SEWER BASELINE

Building		Baseline Consumption - 12 months			
Name	Gross sq. ft.	Electricity (kWh)	Natural Gas (CCF)	Sewer (kgal)	Water (kgal)
Brown Heatly	259,224	8,645,053	175,332	6,783	6,783
Central Services	111,935	2,084,400	50,873	2,236	2236
Thomas J. Rusk	99,971	1,663,000	22,703	956	956
William P. Hobby	419,276	9,148,000	433	7,367	7367

Methods to Adjust Energy Consumption

Adjustments

In the basic equation used to determine savings shown below (General Savings Equation), adjustments are sometimes required to account for changes unrelated to the UCRM that affect energy use. Such adjustments may account for changes in weather, occupancy, or other factors between the baseline and performance periods.

General Savings Equation:

Savings = (Baseline Energy – Post Installation Energy) ± Adjustments

The purpose of adjustments is to express both baseline and post-installation energy under the same set of conditions. The modifications to the savings can be further distinguished as routine and non-routine adjustments, as shown in the Expanded Energy Savings Equation.

Energy Savings Equation:

Savings = (Baseline Energy – Post Installation Energy) ±Routine Adjustments ± Non Routine Adjustments

Routine Adjustments

Routine adjustments are used to account for expected variations in independent variables and energy use. These adjustments often use regression analysis to correlate and adjust energy use

to independent variables such as weather, but simple comparisons may also be employed. Routine adjustments are used to normalize energy use as a function of one or more independent parameters such as temperature, humidity, or meals served.

Normalizing energy savings to a prescribed set of conditions is a very important technique used in ESPC projects. Using a fixed set of conditions for both the baseline and performance period cases, such as average weather conditions and the corresponding cooling load profile, allows the risks associated with these operational factors to be reduced.

Alternatively, baseline and performance period conditions could be normalized to either baseline or performance period conditions. If performance period conditions are used to adjust the baseline case, the savings calculated will estimate the actual avoided energy use for that period.

One of the key assumptions made when normalizing savings is that the performance period energy use will have a predictable relationship to the independent variables to be standardized. The baseline model will be completely defined in the contract, but the performance period model will need to be developed from measured data collected during the performance period. Typically, a valid baseline model indicates that a similar performance period model can be successfully developed.

Once the baseline and performance period models of the equipment's energy consumption and the parameter(s) are established and validated, the standardized values of the independent parameters can be used to drive the both models and calculate savings.

Therefore, a project-specific M&V Plan should identify critical independent variables, explain how these variables will be measured or documented, and discuss how they will be used in the empirical models. Additionally, assumptions and mathematical formulas used in the M&V Plan must be clearly stated, and the validity of any mathematical model used should be verified.

Non-Routine Adjustments

Non-routine adjustments are used to compensate for unexpected changes in energy driving factors, such as facility size, operating hours, and facility use. These factors must be monitored for change to ensure that they are not affecting the performance of the energy conservation measure. Tracking these factors is primarily a concern for projects using whole-building options (Options C & D). Option A approaches typically avoid these types of adjustments as many of the factors that could change are stipulated. If future changes are expected, the M&V Plan should incorporate methods for making these non-routine adjustments.

Interactive Effects

It is commonly understood that UCRMs and energy systems interact with one another. Reduced lighting loads, for example, can reduce air conditioning energy consumption (a cooling bonus), but increase heating consumption (a heating penalty).

Whole-building M&V approaches such as building simulation or utility billing analysis account for these types of interactive effects, whereas retrofit isolation M&V approaches do not.

When using retrofit isolation M&V Options A and B, careful consideration must be given to dealing with interaction between UCRMs. One must properly account for interactive effects and avoid double-counting of savings, which can occur inadvertently if interactions are not carefully considered.

Care must be taken to account for the reduced cooling loads on both the new and existing chillers due to the change in lighting. In addition, the cooling bonus should be based on the efficiency of the new chiller. In general, the possibility of double-counting energy savings can be reduced by considering one UCRM at a time.

The later UCRMs should start (the baseline condition) from the performance period condition of the previous UCRMs. For related UCRMs, such as lighting efficiency and lighting controls, double-counting can sometimes be avoided by using a single equation to determine savings from both measures.

Methodologies for determining some of the more common interactions, such as lighting and HVAC, have been developed. However, detailed relationships between many dissimilar but interactive UCRMs are not known, and the methods for measuring interactive effects are not cost-effective for many applications. For projects using retrofit isolation approaches (Options A or B), one of three approaches can be taken to account for savings associated with interactive effects between UCRMs. These approaches are as follows:

- Ignore interactive effects.
- Use mutually agreed-upon values that are based on the site-specifics of the building and HVAC equipment types. The values can be developed on the basis of computer model simulations for typical building conditions or assigned on the basis of available information for typical buildings.
- Develop a site-specific method to measure and estimate interactive effects. The federal agency and/or ESCO will need to agree on the merit and reasonableness of the proposed approach, which may include directly measuring the effects.

SCHEDULE A – MEASUREMENT & VERIFICATION

The purpose of the Measurement and Verification (M&V) Plan is to establish the method by which the calculated energy savings for the project are proven. Texas Facilities Commission shall provide Performance Services with the necessary data, including utility bills, and access to buildings and equipment proposed to be installed under the Scope of Work. Texas Facilities Commission will also provide access to building automation system information and any other Facility Operating and Maintenance data as needed in order for Performance Services to perform the M&V as described herein. Preferably, all requested building automation system data will be pushed electronically to Performance Services ftp site for this project.

For this energy conservation project, Performance Services proposes to use a combination of M&V methodologies based on end use measurement (retrofit isolation) and building energy simulation to verify the estimated savings set forth in the proposal for this project. Performance Services has during the UAR, and will continue to make use of a variety of building environment and equipment end use measurement options including one-time instantaneous and short-term continuous measurements as a means to verify specific performance criteria set forth in this M&V plan. If performance test conditions do not allow for certain prescribed measurements to be made, then alternative M&V methods may be proposed for agreement by the parties. Performance Services utilizes the DOE sponsored International Performance Measurement & Verification Protocol (IPMVP EVO 10000.1 January 2012), and the FEMP M&V Guidelines: Measurement and Verification for Federal Energy Projects Version 3.0 (2008) as references for this M&V plan.

There are essentially two types of measurement procedures: retrofit isolation methods and whole building analysis methods. The retrofit isolation methods are called Option A - Retrofit Isolation with Key Parameter measurement and Option B - All Parameter Measurement options, respectively. The building analysis options are called: Option C, Utility Bill Analysis, and Option D, Calibrated Simulation, respectively. The last two options could be used to measure specific pieces of equipment and hence specific retrofits, if the meter being used in the analysis serves only the impacted piece of equipment. The following are summary descriptions of these M&V approaches based on the reference documents.

OPTION A – Retrofit Isolation with Key Parameter Measurement

Option A is an approach designed for projects in which the potential to generate savings must be isolated and verified, but the actual savings can be determined from short-term measurements, estimates, and engineering calculations. Performance period energy use is not measured throughout the term of the contract. Performance period energy use and baseline energy use are predicted using an engineering or statistical analysis of information that does not involve long-term measurements.

conditions. Carefully constructed models can provide savings estimates for the individual UCRMs on a project.

More elaborate models generally improve the accuracy of savings calculations, but increase costs. A calibrated simulation of a building, however, can be utilized to easily evaluate savings from other potential improvements.

Building simulation requires experienced, qualified analysts, and Option D methods should be used only for projects that meet any or all of the following requirements:

- For complex equipment replacement and controls projects with too many UCRMs to cost-effectively use retrofit isolation methods A or B
- When interactive effects between UCRMs are too complex for retrofit isolation approaches, but need to be quantified
- When the Option C utility data analysis approach is not viable due to the overall level of savings being less than 20% of metered use
- When complex baseline adjustments are expected during the performance period
- When energy savings values per individual measure are desired
- When new construction projects are involved
- When savings levels are sufficient to warrant the cost of simulation
- When either baseline or performance period energy data, but not both, are unavailable or unreliable.

Each method is appropriate for certain types of energy conservation projects, and has its associated benefits, risks and costs. The recommended site and UCRM specific M&V methodologies for verifying the project savings are presented below in section "Recommended M&V Options."

Selecting an M&V Approach

Since the primary purpose of measurement and verification is to validate payments or performance guarantees, the cost of M&V should be less than the payment amount or guarantee that is at risk. Consequently, the objective of M&V should not necessarily be to derive a precise energy savings number, but rather to ensure that energy services companies (ESCOs) properly complete their projects and that the resulting energy savings are reasonably close to the claimed savings. The appropriate level of M&V rigor and accuracy is a level that protects the project investment and fulfills the intent of any legislative requirements. Careful consideration of the M&V level, type, and rigor benefits both parties and can help mitigate potential problems during the performance period.

In general, the selection of a project specific M&V method is based upon:

- Project costs and expected savings

- Complexity of the UCRM
- Number of interrelated UCRMs at a single facility
- Uncertainty or risk of savings being achieved
- Risk allocation between the parties
- Other uses for M&V data and systems

The scale of a project, energy rates, term of the contract, comprehensiveness of energy conservation measures (UCRMs), the benefit-sharing arrangement, and the magnitude of savings can all affect the value of the UCRM or project.

The M&V effort for this project has been scaled to the value of the project so that the value of the information provided by the M&V activity is appropriate to the value of the UCRM and the project itself.

Descriptions of power measurements and the methods used to log (trend) data

The use of power measurements to validate our engineering assumptions is paramount to the success of our performance contract projects. Performance Services invested substantially in high-quality multi-phase and true-RMS metering equipment as well as industrial grade, portable BTU measurement equipment.

Table at the end of the section contains a summary listing of the logging and metering equipment Performance Services uses in developing projects, in validating baseline equipment performance assumptions and post-installation verification of performance. Power, combustion, and BTU metering equipment are checked for calibration regularly by the manufacturer of the equipment. If any element(s) are beyond tolerances, the meter and the associated elements are re-calibrated.

RECOMMENDED M & V OPTIONS

Each method is appropriate for certain types of energy conservation projects, and has its associated benefits, risks and cost. Due to the interconnections of many of the UCRMs savings, PSI proposes to use primarily two M&V Options for this project: 1) Option A – Retrofit Isolation with Key Parameter measurement (instantaneous or short term) and 2) Option B – Retrofit Isolation with All Key Parameter measurements. These methods will verify with a high degree of confidence that the savings are being achieved without adding excessive cost to the project. These Options will be used to verify the savings for the proposed UCRMs. Details are as follows:

TABLE 5 – M&V METHOD PER UCRM

UCRM	ECM Description	Percent of Project	Total Savings	M&V Method
1	LED Lighting w/ 1,326 Sensors	65.7%	$318,782	A
2	Power Conditioning	10.9%	$53,073	B
3	Variable CHW Flow	1.7%	$8,093	A
4	Water Controls	15.4%	$74,698	A
5	Building Automation System	5.3%	$25,913	C
6	Variable Air Volume	0.6%	$2,925	A
7	Load Coop Demand Response	0.3%	$1,652	Deemed

THE BUILDINGS INCLUDED IN THIS PROJECT ARE:

1. Brown Heatly
2. Central Services
3. Thomas J. Rusk
4. William P. Hobby

Option A - Retrofit Isolation: Key Parameter Measurement

Performance Services has selected Option A for the following UCRMs:

UCRM 1 – LED Lighting

Performance Services proposes to retrofit to replace incandescent and fluorescent lightings with LED lighting that would:

- Reduce the energy consumption of the existing lighting system by implementing innovative, improved lighting technologies and by applying creative design and problem solving measures to existing inefficient lighting situations
- Reduce existing lighting maintenance requirements
- Maintain existing light levels or attain light levels established by the Illuminating Engineering Society (IES) based upon best energy savings
- Improve the levels and quality of lighting experienced by Texas Facilities Commission

The key measurement parameters will be the instantaneous power in watts used by each pre and post-retrofit lighting fixture lamp and hours of operation during occupied and unoccupied periods. The measurements will be performed on a statistically significant quantity (sample) of pre and post-retrofit fixtures. Lighting power measurements will be made with a true-RMS watt meter to identify the instantaneous power draw of fixtures or circuits. Fixtures will typically be measured at either the last point of control (switch or circuit breaker), or at the fixture itself, whichever is safest to employ to achieve the readings. When lighting power is measured at the switch or circuit breaker, the number operating and non-operating fixtures is counted in order to accurately describe the average power draw for a particular fixture type. If a mixture of fixture types is on the last point of control or on a power circuit, then the individual fixtures should be measured. Finally, it may not be feasible or cost effective to measure individual fixtures prior to contract execution (e.g., pre- measurements). These are typically for high ceiling-mounted fixtures, and, consequently, these fixtures may be measured during construction for both the pre- and post-installation condition as follows: baseline condition is measured, fixture is retrofitted, and fixture is measured for post-installation condition.

The number of fixtures and usage groups to be selected for measurement is based on the use of statistical sampling method (described below) to ensure reasonable sample populations and confidence level (CL) in the results of the samples.

- Performance Services uses lighting audit to identify the fixtures to measure pre and post implementation and the hours of operation groups.
- For measuring power, Performance Services identified the top 70% or greater of the total connected electric load (kW) based on the lighting audit. Each fixture connected load is calculated by (fixture quantity) X (watts per fixture). Total connected load (Watts) is the sum of all (fixture quantity) X (watts per fixture). The remaining percent of total

connected load have a lesser effect on the savings results and these fixtures will not be measured.

- Performance Services will use Coefficient of Variation (CV) of 20% for pre and post-retrofit
- Performance Services will use Confidence Level (CL) to be 90%
- Performance Services will use Precision to be 10%.
- Based on the fixture quantity an expected sample size will be selected. Minimum sample size per fixture type will be 3 pre-retrofit samples and 3 samples post-retrofit. Additional samples might be required to meet the expected statistical parameters described above.

Savings Formulae

$$ES = \frac{(W_{BASE} \times HRS_{BASE}) - (W_{POST} \times HRS_{POST})}{1000}$$

Where:

ES	=	Total energy savings (kWh)
W_{BASE}	=	Measured baseline watt per fixture (W)
W_{POST}	=	Measured post-implementation watt per fixture (W)
HRS_{BASE}	=	Measured baseline operating hours (Hours)
HRS_{POST}	=	Measured post-implementation operating hours (Hours)

Energy savings was calculated using manufacture data and spreadsheet calculations. Savings include fixture maintenance savings which are consistent with actual cost according to Texas Facilities Commission. The lighting maintenance savings was determined by the reduction of material cost during the warranty period and is based on information collected during interviews with Texas Facilities Commission staff and accepted industry standards. The savings is agree-to for the life of the project, and will not be verified under the annual energy savings report.

Measured Baseline Operational Hours

During the energy audit, Performance Services used available loggers (28) to determine baseline hours of operation for lighting within primary spaces. Also, Performance Services measured fixture wattages for the most common fixture types. The results (baselines) follow:

Operational Hours per Space Type - Logged

Space Type	Avg Hrs/Wk	Avg Hrs/Yr
General Offices	126	6,576
Private Offices	45	2,358
Hallways	168	8,736
Restrooms	121	6,292
Conference Rooms	45	2,318

Operational Hours per Space Type - Established

Space Type	Avg Hrs/Wk	Avg Hrs/Yr
Private Offices w/ OCC	42	2,184
Restrooms w/ OCC	35	1,820
Conference Rooms w/ OCC	42	2,184
Lobby	168	8,736
Break Room	60	3,120
Server Rooms	50	2,600
Mechanical/Electrical	20	1,040
Closets	15	780
Exterior	77	4,004
Parking Garage	168	8,736

Baseline Existing Fixture Wattages

Fixture Type	Wattage
4' 2 Lamp T8	59
4' 3 Lamp T8	88
4' 2 Lamp T12	58
4' 3 Lamp T12	92
4' 4 Lamp T12	115

Lighting Submetering – Performance Services will install submetering to monitor amp draw and voltage on various LED lighting circuits within a project building. This information will be used to confirm post retrofit energy usage.

UCRM 4 – Water Controls

Performance Services proposes to replace high flow toilets and urinals with low flow toilets and urinals as well as replace high flow aerators with low flow aerators. Benefits include:

- Reduce the water consumption of the plumbing system by implementing innovative, improved plumbing technologies
- Reduce hot water usage
- Reduce existing plumbing maintenance requirements

The key measurement parameters will be the water used by each pre and post-retrofit water fixture. The measurements will be performed on a statistically significant quantity (sample) of pre and post-retrofit fixtures. Water use and flow measurements will be made with approved equipment. Fixtures will be measured individually. Finally, it may not be feasible or cost effective to measure individual fixtures prior to contract execution (e.g., pre- measurements). Typically, measurements of pre- and post-installation condition will be as follows: baseline condition is measured, fixture is retrofitted, and fixture is measured for post-installation condition.

The number of fixtures and usage groups to be selected for measurement is based on the use of statistical sampling method (described below) to ensure reasonable sample populations and confidence level (CL) in the results of the samples.

- Performance Services used a water audit to identify the fixtures to measure pre and post implementation and the usage.
- For measuring water usage, Performance Services identified the top 70% of the total domestic water load based on the water audit. Savings will be measured using a sampling of these fixtures. The remaining percent of total connected load have a lesser effect on the savings results and these fixtures will not be measured.
    - Performance Services will use Coefficient of Variation (CV) of 10% for pre and post-retrofit
    - Performance Services will use Confidence Level (CL) to be 90%
    - Performance Services will use Precision to be 20%.
    - Based on the fixture quantity an expected sample size will be selected. Minimum sample size per fixture type will be 3 pre-retrofit samples and 3 samples post-retrofit. Additional samples might be required to meet the expected statistical parameters described above.

SAVINGS FORMULAE

$$WS = \frac{(W_{BASE} \times USG_{BASE}) - (W_{POST} \times USG_{POST})}{1000}$$

Where:

WS	=	Total water savings (kgal)
W_{BASE}	=	Measured baseline gallons per fixture (gal)
W_{POST}	=	Measured post-implementation gallons per fixture (gal)
USG_{BASE}	=	Calculated annual baseline usage (Quantity)
USG_{POST}	=	Calculated post-implementation usage (Quantity)

Savings baselines values are based on the following:

Water Usage Baselines	BHB	CSB	TJR	WPH
Typical Bldg Occupancy Including Visitors	1,200	515	288	1,550
Male/Female Ratio	45/55	45/55	45/55	45/55
# of Toilet Flushes Per Year	685,938	319,375	174,441	890,547
Average gallons/flush	2.63	2.31	3.50	3.43
# of Urinal Flushes Per Year	351,563	163,125	89,184	456,328
Average gallons/flush	1.00	1.00	1.44	2.14
# of Times Lavatory Uses Per Year	1,037,500	482,500	263,625	1,346,875
Average gallons/minute	2.10	2.20	2.20	2.10

Quantity of flushes per year based on the following:

- Employee women using toilets four times per day
- Employee men using toilets one time per day and urinal three times per day
- Visitors using toilet or urinal every two hours

Water savings was calculated using manufacture data and spreadsheet calculations. Savings include a reduction in hot water usage (electric water heater savings) which are consistent with actual cost according to Texas Facilities Commission. Hot water energy savings were determined by using 80 percent of industry standard calculations. The savings is agree-to for the life of the project, and will not be verified under the annual energy savings report.

UCRM 3 Variable Chilled Water Flow

Performance Services proposes to implement variable chilled water flow at both the Brown Heatly and Central Services buildings. This measure will modulate the flow of chilled water based on building demand.

Guaranteed electrical energy savings generated by the fan motor VFD changes shall be based on motor horsepower and baseline hours identified herein. These saving shall be considered variable savings such that the actual savings will vary monthly based on actual motor runtime as measured by the energy management system. The following calculations shall be used in determining the amount of actual electric savings.

Savings Formulae

$$ES = \frac{(W_{BASE} \times HRS_{BASE}) - (W_{POST} \times HRS_{POST})}{1000}$$

Where:

ES	=	Total energy savings (kWh)
W_{BASE}	=	Measured baseline watt per motor (W)
W_{POST}	=	Measured post-implementation watt per motor (W)
HRS_{BASE}	=	Measured baseline operating hours (8,760 Hours)
HRS_{POST}	=	Measured post-implementation operating hours (8,760 Hours)

Pre baseline motor power draw measurements will be made using a true RMS power meter. Post VFD installation motor power draw will be tracked through the building automation system with

input from the VFDs. The post-implementation watts per motor will be the average motor power draw taken over a one-week period. For energy savings purposes, pre and post baseline operational hours will be considered equal at 8,760.

UCRM 6 Variable Air Volume

Performance Services proposes to implement variable air flow for air handling unit 1B at the Central Services buildings. This measure will modulate air flow based on space demand. This measure includes installing variable speed drives on both the cold and hot deck supply fan motors.

Guaranteed electrical energy savings generated by the fan motor VFD changes shall be based on motor horsepower and baseline hours identified herein. These saving shall be considered variable savings such that the actual savings will vary monthly based on actual motor runtime as measured by the energy management system. The following calculations shall be used in determining the amount of actual electric savings.

SAVINGS FORMULAE

$$ES = \frac{(W_{BASE} \times HRS_{BASE}) - (W_{POST} \times HRS_{POST})}{1000}$$

Where:

ES	=	Total energy savings (kWh)
W_{BASE}	=	Measured baseline watt per motor (W)
W_{POST}	=	Measured post-implementation watt per motor (W)
HRS_{BASE}	=	Measured baseline operating hours (8,760 Hours)
HRS_{POST}	=	Measured post-implementation operating hours (8,760 Hours)

Pre baseline motor power draw measurements will be made using a true RMS power meter. Post VFD installation motor power draw will be tracked through the building automation system with input from the VFDs. The post-implementation watts per motor will be the average motor power draw taken over a one-week period. For energy savings purposes, pre and post baseline operational hours will be considered equal at 8,760.

OPTION B - Retrofit Isolation with All Parameter Measurement

Performance Services has selected IPMVP Option B for the following UCRMs and associated maintenance savings:

UCRM 2 – Power Conditioning

The installation of power conditioners with modular capacitance to improve power factor will make motors run cooler and more efficiently. Thus results in a reduction in energy consumption and an extension of the useful life of motor loads. Also power conditioning system will provide

harmonic filtration to mitigate harmonic distortion and recycle waste energy resulting in reduced energy consumption which prolongs the longevity of electrical equipment.

PSI will perform Pre & Post electrical measurements including harmonics using calibrated Hi-Power metering equipment.

Savings were calculated using on-line harmonic reduction spreadsheet calculators. The savings calculation was also performed by the manufacturer's representative. Savings will be evaluated based on the following changes being made to the existing electrical systems:

1. Building Power Factor between 95% and 100%
2. Building total harmonics distortion of 1.8% or less

Power factor will be tracked monthly by Austin Energy's existing electric meter and removal of power factor charges documented via Austin Energy electric billing. Performance Services will use a power quality meter to verify total harmonic distortion levels annually.

OPTION C - Whole Building Data Analysis

Performance Services has selected IPMVP Option C for the following UCRMs:

- Building Automation System

In general, Option C is used with complex equipment replacement and controls projects for which predicted savings are relatively large, i.e., greater than about 10% to 20% of the site's energy use on a monthly basis. Option C regression methods are valuable for measuring interactions between energy systems or determining the impact of projects that cannot be measured directly, such as insulation or other building envelope measures.

Performance Services uses engineering calculations to compute the pre-retrofit baseline from the electricity and fuel bills. The post-retrofit utility consumption data from these meters will be obtained and subsequently compiled, analyzed, normalized for weather, occupancy and other variables and compared to the pre-retrofit baseline to determine the savings for each annual performance period in the contract.

SAVINGS FORMULAE

The savings are defined by the formula:

$$Savings = Baseline\ Energy - Option\ A\&B\ UCRM\ Savings - Post\ Installation\ Energy_{Normalized} \pm Adjustments$$

Where

Baseline Energy	=	Energy consumption calculated from utility bill analysis prior to retrofit and adjusted for other measures at this building for which savings are being measured using Option A and/or B
Option A&B UCRM Savings	=	*Energy and maintenance savings from Option A and Option B measured UCRMs within building*
Post Installation Energy$_{Normalized}$	=	*Performance period energy use (customer provided post-retrofit electricity, natural gas and fuel oil billing data) that will be adjusted to the baseline load conditions to determine the savings*
Adjustments	=	*Routine and non-routine changes made to the baseline or performance period energy use to account for variations in conditions*

UCRM 5 – Building Automation System

Performance Services will replace existing obsolete controls, thermostats and pneumatic controls with BACnet, direct digital controls (DDC) building automations system (BAS). Scope of work includes replacing existing pneumatic valves and damper actuators with electric actuators. Energy savings will be realized through temperature set-points adjustments and optimized equipment operation according to occupancy and load conditions.

Performance Services will utilize the new BAS to trend available data, such as equipment run times, temperature set points, air flow (CFM), damper position, carbon dioxide (CO_2) level, etc. Savings are calculated using spreadsheet based engineering calculations. Savings result from:

- Reduced run hours - Optimal scheduling of HVAC equipment
- Temperature setbacks
- Cold & hot deck reset
- Optimizing outdoor air usage as appropriate
- Minimize simultaneous heating and cooling

Other Savings

Performance Services has provided documentation for the following Other Savings within the Appendix of the UAR. Due to these savings being small and/or not readily documentable, Performance Services believes that it is not cost effective to measure and verify these savings. Other Savings included in this project are as follows:

UCRM 7 Load Coop Demand Response

Performance Services proposes to install BAS programming for short term load curtailment that will allow the Texas Facilities Commission to participate in the Load Cooperative program through Austin Energy. This measure includes automated load curtailment at the Central Services building that can be used to curtail electrical demand/usage during curtailment events.

The Austin Energy load curtailment program typically includes 15 curtailment events per year which occur between the months of June and September. For participating, Austin Energy pays $1.45 per kWh saved during curtailment events.

Lighting Material Savings

The TFC will realize lighting material savings during the 10 warranty on linear LED retrofits and new fixtures. This savings has been calculated based on current TFC maintenance practices and material costs. This savings analysis is included in the Appendix of the UAR. To help assure that TFC achieves projected warranty period savings, PSI will training TFC staff on the warranty process and annually meet with TFC staff to review the procedures. The following annual lighting material savings have been reviewed and approved by TFC: $55,677.

Domestic Water Heating Savings

Retrofitting faucets with low flow aerators will reduce the demand and usage of domestic hot water. These savings are relatively small and as such, it is not cost effective to measure and verify the savings associated with this UCRM.

ENERGY, WATER AND O&M RATE DATA

Performance Services, in collaboration with Texas Facilities Commission, have agreed to the data below as the baseline year utility rates. Performance Services and Texas Facilities Commission agree for the term of this Agreement that the annual Utility Rate escalation factor will be 0% for electricity, natural gas, sewer and water. This escalation rate is based on the historical average rise in electric rates since 2011.

TABLE 7 – UTILITY RATES

Electric Rate for BHB & WPH

	[illegible]	[illegible]
Summer (6 months):	$12.54	$0.05117
Winter (6 months):	$11.40	$0.05117

Summer - April through September

Electric Rate for CSB & TJR

	[illegible]	[illegible]
Summer (4 months):	$14.95	$0.06599
Winter (8 months):	$13.95	$0.06099

Summer - June through September

Building		Rate ($/Unit)		
Name	Gross sq. ft.	Natural Gas (CCF)	Sewer (kgal)	Water (kgal)
Brown Heatly	259,224	$0.48	$6.37	$8.82
Central Services	111,935	$0.48	$6.37	$8.82
Thomas J. Rusk	99,971	$0.48	$6.37	$8.82
William P. Hobby	419,276	$0.48	$6.37	$8.82

M&V SAMPLING GUIDELINES

This appendix introduces the statistical background, theory and formulas used to select, analyze and validate samples for project monitoring and evaluation. It also provides guidelines and procedures for the design and implementation of sampling.

The purpose of monitoring a sample, as an alternative to monitoring an entire population is to; (a) characterize particular attributes of a population from which a sample is drawn with adequate accuracy and reliability, while (b) reducing monitoring costs and effort.

As shown in figure below, sampling involves selecting several members from a population for monitoring and evaluation. The measured characteristics or behavior of the sample group is then used to infer the characteristics and/or behavior of the entire population. As expected, the assumption is that the sample is representative of the population. To ensure that the sample is indeed representative, calculations must be performed to assess and quantify the statistical validity of the sampled data. These calculations are presented later in this Appendix.

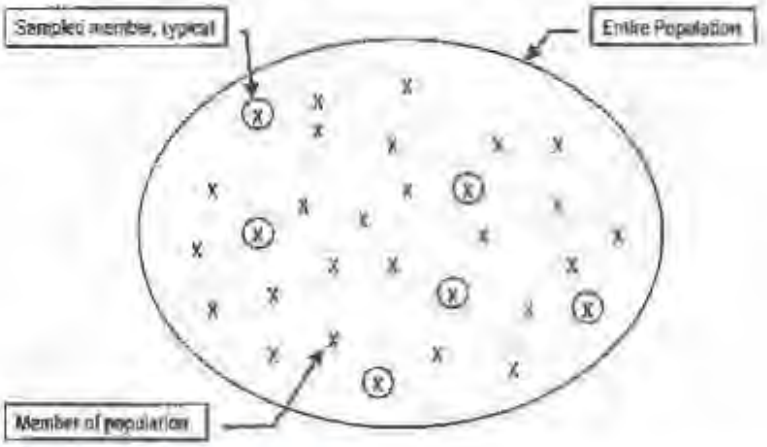

Figure 1 – Population and Sample

Sampling is applicable to projects such as lighting retrofits, energy efficient motor replacements, HVAC unit replacement, water retrofits, or any other project in which a number of similar pieces of equipment are affected by the same type of UCRM.

In the most common applications, sampling strategies are used to characterize the hours of operation and the instantaneous power draw of a constant-load device. A separate sample set is required for each item evaluated.

When selecting a sample from a population to determine hours of operation, it is necessary to ensure that the load is or device being sampled is monitored at or down-stream of its last point of control (LPC).

The last point of control (LPC) is the portion of an electrical circuit (or other source of energy), that serves a set of equipment that is controlled on a single switch. As a result, all of the fixtures or pieces of equipment on that LPC are typically operated the same number of hours per year.

For metering purposes, it is assumed that measurements taken of a single piece of equipment on an LPC captures the operating hours for all of the equipment served on the same circuit.

Mathematical Methods for Sampling

Sampling must be conducted using accepted methods and use an appropriate level of care to ensure that the M&V results that rely on the sampling and analysis are sufficiently accurate. This section provides a summary of the concepts, methods and equations to be used.

Although various assumptions regarding the distribution of the sampled data can be made, the large majority of sampling statistical analysis assumes that the data is normally distributed about the mean and in this Appendix, this assumption is made.

Statistical validity requires that the samples be randomly selected. Use of a random number generator, such as that found in MS Excel™ is convenient for ensuring the sample is randomly selected.

Point Estimation – Confidence and Precision

When we use sampling to estimate an average value of an entire population, we are performing an activity know as point estimation. A value or 'point' that is estimated based on a sample is not the actual average value but rather, is a value that is "reasonably close" to the actual average value. The question, then, for the M&V practitioner is: "What do we mean when we say 'reasonably close'?" The question is answered using the following statistical terms.

- Confidence: Confidence is fundamentally the same as probability, except that confidence refers to data already obtained, while probability refers to a future value. A confidence of 90% is commonly used in M&V. So, using our 90% example, when we refer to a confidence level, we are saying "I am 90% confident that the measured value is within my stated confidence interval."
- Confidence Interval (or Precision): Because the value estimated by sampling cannot be expected to be the actual value, it is useful to state an interval in which we have confidence the true value lies. Confidence interval is also often referred to as precision. An M&V practitioner may state that they know the value has a precision of 20%, which would mean that the "The estimate is within 20% of the true value."

Confidence and precision, then, are the values referred to when a 90/20 (or 80/20 or any other) criteria is specified.

EXAMPLE

Imagine that we wish to measure the run-hours of a sample of equipment for a month. Imagine now that we measure 200 'on' hours. If we are hoping to meet a 90/20 criteria, we are hoping that we can say, with a 90% probability, that our estimate is within 20% of the actual average run hours – that is, we are 9/10th sure the actual runtime is between 180 and 220 hours.

To graphically illustrate the concepts of normal distribution, confidence, and precision, shows a normal distribution with a confidence interval. Note that the confidence interval in the figure is defined by the error (+/- E). This error figure is discussed further below and is defined in Equation 1.

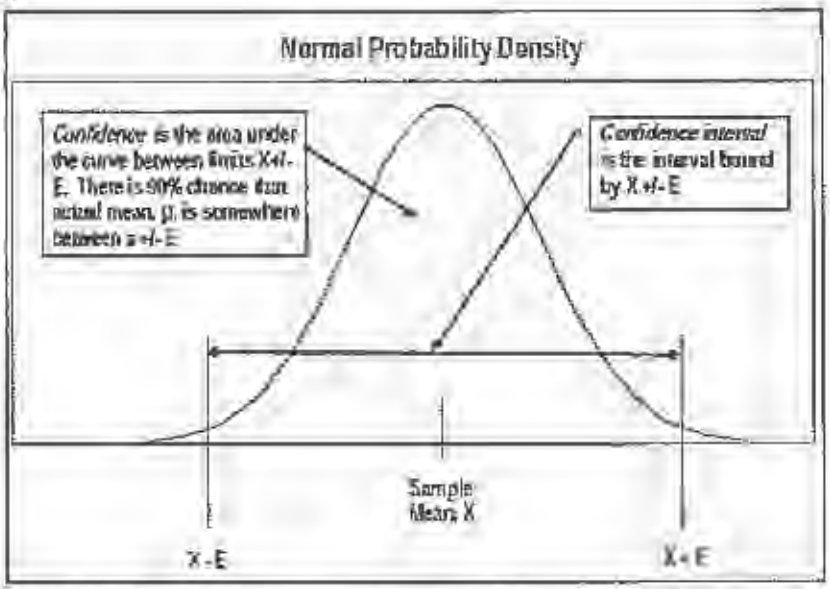

Figure 2 – Normal distribution with confidence interval

The confidence interval (or precision) and the confidence level are positively linked; for any sample, as the confidence interval increases (that is, the precision is reduced, and the range of possible values of the true mean increases) the confidence level increases. Or, looking at it another way, as the confidence interval is reduced, the confidence level is also reduced.

Application of Sampling to Projects

In the next sections considerations for the design and application of sampling are explored. The analysis steps to be used in conducting sampling are as follows:

These steps are discussed below.

Compile Project/UCRM and M&V Plan Information

In this step, the goal is to fully understand several things, including: the measure scope, the savings calculations quantifying the intended performance, the M&V method to be used and the data to be collected. Once the project is understood, an M&V practitioner can identify the calculation method and select variables to be sampled.

In many energy conservation projects, it is often necessary to conduct both pre and post installation sampling. Regardless of whether the sampling is for evaluating the baseline or the post-retrofit conditions, the following information is typically required to properly assign usage groups and determine sample sizes.

- ***Number of circuits, devices or LPCs.*** Identify and document the LPCs that are affected by the installation of UCRMs. This should be provided in the form of an equipment inventory survey in which each line in the survey represents an LPC that includes descriptions of affected and proposed UCRM nameplate data and quantity as well as location information.
- ***Actual or change in load or wattage.*** Using the equipment inventory survey, the total change in load or wattage of the affected equipment by usage group can be computed.
- ***Hours of operation.*** Sampling can be used to estimate the average hours of operation of the equipment. After the first sampling period (whether it is a year, month or week) of monitoring, the sampling result (actual C_v, Equation 3) should be used to compute the sample size. If it is expected that the equipment will be used in a significantly different in the current period than it was in the previous period, the estimate may be adjusted. Lighting hours of operation have already been established and defined herein.

Designate Sampling Groups

Each device or LPC should be assigned to a usage group based on similarities in the parameter being determined, such as operating hours or connected load. If differences are expected, but there are too few usage groups, the resulting variance of the data may result in unsatisfactory confidence and precision levels. However, if too many usage groups are created, then excessive monitoring and too small of populations may occur. So, while considering the tradeoffs, usage groups should be developed from criteria such as:

- Area type (for example; office, hallway, meeting room)
- Annual operating hours

- Timing / usage patterns of the operating hours, load, or other variable
- Variability of operating hours, load, or other variable
- Similar functional use

Usage groups should be selected so that equipment or LFC's are similar in that the sampled value (for example, hours or kW or kW/unit) is clustered around a specific estimate. When possible, avoid designating usage groups with populations that will yield less than 10 sample points.

Examples of standard usage groups for fan motors with similar operating hours are HVAC ventilation supply fans, return fans, and exhaust fans.

Examples of standard usage groups to determine lighting operating hours are fixtures with similar operating characteristics in offices, laboratories, hallways, stairwells, common areas, perimeters, storage areas, etc.

Usage groups may be defined for the population on a building-by-building basis or across a number of buildings with similar usage areas. Monitoring can be done for a single or multiple buildings provided the usage groups are similar. Defining populations for multiple buildings is acceptable and usually results in fewer monitoring points than if each building were considered separately.

Select Samples

Select desired confidence and precision levels. A 90/20 confidence/precision level is commonly used in M&V and is suggested.

Establishing the Coefficient of Variation. Prior to selecting a sample, an estimate of the sampled coefficient of variation (C_v) must be made. A C_v of 0.5 has been historically recommended, and numerous projects have shown this to be reasonable guess for most applications. After the first year of monitoring, the coefficient of variation for each usage group can be projected from the results of the metering in the previous year.

Having selected a confidence and precision level (90/20) and a C_v (perhaps 0.5), use Equation 6 and 7, above, to calculate a sample size for each sampling group. Then, randomly select that number of samples from the population.

It is strongly recommended that oversampling (at a 10% or greater level) be included in case of data collection device failure or unexpectedly high data scatter.

Table 3 illustrates the effect of confidence interval and precision on sample size.

TABLE 8 – FIRST-YEAR (C_v=0.5) SAMPLE SIZE TABLE BASED ON USAGE GROUP SAMPLING[1]

Precision	20%	20%	10%
Confidence	80%	90%	90%
Z-Statistic	1.282	1.645	1.645
Population Size, N	Sample Size, n*		
4	3	4	4
8	5	6	8
12	6	8	11
16	7	9	13
20	8	10	16
25	8	11	19
30	9	11	21
35	9	12	24
40	9	12	26
45	9	13	28
50	10	13	29
60	10	14	32
70	10	14	35
90	10	15	39
100	10	15	41
125	11	15	45
200	11	16	51
300	11	17	56
400	11	17	59
500	11	17	60
Infinite	11	17	68

The samples in each usage group should be drawn at random[2], so that each member has an equal probability of being selected.

If there is reason to believe that there are significant seasonal variations in the operation of the equipment, sufficient monitoring will need to be conducted to capture these variations.

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1 Table does not reflect oversampling. However, because data collection problems are very, very common and because of the departure from normal distribution for small samples (less than 30), over-sampling is critical.

2 Random selection of monitoring points is critical to avoid bias in the sample. Spreadsheet or other computer software should be used to generate a list of random numbers that may be used to place loggers on a given LPC.

TABLE 9 – REPRESENTATIVE MONITORING EQUIPMENT USED FOR MEASUREMENT & VERIFICATION

	Manufacturer	Model	Measurement	Range	Accuracy
Lighting & Occupancy Time of Use	Hobo	Datalogger	-	-	-
Temperature & Relative Humidity	Hobo	U10-003	Temperature	-4°F to 158°F	±0.72°F
			Relative Humidity	25% to 95%	±3.5%
Temperature & Relative Humidity + 2 external inputs	Hobo	U12-013	Temperature	-4°F to 158°F	±0.72°F
			Relative Humidity	25% to 95%	±3.5%
4 external inputs	Hobo	U12-006	-	-	-
Carbon Dioxide external input	Telaire	7001	Carbon Dioxide	0-4000 ppm	±50 ppm
Current Transformer external input	Hobo	CTV-A	Amperage	0-20 A	±4.5%
Current Transformer external input	Hobo	CTV-C	Amperage	0-100 A	±4.5%
Boiler Horsepower / BTU's / Chiller kW per Ton	GE Panametrics	PT878	Flow	-17950 to 179500 gpm	±1.5%
			Temperature	-4°F to 500°F	±0.83°F
Multi-Phase Power	Hioki	3169-20	Voltage	0-600 V	±0.2%
			Amperage	0-500 A	±0.5%
Multi-Phase Power	Hioki	3169-20	Voltage	0-600 V	
			Amperage	0-500 A	
True-RMS Power	FLUKE	345 or 1735	Voltage	0-600 V	±0.3%
			Amperage	0-1400 A	±0.3%
Combustion	Bacharach	PCA-265	Oxygen	0.1% to 20.9%	±0.3%
			Temperature	-4°F to 2192°F	±6°F
			Carbon Monoxide	0-4000 ppm	±5%
			Nitric Oxides	1-3000 ppm	±5%
			Pressure	± 72 inches WC	±2%

Performance Services

Corey Haggard
Performance Assurance Administrator

Biography

With over 13 years of experience in the energy and industrial markets, Corey served in a variety of roles during his 11 years with Indianapolis Power & Light, including Journeyman Lineman and Transmission Systems Operator. While working at IPL, Corey experienced NERC, FERC, and OSHA operating guides and requirements first hand.

In 2012 Corey formed EnerCore LLC, where his focused operations included the installation and maintenance of energy producing assets designed specifically for small business and residential areas. He also developed a strategic business plan necessary for a competitive energy portfolio management and supply chain consulting company. Corey joined Performance Services in 2014.

Education

B.S. Business, Finance and Operations, Kelley School of Business at Indiana University Indianapolis, 2009

Associations

Six Sigma Green Belt Certification
Journeyman High Voltage Lineman – Indianapolis Power & Light

Measurement & Verification Monitoring

Performance Services will be performing project measurement and verification. Applicable IPMVP options by UCRM are identified in the measurement and verification plan. The following table identifies the type of tool used to measure savings and the duration of the annual measurements.

Measurement & Verification Methods			
UCRM No.	UCRM Title	Measurment Tool	Measurement Frequency & Duration
1	LED Lighting	Power Meter	One time annual power consumption measurements
2	Power Conditioning	Power Meter	One time annual measurements with Monthly power factor verification thru Austin Energy
3	Variable CHW Flow	VFD/BAS	Continuous power (kW) monitoring (15 minute intervals) for one week per year
4	Water Controls	Meter or Trap	One time annual flow and gallons per flush measurements
5	Building Automation System	BAS	Monthly/annual Utility bill analysis
6	Variable Air Volume	VFD/BAS	Continuous power (kW) monitoring (15 minute intervals) for one week per year
7	Load Coop Demand Response	None	Not Applicable

EXHIBIT I

Performance Services

EXHIBIT I
PERFORMANCE GUARANTEE AGREEMENT

Project: Texas Facilities Commission
Energy Savings Performance Contracting 15-020-0802
Thomas Jefferson Rusk, William P. Hobby, Central Service, Brown-Heatly
Austin, Texas

Qualified Provider:

Company Name: Performance Services of Texas, Inc.

Address: 3010 LBJ Freeway, 1215-A

City, State, Zip: Dallas, TX 75234

Representative: Timothy P. Thoman

Performance Guarantee Information:

Annual Guaranteed Operational Savings Amount =	$ 62,934
Annual Guaranteed Energy/Water/Sewer Savings Amount =	$ 422,201
Total Annual Guaranteed Amount =	$ 485,135
One Time Utility Rebate Guarantee Amount =	$ 175,000

Program Term = 10 Years

Guarantee
Performance Services, Inc. (the "Provider") guarantees that Texas Facilities Commission (the "Owner") will annually save the amounts stated above in energy and operating costs during the stated program term.

The Performance Guarantee Agreement (the Guarantee) shall commence once the Utility Cost Reduction Measures (UCRMs) are installed, the Owner's staff has been trained how to operate the UCRMs and the UCRMs have been optimized by the Provider. The Guarantee commencement date shall be established by both the Owner and Provider by their signatures on the Guarantee Commencement Letter contained herein. The Guarantee shall be fulfilled and fully satisfied once the Guaranteed Energy and Operational Savings have equaled the Owner's payments as identified on the Amortization Schedule in the Guaranteed Energy Savings Contract (the Agreement).

Energy Savings
Energy savings shall be measured and verified by various methods depending on the UCRM. The measurement and verification methods to be used in determining actual energy savings are identified for each UCRM within this Guarantee and the Measurement and Verification Plan included in the Utility Assessment Report (UAR) dated July 19, 2016.

The utility information used in this Guarantee for the Base Year shall be for the one-year period from January 2014 through December 2014. Current Year utility rate data shall be used in calculating energy savings occurring during that current year; provided Current Year utility rates are not less than Base Year utility rates. If Current Year utility rates drop below Base Year rates, Base Year rates shall be used to calculate Current Year energy savings. Any energy savings generated during the installation phase of this project shall be added to savings achieved during the first annual period of the Guarantee.

The Owner shall pay the Provider the annual Energy Monitoring fees identified within this Guarantee. For these fees, the Provider shall calculate and report the actual energy savings over the term of the Guarantee as described herein.

At the end of every annual guaranteed period, the actual annual savings will be compared to the guaranteed annual savings to determine if the guaranteed savings were achieved. If the actual savings for this one year period are less than the guaranteed annual savings amount, the Provider shall pay the Owner a cash refund for the difference between these amounts (herein call the "shortfall"). The maximum shortfall in any one-year period is limited to the annual guaranteed energy savings amount identified on the first page of this guarantee.

UCRM 1 - LED Lighting Savings

Guaranteed electrical energy savings generated by the lighting UCRMs included in the Project shall be based on a one-time measurement of lighting energy consumption under existing conditions and a one-time measurement upon completion of the lighting retrofit. The number of fixtures and usage groups selected for measurement is determined by the methods indicated in the UAR. These sample measurements shall be used to determine actual lighting savings. Each sample circuit shall be measured before and after the retrofit. The following calculations determine the actual annual electrical savings for the entire period of the guarantee.

Consumption Savings:

$$Savings_{kWh} = \Sigma[(FIXT) \times (Powerdraw_B - Powerdraw_A) \times (Baseline\ Hours)]$$

$$Savings_{\$} = Savings_{kWh} \times TrailRate_{consumption}$$

Where:

FIXT =	Number of fixtures for each retrofit
$Powerdraw_B$ =	Power draw in kW for each fixture type before implementing lighting ECM per UAR
$Powerdraw_A$ =	Power draw in kW for each fixture type after implementing lighting ECM.
$Savings_{kWh}$ =	Actual annual electric consumption savings in kWh
$Savings_{\$}$ =	Actual annual electric savings in dollars
$TrailRate_{consumption}$ =	Electrical consumption rate (trailing rate) in dollars per kWh
Baseline Hours =	Baseline Hours are provided for each retrofit type in the UAR.

Demand Savings:

$$Savings_{kW} = \sum[(FIXT) \times (Powerdraw_B - Powerdraw_A)]$$

$$Savings_{\$} = Savings_{kW} \times TrailRate_{Demand}$$

Where:

FIXT =	Number of fixtures for each retrofit
$Powerdraw_B$ =	Power draw in kW for each fixture type before implementing lighting ECM.
$Powerdraw_A$ =	Power draw in kW for each fixture type after implementing lighting ECM
$Savings_{kW}$ =	Actual annual electric demand savings in kW
$Savings_{\$}$ =	Actual annual electric savings in dollars
$TrailRate_{Demand}$ =	Electrical demand rate (trailing rate) in dollars per kW

UCRM 2 – Power Conditioning
Guaranteed electrical energy savings generated by power conditioners shall be based upon one-time Pre- and annual Post- electrical measurements as described in the UAR and monthly tracking of power factor as reported on the utility bills by Austin Energy.

UCRM 3 – Variable CHW Flow
Guaranteed energy, water and sewer savings for this UCRM shall be based upon the methods described in the UAR.

UCRM 4 – Water Controls
Guaranteed energy, water and sewer savings for this UCRM shall be based upon the methods described in the UAR.

UCRM 5 – Building Automation System
Guaranteed electrical energy savings generated by the fan and pump motor UCRMs shall be based on motor horsepower, baseline hours identified in this Guarantee and trended run hours. These saving shall be considered variable savings such that the actual savings will vary monthly based on actual motor runtime as measured by the energy management system. The following calculations shall be used in determining the amount of actual electric savings.

$$Savings_{kWh} = \frac{Motor_{HP} \times (.746kW / HP) \times (Baseline\ Hours - Trended\ Hours)}{Motor\ Efficiency}$$

$$Savings_{\$} = Savings_{kWh} \times Rate_{kWh}$$

Where:

$Motor_{HP}$ =	Motor horsepower identified on motor nameplate
$Savings_{kWh}$ =	Actual annual electric consumption savings in kWh
$Savings_{\$}$ =	Actual annual electric savings in dollars
$Rate_{kWh}$ =	Electrical consumption rate in dollars per kWh
Baseline Hours =	Runtime hours shown on Schedule B

Additional guaranteed energy savings for this UCRM shall be based upon the methods described in the UAR.

UCRM 6 – Variable Air Volume
Guaranteed energy, water and sewer savings for this UCRM shall be based upon the methods described in the UAR.

UCRM 7 – Load Coop Demand Response
Guaranteed energy savings for this UCRM are considered "Deemed" and they shall be applied to the guaranteed annual energy savings amount throughout the term of the Guarantee.

Adjustments

Increased energy usage resulting from increasing outside air amounts to meet current building codes, air-conditioning of areas that were previously not air-conditioned and other identified adjustments shall be added to Base Year energy costs.

Operational Savings

Operational savings exist when an improvement implemented under this program reduces future repair or replacement labor and / or material monies that would have otherwise been expended if the improvement was not implemented. The operational savings described and quantified in this Guarantee shall be added to the energy savings to arrive at the total guaranteed savings amount. The stipulated operational savings calculations for this Guarantee are included in the UAR. All operational savings are considered Stipulated Savings such that the annual operational savings amounts identified in the UAR shall be applied annually to the guaranteed annual operational savings amount throughout the term of the Guarantee.

Energy Monitoring

Energy monitoring services shall be performed by the Provider as described in this Guarantee. The Guarantee is void if the Owner ceases paying the Energy Monitoring fees identified below.

The annual Energy Monitoring fees for FSI are shown below and shall be paid for the previous 6 months of documented work.

Year	Price
1	$29,000
2	$29,000
3	$29,000
4	$29,000
5	$29,000
6	$29,000
7	$29,000
8	$29,000
9	$29,000
10	$19,000

Performance Services

- Note: The Owner has the right to request that the Provider change the scope of this Guarantee at the end of each annual guaranteed period to reduce monitoring / reporting labor and its associated costs. Prices shown above would be reduced if the Owner requested labor reductions.

Other Requirements

The Owner agrees to maintain the physical plant and all existing equipment / systems affecting energy efficiency such that the condition of the existing equipment / systems during the term of Guarantee is at least equal to their condition at the completion of this Contract. The Owner also agrees to properly maintain all new and existing equipment and operate all of the new and existing systems as described in the Proposal, Installation Contract and Guarantee. If the Owner fails to operate his equipment / systems as described herein and it results in reduced energy or operational savings, their actual energy or operational savings shall be adjusted to the benefit of the Provider to offset lost energy savings caused by such failures by the Owner.

The calculations contained within this Guarantee shall be used exclusively in determining the actual savings over the term of the Guarantee. No additional monitoring or verification methods shall be used in determining the performance of this Guarantee related to energy or operational savings, unless agreed to in writing by both the Owner and Provider. By signing below, the Owner and Provider are fully accepting this Guarantee and all of its provisions, requirements, calculations, amounts and conditions.

Texas Facilities Commission

By: ***

_____

***

_____, President

***

Date: _____

*** Acceptance of this Exhibit I, Performance Guarantee Agreement shall be by execution of TFC Contract No. 16-130-000

Performance Services, Inc.

By: ***

_____

Timothy P. Thomas, ***, President

***

Date: _____

EXHIBIT J

Performance Services

Exhibit "J" – Sample Annual Savings Report

Periodic Utility Savings Reporting

Texas Facilities Commission confirms that they will provide to SECO project Periodic Utility Savings Reports. These reports will be provided to SECO in a timely manner. Periodic Utility Savings Reports will be prepared by Performance Services following project construction and beginning in year one of the savings guarantee.

Third party reviewer certification of Periodic Utility Savings Reports will be provided to SECO along with reviewed reports.

Hamilton Southeastern Schools

Geist Elementary School

Year 4 – Quarter 4 Review

Performance Services

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Actual Equipment Runtimes	6
Fan Motor Savings for boiler	10
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Performance Services

Executive Summary

This Year 4 – Quarter 4 Guarantee Report contains the savings results for the period of time between October 1, 2014 and September 30, 2015. This report is intended to provide an update on the savings performance to date and to help uncover potential operating problems.

ENERGY SAVINGS:

Actual Measured Energy Savings:	$66,456	(electric)
	$22,904	(gas)
	$89,360	
Guarantee Savings (12 months)	**$66,288**	

Actual energy savings for the fourth guarantee year exceeded guaranteed energy savings by $23,072 after adjusting for utility rate changes, operating schedule variations, and owner overrides. The Guarantee is based on a combination of measured, verified, and calculated savings that are the most accurate methods of determining actual savings.

NEXT REPORT:

We will provide the Year 5 – Quarter 1 Guarantee Report in February 2016. Please feel free to contact us at 888-390-2700 with any questions or comments.

CONTACTS:

- Corey Haggard, Performance Assurance Analyst
- Chris Rainey, Engineering Manager
- Scott Morris, Operations Vice President
- Scott Zigmond, Sales and Marketing Vice President
- Tim Thoman, President
- Office: 888-390-2700

Performance Services

Annual Guaranteed Savings Report Summary

Year 4 - Quarter 4 (October 1, 2014 - September 30, 2015)

Description	Guaranteed Savings	Actual Savings	Net Difference
ENERGY SAVINGS			
Geist Elementary			
* Electric	48,202	66,456	18,254
* Gas	18,085	22,904	4,818
SAVINGS	66,288	89,360	23,072

Energy Savings Summary

Year 4 Quarter 4 (October 1, 2014 - September 30, 2015)

Improvements	Utility Tracking Savings			Measured and Verified Savings			Fixed Savings			Total Savings
	Guaranteed YTD	Actual YTD	Difference YTD	Guaranteed YTD	Actual YTD	Difference YTD	Guaranteed YTD	Actual YTD	Difference YTD	Actual YTD
GEIST ELEMENTARY										
GES-1 Jockey boiler installation & GES-2 AHU VFD & Control Modifications										
* Savings due to replacement of old boilers with high efficiency units	5,446		(5,446)	-		-	-			-
* Savings due to elimination of summer boiler reheat	5,351		(5,351)							
* Savings due to fan replacement and runtime reduction							498	663	165	663
* Adjustment for additional of pump with new boiler				(653)	(898)	(245)				(898)
* Savings due to reduced OA resulting from less fan running	4,186		(4,186)				3,547	4,719		4,719
* Savings due to controlling outside air with CO2 sensors	3,102		(3,102)				294	392		392
Gas Savings - Utility Tracking Savings from Bills (Sub total Utility Tracking)	18,085		(18,085)							-
* Savings due to fan replacement and runtime reduction				6,931	9,603	2,692				9,603
* Savings due to reducing speed on AHUs and pumps							5,119	6,825	1,706	6,825
* Savings due to pumping changes				20,908	29,785	8,877				38,785
* Savings due to reduced compressor runtime							11,519	15,358	3,839	15,358
Geist Elementary School Total Savings (not including adjustments)	**18,085**	**22,904**	**4,818**	**27,276**	**38,490**	-	**20,976**	**27,957**	**5,710**	**65,496**
BASELINE ADJUSTMENTS										-
* Baseline adjustment to provide 15 CFM/person outside air per current code	(2,278)	(2,278)					(156)	(187)	(31)	(2,465)
Subtotal of adjustments	*(2,278)*	*(2,278)*	-	-	-	-	*(156)*	*(187)*	*(31)*	*(2,465)*

No. of years monthly guarantee: 7
No. of years quarterly guarantee: 5
Total: 12

Performance Services

Utility Bill VS. Actual Savings Comparison

Year 4

Description	Utility Bill Savings	Outside Air & Motor Adjustments	Owner Override Impact	Anticipated Utility Bill Change
UTILITY SAVINGS				
Geist Elementary				
* Electric (not weather adjusted)	32,721	187	20,632	53,541
* Gas (weather adjusted)	22,904		(5,747)	17,157
SAVINGS	55,625		14,886	70,698

NOTE:

† Actual savings are calculated as defined in the Performance Guarantee Agreement, not based on raw utility data. Raw utility data is not used to measure actual energy savings because it is inaccurate and very time consuming. However, we feel it is important to compare raw utility data to the actual savings as a cross check. Therefore, we have provided raw utility data with this report. After adjusting for utility rate changes, weather, increased fresh air, air-conditioning additional areas and owner overrides the raw utility data corresponds to within 21% or $18,662 of the actual savings.

Performance Services

Weather Adjusted Utility Bill Savings

Buildings:
Geist Elementary

ELECTRIC

Utility: Central Indiana Power
Meter #

Timeframe			Current Year			Base Year			Savings		
Previous Year	Current Year	Month	Usage (kWh)	Rate ($ / kWh)	Raw Costs ($)	Raw Usage (kWh)	Rate ($ / kWh)	Raw Costs ($)	Usage (kWh)	Rate ($ / kWh)	Savings ($)
2008	2014	Oct	99,000	$ 0.1078	$ 10,733	147,900	$ 0.0949	$ 14,039	48,900	$ 0.1078	$ 5,205
2008	2014	Nov	108,000	$ 0.1077	$ 11,631	139,200	$ 0.0985	$ 13,728	31,200	$ 0.1077	$ 3,360
2008	2014	Dec	99,300	$ 0.1078	$ 10,690	64,900	$ 0.0891	$ 5,900	6,600	$ 0.1078	$ 712
2008	2015	Jan	102,000	$ 0.1077	$ 10,990	109,300	$ 0.0865	$ 9,565	7,300	$ 0.1077	$ 786
2008	2015	Feb	115,800	$ 0.1076	$ 12,464	107,700	$ 0.0907	$ 9,756	(8,100)	$ 0.1076	$ (871)
2008	2015	Mar	108,300	$ 0.1077	$ 11,663	125,100	$ 0.0904	$ 11,312	16,800	$ 0.1077	$ 1,809
2008	2015	Apr	94,500	$ 0.1078	$ 10,188	105,000	$ 0.0902	$ 9,526	10,500	$ 0.1078	$ 1,132
2008	2015	May	107,000	$ 0.1028	$ 11,000	121,100	$ 0.0904	$ 11,646	14,100	$ 0.1028	$ 1,449
2008	2015	Jun	90,000	$ 0.1111	$ 10,000	143,700	$ 0.0902	$ 12,965	53,700	$ 0.1111	$ 5,967
2008	2015	Jul	90,000	$ 0.1111	$ 10,000	111,900	$ 0.0909	$ 10,169	21,900	$ 0.1111	$ 2,433
2008	2015	Aug	107,100	$ 0.1077	$ 11,535	150,000	$ 0.0904	$ 13,565	42,900	$ 0.1077	$ 4,620
2008	2015	Sep	117,500	$ 0.1076	$ 12,625	164,700	$ 0.0823	$ 13,565	47,400	$ 0.1076	$ 5,102
Total			1,292,900	$ 0.1078	$ 132,890	1,595,400	$ 0.0897	$ 143,036	302,500	$ 0.1078	$ 32,321

$ 0.1078

GAS

Utility: Vectren/Proliance
Meter #

Timeframe			Current Year				Base Year						Savings		
Previous Year	Current Year	Month	Weather (HDD)	Usage (Therms)	Rate ($ / Therm)	Raw Costs ($)	Weather (HDD)	Raw Usage (Therms)	Rate ($ / Therm)	Raw Costs ($)	Weather Adjustment	Adj. Usage (therms)	Usage (Therms)	Rate ($ / Therm)	Savings ($)
2008	2014	Oct	335	271	$ 1.1557	$ 313	390	1,417	$ 1.3922	$ 1,985	1.12	1,715	1,444	$ 1.3922	$ 2,011
2008	2014	Nov	696	639	$ 0.8467	$ 541	692	2,274	$ 1.1628	$ 2,644	1.25	3,100	2,461	$ 1.1628	$ 2,862
2008	2014	Dec	974	2,722	$ 0.7876	$ 2,143	1,055	4,081	$ 0.8980	$ 4,083	0.92	4,171	1,448	$ 0.8980	$ 1,446
2008	2015	Jan	1,234	3,602	$ 0.7065	$ 2,545	1,218	4,902	$ 1.1417	$ 5,483	1.09	5,675	2,073	$ 1.1417	$ 2,367
2008	2015	Feb	1,249	3,877	$ 0.6896	$ 2,712	1,015	3,330	$ 1.0146	$ 3,375	1.23	4,677	800	$ 1.0146	$ 678
2008	2015	Mar	790	711	$ 0.7608	$ 541	755	4,117	$ 1.1207	$ 4,614	1.05	4,590	3,879	$ 1.1207	$ 4,347
2008	2015	Apr	313	818	$ 0.7793	$ 638	390	3,436	$ 1.2237	$ 4,229	0.92	3,251	2,433	$ 1.2237	$ 3,026
2008	2015	May	29	639	$ 0.8426	$ 539	179	1,888	$ 1.3497	$ 2,548	1.00	1,888	1,249	$ 1.3497	$ 1,685
2008	2015	Jun	16	418	$ 0.9511	$ 398	-	1,530	$ 1.1625	$ 1,805	1.00	1,530	1,112	$ 1.1625	$ 1,315
2008	2015	Jul	-	333	$ 1.0285	$ 343	-	1,017	$ 1.5927	$ 1,658	1.00	1,017	684	$ 1.5927	$ 1,048
2008	2015	Aug	2	342	$ 1.0391	$ 332	-	945	$ 1.3023	$ 1,235	1.00	945	603	$ 1.3023	$ 814
2008	2015	Sep	19	390	$ 0.9846	$ 384	9	1,686	$ 1.0602	$ 1,788	1.00	1,686	1,296	$ 1.0602	$ 1,374
Total			5,866	14,793	$ 0.7753	$ 11,428	5,463	30,963	$ 1.2569	$ 35,267	1.04	34,095	19,302	$ 1.1569	$ 21,904

$ 1.1569

Performance
Services

Actual Equipment Usage

Year 4 - Quarter 1 (October 1, 2014 - December 31, 2014)

School	System	October					November					December					1st Quarter Savings							
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]				[illegible]	[illegible]				[illegible]	[illegible]				[illegible]	[illegible]						
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total																								

[illegible]

Performance
Services

Actual Equipment Usage

Year 4 - Quarter 2 (October 1, 2014 - March 31, 2015)

Building	Equipment ID	January					February					March					Total Quarter Savings							
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]				[illegible]	[illegible]				[illegible]	[illegible]				[illegible]	[illegible]						
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total																								

[illegible] the year. Guaranteed hours which were used to the full schedule number. [illegible] the years and the equipment has an variable usage to peak of equipment hours. Guaranteed hours are the best estimate we have.

Performance Services

Actual Equipment Usage

Year 4 - Quarter 3 (October 1, 2014 - June 30, 2015)

Building	System ID	April					May					June					3-Quarter Savings							
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]				[illegible]	[illegible]				[illegible]	[illegible]				[illegible]	[illegible]						
Geist Elementary	VU-A1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	VU-D1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	VU-E1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	VU-F1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	Tower Fan	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	Exhaust Fans (15 Total)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	Heat Pumps (15 Total)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	Office HVU (3 Total)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	Gym HVU (2 Total)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	Jacket Boiler Pumps	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	Hot Water Pumps	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	Heat Pump Loop Pumps	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Geist Elementary	Sewer Pumps	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total																								[illegible]

[illegible]

Actual Equipment Usage

Year 4 - Quarter 4 (October 1, 2014 - September 30, 2015)

Building	System ID	July					August					September					4th Quarter Savings							
		Base Yr. (Hours)	Base (Hours)	Actual (Hours)	Adjusted (Hours)	Saved (Hours)	Base Yr. (Hours)	Base (Hours)	Actual (Hours)	Adjusted (Hours)	Saved (Hours)	Base Yr. (Hours)	Base (Hours)	Actual (Hours)	Adjusted (Hours)	Saved (Hours)	Base Yr. (Hours)	Base (Hours)	Actual (Hours)	Adjusted (Hours)	Saved (Hours)	Power (kW)	kWh Rate (kWh/hrs)	Savings ($)
		31	31				31	31				30	30				92	92						
Gaine Elementary	Vri-4 E	229	-	116	116	112	231	80	148	84	133	214	150	78	108	54	677	190	395	175	467	7.0	$ 0.109	$ 356
Geist Elementary	Vri-3A	228	-	0	0	228	231	80	80	-	151	214	150	150		64	672	190	190	0	482	7.0	$ 0.109	$ 368
Geist Elementary	Vri-7A	228	-	5	5	223	231	80	80	-	151	214	150	150		64	673	190	190	0	483	4.7	$ 0.109	$ 236
Geist Elementary	Vri-7B	227	-	0	0	227	231	80	148	72	159	214	150	154	4	68	672	190	190	0	482	38.7	$ 0.109	$ 453
Geist Elementary	Tower Fan	1,000	777	777	800	223	1,000	791	770	0	30	900	771	771	0	18	3,000	2,339	2,318	800	682	7.0	$ 0.109	$ 522
Geist Elementary	Exhaust Fans (10 Total)	800	-	800	800	0	800	49	800	751	751	900	364	800	62	176	2,400	204	2,400	2,196	204	3.2	$ 0.109	$ 68
Geist Elementary	Heat Pumps (25 Total)	100	113	141	81	188	100	148	194	46	152	250	245	218	1,259	40	450	504	443	4,611	186	92.9	$ 0.109	$ 1,883
Geist Elementary	Office HP's (3 Total)	100	172	143	143	123	100	191	148	143	95	250	171	161	1,146	18	450	735	451	2,129	160	3.0	$ 0.109	$ 17
Geist Elementary	Gym HP's (3 Total)	400	312	312	0	312	100	151	0	174	151	250	187	187	0	4	850	537	187	175	362	4.0	$ 0.109	$ 145
Geist Elementary	Rocking Boiler Pump	-	-	0	0	-	-	-	-	0	-	-	-	0	0	-	-	-	0	0	-	1.0	$ 0.109	$ -
Geist Elementary	Hot Water System	-	-	0	13	-	-	-	0	20	-	340	-	0	34	268	340	-	77	77	340	1.0	$ 0.109	$ 294
Geist Elementary	Heat Pump Loop Pumps	784	372	1,087	372	392	784	241	0	469	464	720	243	0	474	474	2,288	756	2,087	1,504	2,088	25.1	$ 0.109	$ 5,743
Geist Elementary	Tower Pumps	784	588	588	588	196	784	440	0	440	344	720	625	0	720	144	2,288	2,288	588	1,700	588	22.4	$ 0.109	$ 2,209
Total																								$ 12,346

Hours in gallons are scheduling hours when pumps were on as the actual runtime data for these units was not available.

Power in kW are Guaranteed Power while savings calculations and kWh Units kWh control data for the cooler and that equipment was not available in our building of equipment hours. Guaranteed hours are the best estimates we have.

FAN MOTOR RUNTIME SAVINGS

Building	System ID	Motor HP	Break HP / Motor HP	kW / HP	Fan Speed	Fan kW	Saved Hrs / Yr	Motor Efficiency	Savings (kWh)	Rate (kWh)	Savings ($)
GES-1 Jockey Boiler Installation											
Geist Elementary	Boiler Fan	5.00	1.00	0.746	100%	4.663	1,300	80%	6,061	$ 0.109	$ 663
Subtotal for GES-1									6,061		$ 663

Note: Heat pump fan HP's are the total for all of the fan horsepowers.

Note: Tower Fan has 2-stage HP motor, assume lower motor hp of the 2 stages.

Constant Volume to Variable Speed Fan Conversion

Electric Fan Savings

Description	Full Load Power		Fan Speed		Average kW Savings (kWh)	Future Operating Hours	Savings (kWh)	Composite Consumption Rate ($)	Utility Savings ($)
	(HP)	(kW)	Current Average Amount	Future Average Amount					
GES-2 AHU VFD and CO_2 Sensor Installation and Control System Optimization									
VU-A1	7.50	5.266	100%	60%	4.13	1,400	5,780	$ 0.109	$ 633
VU-D1	7.50	5.266	100%	60%	4.13	1,400	5,780	$ 0.109	$ 633
VU-E1	5.00	3.511	100%	60%	2.75	1,400	3,853	$ 0.109	$ 422
VU-F1	20.00	14.042	100%	55%	11.71	1,400	16,388	$ 0.109	$ 1,794
Hot Water Pumps	15.00	10.532	100%	65%	7.64	4,000	30,558	$ 0.109	$ 3,344
Total for GES-2							31,801		$ 6,825

Heating and Air-conditioning Savings Due to CO_2 Control

Building	Unit Type	Quantity	Occupied Hours		Heating OA		Air-conditioned OA		Occupied Energy Change		Savings	
			Winter (Hours)	Summer (Hours)	Current (CFM)	Future (CFM)	Current (CFM)	Future (CFM)	Heating (BTU)	Cooling (BTU)	Heating $	Cooling $
Geist Elementary	VU-A1	1	1,260	140	3,860	2,500	3,860	2,500	(65,573,960)	(7,261,150)	$ 809	$ 87
Geist Elementary	VU-D1	1	1,260	140	4,105	3,500	4,105	3,500	(28,348,343)	(3,230,162)	$ 360	$ 30
Geist Elementary	VU-E1	1	1,260	140	3,550	3,000	3,550	3,000	(26,316,875)	(2,936,511)	$ 327	$ 27
Geist Elementary	VU-F1	1	1,260	140	9,000	5,000	9,000	3,500	(191,394,000)	(29,365,105)	$ 2,381	$ 269
Total for GES-2					20,515	14,000			(311,732,978)	(42,792,867)	$ 3,878	$ 392

Outside Air Heating & Cooling Savings Resulting From Reduced Runtimes

Building	Unit Type	Quantity	Future Hours		Reduced Hours		Current OA		Energy Savings/Penalties		Savings/Costs	
			Winter (Hours)	Summer (Hours)	Winter (Hours)	Summer (Hours)	Heating (CFM)	Cooling (CFM)	Heating (BTU)	Cooling (BTU)	Heating (BTU)	Cooling (BTU)
Geist Elementary	VU-A1	1	1,260	140	540	660	3,860	3,860	(79,155,090)	(67,156,547)	$ 985	$ 890
Geist Elementary	VU-D1	1	1,260	140	540	660	4,105	4,105	(84,179,183)	(103,323,219)	$ 1,047	$ 946
Geist Elementary	VU-E1	1	1,260	140	540	660	3,550	3,550	(72,798,075)	(89,353,620)	$ 906	$ 818
Geist Elementary	VU-F1	1	1,260	140	540	660	9,000	9,000	(184,558,500)	(226,530,810)	$ 2,296	$ 2,075
Total for GES-2									(420,690,848)	(516,364,396)	$ 5,233	$ 4,729

Increased Heating and Cooling Costs Due to Increased Fresh Air Amounts

Building	Unit Type	Quantity Qty	Occupied Hours		Heating OA		Air-conditioned OA		Occupied Energy Change		Dollars Change	
			Winter (Hours)	Summer (Hours)	Current (CFM)	Future (CFM)	Current (CFM)	Future (CFM)	Heating (BTU)	Cooling (BTU)	Heating $	Cooling $
Geist Elementary	VU-D1	1	1,260	140	2,053	4,105	2,053	4,105	98,209,046	10,958,523	($1,225)	($106)
Geist Elementary	VU-E1	1	1,260	140	1,775	3,550	1,775	3,550	84,931,088	9,476,920	($1,056)	($87)
Subtotal					3,828	7,655	3,828	7,655	183,140,134	20,435,444	($2,278)	($187)

Notes:

1. Minimum OA is based upon an occupancy of 25 persons in each classroom.

Chiller Runtime Savings

System ID	Quantity	Efficiency (kW / Ton)	Tonage per unit	Total kW	Average Output	Average kW	Average Tonage	Saved Hours / Year	Usage (kWh/yr)	Rate ($/kWh)	Savings ($/yr)
GES-2 AHU VFD and CO_2 Sensor Installation and Control System Optimization											
VU-A1	1	1.41	30.50	42.94	50%	21.47	15.25	720	15,460	$ 0.109	$ 1,692
VU-D1	1	1.41	30.50	43.01	50%	21.50	15.25	720	15,482	$ 0.109	$ 1,694
VU-E1	1	1.41	26.70	37.59	50%	18.80	13.35	720	13,534	$ 0.109	$ 1,481
VU-F1	1	1.41	88.50	124.61	50%	62.30	44.25	720	44,859	$ 0.109	$ 4,909
Heat Pumps (75 Total)	75	0.85	3.40	216.75	40%	86.70	1.36	510	44,217	$ 0.109	$ 4,839
Office HP's (3 Total)	3	0.85	2.50	6.38	35%	2.23	0.88	319	711	$ 0.109	$ 78
Gym HP's (2 Total)	2	0.85	20.00	34.00	35%	11.90	7.00	510	6,069	$ 0.109	$ 664
Total Savings for GES-2									140,331		$ 15,358

Note:

1. Average Output is calculated based on existing tonnage installed and calculated load.
   AO = (calculated load / installed tons) * (60% average annual loading)

2. Efficiency based on part load operation of 19 year old equipment, used 1.28 kW/ton x 1.10 fouling factor

EXHIBIT K

Exhibit K – Certification Regarding Wage Rate Notification

General Decision Number: TX160323 08/26/2016 TX323

Superseded General Decision Number: TX20150323

State: Texas

Construction Type: Building

County: Travis County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.15 for calendar year 2016 applies to all contracts subject to the Davis-Bacon Act for which the solicitation was issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.15 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2016. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/08/2016
1	01/15/2016
2	03/18/2016
3	05/27/2016
4	06/17/2016
5	08/26/2016

ASBE0087-014 01/01/2016

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR (Duct, Pipe and Mechanical System Insulation)	$ 21.57	19.82

BOIL0974-003 01/01/2014

	Rates	Fringes
BOILERMAKER	$ 23.14	21.55

CARP1266-002 04/01/2014

	Rates	Fringes
CARPENTER (Excludes Acoustical Ceiling Installation, Drywall Hanging, Form Work, and Metal Stud Installation)	$ 20.75	7.30

ELEC0520-005 06/01/2015

	Rates	Fringes
ELECTRICIAN		

Excludes Installation of
Sound and Communication
Systems.....$ 27.15 8%+5.71
Low Voltage Wiring Only.....$ 27.15 8%+5.71

ELEV0133-002 01/01/2016

	Rates	Fringes
ELEVATOR MECHANIC.....$	37.76	29.985+a

Footnote: A. 6% under 5 years based on regular hourly rate for all hours worked. 8% over 5 years based on regular hourly rate for all hours worked.

New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and Veterans Day.

ENGI0450-002 04/01/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Cranes.....$	34.85	9.85

IRON0084-011 06/01/2015

	Rates	Fringes
IRONWORKER, ORNAMENTAL.....$	23.02	8.35

PLUM0286-010 05/30/2016

	Rates	Fringes
PIPEFITTER (Including HVAC Pipe Installation).....$	28.03	12.43

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* SFTX0669-002 04/01/2016

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers).....$	28.18	17.52

SHEE0067-007 07/01/2015

	Rates	Fringes
SHEET METAL WORKER		
Excludes HVAC Duct Installation.....$	24.38	13.74
HVAC Duct Installation Only.$	24.38	13.74

SUTX2014-049 07/21/2014

	Rates	Fringes
BRICKLAYER.....$	20.07	0.00
CARPENTER (Acoustical Ceiling Installation Only).....$	14.00	0.00

CARPENTER (Form Work Only).....	$ 15.62	0.85
CEMENT MASON/CONCRETE FINISHER...	$ 15.71	0.00
DRYWALL FINISHER/TAPER.....	$ 17.06	4.43
DRYWALL HANGER AND METAL STUD INSTALLER.....	$ 17.47	3.45
ELECTRICAL INSTALLER (Sound and Communication Systems) (Excludes Wiring).....	$ 18.00	2.38
FLOOR LAYER: Carpet.....	$ 21.88	0.00
GLAZIER.....	$ 12.83	0.00
HVAC MECHANIC (HVAC Unit Installation Only).....	$ 23.78	6.89
IRONWORKER, REINFORCING.....	$ 12.27	0.00
IRONWORKER, STRUCTURAL.....	$ 20.73	5.24
LABORER: Common or General.....	$ 11.44	0.00
LABORER: Mason Tender - Brick...	$ 12.22	0.00
LABORER: Mason Tender - Cement/Concrete.....	$ 11.85	0.00
LABORER: Pipelayer.....	$ 12.45	0.00
LABORER: Roof Tearoff.....	$ 11.28	0.00
OPERATOR: Backhoe/Excavator/Trackhoe.....	$ 19.43	3.49
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	$ 13.00	0.00
OPERATOR: Bulldozer.....	$ 14.00	0.00
OPERATOR: Drill.....	$ 14.50	0.00
OPERATOR: Forklift.....	$ 16.64	5.26
OPERATOR: Grader/Blade.....	$ 19.30	0.00
OPERATOR: Loader.....	$ 14.00	0.00
OPERATOR: Mechanic.....	$ 18.75	5.12
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	$ 16.83	0.00
OPERATOR: Roller.....	$ 11.25	0.00
PAINTER (Brush, Roller and Spray), Excludes Drywall Finishing/Taping.....	$ 18.76	6.35
PLUMBER, Excludes HVAC Pipe Installation.....	$ 23.57	6.57

ROOFER.....$ 12.08 0.00

TILE FINISHER.....$ 11.32 0.00

TILE SETTER.....$ 18.35 0.00

TRUCK DRIVER: Dump Truck.....$ 12.39 1.18

TRUCK DRIVER: Flatbed Truck.....$ 19.65 0.57

TRUCK DRIVER: Semi-Trailer
Truck.....$ 12.50 0.00

TRUCK DRIVER: Water Truck.....$ 12.86 4.11

WATERPROOFER.....$ 16.39 0.06

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that

no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.

Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

EXHIBIT L

Exhibit L - Project Manager and Subcontractors List

Performance Services, Inc.:

Project Manager: Greg Mizell

Project Subcontractors:

Kim Neal & Associates, LLC
PDI Group
Blue Ocean Energy Management
DFW Consulting Group
Alan Plummer & Associates Inc
LPG Group
Lockey Heating & Air Conditioning
Kamo Energy
2nd Tier to LPG Group – Wire Doctor Corp
2nd Tier to Kim Neal & Associates, LLC – Lighting Technologies, LP

EXHIBIT M

Exhibit M – Criminal Background Check Criteria and Information

TEXAS FACILITIES COMMISSION CRIMINAL BACKGROUND CHECKS AND APPLICATION GUIDELINES

It is the policy of the Texas Facilities Commission ("TFC") that all contractor employees and subcontractors that will complete any work on-site at a state-owned property may be subject to a criminal background check. Any expense associated with such criminal background check shall be borne by the contractor. Contractor employees and subcontracts who work in case-sensitive areas will be required to submit to a criminal history background check. If requested by TFC, a complete criminal background check shall be completed before any employee performs services at the site. Criminal background checks must be performed by the Texas Department of Public Safety ("DPS") and must be on the form provided here by TFC.

I. Criminal History Criteria.

Employers should use the following criminal history criteria when hiring employees to perform work for TFC. Any employee failing to meet the minimum standard will be denied. If special circumstances exist, please contact the TFC representative for clarification.

A conviction or deferred adjudication for one of the following offenses will result in the **permanent disqualification** of a person from eligibility to provide contractual services with TFC:

(i) any act causing death as defined in Texas Penal Code, and

(ii) any felony or misdemeanor involving arson, burglary, breach of computer security, credit card abuse, counterfeiting, forgery, kidnapping, robbery, stalking, terroristic threat, theft, and any sexual offense designated as a felony in Texas Penal Code.

Additionally, anyone who has a current duty to register as a sex offender, is under indictment, or is a fugitive from justice is disqualified.

For individuals who have a conviction or deferred adjudication for felonies not enumerated above, ten (10) years must have passed from the time of disposition or discharge of probation in order for that person to be eligible to provide contractual services with TFC.

For individuals who have a misdemeanor conviction or deferred adjudication for misdemeanors not enumerated above, five (5) years must have passed from the time of disposition or discharge of probation in order for that person to be eligible to provide contractual services with TFC.

II. CRIMINAL BACKGROUND PROCESS.

DPS has entered into an exclusive contract with IdentoGO Centers, formerly L-i Enrollment Services, operated by MorphoTrust USA. IdentoGO by MorphoTrust is the exclusive live scan fingerprinting provider for DPS. All TFC contractors that are subject to TFC criminal background check requirements must create an account with IdentoGo in accordance with the IdentoGo Account Application and requirements attached hereto as "Attachment A." Thereafter, all contractor employees and subcontractors must follow the registration procedures attached hereto as "Attachment B" including using the ***Texas Facilities Commission In State Application*** **("F.A.S.T. Pass")** attached hereto as "Attachment C." All necessary instructions and information to schedule a fingerprint appointment is included in Attachment B. In addition, the only F.A.S.T. Pass accepted by DPS for a TFC criminal background check is the form attached hereto, therefore, if an individual does not use the form in Attachment C, he or she may be required to repeat the process at the expense of contractor.

Additionally, all Attachments and instructions can be found on the Identogo website at *http://www.identogo.com* and clicking on the State of Texas. Links on that page include one for online scheduling and a list for the state-wide fingerprinting locations.

III. CRIMINAL HISTORY ERROR RESOLUTION.

The Error Resolution Unit ("ER") is responsible for updating and evaluating possible errors in criminal history records. Potential errors are reported to ER by law enforcement, judicial agencies, as well as private citizens.

If an applicant needs to request that a criminal history record be updated or corrected, the applicant will need to supply certified documents to the ER. Required forms and additional information to assist your applicant in retrieving the proper documentation to submit their requests to the ER can be found at:

http://www.txdps.state.tx.us/administration/crime_records/pages/errorresolution.htm

IV. TFC CONTACTS.

For any questions involving the TFC criminal background check process, please contact the following:

Mark Gil, Director of Risk Management
Office: 512-463-1668
Cell: 512-563-4093
Email: mark.gil@tfc.state.tx.us

Marlena Schoenfeld, Risk Management Specialist
Office: 512-463-7148
Cell: 512-828-1996
Email: Marlena.schoenfeld@tfc.state.tx.us

Attachment A

Account Application

Firm Name: _____

Agency ID/ORI: _____

Address: _____

City/State/Zip: _____

Contact Person: _____

Email Address: _____
(for monthly statement delivery)

Telephone: _____ Fax: _____

Average Monthly Volume Estimate (# of applicants): _____

Deposit Amount: _____

_____ _____
Authorized Signature Date

Please remit draw account payments to:

Enrollment Services Division
Finance Department
6840 Carothers Parkway, Suite 650
Franklin, TN 37067

Phone: (877) 512-6962
Fax: (615) 871-0845

Attachment A

Texas Escrow Account Requirements

Your firm has recently indicated an interest in establishing an account for fingerprinting services with our company. Due to the large number of applicants that our firm processes on a monthly basis, we are not able to extend credit terms for fingerprinting services. However, for those facilities that desire a centralized means of managing the fees accompanied with the fingerprinting requirements, we offer the option of establishing an escrow account.

To establish an escrow account with our company, you must submit a deposit check payable to MorphoTrust USA at the address listed below. This check should include the following information:

- Name of facility
- ORI Number (if applicable)
- Account Number
- Contact Person
- Phone number (including area code)

The deposit check should be the amount necessary to cover one month's fingerprinting services. When an employee is scheduled for an appointment, the proper fees are reserved to cover the cost of that applicant's fingerprints. After the applicant has completed their fingerprinting appointment, the reserved fees are deducted from your account. A detailed list of those applicants fingerprinted and charged to your account will be mailed at the beginning of each month.

It will be the responsibility of each facility to ensure that there is always a positive balance in your escrow account and that the account number is listed on each check. Failure to maintain a positive balance may result in applicants not being able to schedule appointments for fingerprinting until the account is returned to a positive balance. Because many facilities have very similar names, failure to include the account number on each check may result in your facility not receiving credit for the check amount.

We appreciate your interest in our escrow account system. If your facility has any additional questions, please call 888-467-2080.

Please remit draw account payments to:

Enrollment Services Division
Finance Department
5840 Carothers Parkway, Suite 650
Franklin, TN 37067

Phone: (877) 512-6962
Fax: (615) 871-0845

Registering for Fingerprinting

is fast and easy.

Customers have two easy ways to register for fingerprinting with IdentoGO by MorphoTrust USA.

On-line Registration

Available 24 hours a day, 7 days a week.

1. Go to www.identogo.com
2. Click on the "Texas" map.
3. Enter required information (including ORI) and provide payment information, if necessary.

Call Center Registration

Available Monday-Friday, 8am – 5pm EST.

1. Call (888) 467-2080 and speak to one of our experienced, friendly operators.
2. Operators will collect required information to register you for fingerprinting
3. Be sure to have your ORI number and payment information handy when calling.

You're ready to go.

IdentoGO®

By MorphoTrust USA

Attachment C

IN STATE APPLICANT

Texas Facilities Commission

This document is your *FAST Fingerprint Pass* for a state and national criminal history record check. Please schedule a fingerprint appointment by visiting http://www.identogo.com or by calling 1-888-467-2080. When scheduling an appointment you will be prompted by IdentoGO for the following additional personal data: Date of Birth, Sex, Race, Ethnicity, Skin Tone, Height, Weight, Eye Color, Hair Color, Place of Birth and Home Address. During your Fingerprint appointment you will also be prompted for Social Security Number and Driver License Number. Requested data is required by the Texas Department of Public Safety to process your background check. These data elements have been omitted from this document in order to better protect the security of your personal information. You may pay for *FAST* services online with a credit card or onsite with a check or money order only. Your fingerprints will be submitted to the Texas Department of Public Safety and the Federal Bureau of Investigation.

1. Logon to http://www.identogo.com
2. Select: *Texas*
3. Select: *Online Scheduling*
4. Select: *English or Español*
5. Enter: *First and Last Name*
6. Select: *All Others*
7. Select: *Option A – Electronic Submission*
8. Select: *Yes, I have a FAST Fingerprint Pass*
9. Enter: *TX9236052*
10. Follow the prompts to enter requested information
11. Bring this completed form with you to your appointment

Section One: Qualified Entity Information

ORI#: TX9236052 Original TCN: _____
(If resubmission for rejected fingerprints)

Agency/Entity/Organization Name: Texas Facilities Commission

Section Two: Applicant Name (To be completed by applicant)

Last: _____ (Please print) First: _____ (Please print) Middle: _____ (Please print)

Section Three: Waiver Information (To be completed and signed by applicant)

I certify that all information I provided in relation to this criminal history record check is true and accurate. I authorize the Texas Department of Public Safety (DPS) to access Texas and Federal criminal history record information that pertains to me and disseminate that information to the designated Authorized Agency or Qualified Entity with which I am or am seeking to be employed or to serve as a volunteer, through the DPS Fingerprint-based Applicant Clearinghouse of Texas and as authorized by Texas Government Code Chapter 411 and any other applicable state or federal statute or policy.

I authorize the Texas Department of Public Safety to submit my fingerprints and other application information to the FBI for the purpose of comparing the submitted information to available records in order to identify other information that may be pertinent to the application. I authorize the FBI to disclose potentially pertinent information to the DPS during the processing of this application and for as long hereafter as may be relevant to the activity for which this application is being submitted. I understand that the FBI may also retain my fingerprints and other applicant information in the FBI's permanent collection of fingerprints and related information, where all such data will be subject to comparisons against other submissions received by the FBI and to further disseminations by the FBI as may be authorized under the Federal Privacy Act (5USC 552a(b)). I understand I am entitled to obtain a copy of any criminal history record check and challenge the accuracy and completeness of the information before a final determination is made by the Qualified Entity. I also understand the Qualified Entity may deny me access to children, the elderly, or individuals with disabilities until the criminal history record check is completed.

Signature: _____ Date: _____

Section Four: Service Center Information (To be completed by FAST Enrollment Agent)

Date Prints Taken _____ Amount Charged For Service: $39.75

Paid by: ☐ Check ☐ Money Order ☐ Visa ☐ MasterCard ☐ Billing Acct _____

TCN: _____

☐ I HAVE COMPARED THE GOVERNMENT-ISSUED IDENTIFICATION PRESENTED BY THE APPLICANT AND ATTEST THAT TO MY BEST DETERMINATION, I HAVE FINGERPRINTED THE SAME PERSON.

E.A. Name: _____ (Please print) E.A. Signature: _____

EXHIBIT N

Exhibit N – HUB Subcontracting Plan form

HUB Subcontracting Plan (HSP)

QUICK CHECKLIST

While this HSP Quick Checklist is being provided to merely assist you in readily identifying the sections of the HSP form that you will need to complete, it is very important that you adhere to the instructions in the HSP form and instructions provided by the contracting agency.

➤ If you will be awarding all of the subcontracting work you have to offer under the contract to only Texas certified HUB vendors, complete:

- ☐ Section 1 - Respondent and Requisition Information
- ☐ Section 2 a. - Yes, I will be subcontracting portions of the contract
- ☐ Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors
- ☐ Section 2 c. - Yes
- ☐ Section 4 - Affirmation
- ☐ GFE Method A (Attachment A) - Complete an Attachment A for each of the subcontracting opportunities you listed in Section 2 b.

➤ If you will be subcontracting any portion of the contract to Texas certified HUB vendors and Non-HUB vendors, and the aggregate percentage of all the subcontracting work you will be awarding to the Texas certified HUB vendors with which you have a *continuous contract** in place for five (5) years or less *meets or exceeds* the HUB Goal the contracting agency identified in the "Agency Special Instructions/Additional Requirements", complete:

- ☒ Section 1 - Respondent and Requisition Information
- ☒ Section 2 a. - Yes, I will be subcontracting portions of the contract
- ☒ Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors and Non-HUB vendors
- ☒ Section 2 c. - No
- ☒ Section 2 d. - Yes
- ☒ Section 4 - Affirmation
- ☒ GFE Method A (Attachment A) - Complete an Attachment A for each of the subcontracting opportunities you listed in Section 2 b.

➤ If you will be subcontracting any portion of the contract to Texas certified HUB vendors and Non-HUB vendors or only to Non-HUB vendors, and the aggregate percentage of all the subcontracting work you will be awarding to the Texas certified HUB vendors with which you have a *continuous contract** in place for five (5) years or less *does not meet or exceed* the HUB Goal the contracting agency identified in the "Agency Special Instructions/Additional Requirements", complete:

- ☐ Section 1 - Respondent and Requisition Information
- ☐ Section 2 a. - Yes, I will be subcontracting portions of the contract
- ☐ Section 2 b. - List all the portions of work you will subcontract, and indicated the percentage of the contract you expect to award to Texas certified HUB vendors and Non-HUB vendors
- ☐ Section 2 c. - No
- ☐ Section 2 d. - No
- ☐ Section 4 - Affirmation
- ☐ GFE Method B (Attachment B) - Complete an Attachment B for each of the subcontracting opportunities you listed in Section 2 b.

➤ If you will not be subcontracting any portion of the contract and will be fulfilling the entire contract with your own resources, complete:

- ☐ Section 1 - Respondent and Requisition Information
- ☐ Section 2 a. - No, I will not be subcontracting any portion of the contract, and I will be fulfilling the entire contract with my own resources
- ☐ Section 3 - Self Performing Justification
- ☐ Section 4 - Affirmation

*Continuous Contract: *Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.*

Rev. 10/14

HUB Subcontracting Plan (HSP)

In accordance with Texas Gov't Code §2161.252, the contracting agency has determined that subcontracting opportunities are probable under this contract. Therefore, all respondents, including State of Texas certified Historically Underutilized Businesses (HUBs) must complete and submit this State of Texas HUB Subcontracting Plan (HSP) with their response to the bid requisition (solicitation).

NOTE: Responses that do not include a completed HSP shall be rejected pursuant to Texas Gov't Code §2161.252(b).

The HUB Program promotes equal business opportunities for economically disadvantaged persons to contract with the State of Texas in accordance with the goals specified in the 2009 State of Texas Disparity Study. The statewide HUB goals defined in 34 Texas Administrative Code (TAC) §20.13 are:

- ***11.2 percent for heavy construction other than building contracts,***
- ***21.1 percent for all building construction, including general contractors and operative builders' contracts,***
- ***32.9 percent for all special trade construction contracts,***
- ***23.7 percent for professional services contracts,***
- ***26.0 percent for all other services contracts, and***
- ***21.1 percent for commodities contracts.***

- - Agency Special Instructions/Additional Requirements - -

In accordance with 34 TAC §20.14(d)(1)(D)(iii), a respondent (prime contractor) may demonstrate good faith effort to utilize Texas certified HUBs for its subcontracting opportunities if the total value of the respondent's subcontracts with Texas certified HUBs meets or exceeds the statewide HUB goal or the agency specific HUB goal, whichever is higher. When a respondent uses this method to demonstrate good faith effort, the respondent must identify the HUBs with which it will subcontract. If using existing contracts with Texas certified HUBs to satisfy this requirement, only contracts that have been in place for five years or less shall qualify for meeting the HUB goal. This limitation is designed to encourage vendor rotation as recommended by the 2009 Texas Disparity Study.

**ATTENTION: Failure to submit an HSP or demonstrate good faith efforts in accordance with Title 34 Texas Administrative Code §20.14 will deem your proposal non-responsive and will not be considered for award.

The HSP is a Pass/Fail element of your proposal.

Second-tier Texas certified HUB participation contributes toward meeting good faith efforts. Indicate second-tier HUBs on the HSP for Attachment A, Section A-2 or Attachment B, Section B-4.

For questions or assistance completing your HSP, please contact the HUB Program Director, Dinita Caldwell at 512-475-0453 or send an e-mail to HUB@tfc.state.tx.us.

SECTION 1: RESPONDENT AND REQUISITION INFORM

a. Respondent (Company) Name: Performance Services Inc. State of Texas VID #:

Point of Contact: Doug Kirkley Phone #: (214) 272-6963

E-mail Address: dkirkley@performanceservices.com Fax #: (317) 713-1751

b. Is your company a State of Texas certified HUB? ☐ - Yes ☑ - No

c. Requisition #: RFQ #303-6-00006 Bid Open Date: 8/28/2015 (mm/dd/yyyy)

Enter your company's name here: Performance Services Inc Requisition #: 303-6-00006

SECTION 2 SUBCONTRACTING INTENTIONS RESPONDENT

After dividing the contract work into reasonable lots or portions to the extent consistent with prudent industry practices, and taking into consideration the scope of work to be performed under the proposed contract, including all potential subcontracting opportunities, the respondent must determine what portions of work, including goods and services, will be subcontracted. Note: In accordance with 34 TAC §20.11, an "Subcontractor" means a person who contracts with a prime contractor to work, to supply commodities, or to contribute toward completing work for a governmental entity.

a. Check the appropriate box (Yes or No) that identifies your subcontracting intentions:

☒ - *Yes*, I will be subcontracting portions of the contract. (If *Yes*, complete Item b, of this SECTION and continue to Item c of this SECTION.)
☐ - *No*, I will not be subcontracting any portion of the contract, and I will be fulfilling the entire contract with my own resources. (If *No*, continue to SECTION 3 and SECTION 4.)

b. List all the portions of work (subcontracting opportunities) you will subcontract. Also, based on the total value of the contract, identify the percentages of the contract you expect to award to Texas certified HUBs, and the percentage of the contract you expect to award to vendors that are not a Texas certified HUB (i.e. Non-HUB).

Item #	Subcontracting Opportunity Description	HUBs: Percentage of the contract expected to be subcontracted to HUBs with which you have a continuous contract* in place for five (5) years or less:	HUBs: Percentage of the contract expected to be subcontracted to HUBs with which you have a continuous contract* in place for more than five (5) years:	Non-HUBs: Percentage of the contract expected to be subcontracted to non-HUBs.
1	LED Lighting Energy Audit	0.2 %	%	%
2	Building energy audits	0.6 %	%	%
3	Retro-commissioning	0.6 %	%	%
4	Water conservation measures	%	%	5.1 %
5	LED Lighting Retrofits	33.8 %	%	%
6	Power Factor Correction	%	%	6.9 %
7	Mechanical & HVAC Improvements	%	%	0.8 %
8	Bldg Automation System Installation	2.6 %	%	%
9		%	%	%
10		%	%	%
11		%	%	%
12		%	%	%
13		%	%	%
14		%	%	%
15		%	%	%
	Aggregate percentages of the contract expected to be subcontracted:	44.0 %	%	12.6 %

(Note: If you have more than fifteen subcontracting opportunities, a continuation sheet is available online at http://window.state.tx.us/procurement/prog/hub/hub-subcontracting-plan/.)

c. Check the appropriate box (Yes or No) that indicates whether you will be using only Texas certified HUBs to perform all of the subcontracting opportunities you listed in SECTION 2, Item b.

☐ - *Yes* (If *Yes*, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed.)
☒ - *No* (If *No*, continue to Item d, of this SECTION.)

d. Check the appropriate box (Yes or No) that indicates whether the aggregate expected percentage of the contract you will subcontract with Texas certified HUBs with which you have a continuous contract* in place with for five (5) years or less meets or exceeds the HUB goal the contracting agency identified on page 1 in the "Agency Special Instructions/Additional Requirements".

☒ - *Yes* (If *Yes*, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed.)
☐ - *No* (If *No*, continue to SECTION 4 and complete an "HSP Good Faith Effort - Method B (Attachment B)" for each of the subcontracting opportunities you listed.)

"Continuous Contract": Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.

Enter your company's name here: Performance Services Inc Requisition #: 303-6-00006

SECTION 2: SUBCONTRACTING INTENTIONS RESPONDENT (CONTINUATION SHEET)

a. This page can be used as a continuation sheet to the HSP Form's page 2, Section 2, Item b. Continue listing the portions of work (subcontracting opportunities) you will subcontract. Also, based on the total value of the contract, identify the percentages of the contract you expect to award to Texas certified HUBs, and the percentage of the contract you expect to award to vendors that are not a Texas certified HUB (i.e., Non-HUB).

Item #	Subcontracting Opportunity Description	HUBs		Non-HUBs
		Percentage of the contract expected to be subcontracted to HUBs with which you have a continuous contract* in place for five (5) years or less.	Percentage of the contract expected to be subcontracted to HUBs with which you have a continuous contract* in place for more than five (5) years.	Percentage of the contract expected to be subcontracted to non-HUBs.
16		%	%	%
17		%	%	%
18		%	%	%
19		%	%	%
20		%	%	%
21		%	%	%
22		%	%	%
23		%	%	%
24		%	%	%
25		%	%	%
26		%	%	%
27		%	%	%
28		%	%	%
29		%	%	%
30		%	%	%
31		%	%	%
32		%	%	%
33		%	%	%
34		%	%	%
35		%	%	%
36		%	%	%
37		%	%	%
38		%	%	%
39		%	%	%
40		%	%	%
41		%	%	%
42		%	%	%
43		%	%	%
	Aggregate percentages of the contract expected to be subcontracted:	%	%	%

**Continuous Contract: Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.*

Rev. 06/13

Enter your company's name here: Performance Services Inc Requisition #: 303-6-00006

SECTION 3: SELF PERFORMING JUSTIFICATION (If you responded "No" to SECTION 2, Item a, you must complete this SECTION and continue to SECTION 4)

Check the appropriate box (Yes or No) that indicates whether your response/proposal contains an explanation demonstrating how your company will fulfill the entire contract with its own resources.

☐ - Yes (If Yes, in the space provided below list the specific page(s)/section(s) of your proposal which explains how your company will perform the entire contract with its own equipment, supplies, materials and/or employees.)

☐ - No (If No, in the space provided below explain how your company will perform the entire contract with its own equipment, supplies, materials and/or employees.)

SECTION 4: AFFIRMATION

As evidenced by my signature below, I affirm that I am an authorized representative of the respondent listed in SECTION 1, and that the information and supporting documentation submitted with the HSP is true and correct. Respondent understands and agrees that, if awarded any portion of the requisition:

- The respondent will provide notice as soon as practical to all the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor for the awarded contract. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity they (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract no later than ten (10) working days after the contract is awarded.
- The respondent must submit monthly compliance reports (Prime Contractor Progress Assessment Report – PAR) to the contracting agency, verifying its compliance with the HSP, including the use of and expenditures made to its subcontractors (HUBs and Non-HUBs). (The PAR is available at http://www.window.state.tx.us/procurement/prog/hub/hub-forms/progressassessmentrpt.xls).
- The respondent must seek approval from the contracting agency prior to making any modifications to its HSP, including the hiring of additional or different subcontractors and the termination of a subcontractor the respondent identified in its HSP. If the HSP is modified without the contracting agency's prior approval, respondent may be subject to any and all enforcement remedies available under the contract or otherwise available by law, up to and including debarment from all state contracting.
- The respondent must, upon request, allow the contracting agency to perform on-site reviews of the company's headquarters and/or work site where services are being performed and must provide documentation regarding staffing and other resources.

Signature	Doug Kirkley Printed Name	Business Development Mgr Title	Date (mm/dd/yyyy)

Reminder:

- If you responded "Yes" to SECTION 2, Items c or d, you must complete an "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed in SECTION 2, Item b.
- If you responded "No" SECTION 2, Items c and d, you must complete an "HSP Good Faith Effort - Method B (Attachment B)" for each of the subcontracting opportunities you listed in SECTION 2, Item b.

Rev. 10/1

HSP Good Faith Effort - Method A (Attachment A)

Enter your company's name here: Performance Services Inc. Requisition #: 393-6-00006

IMPORTANT: If you responded "Yes" to SECTION 2, Items a or d of the completed HSP form, you must submit a completed "HSP Good Faith Effort - Method A (Attachment A)" for each of the subcontracting opportunities you listed in SECTION 2, Item b of the completed HSP form. You may photo-copy this page or download the form at http://window.state.tx.us/procurement/prog/hub/hub-forms/hub-subcont-plan-gfe-action-a.pdf.

SECTION A-1: SUBCONTRACTING OPPORTUNITY

Enter the item number and description of the subcontracting opportunity you listed in SECTION 2, Item b. of the completed HSP form for which you are completing the attachment.

Item Number: 1 Description: LED Lighting Assessment & Audit

SECTION A-2: SUBCONTRACTOR SELECTION

List the subcontractor(s) you selected to perform the subcontracting opportunity you listed above in SECTION A-1. Also identify whether they are a Texas certified HUB and their VID number, the approximate dollar value of the work to be subcontracted, the expected percentage of work to be subcontracted, and indicate whether the company is a Texas certified HUB.

Company Name	Texas certified HUB	VID Number (Required if Texas certified HUB)	Approximate Dollar Amount	Expected Percentage of Contract
PDI Group	☑ - Yes ☐ - No	1710860436400	$7,761.00	0.2 %
Lighting Technologies (LIT)	☐ - Yes ☑ - No		$	%
Kim Neal & Associates (KNA)	☑ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%

REMINDER: As specified in SECTION 4 of the completed HSP form, if you (respondent) are awarded any portion of the requisition, you are required to provide notice as soon as practical to all the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity they (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract no later than ten (10) working days after the contract is awarded.

HSP Good Faith Effort - Method B (Attachment B)

Rev. 10/12

Enter your company's name here: Performance Services Inc	Requisition #: 303-6-00006

IMPORTANT: If you respondedl "*Yes*" to SECTION 2, Items b or d of the completed HSP form, you must submit a completed "HSP Good Faith Effort - Method B (Attachment B)" for each of the subcontracting opportunities you listed in SECTION 2, Item b of the completed HSP form. You may photo-copy this page or download the form at http://window.state.tx.us/procurement/prog/hub/hub-forms/hub-sbcont-plan-gfe-achm-b.pdf.

SECTION B-1 Subcontracting Opportunity

Enter the item number and description of the subcontracting opportunity you listed in SECTION 2, Item b, of the completed HSP form for which you are completing the attachment.

Item Number: _____ Description: _____

SECTION B-2 Mentor Protégé Program

If respondent is participating as a Mentor in a State of Texas Mentor Protégé Program, submitting its Protégé (Protégé must be a State of Texas certified HUB) as a subcontractor to perform the subcontracting opportunity listed in SECTION B-1, constitutes a good faith effort to subcontract with a Texas certified HUB towards that specific portion of work.

Check the appropriate box (Yes or No) that indicates whether you will be subcontracting the portion of work you listed in SECTION B-1 to your Protégé.

☐ - Yes (If *Yes*, to continue to SECTION B-4.)

☐ - No / Not Applicable (If *No* or *Not Applicable*, continue to SECTION B-3 and SECTION B-4.)

SECTION B-3 Notification Of Subcontracting Opportunity

When completing this section you MUST comply with items a, b, c and d, thereby demonstrating your Good Faith Effort of having notified Texas certified HUBs and trade organizations or development centers about the subcontracting opportunity you listed in SECTION B-1. Your notice should include the scope of work, information regarding the location to review plans and specifications, bonding and insurance requirements, required qualifications, and identify a contact person. When sending notice of your subcontracting opportunity, you are encouraged to use the attached HUB Subcontracting Opportunity Notice form, which is also available online at http://www.window.state.tx.us/procurement/prog/hub/hub-subcontracting-plan/.

Retain supporting documentation (i.e., certified letter, fax, e-mail) demonstrating evidence of your good faith effort to notify the Texas certified HUBs and trade organizations or development centers. Also, be mindful that a working day is considered a normal business day of a state agency, not including weekends, federal or state holidays, or days the agency is declared closed by its executive officer. The initial day the subcontracting opportunity notice is sent/provided to the HUBs and to the trade organizations or development centers is considered to be "day zero" and does not count as one of the seven (7) working days.

a. Provide written notification of the subcontracting opportunity you listed in SECTION B-1, to three (3) or more Texas certified HUBs. Unless the contracting agency specified a different time period, you must allow the HUBs at least seven (7) working days to respond to the notice prior to your submitting your bid response to the contracting agency. When searching for Texas certified HUBs, ensure that you use the State of Texas' Centralized Master Bidders List (CMBL) and Historically Underutilized Business (HUB) Search directory located at http://mycpa.state.tx.us/tpasscmbsearch/index.jsp. HUB Status code "A" signifies that the company is a Texas certified HUB.

b. List the three (3) Texas certified HUBs you notified regarding the subcontracting opportunity you listed in SECTION B-1. Include the company's Vendor ID (VID) number, the date you sent notice to that company, and indicate whether it was responsive or non-responsive to your subcontracting opportunity notice.

Company Name	VID Number	Date Notice Sent (mm/dd/yyyy)	Did the HUB Respond?
			☐ - Yes ☐ - No
			☐ - Yes ☐ - No
			☐ - Yes ☐ - No

c. Provide written notification of the subcontracting opportunity you listed in SECTION B-1 to two (2) or more trade organizations or development centers in Texas to assist in identifying potential HUBs by disseminating the subcontracting opportunity to their members/participants. Unless the contracting agency specified a different time period, you must provide your subcontracting opportunity notice to trade organizations or development centers at least seven (7) working days prior to submitting your bid response to the contracting agency. A list of trade organizations and development centers that have expressed an interest in receiving notices of subcontracting opportunities is available on the Statewide HUB Program's webpage at http://www.window.state.tx.us/procurement/prog/hub/mwb-links-1/.

d. List two (2) trade organizations or development centers you notified regarding the subcontracting opportunity you listed in SECTION B-1. Include the date when you sent notice to it and indicate if it accepted or rejected your notice.

Trade Organizations or Development Centers	Date Notice Sent (mm/dd/yyyy)	Was the Notice Accepted?
		☐ - Yes ☐ - No
		☐ - Yes ☐ - No

HSP Good Faith Effort - Method B (Attachment B) Cont.

Enter your company's name here: Performance Services Inc Requisition #: 303-6-00068

SECTION B-4: SUBCONTRACTOR SELECTION

Enter the item number and description of the subcontracting opportunity you listed in SECTION 2, item b, of the completed HSP form for which you are completing the attachment.

a. Enter the item number and description of the subcontracting opportunity for which you are completing this Attachment B continuation page:

Item Number: _____ Description: _____

b. List the subcontractor(s) you selected to perform the subcontracting opportunity you listed in SECTION B-1. Also identify whether they are a Texas certified HUB and their VID number, the approximate dollar value of the work to be subcontracted, the expected percentage of work to be subcontracted, and indicate whether the company is a Texas certified HUB.

Company Name	Texas certified HUB	VID Number (Required if Texas certified HUB)	Approximate Dollar Amount	Expected Percentage of Contract
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%
	☐ - Yes ☐ - No		$	%

c. If any of the subcontractors you have selected to perform the subcontracting opportunity you listed in SECTION B-1 is not a Texas certified HUB, provide written justification for your selection process (attach additional page if necessary).

REMINDER: As specified in SECTION 4 of the completed HSP form, if you (respondent) are awarded any portion of the requisition, you are required to provide notice as soon as practical to all the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity it (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract no later than ten (10) working days after the contract is awarded.

Rev. 10/14

HUB Subcontracting Opportunity Notification Form

In accordance with Texas Gov't Code, Chapter 2161, each state agency that considers entering into a contract with an expected value of $100,000 or more shall, before the agency solicits bids, proposals, offers, or other applicable expressions of interest, determine whether subcontracting opportunities are probable under the contract. The state agency I have identified below in Section B has determined that subcontracting opportunities are probable under the requisition to which my company will be responding.

34 Texas Administrative Code, §20.14 requires all respondents (prime contractors) bidding on the contract to provide notice of each of their subcontracting opportunities to at least three (3) Texas certified HUBs (who work within the respective industry applicable to the subcontracting opportunity), and allow the HUBs at least seven (7) working days in respond to the notice prior to the respondent submitting its bid response to the contracting agency. In addition, at least seven (7) working days prior to submitting its bid response to the contracting agency, the respondent must provide notice of each of its subcontracting opportunities to two (2) or more trade organizations or development centers (in Texas) that serves members of groups (i.e., Asian Pacific American, Black American, Hispanic American, Native American, Women, Service Disabled Veteran) identified in Texas Administrative Code, §20.11(19)(C).

We respectfully request that vendors interested in bidding on the subcontracting opportunity scope of work identified in Section C, Item 2, reply no later than the date and time identified in Section C, Item 1. Submit your response to the point-of-contact referenced in Section A.

SECTION A PRIME CONTRACTOR'S INFORMATION

Company Name: _____ State of Texas VID #: _____

Point-of-Contact: _____ Phone #: _____

E-mail Address: _____ Fax #: _____

SECTION B CONTRACTING STATE AGENCY AND REQUISITION INFORMATION

Agency Name: _____

Point-of-Contact: _____ Phone #: _____

Requisition #: _____ Bid Open Date: _____ (mm/dd/yyyy)

SECTION C SUBCONTRACTING OPPORTUNITY RESPONSE DUE DATE, DESCRIPTION, REQUIREMENTS AND RELATED INFORMATION

1. Potential Subcontractor's Bid Response Due Date:

If you would like for our company to consider your company's bid for the subcontracting opportunity identified below in Item 2, we must receive your bid response no later than Select (Central Time) on _____ (Date (mm/dd/yyyy))

In accordance with 34 TAC §20.14, each notice of subcontracting opportunity shall be provided to at least three (3) Texas certified HUBs, and allow the HUBs at least seven (7) working days to respond to the notice prior to submitting our bid response to the contracting agency. In addition, at least seven (7) working days prior to us submitting our bid response to the contracting agency, we must provide notice of each of our subcontracting opportunities to two (2) or more trade organizations or development centers (in Texas) that serves members of groups (i.e., Asian Pacific American, Black American, Hispanic American, Native American, Women, Service Disabled Veteran) identified in Texas Administrative Code, §20.11(19)(C).

(A working day is considered a normal business day of a state agency, not including weekends, federal or state holidays, or days the agency is declared closed by its executive officer. The initial day the subcontracting opportunity notice is sent/provided to the HUBs and to the trade organizations or development centers is considered to be "day zero" and does not count as one of the seven (7) working days.)

2. Subcontracting Opportunity Scope of Work:

3. Required Qualifications: ☐ - Not Applicable

4. Bonding/Insurance Requirements: ☐ - Not Applicable

5. Location to review plans/specifications: ☐ - Not Applicable

EXHIBIT O

Exhibit O – HUB Subcontracting Plan PAR form

HUB Subcontracting Plan (HSP)
Prime Contractor Progress Assessment Report

Rev. [illegible]

This form must be completed and submitted to the contracting agency each month to document compliance with your HSP.

Contract/Requisition Number: _____ Date of Award: _____ Object Code: _____

Contracting Agency/University Name: _____

Contractor (Company) Name: _____ State of Texas VID #: _____

Point of Contact: _____ Phone #: _____

Reporting (Month) Period: _____ Total Amount Paid this Reporting Period to Contractor: $ _____

Report HUB and Non-HUB subcontractor information

When verifying subcontractors' HUB status, ensure that you use the State of Texas' Centralized Master Bidders List (CMBL) - Historically Underutilized (HUB) Directory Search located at: http://mycpa.cpa.state.tx.us/tpasscmbl/search/index.jsp. HUB status code "A" signifies that the company is a Texas certified HUB.

Subcontractor's Name	Texas certified HUB (Yes or No)	Texas VID or federal EIN (Social Security numbers if you do not know the VID / EIN, leave blank)	Total Contract $ Amount from HSP with Subcontractor	Total $ Amount Paid this Reporting Period to Subcontractor	Total Contract $ Amount Paid to Date to Subcontractor	Object Code (Agency Use Only)
			$ -	$ -	$ -	
			$ -	$ -	$ -	
			$ -	$ -	$ -	
			$ -	$ -	$ -	
			$ -	$ -	$ -	
			$ -	$ -	$ -	
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			$ -	$ -	$ -	
			$ -	$ -	$ -	
		TOTALS:	$ -	$ -	$ -	

Signature: _____ Title: _____ Date: _____

EXHIBIT P

Performance Services

Exhibit "P" – Tier 1 Product and Manufacturer's List

TFC Energy Project Tier 1 LED Product

Performance Services

Tier 1 LED product definition: UL listed, LED products supplied by an established and reputable manufacturer with a 10 year or longer proven track record in the USA. LED products supplied shall utilize LED chips from one of the following manufacturer's and LED driver/power supplies from one of the following manufacturer's. DLC listing of LED products is strongly preferred.

Tier 1 Fixture Manufacturer's

- Top tier company with annual lighting fixture sales revenues of $100M or more and lighting fixture product sales in the USA for at least 10 years
- Boutique multi-million dollar per year lighting fixture/retrofit company that has been selling product in the USA for at least 10 years
- Proven track record – Good reputation within the USA and internationally
- Normally uses Tier 1 LED chips and drivers within their products
- UL listed products and DLC listed fixtures

Tier 1 LED Chip Manufacturer's

- Samsung
- Nichia
- Cree
- Seoul Semiconductor
- Philips
- Epistar
- Osram

Tier 1 LED Driver/Power Supply Manufacturer's

- Osram
- Philips Brands
- Hubbell Brands
- Meanwell
- Hatch
- LG
- Inventronics
- GE Brands

Tier 1 LED Linear Lamps/Drivers (No glass tubes)

- eTech LED
- James Industries
- Ampco Lighting
- EnergyFocus
- Philips

Tier 1 LED Screw/Plug-in Lamps

- Cree
- TCP
- Philips
- Osram

Criteria for Defining Tier 1 Component Manufacturer's

1. Recognized in industry for providing quality products for many years – Low failure rates
2. Tight standards on color temperature (binning) - Consistent light color between fixtures.
3. 10 year or greater track record of standing behind their product
4. Producer of second generation, high efficiency components. High lumens per watt.
5. Spends a high percentage of budget on research and development – Technology leader
6. Tier 1 fixture manufacturer's use Tier 1 component manufacturer's

EXHIBIT Q

Exhibit Q – Schedule of Values Proposed Payment Schedule

CONTINUATION SHEET - TFC ESPC Project

AIA DOCUMENT G703 FORMAT

PAGE OF PAGES

APPLICATION AND CERTIFICATION FOR PAYMENT, containing
Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED FROM PREVIOUS APPLICATION (D+E)	WORK COMPLETED THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
1	Utility Assessment Report	$105,000						$105,000	
2	R&F Bonds	$47,300						$47,300	
3	LED Lighting w/ 1,228 Sensors	$2,236,769						$2,236,769	
4	Power Conditioning	$172,848						$172,848	
5	Variable CHW Flow	$37,922						$37,922	
6	Water Controls	$287,010						$287,010	
7	Building Automation System	$489,076						$489,076	
8	Variable Air Volume	$22,753						$22,753	
9	Load Cong Demand Response	$1,323						$1,323	
	GRAND TOTALS	$3,600,000	$0.00	$0.00	$0.00	$0.00		$3,600,000	

Performance Services

Estimate Progress Billing Schedule
TFC ESPC Project

Performance Services

ITEM NO	DESCRIPTION OF WORK	SCHEDULED VALUE	EST BILLING MONTH 1	EST BILLING MONTH 2	EST BILLING MONTH 3	EST BILLING MONTH 4	EST BILLING MONTH 5	EST BILLING MONTH 6	EST BILLING MONTH 7	EST BILLING MONTH 8	EST BILLING MONTH 9	EST BILLING MONTH 10
1	Utility Assessment Report	$105,000	$105,000									
2	M&V Reports	$47,300	$47,300									
3	LED Lighting w/ T-5 Sensors	$2,226,768	$223,072	$282,466	$347,554	$359,193	$113,858	$111,838				
4	Power Conditioners	$372,840	$37,281	$279,626	$55,932							
5	Variable CHW Flow	$37,922	$1,302		$14,777	$22,753						
6	Water Conserv.	$287,696	$29,701	$193,232	$47,031							
7	Building Automation System	$289,874	$48,998	$48,998	$23,361	$122,269	$122,269	$24,454	$24,454	$24,454		
8	Variable Air Volume	$22,750			$2,275				$11,375	$9,100		
9	Load Coop Demand Reduction	$1,333								$1,333		
	GRAND TOTALS	$3,600,286	$494,662	$1,326,678	$489,546	$504,214	$234,108	$136,292	$35,829	$34,878	$0	$0

EXHIBIT R

Exhibit R – Required Checklists and Certifications

Performance Services

Texas Facilities Commission
TFC Contract No. 16—130-000

Contract Document Review

David Temming, P.E., working for Performance Services which is a licensed firm in Texas, has reviewed and approved along with the Texas Facilities Commission the contract documents:

- Contract Agreement
- Utility Assessment Report
- Measurement & Verification Plan

Energy Savings Performance Contracts
THIRD PARTY REVIEWER CERTIFICATION

State Agency/Owner: Texas Facilities Commission

Third Party Contractor: Texas Energy Engineering Services, Inc. (TEESI)

Contract Name/Number: Texas Facilities Commission (TFC)

Date of Review: August 2, 2016

State law requires that an independent third party review of the Utility Assessment Report be conducted by a Professional Engineer licensed in the State of Texas. This review, at a minimum, must be both an assessment of the overall program scope of work and a technical review of the consumption savings methodology, program investment, and economic justification.

This review has verified that the following:

Yes ☑ No ☐ 1) Will the guaranteed annual savings be equal to or greater than the total annual cost of the project, for each year during the life of the Contract?

Document: UAR (7/19/2016) Page reference(s): 8 & 47

Yes ☐ No ☐ 2) To the best of my knowledge, do all contract documents comply with all applicable federal, state, and local construction and environmental codes and regulations?

Note: Contract review by TFC, not available with UAR.

Document: N/A Page reference(s): N/A

Yes ☑ No ☐ 3) Does the contract contain a Utility Assessment Report? Exhibit E FZ

Document: UAR (7/19/2016) Page reference(s): N/A

Yes ☑ No ☐ 4) Does the contract contain an M&V Plan?

Document: UAR (7/19/2016) Page reference(s): Appendix J

Yes No

☑ ☐ 5) Does the contract contain a Sample Periodic Savings Report that documents current energy and water consumption energy and water savings that occur as a direct result of this project?

Document: UAR (7/19/2016) Page reference(s): Appendix J

Yes No

☑ ☐ 6) Does the contract require Payment and performance bonds?

Document: UAR (7/19/2016) Page reference(s): 8

Yes No

☑ ☐ 7) Are all costs for verification of savings, provision of bonds, financing, administration, guarantees, etc. are included in the overall project costs?

Document: UAR (7/19/2016) Page reference(s): 8

Yes No

☑ ☐ 8) As the third party reviewer, I attest to my independence according to Statute.

Document: N/A Page reference(s): N/A

I attest that I have no conflict of interest for conducting third party review for the UAR. TEES! UAR technical review & approval provided on August 2, 2016.

I certify that these contract documents (Contract, Utility Assessment Report, Measurement and Verification Plan, and Sample Periodic Utility Savings Report) meet all minimum requirements of the Texas Government Code Section 2166.406 and the current Energy Savings Performance Contracting Guidelines published by the State Energy Conservation Office.

Additionally, I certify that the savings calculations and the cost reduction estimates presented are factual, accurate, reasonable, and in accordance with generally accepted engineering practices to the best of my knowledge and in my best professional judgment.

(signature)

Saleem Khan

(printed name)

President

(title or position)

1301 S. Capital of TX HWY, B-325

(mailing address)

Same as above

(street address)

Austin, Texas 78746

(city, TX)

512-328-2533

(office telephone number)

Saleem@teesi.com

(email address)

98125

(Texas P.E. Registration Number)

Affix Official P.E. Seal
(Only if signed by an Engineer)

FOR SECO USE ONLY

Date Received: 11/4/16

Approved By: Frank Yates

Date Approved: 11/7/16

OR

Date Returned to Agency: _____

Comments: _____

TEXAS ENERGY ENGINEERING SERVICES, INC. (TEESI)

Austin,

August 2nd, 2016 (*updated, 8/16/2016*)

Eddy Trevino, P.E.
State Energy Conservation Office (SECO)
111 E. 17th Street, Suite #1118
Austin, Texas 78711-1400

Re: Texas Facilities Commission (TFC) LoanSTAR Assessment Report Review

Dear Mr. Trevino:

TEESI has completed its review of the Utility Assessment Report for Texas Facilities Commission (TFC) as prepared by Performance Services. The final approved report dated July 19, 2016 includes seven UCRMs (LED Lighting with Motion Sensors, Power Conditioning, Variable CHW Flow, Water Controls, Building Automation System, Variable Air Volume, and Load Cooperative Demand Response). A summary of the UCRMs along with their estimated costs and savings is provided below (excerpted from the final UAR). The final loan amount requested is $3,600,000. Simple payback for the project excluding financing cost is 7.4 years and with financing cost is 8.3 years. It is our understanding that the M&V cost is not included in the loan amount requested. TFC has an arrangement with Performance Service to pay M&V and may cancel at any time. An overall project summary, with total costs and savings, along with total project payback that includes assessment, bonding and ten year financing costs, follows.

		ANNUAL SAVINGS										
UCRM No.	UCRM Title	Electric Energy (kWh/yr)	Demand (kW/mo)	Electric ($/yr)	[illegible]	[illegible]	[illegible]	[illegible]	Other Savings	Project Cost ($)	Payback (yrs)	Financed Payback (Approx. yrs)
1	LED Lighting w/ 1,326 Sensors	1,379,329	2,588	$142,326	0	90			$55,877	$2,158,738	7.0	30
2	Power Conditioning	855,364	895	$45,111	5	90			$7,256	$371,648	7.9	30
3	Variable CHW Flow	139,578	142	$8,081	0	90			50	$37,517	4.7	30
4	Water Controls	99,456	136	$7,847			4,454	167,350	50	$280,050	3.6	30
5	Building Automation System	315,949	78	$20,826	18,331	54,286				$409,078	18.5	30
6	Variable Air Volume	18,607	48	$2,403						$12,751	5.3	30
7	Load Coop Demand Response	3,128	0	$1,802						$1,311	0.8	30
Totals		4,810,363	3,891	$228,343	18,331	54,500	4,454	167,350	62,933	$3,447,700	7.3	
Utility Assessment Report Cost		$165,000										
Measurement & Verification Cost		$0										
Construction Bonding Cost		$47,300										
[illegible]		$3,600,000										
Financing Cost		$407,351										
Project Payback Including Financing Costs		8.3	[illegible]									
Guaranteed Utility Rebate		$0										
Ongoing M&V Service Cost		$47,300	Manager cost - May be cancelled at any time									
Net Energy Savings (Lighting Maintenance, $, etc)		$60,351	Same story									

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[illegible]

SUMMARY OF PROJECT		
	Total[1]	
kWh Savings:	4,883,813	kWh/yr.
Demand Savings:	8,073	kW/yr.
Gas Savings:	10,381	Therms/yr.
BTU Savings:[2]	54,444	MMBtu/yr.
Water Savings:	4,454	kGal/yr.
Cost Savings:	485,155	$/yr.
Base Year Cost Reduction:	26	%
Implementation Cost:	3,600,000	$
Payback Period	7.4	Years

1. Building O&M Savings identified for project justification are included in the total.
2. BTU savings should be calculated on the basis of source BTU's (11,630 BTU/kWh and 1,030,000 BTU/MCF)

Upon its initial review of the report (dated February 16, 2016) received by TEESI on March 17, 2016, TEESI compiled some comments, questions, clarifications and conducted an onsite UAR phase visit. These review comments may be found in Attachment A. As a result a revised report was submitted, dated April 20, 2016. TEESI conducted additional review of April 20th report and requested that Performance Services conduct consultation of proposed UCRMS with TFC staff to address our comments. With input from TEESI and upon consultation with TFC, UAR dated April 20, 2016 was to be revised by PSI an additional time. TEESI requested clarifications to which PSI replied on July 12, 2016. These comments can be found in Attachment B. A revised UAR dated July 19, 2016 was submitted and reviewed by TEESI. The updated UAR (dated July 19, 2016) removed Continuous Commissioning and ERS Demand Response from the scope. PSI agreed to the applicable changes to UCRM calculations and corresponding report pages, and will forward engineer sealed report to SECO and Texas Facilities Commission (TFC). In general, the energy savings estimate and associated costs for all UCRMs are deemed reasonable and appropriate for continued development based on clarifications and supporting information provided.

In following with SECO guidelines for performance contracting, a Measurement & Verification (M&V) plan and sample periodic savings report (included as an Appendix in the UAR) was provided. We had reviewed the M&V plan and requested follow-up and clarifications which were provided. Per PSI, the stipulated savings and methodology proposed in the M&V plan were agreed upon by PSI and Texas Facilities Commission (TFC). Finally, remaining SECO performance contracting requirements such as conflict of interest certifications, as well as ESPC contract documents, were acknowledged by the Engineer and TFC and will be completed and submitted as the project progresses.

The report dated July 19, 2016 is approved by TEESI for continuation with the LoanSTAR Program. If you have any questions regarding TEESI's review, please let us know.

Sincerely,

Saleem Khan, P.E.
President/TEESI

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Attachment A

Performance Services

Response to TEESI UAR Review Comments on TFC Project

April 21, 2016

The following are Performance Services responses to UAR review comments presented by TEESI in a letter dated April 11th. Note that TEESI has been assigned by SECO to conduct a required technical review for further processing of the Texas Facilities Commission LoanSTAR project/application.

1. Page 8

a. Please confirm that on-going monitoring cost is not a part of requested loan amount in Table 1-D.

PSI Response: On-going monitoring costs is not part of requested loan amount.

b. Total project cost plus UAR cost and bonding cost does not equal to implementation total on Table 1D. Please correct the implementation total cost on Table 1C and 1D.

PSI Response: Correct. The summation formula in the tables was not including the Load Coop Demand Response in the implementation total. This has been corrected on Tables 1C, 1D and the project financial analysis table on page 52.

c. Per LoanSTAR guidelines, on-going monitoring and financing costs are to be included in the overall project payback for LoanSTAR funded ESPCs. This overall payback is required to be less than 10 years. The on-going monitoring cost to be included in the payback should be the total on-going monitoring cost, not the yearly cost as is currently noted.

PSI Response: Table 1D has been changed to reflect the total M&V cost. Project payback is less than 10 years – See project cash flow.

d. The annual on-going M&V service cost is noted to be $40,000 per year. What is the term for M&V? As a project cost savings method, M&V term could potentially limited to the first 2-3 years, particularly if the savings are not actually re-measured periodically as part of the service (see M&V plan comment 16.e)

PSI Response: The annual M&V service cost is $49,000 per year. Outdated tables reflecting $40,000 per year were accidently left in the UAR. These tables have been corrected. The M&V contract is an annual contract that can be renewed up to 10 years and cancelled without penalty. See response to comment 16.e.

2. Page 9: Several concurrent system upgrades are noted. Please provide an anticipated timeline for these upgrades and how they will be coordinated with the measures proposed in the UAR.

PSI Response: Requested information follows:

Brown Heatly Building – Upgrades being installed by other contracts are substantially complete. Work being done as part of this performance contract are generally separate and

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\\SDRIVE1\Share\2\TCC\B - SECO - TA Loanstar Program\12 Texas Facilities Commission (TFC)\01 - UAR-LAR Phase\UAR APPROVAL SECO\TFC LoanSTAR Approval Recommendation Rev Aug 12\.docx

Attachment A

Performance Services

Independent of the work being performed by other contractors. Where there is some interdependency, variable flow chilled water, Performance Services will control and commission chilled water flow. Minimum flow through the chillers will be established based on chiller data provided by the other contractor.

Central Services Building – No coordination required.

Thomas J. Rusk – Upgrades installed by other contracts is complete. Work performed by Performance Services will not require coordination.

William P. Hobby – Construction of upgrades being installed by other contracts has not yet begun. Measures being installed as part of this performance contract are separate and independent of the work being performed by other contractors.

3. Page 17

a. The EUI Comparison Table shows the existing EUI for each building as well as the projected EUI after UCRM implementation. The William P. Hobby building shows a change in EUI from 109 to 99. This does not agree with the electric and natural gas savings claimed on Page 45 in the Summary Saving Analysis Table. Natural Gas and kWh savings on page 45 would result in an EUI change from 109 to 89 which does not agree with the EUI Comparison Table on Page 17. Please address.

PSI Response: The mistake on the EUI comparison table is the Existing Total not the Projected Total. The Projected Total accounts for the 1,004,595 chilled water ton-hours being delivered to the building by Austin Energy's district chilled water loop. This is now noted in the text of the UAR and the table has been updated accordingly.

b. Total building square footage total does not agree with cover page square footage. Please correct.

PSI Response: Note that building square footages shown in this table do not include basement parking garages. This has been clarified in the text above the table.

4. Page 21 thru 25: Utility Rate Analysis

a. General: Base year utility data is from January-December of 2013, while utility rates are from a different base period from 2014-2015. Please clarify discrepancy and why more recent utility data are not being used.

PSI Response: Performance Services examined energy usage within these buildings between 2011 and 2014. Annual energy usage was relatively flat over this time period. Performance Services chose to use 2013 as the base year because it had the least number of unusual monthly variations.

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Attachment A

Performance Services

b. Page 21 & 22: Please use the separate energy ($/kWh) and demand ($/kW) avoided costs as presented in the applicable rate schedules of this section of the UAR. This is a requirement of the LoanSTAR Guidelines. Even when analyzed by site, as noted on page 21, an "all-in" rate is not appropriate for every measure, as the proportion and seasonality of energy vs. demand savings may vary. The UAR also states a blended/all-in rate was necessary due to lack of demand data. The demand data of section III appear to be complete. Regardless, even without demand data, equivalent avoided kW costs can be gleaned from applicable rate schedules which are known.
PSI Response: Cost avoidance calculations have been changed to include the separate and seasonal electrical demand and energy usage charges.

c. Page 23: The UAR states a 3% rate escalation assumption is applied to savings, based on historical averages. Rate escalation is not allowed for savings calculations under the LoanSTAR program. Please remove any savings escalations due to anticipated future rate increases.
PSI Response: No utility rate escalation has been applied to savings. Confusing wording on page 23 has been changed.

d. Page 24: While a consumption-only equivalent avoided cost for natural gas is acceptable, it should not include flat service charges such as the Texas Gas Service Customer Charge noted in the rate schedule. The equivalent avoided gas cost should be a sum of all consumption-based charges. It should be the same for every facility on the same rate.
PSI Response: Performance Services has revised the equivalent avoided natural gas cost to $0.48 per CCF for all buildings. This cost is based on the actual cost of natural gas in 2015 at BHB following removal of the flat service charges such as the Texas Gas Service Customer Charge.

5. Page 53: 10 year Cash flow shows M&V cost to be $49,000 – $51,250 annually, but Table 10 shows annual M&V cost to be $40,000. Please clarify.
PSI Response: Table 10 has been corrected.

6. UCRM 1 (LED Lighting)

a. Sample savings calculations were not included in the UAR. Please provide saving calculations in the report with sample calculations specific to a sample line item.
PSI Response: Savings calculations are included in the appendix. Performance Services has referenced the savings calculations in the text of the UAR. Additional a sample savings calculation for lighting has been included in the M&V plan.

b. Please confirm that post-retrofit systems will meet applicable light level standards.
PSI Response: Performance Services has mocked up the proposed LED lighting upgrades and documented that post illumination measurements will meet applicable light level standards.

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Attachment A

Performance Services

c. How will fixtures on emergency generator circuits or battery backup be addressed for LED retrofit?
PSI Response: Emergency lighting is powered by standby generators not battery backup. LED upgrades are the same for both emergency and non-emergency lighting.

d. UCRM description (page 27 & 28) note the installed lamps will have lamp life of 70,000 hours and a ten year warranty. Cut sheets in the appendix indicate only 50,000 hour life for linear LED tubes and 25,000 hour for screw-in bulbs, plus a 5 year warranty. Is the ten year warranty an extended warranty through the manufacturer or a guarantee by the ESCO? Has the additional warranty been included in the cost to the owner?
PSI Response: Performance Services has revised the 70,000 hour lamp life to 50,000 hours to better match the product sheets. A 10 year warranty is being provide from the manufacturers on the vast majority of the lighting upgrades: Linear lamps, LED troffer retrofit kits, new fixtures. The cost for this 10 year warranty is included in the overall pricing. A five year warranty is being provided on the balance of the LED lighting: Screw in lamps and CFL retrofits.

e. Lighting Appendix Spreadsheet

i. The annual kWh and monetary savings are different values than those on page 28. More specifically, in the Appendix the annual savings are shown as 3,884,003 kWh and an annual cost savings of $276,300. Please explain.
PSI Response: These spreadsheet have been revised to incorporate the actual electric rate at each building. Additionally, a safety factor has been applied to all calculated savings which is shown on the summary savings sheet.

ii. Additionally, were the annual cost savings applied to the appropriate rate schedules for each building? Please provide example.
PSI Response: As noted above, this spreadsheet has been revised to incorporate the actual electric rate at each building. A supplemental summary savings sheet has been added to the appendix to correct this issue.

iii. The occupancy sensor installation claims to reduce 40% operating hours for majority of areas. However, typical office spaces have regular office hours of 8-10 hours per day. For example, at line 20, annual operating hours is proposed to reduce from 2,358 hours to 1,415 hours. Annual operating hours is close to 2,000 hours if operating 8 hours per day. How many hours per day of reduced operation are expected as a result of occupancy sensors. Will the sensors achieve such savings in these areas?
PSI Response: The lighting savings spreadsheet has been changed to more conservatively calculate occupancy sensor savings in areas with relatively low hours of usage such as private offices, break rooms and conference rooms. The sensor reduction factors used in the lighting savings spreadsheet follow:

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Attachment A

Performance Services

Building Area Type	Sensor Reduction Factor
Break & Lounge Areas	0.70
Common Areas & Hallways	0.60
Common Restroom	0.60
Conference & Meeting Rooms	0.70
Dressing & Locker Rooms	0.70
PRIVATE OFFICE	0.70
General Work Area	0.60
Janitors Closet	0.70
Kitchen Area	0.70
Mechanical/Electrical Room	0.70
Parking Garage - 24 Hr.	0.60
Private Restroom	0.70
Storage Room	0.70

Note that in IES studies, occupancy sensors save between 28 and 38 percent of energy usage in offices.

iv. Lamp replacement cost savings are not indicated in the spreadsheet though they are mentioned in the UCRM description (for materials only) on page 28 and the M&V plan. Please provide backup sources and calculations for avoided replacement costs (material only).
PSI Response: The material only, warranty period savings calculation which is based on actual TFC material costs is included in the Appendix immediately before the lighting savings spreadsheet.

f. Per LoanSTAR Guidelines, please provide written contractor estimate or other approved form of cost backup with labor, material, overheat & profit, etc. breakdown.
PSI Response: See Pricing Breakout at the end of this document.

7. UCRM 2 (Power Conditioning)

a. In the Appendix, neither the Harmonics Limited calculations nor the "Power Factor Savings Analysis" match savings for each facility as claimed in table on Page 45. Please explain.
PSI Response: There is a safety factor on the savings used in the UAR. See new savings summary table in the appendix showing the safety factor and electric rate structure.

b. The savings claimed appear to be purely reduced I²R losses in the facility, assumed to be approximately 2% of total facility average kW. Will the power factor correction modules be

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Attachment A

Performance Services

installed at the point(s) of use or at the building service entrance? If at the equipment, only the loads with correction being applied should be included in the avoided loss calculations.
PSI Response: The power conditioning devices that address both power factor and harmonics will be installed at panels and/or switchgear serving inductive and harmonic loads. In this way energy savings will be maximized throughout the building. Calculations provided reflect achieving savings within the building. Note that minimal energy savings would result if the power conditioning devices were installed at the building service entrance.

c. Per LoanSTAR Guidelines, please provide written contractor estimate or other approved form of cost backup with labor, material, overhead & profit, etc. breakdown.
PSI Response: See Pricing Breakout at the end of this document.

d. In the utility data (page 18-20), Brown Heally has consistent 87% power factor, William Hobby has 89% power factor on few months, and other buildings do not have power factor data. Please provide power factor data for other buildings.
PSI Responses Power factor data has been included in the utility tables. Note that during the UAR development, Performance Services recorded the following power factors at the service entrance of each of the buildings: BHB – 82%; CSB – 77%, TIR – 87%; WPH – 82%.

8. UCRM 3 (New DDC BAS)

a. Please describe in general the capabilities of the existing BAS and why there is no effective start/stop in the base base (typically even rudimentary systems have timeclock capabilities.)
PSI Response: Stand-alone pneumatic controls from various vendors, including Johnson Controls, Honeywell, etc. provide operational control of the existing HVAC systems. HVAC equipment is not currently being scheduled off and is operated 24 hours per day, seven days per week. Note that HVAC equipment in other TFC office buildings is also operated 24 hours per day seven days per week even though DDC exist within these buildings. Pictures of several control panels within CSB follow:

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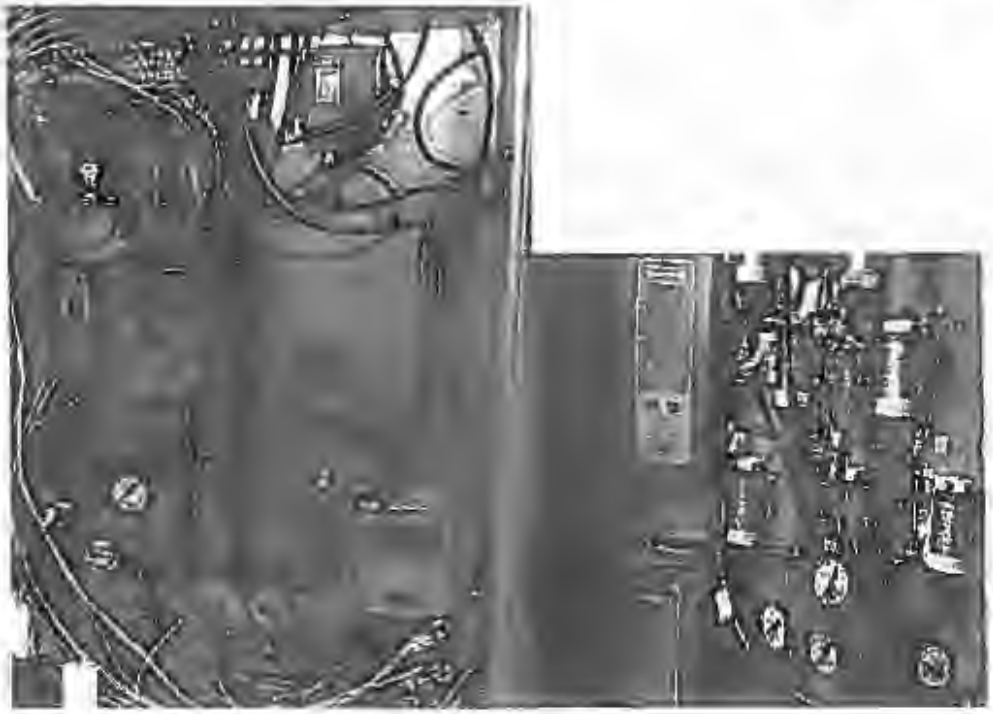
Attachment A

Performance Services



b. The UCRM proposed to incorporate schedules and set unoccupied cooling setpoint to 90 degree while existing building HVAC is operating 24/7. Has this been approved by the TFC?
PSI Response: TFC has review and approved the building setbacks as decribed in the UAR.

c. Please provide eQuest program files or screen captures that show both input and output data for further verification.
PSI Response: Provided at the end of this document.

d. Per LoanSTAR Guidelines, please provide written contractor estimate or other approved form of cost backup with labor, material, overhead & profit, etc. breakdown.
PSI Response: See Pricing Breakout at the end of this document.

9. UCRM 4 (Variable Chilled Water Flow)

a. Difference in kWh savings from sample calculations than those shown on page 45. Please address.
PSI Response: The kWh savings are consistent between pages 34 and 45. Concerning the appendix calculations, see new savings summary table in the appendix showing the safety factor and electric rate structure. Note that a safety factor has not been applied to the CSB savings value as the calculation is already conservative.

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Performance Services

b. In the Appendix, there is a spreadsheet calculation (CHW system to variable primary conversion and optimization) and eQuest simulation printout (Variable flow CHW @ BHB). Are they both related to ECRM 4?
PSI Response: The eQuest simuation is for variable chilled water flow at the Brown Heatly building and the spreadsheet addresses the Central Services building – Both are ECRM 4. See new savings summary table in the appendix showing the safety factor and electric rate structure.

c. In the appendix spreadsheet calculations, 85% is assumed to be the motor efficiency. Do the existing pumps not have premium efficiency motors? Could motor replacement be added to the scope for additional savings? Outdated motors may require replacement anyway (with appropriate cost contingency) for proper operation with VFDs.
PSI Response: These are premium efficiency motors. Calculations have been revised to reflect the higher efficiency motors.

d. Please describe how minimum flow through the chillers will be ensured following conversion to variable primary flow. Is this included in the cost estimate?
PSI Response: Using the BAS and a flow meter and/or differential pressure, flow will be measured through the chiller and maintained by setting a minimum speed for the variable frequency drive powering the chilled water pump motor.

e. Per LoanSTAR Guidelines, please provide written contractor estimate or other approved form of cost backup with labor, material, overheat & profit, etc. breakdown.
PSI Response: See Pricing Breakout at the end of this document.

10. UCRM 5 (RCx and/or CC*)

a. There is a chance that some deferred maintenance could prevent Continuous Commissioning from achieving claimed savings. Does the proposed cost for CCx (approx. $1.44/SF) include any deferred maintenance related costs? If not, how will necessary repairs be funded?
PSI Response: Performance Services has budgeted $12,000 to make deferred maintenance repairs. Additionally, TFC recently replaced and commissioned the VAV boxes throughout the building which further minimizes the potential deferred maintenance repairs in this building.

b. Please elaborate on the no-cost followup for one year following CC. What is included?
PSI Response: The CC* project cost includes a 12 month monitoring phase following implementation. This phase includes quarterly site visits to conduct seasonal tuning of CC* measures and onsite training with operations personnel.

c. CCx calculations in the appendix note horsepower of existing exhaust fans. Please describe the function of the exhaust fans targeted for CCx.

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Performance Services

PSI Response: CC1 Optimize Mechanical System Schedules at TJR includes 3.75HP (9,240cfm) of exhaust fans. This total includes toilet exhaust fans EF-(1-2) and kitchen exhaust fan EF-10.

d. Demand based ventilation is proposed as CC measure. Please elaborate on the strategy for effectively implementing demand based ventilation and how it will comply with applicable Indoor Air Quality standards.
PSI Response: CC2.3 Optimize Outside Airflow for Ventilation at TJR includes adjusting the amount of outside air introduced by the AHUs between minimum and maximum values based on available feedback of building occupancy (time of day schedule, CO2 sensor, etc). Depending on the availability of BAS airflow monitoring devices, the minimum and maximum values may be associated with controlled setpoints or damper settings based on field measurements to maintain building pressure and ventilation requirements (ASHRAE Standard 62.1), respectively.

e. Per LoanSTAR Guidelines, please provide written contractor estimate or other approved form of cost backup with labor, material, overhead & profit, etc. breakdown.
PSI Response: See Pricing Breakout at the end of this document.

11. UCRM 6 (Water Controls)

a. Water savings in appendix are significantly greater than claimed savings on page 45. Are the numbers of fixtures to be replaced correct on pages 38 and 39?
PSI Response: See new savings summary table in the appendix showing the safety factor and electric rate structure.

b. Please provide sample calculations that demonstrate formulas for a given savings line item of the savings spreadsheet.
PSI Response: See revised M&V plan with sample calculation and the baseline documentation that defines baseline development.

c. Per LoanSTAR Guidelines, please provide written contractor estimate or other approved form of cost backup with labor, material, overhead & profit, etc. breakdown.
PSI Response: See Pricing Breakout at the end of this document.

12. UCRM 7 (Demand Response)

a. A commitment letter from the Utility and the Owner stating intention to participate in the demand response program and the anticipated incentive will be required to evaluate projected savings for LoanSTAR purposes. UCRM M&V measuring method is in deemed savings category.
PSI Response: Commitment documentation from both TFC and Austin Energy is forthcoming.

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Attachment A

Performance Services

b. Is the existing generator designed to carry the loads of the entire building or only emergency circuits?
PSI Response: Only emergency loads.

c. Is the existing generator diesel or natural gas powered? Provide calculations for estimated annual fuel penalties as a result of using the generator for these events.
PSI Response: Diesel powered generator. Concerning fuel penalties, see attached life cycle cost analysis.

d. Does estimated cost include applicable permitting by the City and ERCOT to run the generator while potentially feeding back into the grid?
PSI Response: Yes, permitting costs are included.

e. Per LoanSTAR Guidelines, please provide written contractor estimate or other approved form of cost backup with labor, material, overhead & profit, etc. breakdown.
PSI Response: See Pricing Breakout at the end of this document.

13. UCRM 8 (Variable Air Volume)

a. Please provide inputs used in savings calculations by eQuest. Also, please provide eQuest program file(s).
PSI Response: Please disregard eQuest calculation.

b. eQuest is indicated in the UCRM description, but there is a spreadsheet calculation (VFD retrofit to built-up dual duct AHU) with no UCRM# in Appendix. Is this spreadsheet calculation related to this UCRM 8?
PSI Response: Spreadsheet calculation will be identified as VAV savings analysis and relocated in the appendix. Please use this calculation for this measure – UCRM 8.

c. See comment 8c above on existing motor efficiency and potential replacement.
PSI Response: Motors are standard efficiency motors and could benefit from replacement. However, this would likely not have a good payback based on the reduced hours of operation and VFD being installed. Further, TFC has requested that Performance Services not address the deferred maintenance associated with this and other air handling units. Additionally, Performance Services does not expect the ABB VFDs to shorten the life of these motors.

d. Per LoanSTAR Guidelines, please provide written contractor estimate or other approved form of cost backup with labor, material, overhead & profit, etc. breakdown.
PSI Response: See Pricing Breakout at the end of this document.

14. UCRM 9 (Load Loop Demand Response)

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Attachment A

Performance Services

a. A commitment letter from the Utility and the Owner stating intention to participate in the demand response program and the anticipated incentive will be required to evaluate projected savings for LoanSTAR purposes. UCRM M&V measuring method is in deemed savings category.
PSI Response: Commitment documentation from both TFC and Austin Energy is forthcoming.

b. Calculated savings in the appendix are based on reducing the chiller load by 25%. Is this the estimated load reduction from increasing setpoints during curtailment periods, or will the chiller demand limit setpoint be overridden to 75%? If the former, please provide backup.
PSI Response: Space temperature set-points will be increased during curtailment periods and during this period the Performance Services will be reset the chilled water temperature by 2F to limit chiller demand.

c. Per LoanSTAR Guidelines, please provide written contractor estimate or other approved form of cost backup with labor, material, overheat & profit, etc. breakdown.
PSI Response: See Pricing Breakout at the end of this document.

15. General Appendix Comments:

a. Please indicate the relevant UCRM# for each spreadsheet calculations/eQuest printout in appendix.
PSI Response: UCRM numbers have been added to calculations.

b. Please provide page # in Appendix for easy reference going forward.
PSI Response: Page numbers have been added in the savings calculations portion of the appendix.

c. UCRM 3 and 5 will have energy saving from the various equipment. Please explain how M&V method B will be used to measure the savings. Are there existing energy meters to measure CHW and HW energy consumptions distributed to each building?
PSI Response: See revised M&V plan.

d. M&V plan UCRM# don't agree with the UCRM# in Table 1. Please correct.
PSI Response: Corrected in updated document.

16. M&V Plan Comments:

a. It is recommended that TFC staff review & comment on the M&V plan provided with the UAR, if not already done. Performance Services to forward any review comments by TFC on the M&V plan for our files.
PSI Response: Commitment documentation from TFC is forthcoming.

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Attachment A

Performance Services

b. Several concurrent upgrades to the buildings are noted on page 9 of the UAR. Please describe the impact of these upgrades on M&V activities and calculations in the M&V plan.
PSI Response: No impact as our measures are independent of this work. See response to question 2 above for additional information.

c. Table 5 (Page 17 of M&V Plan) UCRM 3 and 5 will have energy saving from the various equipment. Please explain how M&V method B will be used to measure the savings. Are there existing energy meters to measure CHW and HW energy consumptions distributed to each building?
PSI Response: See revised M&V plan. Note that the majority of energy savings from these measures come from scheduling HVAC equipment off during unoccupied periods. Motor loads will be measured and the reduced hours of operation will be documented using the BAS. Note that there will be an energy meter installed for the chilled water plant at CSB. Concerning chilled water usage at TJR, it is not tracked or documented.

d. Table 5 (Page 17 of M&V Plan): UCRM 4,7,8, & 9 are noted to have deemed savings. Explanations for this selection are provided in the report based on the low percentage of total savings occurring from these measures, which makes sense. Using a deemed savings for these measures as noted is acceptable if agreed upon by the Owner.
PSI Response: Commitment documentation from TPC is forthcoming. Note however, that UCRM 4 and 8 are now being measured using IPMVP option A.

e. Will M&V savings determined from IPMVP options A or B (per Table 5 Page 17) be remeasured and reevaluated periodically throughout the term of M&V (see also comment 1.d regarding anticipated M&V term)? If so, what is the proposed measuring/reporting interval?
PSI Response: Savings determined from IPMVP options A and B will be re—measured annually and findings presented in an annual report.

f. Savings calculations for UCRM 2 (Power Conditioning) in the appendix assume power factor will be corrected to 95%. The M&V plan (M&V plan page 20) only proposes to guarantee power factor is above 90%. Please clarify discrepancy.
PSI Response: The M&V plan has been adjusted to guarantee that post project building power factors will be 95% or greater.

g. M&V plan page 22: UCRM 4 Building Controls (UCRM 3 in body of the UAR) proposes to utilize trend data from the BAS to calculate savings, but also states savings are calculated using an eQuest simulation model. This would be more consistent with Option D – Calibrated Simulation. Note that Option D is not approved for use in LoanSTAR. Please elaborate on what will be measured and how savings will be calculated therefrom for this UCRM.
PSI Response: See response to question 16c.

h. M&V plan page 23: Continuous Commissioning scope description notes that savings will be calculated based on utility data, which would be more consistent with IPMVP Option C –

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Attachment A

Performance Services

Whole Building Analysis. Please elaborate on what will be measured and how savings will be calculated therefrom for this UCRM.
PSI Response: See response to question 16c.

17. Additional SECO ESPC requirements:

a. The contract between the Owner and the ESCO will need to be submitted to SECO before final ESPC approval by SECO and LoanSTAR reimbursement.
PSI Response: Understood.

b. TEESI will provide UAR third party reviewer certification as required by SECO for ESPCs upon acceptance of the UAR.
PSI Response: N/A

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Attachment B

Performance Services

Response to follow-up TEESI UAR Review Comments on TFC Project

July 12, 2016

The following are Performance Services responses to UAR review comments presented by TEESI in emails. Note that TEESI has been assigned by SECO to conduct a required technical review for further processing of the Texas Facilities Commission LoanSTAR project/application.

TEESI Comment: A commitment letter from the Utility and the Owner stating intention to participate in the demand response program and the anticipated incentive will be required to evaluate projected savings for LoanSTAR purposes. UCRM M&V measuring method is in deemed savings category.

> PSI Response: Comment is no longer applicable as TFC has removed demand response from the project scope.

TEESI Comment: In regards to utility data I will like for you to use 2014 or 2015 i.e. more current data with associated fuel adjustments and other factors for the time period in the rate analysis. Per LoanSTAR guidelines the baseline shall be a contiguous 12 month period of utility consumption occuring within the two-year period preceding the audit. The final audit report for the project is dated February /March of 2016.

> PSI Response: PSI is now using 2014 energy usage for utility baselines. Utility rates schedules have not changed since 2014.

TEESI Comment: UCRM #5, Measure CC2.3 "optimized outside air flow at TJR". Please reconsider implementation this measure, cursory review indicates there are no space CO2 sensors within the building and no VFD at outside air unit. Also, it appears that the building is plenum return where CO2 measurement will not be representative of spaces served thus no meeting the intent of ASHRAE 62.1. This measures may not be feasible and savings not possible.

> PSI Response: Comment is no longer applicable as TFC has removed Continuous Commissioning" (previously UCRM #5) from the project scope.

TEESI Comment: In regards to M&V methods, we feel like M&V Option C will be more appropriate for facility undergoing commissioning measure i.e. UCRM 4. In addition, this facility has multiple measures implemented for which Option C is desirable & generally recommended.

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Attachment B

Performance Services

In regards, to UCRM 2, since it is not an established measure it is recommend that Option B be used instead of Option A.

> PSI Response: Since TFC has removed Continuous Commissioning® from the project scope, the first part of this comment is no longer applicable. However, PSI is now using M&V Option C for the new Building Automation System (UCRM #6) at the Central Services building based on complexity of this measure. Additionally and as requested, PSI will be performing M&V Option B for Power Conditioning (UCRM #2).

Note that PSI has made the following project scope and cost changes to address TFC requests:

1. Reduced quantity of lighting occupancy sensors within project scope from 1,986 to 1,326.
2. Removed ERS Demand Response from project scope.
3. Removed Continuous Commissioning® from project scope.
4. PSI will be providing a 2 year lighting warranty.
5. Reduced project costs in order to improve payback.

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SECO

State Energy Conservation Office

Energy Savings Performance Contracting
Guidelines for State Agencies

Part 2
For The Owner (Agency)
Contract Structure, Essential Elements, and Certifications

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Texas Government Code 2166.406 Contract Requirements

Term: The state agency may enter into an energy savings performance contract for a period of more than one year only if the state agency finds that the amount the state agency would spend on the energy or water conservation measures will not exceed the amount to be saved in energy, water, wastewater, and operating costs over 20 years from the date of installation.

Contractor Experience: A state agency may enter into energy savings performance contracts only with a person who is experienced in the design, implementation, and installation of the energy or water conservation measures addressed by the contract.

Self Funding: The total savings guaranteed during the Contract term must be equal to or greater than the total project costs during the term.

Annual Payment Limitation: If the term of the contract exceeds one year, the agency's contractual obligation, including costs of design, engineering, installation, and anticipated debt service, in any one year during the term of the contract beginning after the final date of installation may not exceed the total energy, water, wastewater, and operating cost savings, including electrical, gas, water, wastewater, or other utility cost savings and operating cost savings resulting from the measures, as determined by the state agency in this subsection, divided by the number of years in the contract term.

Guarantee: An energy savings performance contract shall contain provisions requiring the provider of the energy or water conservation measures to guarantee the amount of the savings to be realized by the state agency under the contract.

Payment and Performance Bond: Before entering into an energy savings performance contract, a state agency shall require the provider of the energy or water conservation measures to file with the agency a payment and performance bond relating to the installation of the measures in accordance with Chapter 2253. The agency may also require a separate bond to cover the value of the guaranteed savings on the contract.

Code Compliance: Each energy or water conservation measure must comply with current local, state, and federal construction, plumbing, and environmental codes and regulations.

Utility Cost Reduction Measure (UCRM): a measure to reduce energy or water or operating costs of governmental facilities. The term includes:

(1) insulation of a building structure and systems within the building;

(2) storm windows or doors, caulking or weather stripping, multiglazed windows or doors, heat absorbing or heat reflective glazed and coated window or door systems, or other window or door system modifications that reduce energy consumption;

(3) automatic energy control systems, including computer software and technical data licenses;

(4) heating, ventilating, or air-conditioning system modifications or replacements that reduce energy or water consumption;

(5) lighting fixtures that increase energy efficiency;

(6) energy recovery systems;

(7) electric systems improvements;

(8) water-conserving fixtures, appliances, and equipment or the substitution of non-water-using fixtures, appliances, and equipment;

(9) water-conserving landscape irrigation equipment;

(10) landscaping measures that reduce watering demands and capture and hold applied water and rainfall, including:

(A) landscape contouring, including the use of berms, swales, and terraces; and

(B) the use of soil amendments that increase the water-holding capacity of the soil, including compost;

(11) rainwater harvesting equipment and equipment to make use of water collected as part of a storm-water system installed for water quality control;

(12) equipment for recycling or reuse of water originating on the premises or from other sources, including treated municipal effluent;

(13) equipment needed to capture water from nonconventional, alternate sources, including air conditioning condensate or graywater, for nonpotable uses;

(14) metering equipment needed to segregate water use in order to identify water conservation opportunities or verify water savings; or

(15) other energy or water conservation-related improvements or equipment including improvements or equipment related to renewable energy or nonconventional water sources or water reuse.

Utility Assessment Report (UAR): The UAR must be reviewed by a third party Engineer in accordance with applicable statutory requirements.

Required Third Party Review of Cost Savings: Texas Statute requires that the Utility Assessment Report (detailed audit) be reviewed by an independent third party engineer licensed in Texas.

Key Components of an Energy and Water Savings Performance Contract

I. List of Contract Documents

1. Utility Assessment Report (UAR)
2. Measurement and Verification Plan (M&V Plan)
3. Utility Assessment Report Agreement (also referred to as an Investment Grade Audit or Detailed Utility Audit)
4. Implementation Agreement
5. Sample Periodic Savings Report

II. Project Description

This section provides an overview of the project. It should include a brief description of why the state agency is entering into the Contract, a general list of retrofits or improvements being performed under the terms of the Contract, the cost of the Contract, a brief description of services to be provided, a brief description of the financing method used, and a description of the savings that will be used to pay for the project. This section should also describe the guarantee associated with the project and any bonding associated with it.

III. Terms and Conditions

A. Scope of the Project

This section provides a detailed description of the project, including equipment to be purchased, a list of retrofits, locations of the retrofits, and number of retrofits (i.e., fixture counts, number of pieces of equipment replaced, and size of chillers/boilers, etc.). The resolution of this information is the Owner's decision. It should be no less than the resolution in the energy and water assessment report submitted to the independent third party for review. The intent of this section is to give both parties a clear understanding of the retrofits and services that are included under the Contract. The contract should reference the scope of work contained in the Utility Assessment Report (UAR) dated XX/XX/XXXX. If the UAR changes between the time it is submitted to the owner, the contract should reference the Revised UAR dated XX/XX/XXXX.

B. Performance Bonds for Construction

This section describes in detail the payment and performance bonds provided with the project as they pertain to construction. This is covered in Chapter 2253 of the Texas Government Code.

C. Guarantee

This section explains how the guarantee will work, including the following:

- Source of energy and water savings
- Source of operational savings (operational savings are not energy or water savings).

- Conditions for reimbursement from the ESCO in the event of energy and water savings shortfall
- Conditions for reimbursement from the ESCO in the event of operational savings shortfall.
- Predetermined escalation rates shall not be utilized.
- A clear description of how any changes in utility rates are treated with respect to the guarantee.

All guaranteed savings should be consistent with the guaranteed savings presented in the Utility Assessment Report. The UAR should become part of the Contract. The guaranteed savings should be listed in the UAR report.

D. ESCO Compensation

This section details the total cost of the project and the method of payment. It should include frequency of payments, billing procedure, and costs for any service contracts during the construction phase of the project and after construction is complete.

E. Insurance

This section details the insurance provided by the ESCO for the project. It is incumbent on the Owner to require the proper amounts of insurance for the specific types of work being performed under the Contract.

F. Owner Obligations

This section describes any obligations of the Owner in conjunction with the Contract. The listed items are negotiable in most contracts and responsibility for them should depend on the Owner's needs and capabilities. Major obligations that should be addressed include the following:

- Retaining an independent third party engineer licensed in Texas to review the required Utility Assessment Report.
- Repair or replacement of any existing equipment not included in the Contract
- Information such as prints, schedules, billings, logs, etc.
- Responsibilities during the ongoing monitoring of the project
- Ongoing maintenance requirements following completion
- Any disposal of materials not covered in the Contract
- Operation of the facility in accord with the Contract

G. ESCO Obligations

This section describes any obligations of the ESCO in conjunction with implementation of the project according to the project description. Major obligations that should be addressed include the following:

- Accounting Records
- Supervision responsibilities of employees and/or subcontractors
- Procedures for coordinating work

- Warranties
- Taxes
- Compliance with laws, rules, ordinances, regulations, etc.
- Financing (if required)
- Ongoing support
- Financial Guarantee
- Material removal and disposal
- M&V Plan
- Periodic Savings Reports

H. Conditions of Default – Remedy

- Any actions or conditions that would result in default of the Contract by the Owner
- Any actions or conditions that would result in default of the Contract by the ESCO

I. Dispute Resolution

- Methods for resolving disputes
- Venue for any dispute resolution
- Involvement of third parties

J. Early Termination

- Terms and/or conditions for early termination by the Owner
- Financial considerations of early termination such as penalties, payments, etc.

K. Schedules

1. Measurement & Verification Plan

All Measurement & Verification plan should be consistent with the plan presented in the Utility Assessment Report and should address the following:

- Methodology of how energy and water savings are measured
- Methodology of how operational savings are measured
- Methodology of how energy and water savings are valued (use base year rate)
- Methodology of how operational savings are valued (describe origin of information and complete description of savings)

2. Operational Parameters

All anticipated and required equipment operational parameters should be described and included in the UAR and in the M&V plan. These parameters include but are not limited to the following:

- Hours of operation
- Temperatures
- Operating Schedules
- Humidity Requirements
- Other identified operational requirements that the ESCO and Owner needs to consider prior to calculating projected savings.

All operational parameters should be listed in the M&V plan with procedures in place to take into account owner required changes to the agreed upon parameters.

All operational parameter information should be consistent with the parameters presented in the Utility Assessment Report (UAR). This information should become part of the Contract.

3. **Maintenance Requirements**
   - Any required maintenance contracts or services provided by the ESCO
   - Required levels of maintenance by Owner

4. **ESCO Supplied Training**
   - Specific training supplied as part of the project
   - Any additional training required by the Owner

5. **Project Financing (if applicable)**
   This section describes any financing relationship between the ESCO and the Owner that is required as part of the Contract.

IV. Attachments to the Contract

A. The Utility Assessment Report
B. The Measurement and Verification Plan
C. The Periodic Savings Report

Third Party Independent Review

State law requires that an independent third party review of the UAR be conducted by a licensed engineer. This review, at a minimum, must be both an assessment of the overall project scope of work and a technical review of the consumption savings methodology, project investment, and economic justification. The review must include reviews of the following documents:

- The Contract (Review from a technical perspective. This is not a legal review)
- The UAR
- The M&V Plan
- Sample Periodic Utility Savings Report

The reviewer must certify that these documents have been reviewed and are complete in identification and development of potential utility costs reduction projects. The third party reviewer must check that the Contract, UAR, and M&V Plan present a cohesive package that fully describes the intended scope of services. The reviewer must also provide a check of the project's technical details, including energy audit procedures, the savings calculation methodology, commitment to comply with state energy and water conservation standards, any stated assumptions in developing the costs and savings, applicability of energy and water utility

reduction projects, methodology for development of the utility baseline, and procedure for verifying savings post-installation.

Agency Checklists and Certifications

In order to fulfill the requirements of Texas Government Code § 2166.406 (i), the following documents, which are found on the following pages of Section 2 of these Guidelines, must be completed by the State Agency. A State Agency may not enter into an Energy Savings Performance Contract unless it has been approved by the State Energy Conservation Office. The Energy Savings Performance Contract Approval Checklist and Certifications will serve as the vehicle for SECO review and approval.

1. STATE AGENCY APPROVAL CHECKLIST
2. STATE AGENCY CHIEF FINANCIAL OFFICER CHECKLIST
3. AGENCY GENERAL COUNSEL CONTRACT CHECKLIST
4. PROJECT COST SUMMARY TABLE

Texas Facility Commission Certification

As required by Texas Government Code, TFC has completed and included in this ESPC contract the following referenced checklists and project summary table.

1. STATE AGENCY APPROVAL CHECKLIST
2. STATE AGENCY CHIEF FINANCIAL OFFICER CHECKLIST
3. AGENCY GENERAL COUNSEL CONTRACT CHECKLIST
4. PROJECT COST SUMMARY TABLE

Energy Savings Performance Contracts
STATE AGENCY APPROVAL CHECKLIST

State Agency/Owner: Texas Facilities Commission

ESCO/Contractor: Performance Services of Texas, Inc.

Contract Name/Number: Energy Performance Contract Between Texas Facilities Commission and Performance Services of Texas, Inc., TFC Contract No. 16-130-000

Date of Review: November 2, 2016

SECO requires that a State Agency complete this checklist in order to fulfill the requirements of Texas Government Code § 2166.406 (i), therefore, a State Agency may not enter into an Energy Savings Performance Contract unless this checklist has been completed and approved by the State Energy Conservation Office.

At the minimum, have the following requirements been met?

Yes ☒ No ☐ 1) The contract documents were reviewed and approved by a Professional Engineer, licensed in the State of Texas, working for a firm licensed in the State of Texas?

Document: Exhibit E - UAR; Exhibit R - Checklists & Certifications — Page reference(s): Exhibit E – Pages 48-49; Exhibit R – Pages 1-6

Yes ☒ No ☐ 2) The reviewer has provided a Third Party Reviewer Certification in addition to a summary report of findings?

Document: Exhibit R Checklists& Certifications — Page reference(s): Pages 2-22

Yes ☒ No ☐ 3) The contract document review and report were implemented in accordance with SECO's Energy Savings Performance Contracting Guidelines and include all specified documents?

Document: Exhibit R — Page reference(s): Pages 23-31, 31A

Yes ☒ No ☐ 4) All costs associated with the contracted review, financing, verification of savings, provision of bonds, and guarantees are included in the overall project cost as represented in the attached "Project Cost Summary Table?"

Document: Exhibit E - UAR; Exhibit R - Checklists & Certifications — Page reference(s): Exhibit E – Page 46; Exhibit R – Page 22

Yes No

☒ ☐ 5) The review demonstrated that the savings achieved will be equal to or greater than the cost of the project each year over the life of the Contract?

Document: Exhibit E - UAR Page reference(s): Page 47

Yes No

☒ ☐ 6) A" no-conflict of interest" certification for any third party ESPC reviewer?

Document: Exhibit R, No-Conflict of Interest-UAR No-Conflict of Interest-M&V and Periodic Report Page reference(s): Page 1, Page 49 Will provide no-conflict of certifications after contractor selected

Yes No

☒ ☐ 7) The Contract requires compliance with all applicable federal, state, and local statutes?

Document: TFC Contract Page reference(s): Page 23, Paragraph 7.1.1

Yes No

☒ ☐ 8) The Contract contains a Utility Assessment Report and a Measurement and Verification Plan that documents current energy consumption and will document future energy and water savings that occur as a direct result of the project?

Document: Exhibit E - UAR Exhibit H - M&V Page reference(s): Exhibit E - Pages 18-20, 26-38 Exhibit H - Page 15

Yes No

☒ ☐ 9) The contracting Agency will provide a copy of all Periodic Utility Savings Report Certification Forms upon receipt to SECO?

Document: Sample Annual Savings Report Page reference(s): Exhibit J - Page 1

Yes No

☒ ☐ 10) The offeror has provided a payment and performance bond?

Document: Exhibit S Payment & Performance Bond Page reference(s): To be submitted after contract execution

Yes No

☒ ☐ 11) A copy of the Third Party Review Certification and Summary of Findings Report has been submitted with this checklist?

Document: Exhibit R - 3rd Party Reviewer Certification & Summary Report of Findings Page reference(s): Pages 2 - 22

Yes No

☒ ☐ 12) Contract does not include a provision allowing the contractor to limit payments to the amount of debt service or guaranteed savings, whichever is less, when guaranteed energy savings is not achieved?

Document: Exhibit J - Performance Guarantee Agreement Page reference(s): Page 2, Paragraph 5

Yes	No	
☒	☐	13) Contract has a provision requiring payment and performance bonds as required by statue?

Document: Contract Page reference(s): Page 31

Yes	No	
☒	☐	14) Contract includes the anticipated types and amounts of equipment to be installed?

Document: Contract Exhibit E – UAIC Page reference(s): Page 7 Pages 26-37 & Pages 59-326

Yes	No	
☒	☐	15) A copy of the certification by the design architect or engineer will be submitted to SECO (prior to construction) that verifies to the agency or institution that the construction or renovation will comply with the standards that are established under provisions of 34 TAC §19.347

Document: Forms 50-809 & 50-811 Page reference(s): To be submitted following project design

I am authorized by the above referenced state agency to review the above referenced contract and the answers I have provided are to the best of my knowledge and in my best professional judgment.

(signature)

John S. Raff
(printed name)

Deputy Executive Director,
Facilities, Design & Construction, TFC
(title or position)

Texas Facilities Commission
(mailing address)

1711 San Jacinto Boulevard
(street address)

Austin, Texas 78701
(City, TX)

(512) 463-3567
(office telephone number)

John.Raff@TFC.State.Tx.Us
(email address)

FOR SECO USE ONLY

Date Received: 11/4/16

Approved By: Fred Yebra

Date Approved: 11/7/16

OR

Date Returned to Agency:

Comments:

Energy Savings Performance Contracts
STATE AGENCY CHIEF FINANCIAL OFFICER CHECKLIST

State Agency/Owner: Texas Facilities Commission

ESCO/Contractor: Performance Services of Texas, Inc.

Contract Name/Number: Energy Performance Contract Between Texas Facilities Commission and Performance Services of Texas, Inc., TFC Contract No. 16-130-000

Date of Review: November 2, 2016

SECO requires that a State Agency Chief Financial Officer (CFO) complete this checklist in order to fulfill the requirements of Texas Government Code § 2166.406 (i), therefore, a State Agency may not enter into an Energy Savings Performance Contract unless this checklist has been completed by the CFO and approved by the State Energy Conservation Office.

At the minimum, have the following requirements been met in the Energy Savings Performance Contract?

Yes ☒ No ☐ 1) Does the Energy Savings Performance Contract specifically identify the Energy Conservation Measures (ECMs) that will be installed and accurately identify the types and amounts of equipment to be installed?

Document: Exhibit E - UAR Contract Page reference(s): Exhibit E - Pages 26-39 & Pages 59-226 Page 7

Yes ☒ No ☐ 2) Accurately identifies the total contractual payment obligation incurred by the state agency under contract?

Document: Contract Page reference(s): Page 16, Article 3.1 UAR cost included in $3.6M contract value

Yes ☒ No ☐ 3) Accurately identifies the payments to the Contractor, and the time period covered by the financial guarantee?

Contractor payment: Document: Exhibit Q - Schedule of Values Proposed Payment Schedule

Page reference(s): Pages 1-2

Guarantee: Document: Exhibit I - Performance Guarantee Agreement

Page reference(s): Pages 1-5

Yes No

☐ 4) Does the contract or accompanying documents guarantee the amount of savings to be realized by the state agency?

Document: Exhibit I - Performance Guarantee Agreement Page reference(s): Page 1

Yes No

☐ 5) Does the amount of the guarantee cover the total costs related to the contract incurred by the state agency for the term of the contract?

Document: Exhibit E - OAR Page reference(s): Pages 46-47

Yes No

☐ 6) Does the contract or accompanying documents have an agreed method for determining the amount of actual savings achieved by the UCRMs including the time period for determining the savings?

Document: Exhibit H - M&VP Page reference(s): Pages 13-14

Yes No

☐ 7) Does the contract or accompanying documents have a specified time for payment of any difference between the guarantee and the actual savings?

Document: Exhibit H - M&VP Page reference(s): Exhibit H - Page 4

Yes No

☐ 8) If the contractor is required to submit to the agency a legally adequate performance bond, has the contractor submitted the performance bond?

Document: Payment & Performance Bonds Page reference(s): Exhibit S – To be submitted after contract execution

Yes No

☐ 9) If a performance bond is required, is the amount sufficient to cover the total cost of installing all the UCRMs under contract?

Document: Contract Uniform General Conditions Page reference(s): Page 31, Paragraph 11.1 Exhibit A – Page 22, Article 5.1.1.1

Yes No

☐ 10) If the contractor is required to submit to the agency a legally adequate payment bond, has the contractor submitted the payment bond?

Document: Contract Payment & Performance Bonds Page reference(s): Exhibit A – Page 22, Article 5.1.1.2 Exhibit S – To be submitted after contract execution

Yes No

☒ ☐ 11) If a payment bond has been provided, is it in the amount of the cost of the installation of all the UCRMs under the contract?

Contract - Payment & Exhibit A – Page 22, Article 5.1.1.2
Document: Performance Bonds Page reference(s): Exhibit 3 – to be submitted after contract execution

Summary of Total Project Costs, Total Guaranteed Savings and Project Payback				
			Source References	
		Totals	Document	Page
A	Contract Term (year)	10	UAR	46
B	Total Third Party Review Costs	$ N/A	N/A	N/A
C	Total Utility Assessment Report and Design Costs	$105,000	UAR	8
D	Total Cost of UCRMs	$3,447,700	UAR	8
E	Total Cost of Project Financing	$0		
F	Total Payment and Performance Bond Costs	$47,300	UAR	8
G	Total Financed Costs (B+C+D+E+F)	$3,600,000	UAR	N/A
H	Total Measurement and Verification Fees	$280,000	UAR	8
I	Total Project Costs Contracted (G+H)	$3,880,000	UAR	N/A
J	Total Guaranteed Savings Over Contract Term	$5,081,614	UAR	47
K	Payback (years) (I/J) Ratio*	7.1	N/A	N/A

*Approved by SECO on 10/13/2016

I have reviewed the above referenced contract in my capacity as Chief Financial Officer for the above referenced state agency. The answers I have provided are to the best of my knowledge and in my best professional judgment.

Bill Monroe
(signature)

Bill Monroe
(printed name)

Chief Financial Officer
(title or position)

Texas Facilities Commission
(mailing address)

1711 San Jacinto Boulevard
(street address)

Austin, TX 78701
(City, TX)

(512) 463-6471
(office telephone number)

Bill.Monroe@tfc.state.tx.us
(email address)

FOR SECO USE ONLY

Date Received: _____

Approved By: _____

Date Approved: _____
OR
Date Returned to Agency: _____
Comments: _____

MEASUREMENT AND VERIFICATION PROVIDER CERTIFICATION

State Agency/Owner: Texas Facilities Commission

ESCO/Contractor: Performance Services, Inc.

Contract Name/Number: Energy Savings Performance Contracting/15-020-0303

Date of Review: July 19, 2016

ESCO requires the use of the International Performance Measurement and Verification Protocol (IPMVP), latest edition, which is administered by the Efficiency Valuation Organization (EVO).

[illegible]

[illegible]

☒ 1) A clear scope of work and deliverables (outcomes) define the outputs and service levels provided after the installation of equipment.

Document: M&V Plan Page reference(s): Exhibit H - Pages 1-34

☒ 2) Name and qualifications of the M&V firm and individual technical analysts that will perform the M&V?

Document: M&V Plan Page reference(s): Exhibit H - Page 34

☒ 3) A list of what will be measured

Document: M&V Plan Page reference(s): Exhibit H - Pages 10-15

☒ 4) Time interval(s) to be used for the measurements.

Document: M&V Plan Page reference(s): Exhibit H - Page 34

☒ 5) Total cost of the M&V Plan over the term of the Contract.

Document: M&V Plan Page reference(s): Exhibit H - Page 3

Contract Page 16, Article 5.1.3

This document is Performance Services Trade Secret and Confidential Information to be used by the addressee for evaluating the RFQ process. Addressee is not to disclose the confidential information to third parties without written consent of Performance Services.

Yes	No		
☒		6)	Instruments that will be used for measurement, method of installation, how the instruments will be calibrated and the frequency of calibration. Document: M&V Plan Page reference(s): Exhibit H - Page 32
☒		7)	What baseline and post-retrofit analysis will be performed on the data that are collected. Document: M&V Plan Page reference(s): Exhibit H - Pages 7-9 & 15-24
☒		8)	A sample calculation of the savings analysis including format. Document: M&V Plan & UAR Page reference(s): Exhibit H-pages 15-24, Exhibit E-pages 58-125
☒		9)	What baseline and post-retrofit analysis will be performed on the data that are collected. Document: M&V Plan Page reference(s): Exhibit H - Pages 15-24
☒		10)	A table that shows M&V approach to measure each UCRM or O&M measure. Document: M&V Plan Page reference(s): Exhibit H - Page 15
☒		11)	A Sample Periodic Utility Savings Report including examples of all required documents and showing all data elements, calculations and results Document: Sample Annual Savings Report Page reference(s): Exhibit J, Pages 1-13
☒		12)	Certification of review by a licensed engineer. Document: M&V Provider Certification Page reference(s): Exhibit R, Page 40

This document contains Performance Services Trade Secrets and Confidential Information to be used by the addressee for evaluating the PSI proposal. Addressee shall not disclose the Confidential Information to third parties without written consent of Performance Services.

I certify that this Measurement & Verification Plan has been prepared in accordance with the requirements of the Performance Contracting technical Guidelines for state agencies and that this knowledge is based on my study of the proposed projects and on-site investigation of the facilities involved.

Additionally, I certify that the Measurement and Verification approaches, plans, and specifications presented are factual, accurate, reasonable, and in accordance with generally accepted engineering practices to the best of my knowledge and in my best professional judgment.

signature

David M. Temming
(printed name)

Lead Engineer
title or position

3010 LBJ Freeway
mailing address

Suite 1200
(street address)

Dallas, Texas
City, Texas

214-789-1001
office telephone number

dm.temming@performanceservices.com
Email address

95384
Texas P.E. Registration Number

STATE OF TEXAS
DAVID M. TEMMING
95384

7/29/2016

Affix Official P. E. Seal

(Only if signed by Engineer)

FOR SECO USE ONLY

Date Received: 11/4/16

Approved By: Fred Yates

Date Approved: 11/7/16

Or

Date Returned to Agency: _____

Comments: _____

This document contains Performance Services Trade Secrets and Confidential information to be used by the addressee for evaluating the RFI proposal. Addressee shall not disclose the Confidential information to third parties without written consent of Performance Services.

Energy Savings Performance Contracts
AGENCY GENERAL COUNSEL CONTRACT CHECKLIST

State Agency/Owner: Texas Facilities Commission

ESCO/Contractor (Agency): Performance Services of Texas, Inc.

Contract Name/Number: TFC Contract No. 16-130-000

Date of Review: November 2, 2016

I. Energy Savings Performance Contract[1]. Is there a legally valid agreement between the state agency and the Energy Savings Performance Contractor (Contractor) that:

Yes ☒ No ☐ a) Specifically identifies the Utility Cost Reduction Measures (UCRMs) that are authorized by the statute to be installed and that adequately identifies the types and amounts of equipment to be installed?

Document: Utility Assessment Report / Contract — Page reference(s): Exhibit B – Pages 26-39 / Page 13, Article 3

Yes ☒ No ☐ b) Adequately identifies the total contractual payment obligation incurred by the state agency under the contract?

Document: Utility Assessment Report / Contract — Page reference(s): Exhibit E – Page 46-47 / Page 7

Yes ☒ No ☐ c) Adequately identifies the time period for performing the installation of the UCRM's, the payments to the Contractor, and the time period covered by the financial guarantee?

UCRM installation:

Document: Utility Assessment Report / Contract — Page reference(s): Exhibit E – Appendix O, Page / Page 231 – To be adjusted after contract execution

Contractor payment:

Document: Sch. Of Values Proposed / Payment Schedule — Page reference(s): Exhibit O – Page 2

Guarantee:

Document: Utility Assessment Report / Performance Guarantee Agreement — Page reference(s): Exhibit E – Pages 46-47 & / Exhibit I – Pages 1-5

[1] Tex. Gov't Code §2166.406(a).

Yes No

☒ ☐ d) Requires that each energy or water conservation measure must comply with current local, state, and federal construction, plumbing, and environmental codes and regulations?

Document: Contract Page reference(s): Page 23, Paragraph 7.1.1

2. Financial Guarantee[2]. Does the contract or accompanying documents guarantee the amount of the savings to be realized by the state agency under the contract which identifies:

Yes No

☒ ☐ a) The amount of the guarantee that covers the total costs related to the contract incurred by the state agency for the term of the contract?

Document: Utility Assessment Report Page reference(s): Exhibit E – Pages 46-47
Performance Guarantee Agreement Exhibit I – Pages 1-5

Yes No

☒ ☐ b) An agreed method for determining the amount of actual savings achieved by the UCRMs including the time period for determining the savings?

Document: M&V Plan Page reference(s): Exhibit H – Pages 15-24 & 34

Yes No

☒ ☐ c) A specified time for payment of any difference between the guarantee and the actual savings?

Document: M&V Plan Page reference(s): Exhibit H – Page 4

3. Bond for Guarantee[3]

Yes No

☐ ☒ a) Is the agency exercising its statutory authority to require the contractor to file a separate bond to cover the value of the guaranteed savings on the contract?

Document: N/A Page reference(s): N/A

[2] Tex. Gov't Code §2166.406(a) & (b)
[3] Tex. Gov't Code §2166.406(e).

4. Performance Bond[4]

Yes	No	
☒	☐	a) Has the contractor submitted a performance bond to the agency?

Document: P&P Bonds Page reference(s): Exhibit S – Bonds to be provided following contract execution

OR

Yes	No	
☐	☒	b) Is the contractor contractually required to submit to the state agency a legally adequate performance bond that meets the requirements of checklist items C, D, and E below prior to the contractor securing a contractual right to commence work compensable under the contract?

Document: N/A Page reference(s): N/A

If a performance bond has been submitted, does it provide that it is:

Yes	No	
☐	☐	C) Solely for the protection of the state agency?

Document: N/A
Page reference(s): N/A

Yes	No	
☐	☐	D) In the amount of the cost of installing all the UCRMs under the contract?

Document: N/A
Page reference(s): N/A

Yes	No	
☐	☐	E) Conditioned on the faithful performance of the work in accordance with the plans, specifications, and contract documents?

Document: N/A
Page reference(s): N/A

[4] Tex. Gov't Code §§2166.406(e); 2253.021(b).

5. Payment Bond[7]

Yes	No	
☒	☐	a) Has the contractor provided a payment bond been to the agency?

Document: P&P Bonds Page reference(s): Exhibit S – Bonds to be provided following contract execution

OR

Yes	No	
☐	☒	b) Is the contractor contractually required to provide the state agency a legally adequate payment bond meeting the requirements of checklist items C and D below prior to the contractor securing the contractual right to commence work compensable under the contract?

Document: N/A Page reference(s): N/A

If a payment bond has been provided, does it provide that it is:

Yes	No	
☒	☐	C) Solely for the protection and use of payment bond beneficiaries who have a direct contractual relationship with the prime contractor or a subcontractor to supply work, labor, or material under the contract?

Document: N/A
Page reference(s): N/A

Yes	No	
☐	☐	D) In the amount of the cost of installing all the UCRMs under the contract?

Document: N/A
Page reference(s): N/A

[7] Tex. Gov't Code §§2166.406(e); 2253.021(c).

I have reviewed the above referenced contract in my capacity as legal counsel for the above referenced state agency. The answers I have provided on this four page General Counsel Checklist are to the best of my knowledge and in my best professional judgment.

(signature)

Kay Molina
(printed name)

General Counsel
(title or position)

Texas Facilities Commission
(mailing address)

1711 San Jacinto Boulevard
(street address)

Austin, TX
(City, TX)

(512) 475-2400
(office telephone number)

Kay.Molina@tfc.state.tx.us
(email address)

00794319
(State Bar Number)

FOR SECO USE ONLY

Date Received: 11/4/10

Approved By: Fred Velez

Date Approved: 11/7/10

OR

Date Returned to Agency: _____

Comments: _____

ANALYST CERTIFICATION

The undersigned certifies that this report has been conducted in accordance with the requirements of the Texas LoanSTAR Program Technical Guidelines and Format as administered by the State Energy Conservation Office. The undersigned also certifies that the data and the cost reduction estimates presented are factual, accurate, reasonable and in accordance with generally accepted engineering practices to the best of the analyst's knowledge and that this knowledge is based on the analyst's on-site investigation of the facilities involved.

The undersigned further certifies that the analyst will not receive additional financial remuneration (bonuses) beyond salary based on items recommended in the report. The analyst certifies that he/she has not developed specifications or processes for an item that will result in only one potential supplier or manufacturer meeting those specification or process requirements, particularly the supplier or manufacturer that employs the analyst.

The undersigned further certifies that the analyst has no undisclosed, conflicting financial interest in the recommendations of this report.

The undersigned also agrees that any equipment recommendations resulting from this or any other report generated under this program can be fulfilled by a minimum of two equipment manufacturers for projects under $1,000,000 and three equipment manufacturers for projects over $1,000,000. Additionally, the undersigned affirms that he/she will not influence a borrower to selecting any one of the manufacturers.

Printed Analyst's Name
David Temming, P.E.

October 5, 2016

Analyst's Signature Date

Lead Engineer

Title

Non-Residential Buildings
Energy Conservation Design Standard
Compliance Certification

Form# 50-809

SECO
State Energy Conservation Office

The purpose of this document is for state agencies and institutions of higher education to provide certification to SECO in accordance with 4 Tex. Gov't Code § 447.004(e)(2) and (f)(2).

Name of Building/Facility

Location of Building/Facility (Street Address) *City/State* *Zip Code* *County*

Building Owner (Agency/Institution) *Telephone Number*

Mailing Address *City/State* *Zip Code* *County*

Contact Person at Agency/Institution and Title *Email Address*

Architect/Engineering Firm *Telephone Number*

Mailing Address *City/State* *Zip Code* *County*

Contact Person at Architect/Engineering Firm *Email Address*

PROJECT DESCRIPTION ○ New ○ Renovation ○ Addition

Total Square Footage of Conditioned Space: _____

Provide a brief description of the project:

Indicate the method used to verify compliance and attach documentation:

○ Prescriptive Path ○ Alternative Path (ENV-LTG) ○ Simplified Bldg (HVAC) ○ Energy Cost Budget Method

○ This project complies with the economic feasibility of incorporating alternative energy and energy efficient architectural and engineering design evaluation requirements under 10 Tex. Gov't Code §§ 2166.401, 2166.403, 2166.408.

Having examined the Texas Design Standard for nonresidential buildings, based on ANSI/ASHRAE/IESNA Standard 90.1-2013, and being knowledgeable of provisions thereof, I do hereby notify the agency or institution listed above and the State Energy Conservation Office of the above described project and confirm, to the best of my professional ability, that the construction plans and specifications are in compliance with the provisions of the Standard in accordance with the 4 Tex. Gov't Code § 447.004(e)-(f).

Signature of Confirming Architect/Engineer

Title

Date

Affix Official TBAE/TBPE Seal

TBAE/TBPE Registration No.

For the latest information on energy codes and standards visit: www.TXBuildingEnergyCode.org

Water Conservation Design Standard Compliance Certification For State-Funded Buildings

Form# 50-811

SECO
State Energy Conservation Office

Name of Building/Facility

Location of Building/Facility (Street Address) | City/State | Zip Code | County

Building Owner (Agency/Institution) | Telephone Number

Mailing Address | City/State | Zip Code | County

Contact Person at Agency/Institution and Title | Email Address

Architect/Engineering Firm | Telephone Number

Mailing Address | City/State | Zip Code | County

Contact Person at Architect/Engineering Firm | Email Address

PROJECT DESCRIPTION ◯ Residential ◯ Commercial

◯ New ◯ Renovation ◯ Addition

Total Square Footage of the Building/Facility: _____

Provide a brief description of the project:

◯ Project complies with the SECO Water Conservation Design Standards (2015).

◯ Project complies with 4 Tex. Gov't Code § 447.004(c-1) (1) and (c-1) (2) related to potable and non-potable water for landscape watering and rainwater harvesting technology requirement in new buildings.

◯ Project is an exception to the rainwater harvesting requirements and appropriate documentation is provided per 4 Tex. Gov't Code § 447.004(c-2).

◯ Project complies with 4 Tex. Gov't Code § 447.004(c-3) related to providing written evidence to SECO that the amount of rainwater that will be harvested from existing buildings is equivalent to the rainwater that could be harvested from the new building in an area in which the average annual rainfall is at least 20 inches. Include supporting documentation with this form.

Having examined the SECO Water Conservation Design Standards (2015) for State Agencies and Institutions of Higher Education Facilities, and being knowledgeable of provisions thereof, I do hereby notify the agency or institution listed above and the State Energy Conservation Office of the above described project and confirm, to the best of my professional ability, that the construction plans and specifications are in compliance with the provisions of the Standard in accordance with the 4 Tex. Gov't Code § 447.004.

Signature of Confirming Architect/Engineer

Title

Date

Affix Official TBAE/TBPE Seal | TBAE/TBPE Registration No.

For the latest information on energy codes and standards, visit www.BuildingEnergyCode.org

50-811 (08/15)

To be completed after contract signed with third party reviewer

Energy Savings Performance Contracts

CONFLICT OF INTEREST CERTIFICATION FOR THIRD PARTY REVIEWER OF UTILITY MEASUREMENT AND VERIFICATION SAVINGS REPORTS

State Agency/Owner: _____

Third Party Reviewer Contractor: _____

Contract Name/Number: _____

Date of Review: _____

As third party provider of periodic energy and water savings reports, I certify that I/we have no financial interest in this project or contractual relationship with the energy service company retained to implement the energy cost-saving retrofits under a guaranteed savings agreement.

_____
(signature)

_____
(printed name)

_____
(title or position)

_____
(mailing address)

_____
(street address)

_____
(city, TX)

_____
(office telephone number)

_____
(email address)

_____
(Texas P.E. Registration Number)

Affix Official P.E. Seal
(Only if signed by an Engineer)

FOR SECO USE ONLY

Date Received: _____

Approved By: _____

Date Approved: _____
OR
Date Returned to Agency: _____
Comments: _____
_____

To be completed and submitted during project measurement & verification after subcontractor selection

Energy Savings Performance Contracts

PERIODIC UTILITY SAVINGS REPORT CERTIFICATION

(Submit with each Periodic Utility Savings Report)

State Agency/Owner: _____

ESCO/Contractor: _____

Contract Name/Number: _____

Date of Review: _____

The Periodic Utility Savings Report will be reviewed based on the following criteria:

Yes ☐ No ☐ 1) Are the savings are greater than or equal to those estimated or guaranteed in the UAR and the Contract? (If the estimated and guaranteed savings are not the same, both numbers must be shown throughout the documents.)

Document _____ Page reference(s): _____

Yes ☐ No ☐ 2) Do they meet the requirements of Government Code §2166.406?

Document _____ Page reference(s): _____

Yes ☐ No ☐ 3) Does the report contain the minimum required elements as listed in this document?

Document _____ Page reference(s): _____

Yes ☐ No ☐ 4) Does the report present the data elements, calculations, and results as set forth in the M&V Plan?

Document _____ Page reference(s): _____

Yes ☐ No ☐ 5) Do the parties (i.e., Owner, ESCO/Contractor, or third party contractor) have any disputes or concerns regarding the report?

Document _____ Page reference(s): _____

Yes No

☐ ☐ 6) Has an independent third party reviewed this utility savings report?

Date of review: _____

Yes No

☐ ☐ 7) Has this utility savings report been submitted to the State Energy Conservation Office?

Date submitted: _____

I certify that this Utility Savings Report accurately presents the savings reported with those estimated as set forth in the Sample Utility Savings Report and that any adjustments or variations from the previously approved documents are fully documented and reported.

_____
(signature)

_____
(printed name)

_____
(title or position)

_____
(mailing address)

_____
(street address)

_____
(City, TX)

_____
(office telephone number)

_____
(email address)

_____
(Texas P.E. Registration Number)

Affix Official P.E. Seal
(Only if signed by an Engineer)

FOR SECO USE ONLY

Date Received: _____

Approved By: _____

Date Approved: _____
OR
Date Returned to Agency: _____
Comments: _____
_____

EXHIBIT S

Exhibit S – Payment & Performance Bonds

Project Bonding

Texas Facilities Commission is requiring Performance Services to provide Payment and Performance bonds for this performance contract. Sample bonds are provided herein. Actual bonds will be provided by Performance Services following contract execution.

Based on Performance Services project track record and the company's financial strength, Texas Facilities Commission is not requiring a guarantee savings bond on this project.

CNA SURETY

Performance Bond

Bond No.

CONTRACTOR:
(Name, legal status and address)
Performance Services, Inc.
4670 Haven Point Blvd., Suite 200
Indianapolis, IN 46280

SURETY: Continental Casualty Company; Illinois Corporation
(Name, legal status and principal place of business)
333 S. Wabash Avenue
41st Floor
Chicago, IL 60604

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

AIA Document A312-2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:

Amount:

Description:
(Name and location)

BOND
Date:
(Not earlier than Construction Contract Date)

Amount:

Modifications to this Bond: ☒ None ☐ See Section 16

CONTRACTOR AS PRINCIPAL
Company: *(Corporate Seal)*
Performance Services, Inc.

Signature:
Name
and Title:

SURETY
Company: *(Corporate Seal)*
Continental Casualty Company

Signature:
Name: Robert L. Sherlick,
and Title: Attorney-In-Fact

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:
Pillar Group Risk Management
11708 North College Avenue
Carmel, IN 46032
ph. 317-853-3568

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

CNA SURETY

Payment Bond

Bond No.:

CONTRACTOR:
(Name, legal status and address)
Performance Services, Inc.
4670 Haven Point Blvd., Suite 200
Indianapolis, IN 46280

SURETY: Continental Casualty Company; Illinois Corporation
(Name, legal status and principal place of business)
333 S. Wabash Avenue
41st Floor
Chicago, IL 60604

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

AIA Document A312-2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

OWNER:
(Name, legal status and address)

CONSTRUCTION CONTRACT
Date:

Amount:

Description:
(Name and location)

BOND
Date:
(Not earlier than Construction Contract Date)

Amount:

Modifications to this Bond: ☒ None ☐ See Section 18

CONTRACTOR AS PRINCIPAL
Company: *(Corporate Seal)*
Performance Services, Inc.

SURETY
Company: *(Corporate Seal)*
Continental Casualty Company

Signature:
Name and Title:

Signature:
Name and Title: Robert L. Sherlick, Attorney-In-Fact

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)
AGENT or BROKER:
Pillar Group Risk Management
11708 North College Avenue
Carmel, IN 46032
ph. 317-853-3668

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

.2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:		Name and Title:	
Address:		Address:	

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.