The University of Tennessee

Request for Proposals:

Energy Service Company
for the
Energy Performance Contract
UT Health Science Center
SBC No. 540/013-05-2016

September 6, 2017

The University of Tennessee Division of Facilities Planning
5723 Middlebrook Pike, Suite 119
Knoxville, Tennessee 37996-0040
http://facilitiesplanning.tennessee.edu/
RFP ADVERTISEMENT

Appearing in the Memphis Commercial Appeal on September 7, 2017

Request For Proposals: The University of Tennessee requests proposals for an Energy Service Company. Project: Energy Performance Contract, UT Health Science Center. RFP Documents: Scope of services and proposal requirements will be available on September 6, 2017 on UT’s Web site, http://facilitiesplanning.tennessee.edu/. Accommodation: A Proposer with a disability may request reasonable accommodation for participation to the RFP Coordinator designated in the RFP no later than seven calendar days after initial RFP advertisement. Pre-Proposal Conference: UT Health Science Center, Physical Plant Building 201 East Street, Memphis TN 38163, in Room 225, at 2:00 pm. local time on September 14, 2017. Proposal Deadline: Proposals received by the Owner at the address below until 12:00 p.m. local time on October 2, 2017.

Rebecca Douglas, Office of Capital Projects
5723 Middlebrook Pike, Suite 201
Knoxville, TN 37996-0040
REQUEST FOR PROPOSALS
For an Energy Service Company for the
Energy Performance Contract
UT Health Science Center
SBC No. 540/013-05-2016

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REQUEST FOR PROPOSALS

1. INTRODUCTION

1.1. Purpose

1.1.1. The University of Tennessee, hereinafter referred to as the Owner, has issued this Request for Proposals (RFP) with attachments to define service requirements; solicit proposals; detail proposal requirements; and outline the process for evaluating proposals and selecting and contracting with an Energy Service Company (ESCo) for the Owner’s project titled and numbered as follows.

Energy Performance Contract
SBC No. 540/013-05-2016

1.2. Scope of Services

1.2.1. RFP Attachment 1 provides a Pro Forma Master Contract (MC) with Attachments, which together, detail the Owner’s requirements for the ESCo’s scope of services. RFP Attachment 1 substantially represents the contract document that the Proposer selected by the Owner must agree to and sign.

1.2.2. The following summary scope description for ESCo services is for overview purposes only and does not substitute for any portion of this RFP.

ESCo services are in phases: Master Contract and Delivery Order Contracts (DOC).

Master Contract services allows the contractor to enter into the Construction Development Phase Services.

Delivery Order Contracts are contingent upon Owner approval to proceed with the proposals brought by the ESCo showing scope and potential savings.

Delivery Order Contracts include the completed construction for the Project under the ESCo who will procure and contract with their subcontractors and assume the responsibility and the risk of construction delivery within the specified cost and schedule terms.

Refer to MC Attachment 1.A for a general description of the process, which includes an outline procedure. Refer to MC Attachment 1.B for a previous Project Energy Study (for reference purposes only).

1.3. Nondiscriminatory Participation

1.3.1. Through this RFP, the Owner seeks to procure the best services at the most favorable, competitive prices and to give all qualified businesses, including those that are owned by minorities, women, and persons with a
disability, and small business enterprises, opportunity to do business with the Owner.

1.3.2. No person shall be excluded from participation in, be denied benefits of, be discriminated against in the admission or access to, or be discriminated against in treatment or employment in the State’s contracted programs or activities on the grounds of disability, age, race, color, religion, sex, national origin, or any other classification protected by federal or Tennessee State Constitutional or statutory law; nor shall they be excluded from participation in, be denied benefits of, or be otherwise subjected to discrimination in the performance of contracts with the State of Tennessee or in the employment practices of the State’s contractors. Accordingly, all vendors entering into contracts with the State of Tennessee shall, upon request, show proof of such nondiscrimination and shall post in conspicuous places, available to all employees and applicants, notices of nondiscrimination.

1.3.3. The Owner has designated the following contact to coordinate compliance with the nondiscrimination requirements of the State of Tennessee, Title VI of the Civil Rights Act of 1964, the Americans with Disabilities Act of 1990, and applicable federal regulations.

Office of the General Counsel
The University of Tennessee
Administration Building
719 Andy Holt Tower, Suite 560
Knoxville, TN 37996-0174
(865) 974-3245

1.4. Diversity in Contractual Relationships

1.4.1. It is the express desire of The University of Tennessee and the State Building Commission to include an emphasis on diversity in its contractual relationships with contractors for the construction, demolition or renovation of State projects under jurisdiction of the Commission. The Commission acknowledges that firms who demonstrate and embrace diversity within their programs and policies are assisting the State in achieving its goals in building a more reflective marketplace of the community within this state.

2. RFP COMMUNICATIONS

2.1. Request for RFP Communications

2.1.1. THE OWNER will convey all official communications and addenda pursuant to this RFP to the potential Proposers from whom the RFP Coordinator has received a Request for RFP Communications in writing, by letter or by email, with the request clearly indicating the potential Proposer’s organization name and the name and title of a contact person with their telephone number and email address.
2.1.2. The Request for RFP Communications shall be made no later than the date of the Pre-Proposal Conference detailed in the RFP Advertisement. Such request creates no obligation and is not a prerequisite for making a proposal.

2.2. RFP Communications Process

2.2.1. Unauthorized contact regarding this RFP with employees or officials of the Owner or of the State of Tennessee other than the RFP Coordinator detailed below may result in disqualification from this procurement process.

2.2.2. Interested parties and potential proposers must direct all communications regarding this RFP to the following RFP Coordinator, who is the Owner’s official point of contact for this RFP.

    Rebecca Douglas, RFP Coordinator
    Office of Capital Projects
    The University of Tennessee
    5723 Middlebrook Pike, Suite 119
    Knoxville, TN 37996-0040
    Telephone: (865) 974-2628
    Email: designer@tennessee.edu

2.2.3. Notwithstanding the foregoing, Interested Parties may contact the staff of the Governor’s Office of Diversity Business Enterprise for general, public information regarding this RFP, assistance available from the Governor’s Office of Diversity Business Enterprise, or potential future Owner procurements.

2.2.4. The State Building Commission Number (SBC No. 540/013-05-2016) for the project must be referenced in all communications regarding the RFP.

2.2.5. Any oral communications shall be considered unofficial and non-binding with regard to this RFP.

2.2.6. Each Proposer shall assume the risk of the method of dispatching any communication or proposal to the Owner. The Owner assumes no responsibility for delays or delivery failures resulting from the method of dispatch. “Postmarking” of a communication or proposal shall not substitute for actual receipt of a communication or proposal by the Owner.

2.2.7. Only the Owner’s official written responses and communications shall be considered binding with regard to this RFP.

2.2.8. The Owner reserves the right to determine, at its sole discretion, the method of conveying official written responses and communications pursuant to this RFP such as by letter, by fax, by email, or by Web site posting.

2.2.9. Any data or factual information provided by the Owner, in this RFP or an official response or communication, shall be deemed for informational purposes only, and if a Proposer relies on such data or factual
information, the Proposer should either: (1) independently verify the information; or, (2) obtain the Owner’s written consent to rely thereon.

3. **RFP Schedule of Events**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFP Issued</td>
<td>09/06/2017</td>
<td></td>
</tr>
<tr>
<td>Pre-proposal Conference</td>
<td>09/14/2017</td>
<td>2:00 p.m. (cdt)</td>
</tr>
<tr>
<td>Deadline for Written Questions and Clarification Requests</td>
<td>09/25/2017</td>
<td>After 5:00 p.m. (edt)</td>
</tr>
<tr>
<td>Final Addendum Released</td>
<td>09/29/2017</td>
<td>After 5:00 p.m. (edt)</td>
</tr>
<tr>
<td>Proposal Deadline</td>
<td>10/02/2017</td>
<td>12:00 p.m. (edt)</td>
</tr>
<tr>
<td>Evaluation Period</td>
<td>10/03/2017 – 10/12/2017</td>
<td></td>
</tr>
<tr>
<td>Notification of Short Listed Proposers</td>
<td>10/13/2017</td>
<td>9:00 a.m. (cdt)</td>
</tr>
<tr>
<td>Oral Presentation (Tentative)</td>
<td>10/26/2017</td>
<td>2:00 p.m. (cdt)</td>
</tr>
<tr>
<td>Notice of Intent to Award</td>
<td>10/30/2017</td>
<td></td>
</tr>
<tr>
<td>State Building Commission Approval to Award</td>
<td>12/14/2017</td>
<td></td>
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</tbody>
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4. **PRE-PROPOSAL CONFERENCE AND PROPOSER COMMENTS**

4.1. Pre-Proposal Conference

4.1.1. A Pre-Proposal Conference will be held at the time, date, and location detailed in the RFP Advertisement. Attendance is not a prerequisite for making a proposal.

4.1.2. The purpose of the conference is to discuss the RFP scope of services and contract requirements. While questions will be entertained, the oral response to any question at the conference shall be considered tentative and non-binding with regard to this RFP.

4.2. Proposer Comments and Waiver of Objections

4.2.1. Each Proposer shall carefully review this RFP and all attachments for comments, questions, defects, objections, or any other matter requiring clarification or correction, collectively called Comments. Comments must be made in writing and received by the RFP Coordinator no later than five calendar days after the date of the Pre-Proposal Conference.

4.2.2. A Proposer’s protests based on any objections concerning the RFP shall be considered waived and invalid if Comments relevant to the objections
have not been brought to the attention of the Owner, in writing, no later than five calendar days after the date of the Pre-Proposal Conference.

4.2.3. The Owner reserves the right to determine, at its sole discretion, the appropriate and adequate responses to Comments. The Owner’s official responses to Comments and other official communications pursuant to this RFP shall constitute an addendum to this RFP.

5. PROPOSAL REQUIREMENTS AND PROCESS

5.1. Deadline

5.1.1. Proposals must be submitted to the RFP Coordinator no later than the Proposal Deadline date and time detailed in the RFP Advertisement. A late proposal will not be accepted. A Proposer's failure to submit a proposal before the Proposal Deadline shall cause the proposal to be disqualified.

5.1.2. Proposers assume the risk of the method of dispatch chosen. The Owner assumes no responsibility for delays caused by any delivery service. Postmarking by the due date shall not substitute for actual Proposal receipt by the University.

5.1.3. The Proposal Deadline time shall be established by the timepiece of the Owner.

5.2. Proposal Contents

5.2.1. A proposal must respond to the description of ESCo scope of services, contract requirements, and proposal requirements described in this written RFP and any RFP attachments, exhibits, or addenda.

5.2.2. Each Proposer must submit a proposal in response to this RFP with the most favorable terms that the Proposer can offer in recognition that there will be no best and final offer procedure.

5.2.3. No portion of a proposal may be delivered orally or by any means of electronic transmission.

5.2.4. A proposal in response to this RFP shall consist of the following three documents, each of which is further described in a later section and in an RFP attachment.

1. Certification Statement with required attachments (RFP Attachment 2)
2. Qualifications and Technical Proposal (RFP Attachment 3)
3. Cost Proposal (RFP Attachment 4)

5.2.5. Each Proposer must submit eight copies of the Qualifications and Technical Proposal and a single digital file copy in .pdf format on a flash drive. The digital file should not exceed 20 MB and should be named using the following format: (Proposer Name) UTHSC EPC –2017-10-02. Proposals should be clearly marked as follows.

Qualifications and Technical Proposal
Energy Savings Company
5.2.6. Each Proposer must submit one original Cost Proposal in a separately sealed package that is clearly marked as follows: signed and dated by an individual empowered to contractually bind the Proposer.

Cost Proposal
Energy Savings Company
Energy Performance Contract, UT Health Science Center
SBC No. 540/013-05-2016
For RFP Coordinator Opening Only

5.2.7. Each Proposer must submit one original Certification Statement and Security Deposit signed and dated by an individual empowered to contractually bind the Proposer.

Proposal Security Deposit will be returned to the unsuccessful Proposer as soon as practical after the evaluation of the proposals. The Proposal Security for Proposers, which the State believes to have a reasonable chance of receiving the award, may be retained by the Owner for six months after the proposal receipt closing date, or until the Owner executes the contract(s), whichever is sooner.

If the successful Proposer fails to execute and deliver the contract(s), the Owner may annul the notice of the award and the Proposal Security Deposit of the Proposer will be forfeited to the Owner as liquidated damages, not a penalty.

If a proposal bond accompanies the proposal, the attorneys in fact who signed the proposal bond must file a certified and effectively dated copy of their power of attorney.

5.2.8. The Proposer must enclose all documents in a larger sealed package. The Proposer shall clearly mark the outermost package as follows.

Qualifications and Technical Proposal, Cost Proposal, and Certification Statement
Energy Savings Company
Energy Performance Contract, UT Health Science Center
SBC No. 540/013-05-2016
Submitted By: <<ESCo Name>>
Contact Information: <<Contact Person Name, Address, Telephone Number>>

5.3. Qualifications and Technical Proposal Requirements

5.3.1. No pricing information, except for what is specifically requested, shall be included in the Qualifications and Technical Proposal. Inclusion in the Qualifications and Technical Proposal of any direct or implied revelation of requested Cost Proposal information shall make the proposal non-responsive and the Owner will reject it.
5.3.2. Each Proposer shall use RFP Attachment 3 to guide organization of the Qualifications and Technical Proposal. Each Proposer shall duplicate RFP Attachment 3 for use as the Table of Contents for the Qualifications and Technical Proposal by adding proposal page numbers and the Proposer’s name as indicated. The Proposer must address all items for all sections and provide, in sequence, the required information and documentation with the associated item references.

5.3.3. The Qualifications and Technical Proposal shall be economically prepared, with emphasis on completeness and clarity of content, legibly written, brief, and to the point in a direct response to the information requested for each item. All material must be on standard 8 1/2” x 11” paper with exceptions permitted for foldouts containing non-text information such as charts and spreadsheets.

5.3.4. All pages must be numbered.

5.3.5. The Qualifications and Technical Proposal shall not exceed 50 pages including photo pages, charts, spreadsheets, and appendices. Pages or sheets with print on both sides will be counted as two pages.

5.3.6. All information included in a Qualifications and Technical Proposal shall be relevant to a specific requirement detailed in RFP Attachment 3. All information must be incorporated into a response to a specific requirement and clearly referenced. Any information not meeting these criteria will be deemed extraneous and will in no way contribute to the evaluation process.

5.4. Cost Proposal

5.4.1. Each Proposer shall record and submit Cost Proposal information exactly as required by RFP Attachment 4 on an exact duplicate of the attachment and shall not record any other rates, amounts, or information.

5.4.2. The Cost Proposal must be signed and dated by an individual empowered to contractually bind the Proposer.

5.5. RFP Addenda and Cancellation

5.5.1. The Owner reserves the unilateral right to issue addenda to this RFP in writing at any time.

5.5.2. The Owner reserves the right, at its sole discretion, to cancel and reissue this RFP or to cancel this RFP in its entirety.

5.6. Proposal Prohibitions and Right of Rejection

5.6.1. The Owner reserves the right, at its sole discretion, to reject any and all proposals in accordance with applicable laws and regulations.

5.6.2. Each proposal must comply with all of the terms of this RFP and all applicable State laws and regulations. The Owner may consider non-
responsive and reject any proposal that does not comply with all of the
terms, conditions, and performance requirements of this RFP.

5.6.3. A proposal of alternate services (i.e., a proposal that offers services
different from those requested by this RFP) may be considered non-
responsive and rejected.

5.6.4. A Proposer shall not restrict the rights of the Owner or otherwise qualify a
proposal. The Owner may determine such a proposal to be a non-
responsive counteroffer and reject the proposal.

5.6.5. A Proposer shall not submit the Proposer's own contract terms and
conditions in a response to this RFP. If a proposal contains such terms
and conditions, the Owner may determine, at its sole discretion, the
proposal to be a non-responsive counteroffer, and the proposal may be
rejected.

5.6.6. A Proposer shall not submit more than one proposal. Submitting more
than one proposal shall result in the disqualification of the Proposer.

5.6.7. A Proposer shall not submit multiple proposals in different forms. This
prohibited action shall be defined as a Proposer submitting one proposal
as an ESCo and permitting a second Proposer to submit another proposal
with the first Proposer offered as a subcontractor. This restriction does
not prohibit different Proposers from offering the same subcontractor as a
part of their proposals, provided that the subcontractor does not also
submit a proposal as ESCo. Submitting multiple proposals in different
forms may result in the disqualification of all Proposers knowingly
involved.

5.6.8. The Owner will reject a proposal if the Cost Proposal was not arrived at
independently without collusion, consultation, communication, or
agreement as to any matter relating to such prices with any other
Proposer. Regardless of the time of detection, the Owner shall consider
any of the foregoing prohibited actions that are detected to be grounds for
proposal rejection or contract termination.

5.6.9. The Owner will not contract with or consider a proposal from:

5.6.9.1. An individual who is, or within the past six months has been, an
employee or official of the State of Tennessee;

5.6.9.2. A company, corporation, or any other contracting entity in which an
ownership of two percent (2%) or more is held by an individual who
is, or within the past six months has been, an employee or official of
the State of Tennessee (this shall not apply either to financial
interests that have been placed into a “blind trust” arrangement
pursuant to which the employee does not have knowledge of the
retention or disposition of such interests or to the ownership of publicly traded stocks or bonds where such ownership constitutes less than 2% of the total outstanding amount of the stocks or bonds of the issuing entity);

5.6.9.3. A company, corporation, or any other contracting entity which employs an individual who is, or within the past six months has been, an employee or official of the State of Tennessee in a position that would allow the direct or indirect use or disclosure of information, which was obtained through or in connection with his or her employment and not made available to the general public, for the purpose of furthering the private interest or personal profit of any person; or,

5.6.9.4. Any individual, company, or other entity involved in assisting the Owner in the development, formulation, or drafting of this RFP or its scope of services shall be considered to have been given information that would afford an unfair advantage over other Proposers, and such individual, company, or other entity may not submit a proposal in response to this RFP.

5.6.9.5. For the purposes of applying the requirements of Section 4.6.9, et. seq., an individual shall be deemed an employee or official of the State of Tennessee until such time as all compensation for salary, termination pay, and annual leave has been paid.

5.7. **Waiver of Variances**

5.7.1. The Owner reserves the right, at its sole discretion, to waive a proposal’s variances from full compliance with this RFP. If the Owner waives minor variances in a proposal, such waiver shall not modify the RFP requirements or excuse the Proposer from full compliance with such. Notwithstanding any minor variance, the Owner may hold any Proposer to strict compliance with this RFP.

5.8. **Proposal Information Not Correct, Complete or Properly Organized**

5.8.1. If the Owner determines that a Proposer has provided, for consideration in this RFP process or subsequent contract negotiations, incorrect information that the Proposer knew or should have known was materially incorrect, the Owner may determine such a proposal to be non-responsive and reject the proposal.

5.8.2. The Owner may determine a proposal to be non-responsive and reject it if the proposal fails to appropriately address or meet all of the requirements.
5.8.3. The Owner may determine a proposal to be non-responsive and reject it if the Proposer fails to organize and properly reference the proposal as required.

5.9. Proposal Withdrawal

5.9.1. A Proposer may withdraw a submitted proposal at any time up to the Proposal Deadline time and date detailed in the RFP Advertisement. To do so, a Proposer must submit a written request, signed by a Proposer’s authorized representative to withdraw a proposal. After withdrawing a previously submitted proposal, a Proposer may submit another proposal at any time up to the Proposal Deadline.

5.10. Proposal Errors and Amendments

5.10.1. Each Proposer is liable for all proposal errors or omissions. A Proposer will not be allowed to alter or amend proposal documents after the Proposal Deadline time and date detailed in the RFP Advertisement unless such is formally requested, in writing, by the Owner.

5.11. Proposal Preparation Costs

5.11.1. The Owner will not pay any costs associated with the preparation, submittal, presentation, or contracting of any proposal.

5.12. Disclosure of Proposal Contents

5.12.1. Each proposal and all materials submitted to the Owner in response to this RFP shall become the property of the Owner. Selection or rejection of a proposal does not affect this right. All proposal information, including detailed price and cost information, shall be held in confidence during the evaluation process. Notwithstanding, a list of actual Proposers submitting timely proposals may be available to the public, upon request, immediately after Technical Proposals are opened by the Owner.

5.12.2. Upon the completion of the evaluation of proposals the proposals and associated materials shall be open for review by the public in accordance with Tennessee Code Annotated, Section 10-7-504(a)(7). By submitting a proposal, the Proposer acknowledges and accepts that the full proposal contents and associated documents shall become open to public inspection.

5.13. Licensure

5.13.1. A Proposer must be a licensed General Contractor in the State of Tennessee. Before a Contract pursuant to this RFP is signed; the Proposer and its personnel, if applicable, must hold all necessary, applicable business and professional licenses as may be required for
specific services. The Owner may require any or all Proposers to submit evidence of proper licensure.

5.13.2. Proposers shall be familiar with the Contractors Licensing Act of 1994, as currently amended (codified in Tennessee Code Annotated Sections 62-6-101, et seq.). A contract will not be awarded to a Proposer whose proposal is in conflict with State licensing law.

5.14. Proposals by Joint Ventures

5.14.1. Any form of business arrangement with consultants or joint venture partners may be proposed for this project. However, the Owner prefers that a single firm serve as the project leader and administrative manager supported by business partners and consultants that serve under the management of that single firm. If a Proposer intends to submit a Proposal as a joint venture, then the following requirements shall apply:

1. For the purposes of this RFP, the Owner recognizes a joint venture as separate organizations or business entities that intend to combine professional or technical expertise and business experience, and to share contractual and project responsibilities in performance of a contract pursuant to this RFP.

2. Each joint venture participant shall meet the licensure requirements stated in the RFP.

3. Each joint venture participant shall meet the insurance requirements stated in the RFP.

4. Each joint venture participant shall individually provide all documentation required for review of financial responsibility and stability. The Owner will not recognize nor accept as a singular qualification, any combination of financial assets and resources from separate organizations or business entities submitting a Proposal in response to this RFP.

5.14.2. A subcontractor to a Proposer is not a joint venture participant.

5.15. Severability

5.15.1. If any provision of this RFP is declared by a court to be illegal or in conflict with any law, said decision shall not affect the validity of the remaining RFP terms and provisions, and the rights and obligations of the Owner and Proposers shall be construed and enforced as if the RFP did not contain the particular provision held to be invalid.

5.16. False Statement, Misrepresentation or Omission

5.16.1. Any false statement, misrepresentation, or omission regarding a material fact concerning any aspect of a Proposer’s submittals shall render the Proposer ineligible for award. The failure to submit information and documentation required by this RFP may also render the Proposer ineligible for award.
5.16.2. In the event a contract is awarded to the Proposer, and it is later
determined that the Proposer failed to disclose requested information, or
made a false statement, misrepresentation or omission regarding a
material fact concerning any aspect of this RFP; the Proposer may be
considered in default and the Owner may terminate the contract
immediately and/or withhold full or partial payment as it deems
appropriate. In addition, the Owner may seek other available remedies
to which it is entitled by law, including, but not limited to, debarment.

5.17. Completeness/Accuracy of Submittals

5.17.1. The Proposer shall be fully responsible for and bound by all information
and data included in any and all of its submittals and any appendices or
attachments thereto.

5.17.2. It is the Proposer's responsibility to ensure that all information and data
provided in any and all of its submittals in connection with this RFP are
truthful, accurate and complete.

5.17.3. In the event that there are any material changes in the operations,
management or performance capabilities of the Proposer or its listed
subcontractors that may impact performance of the Contract Work after
the submission of the documents, but prior to the award of the project,
the Proposer shall immediately notify the Owner and inform it of the
details of any such changes.

5.18. Proposal Evaluation Guide

5.18.1. The Owner will be guided in the evaluation of proposals by the process
described herein. The evaluation process is designed to award the
contract to the Proposer with the best Total Score derived by adding
their Qualifications and Technical Proposal Score to their Cost Proposal
Score as shown in RFP Attachment 6.

5.19. Evaluation Process

5.19.1. After the Proposal Deadline, the RFP Coordinator will open and review
each Qualifications and Technical Proposal for a "Pass" or "Fail"
evaluation based on compliance with each of the Mandatory
Requirements detailed in Section A of RFP Attachment 3 and the
following Proposal format and content requirements.

1. Received on or before the Proposal Deadline.
2. Copies submitted and packaged as required.
3. Formatted as required and does not exceed size or page number
   limits.
4. Contains no cost data, except as requested.
5. Proposer did not submit any voluntary alternate proposals.
6. Proposer did not submit multiple proposals in a different form.
7. Does not contain any restrictions of the rights of the Owner or other
   qualification of the proposal.
5.19.2. If the RFP Coordinator determines that a proposal may have failed to meet one or more of the “Pass or Fail” criteria or the Proposal format and content requirements, the Evaluation Team, described herein, will review that proposal and make its own determination, documented in writing, of whether (1) the proposal meets requirements for further evaluation or (2) the Owner will request clarifications or corrections to enable further evaluation or (3) the Owner will determine the proposal non-responsive to the RFP and reject it.

5.19.3. An Evaluation Team made up of five or more Owner employees will evaluate each Proposal. Team members will be knowledgeable concerning the scope and goals of the project and familiar with the construction process. The Evaluation Team will utilize technical advisers as appropriate for their evaluation.

5.19.4. The Owner reserves the right to contact references provided by the Proposer and any other source available for reference information.

5.19.5. Each Evaluation Team member will independently evaluate and assign points for each Proposal in accordance with the established evaluation criteria and associated possible points for each.

5.19.6. The Owner reserves the right, at its sole discretion, to request Proposer clarification of submittals or to conduct clarification discussions with any or all Proposers. Any such clarification or discussion shall be limited to specific sections of the proposal identified by the Owner. The subject Proposer shall put any resulting clarification in writing as may be required by the Owner.

5.19.7. The Owner reserves the right to receive an oral presentation from a Proposer. Oral presentation topics and the number of firms presenting are at the sole discretion of the Owner.

5.19.8. Using the scores from the Evaluation Team, the RFP Coordinator will develop scores for Qualifications and Technical Proposals in accordance with RFP Attachment.

5.19.9. After Qualifications and Technical Proposal evaluations are completed the RFP Coordinator will either, inform Proposers of firms selected for an oral presentation or proceed with opening the Cost Proposals and use RFP Attachment 6 to develop Cost Proposal scores.

5.19.10. If the Owner determines that a Cost Proposal is non-responsive and the proposal is rejected; the RFP Coordinator will make revisions to the Qualifications and Technical Proposal scores.

5.19.11. The RFP Coordinator will use RFP Attachment 6 to develop Cost Proposal Scores.

5.19.12. The RFP Coordinator will add each Proposer’s Qualifications and Technical Proposal Score to their Cost Proposal Score to develop the Total Score for each proposal and a ranking of all proposals in accordance with RFP Attachment 6.
5.19.13. The Owner reserves the right to request CPA audited or reviewed financial statements prepared in accordance with generally accepted accounting principles from the apparent best-evaluated Proposer prior to the final award of the contract. If the requested documents do not support the financial stability of the Proposer the Owner reserves the right to reject the proposal.

6. CONTRACT REQUIREMENTS AND PROCESS

6.1. Assignment and Subcontracting

6.1.1. The Proposer awarded a contract pursuant to this RFP shall not transfer or assign any portion of the contract without the Owner’s prior, written approval.

6.1.2. A subcontractor may only be substituted for a proposed subcontractor at the discretion of the Owner and with the Owner’s prior, written approval.

6.1.3. At its sole discretion, the Owner reserves the right to refuse approval of any subcontract, transfer, or assignment.

6.1.4. Notwithstanding the use of subcontractors, the Successful Proposer awarded a Contract under this RFP shall be the prime contractor and shall be responsible for all work performed.

6.1.5. The Owner encourages Proposers to look at opportunities to contract with Tennessee Businesses to perform work that is not to be self-performed by the Proposer. As used herein, the term “Tennessee Business” means a business in which the majority of the employees of the business working on this project are Tennessee residents working out of an office with a location in the State of Tennessee.

6.2. Right to Refuse Personnel

6.2.1. At its sole discretion, the Owner reserves the right to refuse any personnel of the ESCo or a subcontractor for use in the performance of a contract pursuant to this RFP.

6.3. Insurance

6.3.1. Before entering into a contract, the Owner will require the apparent successful Proposer to provide a Certificate of Insurance in accordance with RFP Attachment 1. Failure to provide such insurance certificate is a material breach and grounds for termination of contract negotiations.

6.4. Contract Award Process

6.4.1. The RFP Coordinator will forward the evaluation results to the responsible Owner official, who will consider the results and all pertinent information available to make a recommendation of contract award to the State Building Commission. The Owner reserves the right to make an award recommendation without further discussion of any proposal.

6.4.2. Prior to the approval of the State Building Commission, the Owner will notify proposers of the apparent best-evaluated proposal and the
opportunity to review proposal documents and an evaluation summary. Such notification shall not create rights, interests, or claims of entitlement in either the Proposer with apparent best-evaluated proposal or any other Proposer.

6.4.3. The Owner reserves the right to add, delete, or modify terms and conditions or to revise pro-forma contract requirements at any time prior to date of contract execution as set forth in this RFP. No such modifications will materially affect the basis of proposal evaluations or negatively impact the competitive nature of the RFP process.

6.4.4. The Proposer with the apparent best-evaluated proposal must sign and return the contract drawn by the Owner pursuant to this RFP within 14 calendar days of receipt of the contract form provided by the Owner. If the Proposer fails to provide the signed contract within this time period, the Owner may determine the Proposer non-responsive to the terms of this RFP and reject the proposal.

6.4.5. The RFP and this selection processes do not obligate the Owner and do not create rights, interests, or claims of entitlement in either the Proposer with the apparent best-evaluated proposal or any other Proposer. Contract award and the Owner obligations pursuant thereto shall commence only after contract approval of all State officials as required by State laws and regulations and not prior to the contractor’s receipt of a fully signed contract.

6.5. **Contract Payments**

6.5.1. All contract payments shall be made in accordance with the contract’s provisions for Payment Terms and Conditions as detailed in RFP Attachment 1. No payment shall be made until the contract is approved as required by State laws and regulations. Under no conditions shall the Owner be liable for payment of any type associated with the contract or responsible for any work done by the ESCo, even work done in good faith and even if the ESCo is orally directed to proceed with the delivery of services, if it occurs before contract approval by the Owner as required by applicable statutes and rules of the State of Tennessee or before the contract start date or before the ESCo’s receipt of a fully executed contract or after the contract end date specified by the contract.

6.6. **ESCo Performance**

6.6.1. The ESCo shall be responsible for the completion of all work set out in the contract. All work is subject to inspection, evaluation, and acceptance by the Owner. The Owner may employ all reasonable means to ensure that the work is progressing and being performed in compliance with the contract.

6.6.2. Improvements and services must result in guaranteed minimum annual energy and O&M savings, as well as guaranteed minimum levels of occupant comfort and equipment performance. The combined saving achieved by the installed projects must be sufficient to cover all project
costs, including debt service, and all ESCO fees for services for the duration of the contract term. At a minimum, the savings guaranteed must be structured to correspond to the annual financing costs associated with the project. Payments must be linked to actual measured post-retrofit improvements as compared to building performance before the installation of any energy systems and service improvements. The guaranteed savings must be achieved each year. Annual cost savings derived for such improvements beyond guaranteed minimum savings will be held by the Owner and will not be allocated to future annual savings guarantees or shortfall in other years.

6.6.3. If the ESCO fails to achieve the guaranteed savings as set forth within the established contract, the ESCO shall reimburse the Owner the shortfall within 30 days. The Owner is to be guaranteed compensation for any monetary loss up to the amount of the ESCO’s performance bond.

END OF REQUEST FOR PROPOSALS
RFP ATTACHMENT 1
For an Energy Service Company for the
Energy Performance Contract
UT Health Science Center
SBC No. 540/013-05-2016

CERTIFICATION STATEMENT

Proposer Legal Entity Name: ________________________________

Proposer Federal Taxpayer Identification Number: ________________

Proposer Tennessee Contractor License Information:
License Number: ____________ License Classification applicable to project: ______________
License expiration date: ________ License Limit: $__________________

In regard to the project identified in the header above the Proposer does hereby affirm and expressly declare
confirmation, certification, and assurance of the following:

1. This proposal constitutes (a) a commitment to provide all services as defined in the RFP Pro Forma
   Master Contract (MC) and attached Scope of Services for the total contract period and (b) confirmation that
   the Proposer shall comply with all of the provisions in this Request for Proposal and shall accept all terms
   and conditions set out in the MC.

2. The information detailed in the proposal submitted herewith in response to the subject RFP is accurate.

3. The proposal submitted herewith in response to the subject RFP shall remain valid for at least 120 days
   subsequent to the date of the Cost Proposal opening and thereafter in accordance with any contract
   pursuant to the RFP.

4. As applicable to this proposed MC, the Proposer shall comply with:
   a) the laws of the State of Tennessee;
   b) Title VI of the federal Civil Rights Act of 1964;
   c) Title IX of the federal Education Amendments Act of 1972;
   d) the Equal Employment Opportunity Act and the regulations issued there under by the federal
      government;
   e) the Americans with Disabilities Act of 1990 and the regulations issued there under by the federal
      government;
   f) the condition that the submitted proposal was independently arrived at, without collusion, under
      penalty of perjury; and,
   g) the condition that no amount shall be paid directly or indirectly to an employee or official of the
      State of Tennessee as wages, compensation, or gifts in exchange for acting as an officer, agent,
      employee, subcontractor, or consultant to the Proposer in connection with the Procurement under
      this RFP.

5. The Respondent affirms the following statement, as required by the Iran Divestment Act Tenn. Code
   Ann. § 12-12-111. "By submission of this response, each Respondent and each person signing on behalf of
   any Respondent certifies, and in the case of a joint response each party thereto certifies as to its own
   organization, under penalty of perjury, that to the best of its knowledge and belief that each Respondent is
   not on the list created pursuant to § 12-12-106."

6. The Proposer shall include a Security Deposit in the amount of Two Hundred Fifty Thousand Dollars
   ($250,000), guaranteeing that the selected Proposer will execute the contract(s) with the State under the
   terms and conditions of their proposal and the RFP.

The Proposal Security Deposit shall be made payable to The University of Tennessee in one of the
following forms:
   a) Certified or cashier’s check
b) Irrevocable letter of credit as defined by T.C.A. 12-4-201
c) Proposal bond issued by security company licensed to do business in Tennessee by Tennessee Department of Commerce and Insurance and shall have certified and current power of attorney in fact attached.

6. The Proposer shall include proof of insurance in accordance with the requirements of the RFP
   a) Letter of Evidence of Professional Liability
   b) Letter of Evidence of insurability for contractor insurance as required for Construction Phase work

7. The Proposer shall include a letter from at least one financial institution that has previously financed an EPC project of at least two million dollars ($2,000,000), performed by this Proposer.

8. The Proposer shall include documentation as follows:
   a) For public corporations, include a complete set of audited financial statements for the Proposer for the last three years, including the Balance Sheet, the Income Statement, the Statement of Cash Flow, complete Notes to Financial Statement, and the Auditor’s Report.
   b) For nonpublic corporations provide items as mentioned in 8a above or the following:
      a. Common size Balance Sheets and Income Statements for the Proposer for the last three years, prepared in accordance with generally accepted accounting principles.
      b. For the last three years, the following ratios for the Proposer, calculated according to generally accepted accounting principles: Quick; Current; Sales/Working Capital; and Debt/Worth.

9. The Proposal shall include a letter of evidence of bondability for the requirements of the Construction Phase work.

10. The Proposer’s status, as required by the State Building Commission Policy and Procedures, is:
    (True or False) _______ The Bidder and/or any of the Bidder’s employees, agents, independent contractors and/or proposed Subcontractors have been convicted of, pled guilty to, or pled nolo contendere to any contract crime involving a public contract.
    (Yes or No) _______ The Bidder is a “Certified Diversity or Disadvantaged Business Enterprise,” Women Owned, Minority Owned, or Small Business, per TCA. § 12-3-801-808. If “Yes”, then indicate the applicable status and name the Certifying Agency below.
    Status: ______________________
    Certifying Agency: ________________

11. The Proposer acknowledges receipt of Addendum:
    Addendum number and date: ______________
    Addendum number and date: ______________
    Addendum number and date: ______________

SIGNATURE AND DATE: ____________________________

Printed Name and Title: ____________________________

END OF CERTIFICATION STATEMENT
RFP ATTACHMENT 2
For an Energy Service Company for the
Energy Performance Contract
UT Health Science Center
SBC No. 540/013-05-2016

QUALIFICATIONS AND TECHNICAL PROPOSAL

SECTION A: MANDATORY REQUIREMENTS

<table>
<thead>
<tr>
<th>Proposal Page Number By Proposer</th>
<th>MANDATORY REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1</td>
<td>Describe your firm’s form of business (i.e., individual, sole proprietor, corporation, non-profit corporation, partnership, limited liability company) and the name of the U.S. state in which it is established.</td>
</tr>
<tr>
<td>A.2</td>
<td>Provide a statement of whether there have been any mergers, acquisitions, or sales of your firm within the last five years, and if so, an explanation providing relevant details.</td>
</tr>
<tr>
<td>A.3</td>
<td>Provide a statement that discloses any pending litigation against your firm; and if such litigation exists, an attached opinion of counsel as to whether the pending litigation will impair your firm’s performance in a contract under this RFP.</td>
</tr>
<tr>
<td>A.4</td>
<td>Provide a statement of whether, in the last ten years, your firm has filed (or had filed against it) any bankruptcy or insolvency proceeding, whether voluntary or involuntary, or undergone the appointment of a receiver, trustee, or assignee for the benefit of creditors, and if so, an explanation providing relevant details.</td>
</tr>
<tr>
<td>A.5</td>
<td>Identify your firm’s contact person regarding the proposal with mailing address, telephone number, and e-mail address.</td>
</tr>
<tr>
<td>A.6</td>
<td>State whether the Proposer or any individual who will perform work under the Contract has a possible conflict of interest (e.g., employment by the State of Tennessee or University of Tennessee) and, if so, the nature of that conflict. The University reserves the right to cancel an award if any source could either give the appearance of a conflict of interest or cause speculation as to the objectivity of the Proposer. Such determination regarding any questions of conflict of interest will be solely within the discretion of the University.</td>
</tr>
</tbody>
</table>

Mandatory Requirements (Pass or Fail)
## SECTION B: QUALIFICATIONS AND EXPERIENCE

### PROPOSER NAME:

<table>
<thead>
<tr>
<th>Proposal Page Number By Proposer</th>
<th>QUALIFICATIONS AND EXPERIENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B.1 Briefly state your firm’s credentials to deliver the required services. Include your firm’s license information, number of employees, type of client base, and location of offices. Include awards or honors earned from industry organizations and publications.</td>
</tr>
<tr>
<td></td>
<td>B.2 List contracts with the Owner and the State of Tennessee including current contracts and contracts completed within the previous five years.</td>
</tr>
<tr>
<td></td>
<td>B.3 List current projects on which your firm is presently committed, or will be committed, with client name, dollar amount, the start and completion dates, and the services being provided.</td>
</tr>
</tbody>
</table>
|                                 | B.4 Provide summary information for each of no more than five projects of similar scope that have been contracted or are being constructed by your firm and describe the services provided. **Format information as shown after this section.**

As an approved alternate, the Proposer may provide a sample work product to meet B.4 requirements.

*If a Proposer is chosen for an interview then the Proposer will be asked to provide a sample work product to further meet this requirement.*

|                                 | B.5 List your firm’s management, supervisory, and technical professional personnel that will be assigned to the project in (a) the Master Contract and (b) the Construction Phase. Provide one-page résumés of key personnel with title/position, role for this project; time commitment for this project, education, professional license or registration, state of residency, and general employment history. Provide relevant references names with contact information for the project manager(s). **Identify the decision-maker** for the EPC in each phase. |
|                                 | **NOTE:** The Owner will apply the requirements of General Conditions Section 3.9.1 to the key personnel, requiring such personnel be designated in writing prior to Construction Services award and requiring that the Contractor shall not change personnel designated without consent of Owner. |
|                                 | B.6 Provide a table identifying personnel named in B.5 that were assigned to projects named in B.4 and their job titles for that project. |
|                                 | B.7 Provide an organizational chart highlighting named participants in B.5. Illustrate the lines of authority and designate the individual responsible for the completion of each service component. |
|                                 | B.8 As used herein, the term “Tennessee Business’ means a business in which the majority of the employees of the business working on this project are Tennessee residents working out of an office with a location in the State of Tennessee. Provide documentation of your firm’s current contracts with Tennessee Businesses. Please include the following information: |

(a) **Business Strategy.** Provide a description of your firm’s procedures designed to encourage and foster commerce with Tennessee Businesses, including how your firm will
provide Tennessee Businesses the opportunity to competitively compete for subcontracts awarded pursuant to Pro Forma Master Contract Section D.5.

(b) Business Relationships. Provide a listing of your firm’s current contracts with Tennessee Businesses. Please include the following information:

(i) Contractor’s name, point of contact name, and telephone number,

(ii) Contractor’s primary place of business and location of staff (if different than primary place of business); and

(iii) Contract description and total value.

<table>
<thead>
<tr>
<th>Qualifications and Experience Proposal Points (Maximum = 50)</th>
<th></th>
</tr>
</thead>
</table>
QUALIFICATIONS AND EXPERIENCE INFORMATION

Information and format required for Qualifications and Experience Criteria B.4.

PROPOSER NAME:

Project Information:

<table>
<thead>
<tr>
<th>Project:</th>
<th>Period of Service:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client:</td>
<td>Current Project Status:</td>
</tr>
<tr>
<td>Client Point of Contact:</td>
<td>Start Date:</td>
</tr>
<tr>
<td>Location:</td>
<td>Completion Date:</td>
</tr>
</tbody>
</table>

Key Personnel with Office Location:

Manager:

Supervisor

Architect / Engineer or Technical Professional:

Other Personnel:

Summary of Scope and Services Provided:

Listing of Energy Savings Projects Implemented including the following information for each listing:

- Amount Invested
- Annual Energy Cost Savings Identified
- Energy Usage and/or Demand Savings
- Calculation Methodology
- Project Simple Paybacks, Other Benefits, etc.
- Brief Description of Building Types included in the Gross Square Footage
- Average Unit Cost of Energy by Type
- Type of Funding Secured and Payment Methodology
- Savings Guarantee Arrangement
- Measurement and Verification Methodology, Reporting, Results, Any Resolutions, etc.
SECTION C: TECHNICAL APPROACH

<table>
<thead>
<tr>
<th>Proposal Page Number By Proposer</th>
<th>TECHNICAL APPROACH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C.1 Energy Performance Contracting:</strong></td>
<td>Describe the methods to be used for the following services for this project. Proposers should highlight their management and cost approach to delivering the services with enough information to show their understanding of the project.</td>
</tr>
<tr>
<td>Master Contract Phase</td>
<td></td>
</tr>
<tr>
<td>a. Construction Development Phase</td>
<td></td>
</tr>
<tr>
<td>Construction Services Phase</td>
<td></td>
</tr>
<tr>
<td>b. Design and Construction Documents</td>
<td></td>
</tr>
<tr>
<td>c. Construction</td>
<td></td>
</tr>
<tr>
<td>d. Closeout</td>
<td></td>
</tr>
<tr>
<td>Performance Period Phase</td>
<td></td>
</tr>
<tr>
<td>e. M&amp;V Methodology</td>
<td></td>
</tr>
<tr>
<td>f. M&amp;V Reporting</td>
<td></td>
</tr>
<tr>
<td>g. Operations and Maintenance</td>
<td></td>
</tr>
<tr>
<td><strong>C.2 Technical Services:</strong></td>
<td>Describe the methods to be used for the following services for this project.</td>
</tr>
<tr>
<td>a. Assessments and Audits:</td>
<td>Provide evidence demonstrating capabilities including: Organizational participation; date collections procedures; proposer furnished equipment to be used</td>
</tr>
<tr>
<td>b. Initial Proposal:</td>
<td>Provide evidence demonstrating capabilities including: List of technologies; calculations; preliminary economics</td>
</tr>
<tr>
<td>c. Detailed Energy Study:</td>
<td>Provide evidence demonstrating capabilities including: List of proposed energy savings; modeling and calculations; energy and cost savings; cost basis for the construction services</td>
</tr>
<tr>
<td>d. Final Proposal:</td>
<td>Provide evidence demonstrating capabilities including: Final energy savings; owner interface issues and energy savings bundles; final economics</td>
</tr>
<tr>
<td>e. Construction:</td>
<td>Provide evidence demonstrating capabilities including: Scheduling; cost control; subcontractors</td>
</tr>
<tr>
<td>f. Performance Period:</td>
<td>Provide evidence demonstrating capabilities including: Measurement and verification plan and results; O&amp;M plan with training</td>
</tr>
<tr>
<td>g. Lessons Learned:</td>
<td>Provide statements or relevant lessons from previous experience.</td>
</tr>
<tr>
<td><strong>C.3</strong></td>
<td>Describe your firm’s experience with implementing criteria for sustainable design and construction such as Tennessee High Performance Building Requirements, State of Tennessee Sustainable Design Guidelines, LEED, Green Globes, or Energy Star.</td>
</tr>
<tr>
<td><strong>C.4</strong></td>
<td>Describe your firm’s diversity participation as follows:</td>
</tr>
</tbody>
</table>
| 1) | A description of the Proposer’s existing programs and procedures designed to
encourage and foster commerce with business enterprises owned by minorities, women, persons with a disability and small business enterprises.

2) A listing of the Proposer’s current contracts with business enterprises owned by minorities, women, persons with a disability and small business enterprises.

3) An estimate of the level of participation by business enterprises owned by minorities, women, persons with a disability and small business enterprises in a contract awarded to the Proposer pursuant to this RFP.

4) The percent of the Proposer’s current employees listed by gender, noting ethnicity and disability.

C.9 Describe how your firm will select its professional representative licensed in the discipline of engineering in the State of Tennessee to manage the services required of a design professional under the Pro Forma Contract. Please be aware that such selection process must be compliant with the requirements of Tenn. Code Ann. § 12-4-107.

C.10 Describe how your firm will select subcontractors used to perform Construction Phase services not self-performed by your firm.

END OF QUALIFICATIONS AND TECHNICAL PROPOSAL
COST PROPOSAL

PROPOSER NAME:

NOTICE TO PROPOSERS: This Cost Proposal must specifically record below the margins proposed in the appropriate space(s) as required herein.

The Cost Proposal shall record only the cost margins proposed as required, and any other unit labor rates as indicated. It shall not record any text that could be construed as a qualification of the cost proposed. If the Proposer fails to specify the Cost Proposal required, the University shall determine the proposal non-responsive and reject it.

The proposer must sign and date the Cost Proposal.

GENERAL:
1. Reference Pro Forma Master Contract (MC) and MC Attachments 1.A through 1.D, including term definitions.
2. Complete all sections, provide authorizing signature, and date.

SECTION A: Proposed Percentage

The Proposer shall indicate below the margins for each specific technology and performance period activities that may be utilized in approval of Construction Services under this ESCo Master Contract resulting from this RFP.

<table>
<thead>
<tr>
<th>Installation Margins by Technology</th>
<th>Percent Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Lighting Improvements</td>
<td></td>
</tr>
<tr>
<td>2 Electric Motor Systems</td>
<td></td>
</tr>
<tr>
<td>3 Electrical Power System Improvements</td>
<td></td>
</tr>
<tr>
<td>4 Chiller Improvements</td>
<td></td>
</tr>
<tr>
<td>5 Chiller Replacements</td>
<td></td>
</tr>
<tr>
<td>6 Boiler System Improvements</td>
<td></td>
</tr>
<tr>
<td>7 HVAC System Improvements</td>
<td></td>
</tr>
<tr>
<td>8 Utility Monitoring &amp; Control Systems</td>
<td></td>
</tr>
<tr>
<td>9 Building Envelope Modifications</td>
<td></td>
</tr>
<tr>
<td>10 Mechanical System Improvements (not elsewhere listed)</td>
<td></td>
</tr>
</tbody>
</table>
Section B: Unit Labor Rates

The proposer shall indicate below in preferred tabular format, the unit labor costs for the individuals indicated in Section B.6 of Attachment 3.

PROPOSER’S AUTHORIZATION OF COST PROPOSAL

The signatory must be an individual or a company officer empowered to contractually bind the Proposer. This Cost Proposal and the submitted associated Qualifications and Technical Proposal shall remain valid for at least 60 days subsequent to the date of the Cost Proposal opening and thereafter in accordance with any resulting contract between the Proposer and the Owner. All monetary amounts are United States currency.

Signature and Date

ESCo Approving Official
Name and Title:

END OF COST PROPOSAL
RFP ATTACHMENT 4
For an Energy Service Company for the
Energy Performance Contract
UT Health Science Center
SBC No. 540/013-05-2016

Energy Conservation Measure (ECM) Technology Categories

1. Lighting Improvements
   a. Interior and exterior lighting replacements and / or retrofits
   b. Lighting control improvements
   c. Occupancy sensors
   d. LED exit sign installations
   e. Daylighting controls / daylight harvesting

2. Electric Motor Systems
   a. Motor replacements with higher efficiency motors
   b. Variable speed motor or drive installations
   c. Efficient motor sizing

3. Electrical Power System Improvements
   a. Transformer replacements
   b. Electrical Transmission and distribution system improvements

4. Chiller Improvements
   a. Chiller retrofits
   b. Chiller controls upgrades

5. Chiller Replacements

6. Boiler System Improvements
   a. Boiler control system improvements
   b. Boiler upgrades
   c. Boiler replacements
   d. Boiler conversions from coal to natural gas
   e. Heat recovery systems

7. HVAC System Improvements
   a. Fan and pump resizing and replacement
   b. Fan and pump re-shelving and impeller trimming
   c. Variable air volume (VAV) retrofits
   d. Heat pump replacement of air conditioning and heating units
   e. High efficiency window air conditioning units
   f. Economizer installations
   g. Pre-treatment of makeup ventilation air
   h. De-stratification of conditioned air

8. Utility Monitoring & Control Systems
   a. HVAC direct digital control systems installations
   b. HVAC direct digital control systems improvements
c. Energy management control systems installation or improvements

9. Building Envelope Modifications
   a. Install Insulation
   b. Building Weatherization
   c. Window Replacements

10. Mechanical System Improvements (not elsewhere listed)
    a. Piping system new insulation
    b. Water conservation
    c. Compressed air system improvements
    d. Cooling tower retrofits or replacements

11. Operations & Maintenance / Retro-Commissioning
    a. Steam trap maintenance and replacements
    b. HVAC damper and controller repair or replacement
    c. Steam, hot water & chilled water valve replacements
    d. Piping system insulation repair and replacement
    e. Duct system insulation repair and replacement
    f. Packaged air conditioning unit replacements

12. Utilities Procurement
    a. Electricity
    b. Natural gas / coal / fuel oil / etc.
    c. Steam / chilled water
    d. Water / sewer
    e. Utility rebates, incentives, and subsides

13. Environmental and Related Construction Services
    a. Asbestos abatement
    b. Indoor air quality systems or equipment
    c. Industrial hygiene
    d. Health physics

14. Ground Source Heat Pump
    a. Installation
    b. Upgrade

15. Miscellaneous
    a. Thermal energy storage system installations
    b. Electric peak shaving systems
    c. Demand side management systems
    d. Utility metering and sub-metering
    e. Photovoltaic systems
    f. Other

END OF ECM Technical Categories
RFP ATTACHMENT 5
For an Energy Service Company for the
Energy Performance Contract
UT Health Science Center
SBC No. 540/013-05-2016

EVALUATION GUIDE

STEP 1: QUALIFICATIONS AND TECHNICAL PROPOSAL SCORE

A. Determine Proposer’s Qualifications and Technical Proposal Evaluation Amount as follows.
   The median score for all Evaluators is determined for both Section B and Section C and the
   Evaluation Amount is the sum of the two median scores for the Proposer.

<table>
<thead>
<tr>
<th>Qualifications and Technical Proposal</th>
<th>Section B: Qualifications and Experience</th>
<th>Section C: Technical Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum of 50 Points</td>
<td>Maximum of 50 Points</td>
</tr>
<tr>
<td>Evaluator 1</td>
<td></td>
<td>Evaluator 1</td>
</tr>
<tr>
<td>Evaluator 2</td>
<td></td>
<td>Evaluator 2</td>
</tr>
<tr>
<td>Evaluator 3</td>
<td></td>
<td>Evaluator 3</td>
</tr>
<tr>
<td>Evaluator 4</td>
<td></td>
<td>Evaluator 4</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td>Etc.</td>
</tr>
<tr>
<td></td>
<td>Section B Median</td>
<td>Section C Median</td>
</tr>
<tr>
<td>Proposer A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposer B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposer C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluation Amount (B Median)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>plus (C Median)</td>
<td></td>
</tr>
</tbody>
</table>

B. Determine each Proposer’s Technical Proposal Score by applying the following formula.

\[
\text{The Proposer's Evaluation Amount} \times \frac{70}{\text{The Highest Evaluation Amount of All Proposers}} = \text{Technical Proposal Score}
\]

STEP 2: COST PROPOSAL SCORE

A. Determine each Proposer’s Evaluation Amount as follows.

<table>
<thead>
<tr>
<th></th>
<th>The Lowest proposed Total Margin Price from all proposals (Baseline)</th>
<th>$</th>
</tr>
</thead>
</table>
2. The Total Margin Price for this Proposal: $ \\
3. The result calculated by dividing the amount in row one by the amount in row two above: $ \\
4. The maximum number of points that shall be awarded for this Cost Proposal category: 30 \\
5. The product calculated by multiplying the amount in row three above times the number in row four above: $

B. Determine each Proposer’s Cost Proposal Score by applying the following formula.

\[
\text{Cost Proposal Score} = \frac{\text{The Lowest Total Margin Price Amount of All Proposers (Row 1)}}{\text{The Total Margin Price for this Proposal (Row 2)}} \times 30
\]

STEP 3: TOTAL SCORE

Determine each Proposer’s Total Score as follows.

<table>
<thead>
<tr>
<th>Final Score</th>
<th>Maximum of 100 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualifications and Technical Proposal Final Score (Max 70 Points)</td>
<td>Cost Proposal Score (Max 30 Points)</td>
</tr>
</tbody>
</table>

Proposer A
Proposer B
Proposer C
Etc.

END OF EVALUATION GUIDE
RFP EXHIBIT 1
For an Energy Service Company for the
Energy Performance Contract
UT Health Science Center
SBC No. 540/013-05-2016

PRO-FORMA MASTER CONTRACT (MC)
BETWEEN OWNER and
Energy Service Company (ESCo)

MASTER CONTRACT AGREEMENT
Made as of the __________ Day of __________ in the year of __________.

BETWEEN THE OWNER:
The University of Tennessee
5723 Middlebrook Pike, Suite 119
Knoxville, Tennessee 37996-0040

AND
THE ENERGY SERVICE COMPANY, HEREINAFTER “ESCo”:
<<ESCo name>>
<<Address>>
Federal Taxpayer Identification Number: <<Number>>

Wherein the ESCo is a <<form of business, e.g., corporation, individual, sole proprietor, corporation, partnership>> and the ESCo’s place of incorporation or organization is <<Name of State, e.g. Tennessee>>.

THE PROJECT:
Energy Performance Contract
SBC No. 540/013-05-2016
Memphis, Tennessee

THE DESIGNER:
Designer
Address
City, State zip

THE OWNER AND THE ESCo AGREE AS SET FORTH BELOW.
A. SCOPE OF SERVICES

A.1 Scope

A.1.1 The ESCo (aka Contractor) shall provide the services as detailed in Master Contract (MC) Attachment 1.A, Scope of ESCo Construction Phase Development AND, contingent upon the development, negotiation, and execution of a mutually acceptable agreement between the Owner and the ESCo, as detailed in MC Attachment 1.C, Pro Forma Delivery Order Contract (DOC) between Owner and ESCo/Contractor and Contract Documents associated with the DOC including Standard Bidding and Construction Documents which are represented pro forma in MC Attachment 1.D. The deliverables from services detailed in MC Attachment 1.A shall provide the primary input and guidance for DOC development.

A.1.2 Upon execution of a mutually acceptable DOC between the Owner and the Contractor, the executed form of the contract and subsequent modifications shall replace the Pro Forma documents. The State Architect must approve in writing any DOC having a value in excess of $500,000 prior to the commencement of any work under such DOC.

A.1.3 The intent of the scope is to join together the ESCo with the Owner on a team, governed by specific contracts, that is responsible for expeditious and economical progress of the Project consistent with the interests of the Owner.

A.1.4 Services provided under this MC include professional design services by the ESCo.

B. CONTRACT TERM

B.1 Contract Term

B.1.1 The Contract Term for this MC shall be for an initial three (3) year period that includes the Construction Phase Development services as set forth below AND, contingent upon the negotiation and execution of a DOC, shall be extended through the period of construction and performance periods required for the Work as defined and set forth in the executed DOC.

The period for Construction Development Phase services shall commence on the date of execution of this MC and end on <<Date>>.

B.1.2 The Owner shall have no obligation for services rendered by the ESCo which are not performed within the specified period.

B.2 Contract Term Extension

B.2.1 The Owner reserves the right to extend the period for Construction Phase Development services for an additional period or periods of time.

B.2.2 An extension of the term of this MC will be affected through an amendment to the MC. If the extension of the MC necessitates additional funding beyond that which was included in the original MC, the increase in Owner’s maximum liability will also be affected through an amendment to the MC.
C. PAYMENT TERMS AND CONDITIONS

C.1 Maximum Liability

C.1.1 In no event shall the Maximum Liability of the University under this Contract exceed $4,917,000. This amount shall constitute the entire compensation due the Contractor for the Service and all the Contractor’s obligations hereunder regardless of the difficulty, hours worked, or materials or equipment required. The Contract Amount includes, but is not limited to, all applicable taxes, fees, overhead, profit, and all other direct and indirect costs incurred or to be incurred by the Contractor.

The Contractor is not entitled to be paid the Maximum Liability for any period under the Contract or any extensions of the Contract for work not requested by the State. The maximum liability represents available funds for payment to the Contractor and does not guarantee payment of any such funds to the Contractor under this Contract unless the University requests work and the Contractor performs said work; in which case, the Contractor shall be paid in accordance with the margins detailed in Attachment 3. The University is under no obligation to request work from the Contractor in any specific dollar amounts or to request any work at all from the Contractor during any period of the Contract.

C.1.2 The Construction Development Phase Services fee does not include the amounts that are to be covered under the DOC. Construction Development Phase Services are detailed in the Master Contract, Attachment 1.A.

C.2 Payment Methodology for Construction Development Phase Services

C.3.1 The ESCo’s compensation for Construction Development Phase Services shall be contingent upon progress in the completion of required services satisfactory to the Owner and in a total amount not to exceed the Maximum Liability established herein.

C.3.2 Prior to any payment for Construction Development Phase Services the ESCo shall submit an invoice in form and substance acceptable to the Owner and with all of the necessary supporting documentation, including the form entitled “Attestation: Personnel Used in Contract Performance” as described herein. Invoices shall state (a) ESCo name, (b) invoice date and number, (c) project title and SBC Number, (d) the invoice period of service, (e) amount being invoiced for the invoice period, (f) prior cumulative amount invoiced, and (g) new cumulative amount invoiced.

C.3.3 The ESCo’s progress payment requests for Construction Development Phase Services shall be submitted based upon phases of completed work for each building included in the DOC.

C.3.4 Final payment may be requested upon the completion of Construction Development Phase Services satisfactory to the Owner.

C.3.5 Payment to the ESCo for services shall be made within 45 days after being properly invoiced and payable in accordance with TCA Title 12, Chapter 4, Part 7.

C.4 Travel Compensation

C.4.1 Travel expenses are not reimbursable and must be included in overall ESCo costs and fees.
C.5 Payment of Invoices for Construction Development Phase Services
C.5.1 The payment of any invoice for Construction Development Phase Services by the Owner shall not prejudice the Owner’s right to object to or question any invoice or matter in relation thereto. Such payment by the Owner shall neither be construed as acceptance of any part of the work or service provided nor as an approval of any of the amounts invoiced therein.

C.6 Invoice Reductions for Construction Development Phase Services
C.6.1 The ESCo’s invoices for Construction Development Phase Services shall be subject to reduction for amounts included in any invoice or payment theretofore made which are deemed by the Owner not to be justifiable costs, and on the basis of audits where applicable, conducted in accordance with the terms of this MC, not to constitute proper remuneration for the services performed.

C.7 Deductions for Construction Development Phase Services
C.7.1 Regarding Construction Development Phase Services the Owner reserves the right to deduct from amounts which are or shall become due and payable to the ESCo under this or any contract between the ESCo and the Owner any amounts which are or shall become due and payable to the Owner by the ESCo.

D. STANDARD TERMS AND CONDITIONS:

D.1 Required Approvals
D.1.1 Neither party is bound by this MC until it is approved by the Owner in accordance with applicable Tennessee State laws and regulations. This MC shall not be considered awarded prior to the EPC’s receipt of a fully signed Contract.

D.2 Insurance for Construction Development Phase Services
D.2.1 In regard to Construction Development Phase Services, the ESCo shall furnish to the Owner a certificate of insurance, acceptable to the Owner, providing evidence of policies in no less than the following minimum limits and coverages. The certificate of insurance shall show the name of the insured, producer, carrier(s), coverages, the Owner as certificate holder. The ESCo shall notify the Owner within 10 days in the event of change or renewal.

1. Workers’ Compensation Insurance in the amount required by statute
2. General Liability Insurance in the amount of $500,000.00
3. Automobile Liability Insurance in the amount of $500,000.00

D.2.2 The ESCo shall maintain such insurance for the duration of Construction Development Phase Services.

D.2.3 Insurance during construction period will be as set forth in DOC.

D.3 Modification and Amendment
D.3.1 This MC may be modified only by a written amendment executed by all parties hereto and approved by the Owner in accordance with applicable Tennessee State laws and regulations.
D.4 Termination of Construction Development Phase Services

D.4.1 The Owner may terminate the Construction Development Phase Services of this MC at any time upon 30 days notice in writing from the Owner to the ESCo specifying the effective date of termination. In that event, all finished or unfinished documents and other materials shall, at the option of the Owner, become its property. If this MC is terminated by the Owner as provided herein, the ESCo shall be entitled to receive equitable compensation for satisfactory, authorized service completed as of the termination date, but in no event shall the Owner be liable to the ESCo for compensation for any Construction Development Phase Services which has not been rendered. At the option of the Owner, all finished or unfinished documents, data, studies, surveys, analyses, estimates, models, and reports prepared by the ESCo shall become Owner's property. Upon such termination, the ESCo shall have no right to actual, general, special, incidental, consequential, or any other damages whatsoever of any description or amount on account of Construction Development Phase Services. Notwithstanding the above, the ESCo shall not be relieved of liability to the Owner for damages sustained by the Owner by virtue of any breach of this MC by the ESCo, and the Owner may withhold any reasonable payments to the ESCo for the purpose of setoff until such time as the exact amount of damages due the Owner from the ESCo is determined.

D.5 Subcontracting

D.5.1 The ESCo shall not assign this MC without obtaining the prior written approval of the Owner. Subcontracts to this MC shall contain, at a minimum, Sections D.7, D.8, and D.9 of this MC. The ESCo shall not enter into a subcontract for any of the services to be performed under this MC, including, without limitation any DOC or contracts for engineering or construction, without obtaining a fully signed DOC. The Owner reserves the right to request additional information or impose additional terms and conditions before approving an assignment of this MC in whole or in part or the use of subcontractors in fulfilling the ESCo’s obligations under this MC, any DOC associated with this MC, or other subcontract to this MC. If such subcontracts are approved, they shall be consistent with the terms of this MC; shall be assignable to the Owner at the Owner’s option; and shall waive any claims the subcontractor may make against the Owner associated with the subcontractors performance under the DOC or subcontract, as applicable.

Where practical, procurement efforts carried out by the ESCo pursuant to the terms of this MC, including the procurement of goods, materials, supplies, equipment, and/or contracted services under a DOC or otherwise, shall be made on a competitive basis, including the use of competitive bidding procedures; provided however, the selection of engineering professionals must satisfy the requirements of Tenn. Code Ann. Sec. 12-4-107. ESCo shall follow the methodology for selecting subcontractors, including engineering professionals, set forth in its response to the request for proposals resulting in this MC, which shall be attached to this MC as Master Contract (MC) Attachment 2. The Owner also encourages ESCo to look at opportunities to contract with Tennessee Businesses where appropriate. As used herein, the term “Tennessee Business” means a business in which the majority of the employees of the business
working on this project are Tennessee residents working out of an office with a location in the State of Tennessee. In the event of a tie between respondents to a procurement carried out by the ESCo pursuant to the terms of this MC, the first tie breaker should provide that preference will be given to a Tennessee Business. ESCo shall maintain documentation for the basis of each procurement conducted in furtherance of providing the services under this MC. In each instance where it is determined that use of a competitive procurement method is not practical, supporting documentation shall include a written justification for such decision and non-competitive procurement.

D.6 Conflicts of Interest

D.6.1 The ESCo warrants that no part of the total amount paid to the ESCo shall be paid directly or indirectly to an employee or official of the Owner as wages, compensation, or gifts in exchange for acting as an officer, agent, employee, subcontractor, or consultant to the ESCo in connection with any work contemplated or performed relative to this MC.

D.7 Nondiscrimination

D.7.1 No person on the grounds of disability, age, race, color, religion, sex, national origin, or any other classification protected by federal and Tennessee State constitutional or statutory law shall be excluded from participation in, or be denied the benefits of, or be otherwise subjected to discrimination in the performance of this MC or employment practices of the ESCo or subcontractors.

D.7.2 The ESCo and its subcontractors shall take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to disability, age race, color, religion, sex, or national origin including but not limited to practices in recruitment, recruitment advertising, employment, selection for training or apprenticeship, rates of pay or other forms of compensation, upgrading, demotion, transfer, layoff, or termination.

D.7.3 The ESCo shall post in conspicuous places, available to employees and applicants for employment, notices setting forth these policies.

D.8 Prohibition of Illegal Immigrants

D.8.1 The requirements of Public Acts of 2006, Chapter Number 878, of the State of Tennessee, addressing the use of illegal immigrants in the performance of any contract to supply goods or services to the State of Tennessee, shall be a material provision of this MC, a breach of which shall be grounds for monetary and other penalties, including termination of this MC.

D.8.2 The ESCo by entering into this contract attests, certifies, warrants, and assures that the ESCo shall not knowingly utilize the services of an illegal immigrant in the performance of this MC and shall not knowingly utilize the services of any subcontractor or consultant who will utilize the services of any illegal immigrant in the performance of this MC. The ESCo shall reaffirm this attestation, in writing, by submitting to the Owner with each invoice a completed and signed copy of the standard form provided by the Owner entitled “Attestation: Personnel Used in Contract Performance”. Such attestations shall be maintained by the ESCo and made available to State officials upon request.
D.8.3 Prior to the use of any Subcontractor in the performance of the MC, and semi-annually thereafter, during the period of this MC, the ESCo shall obtain and retain a current written attestation that the Subcontractor shall not knowingly utilize the services of an illegal immigrant to perform work relative to this MC and shall not knowingly utilize the services of any Subcontractor who will utilize the services of an illegal immigrant to perform work relative to this MC. Such attestations by Subcontractors shall be maintained by the ESCo and made available to State officials upon request.

D.8.4 The ESCo shall maintain records for all personnel used in the performance of this MC. Said records shall be subject to review and random inspection at any reasonable time upon reasonable notice by the State.

D.8.5 The ESCo understands and agrees that failure to comply with this section will be subject to the sanctions of Public Chapter 878 of 2006 for acts or omissions occurring after its effective date. This law provides for the prohibition of a ESCo from contracting with, or submitting an offer, proposal, or bid to contract with the State of Tennessee to supply goods or services for a period of one year after a ESCo is discovered to have knowingly used the services of illegal immigrants during the performance of this MC.

D.8.6 For purposes of this MC, "illegal immigrant" shall be defined as any person who is not either a United States citizen, a lawful permanent resident, or a person whose physical presence in the United States is authorized or allowed by the Department of Homeland Security and who, under Federal immigration laws and/or regulations, is authorized to be employed in the U.S. or is otherwise authorized to provide services under the MC.

D.9 Records

D.9.1 In regard to Construction Development Phase Services, the ESCo shall maintain documentation for all charges against the Owner and all costs of delivery of services under this MC. The accounting records, Subcontract agreements, and documents of the ESCo shall be maintained for a period of five full years from the date of final maturity of any debt issued by the University providing funding under this MC and shall be subject to audit at any reasonable time and upon reasonable notice by the State or the Comptroller of the Treasury, or their duly appointed representatives. The records shall be maintained in accordance with generally accepted accounting principles.

D.10 Monitoring

D.10.1 The ESCo’s activities conducted and records maintained pursuant to this MC shall be subject to monitoring and evaluation by the Owner, the Comptroller of the Treasury, or their duly appointed representatives.

D.11 Strict Performance

D.11.1 Failure by the Owner to insist on strict compliance with any provision of this MC by the ESCo will not operate as a waiver of the right to require strict performance by the ESCo of any term, covenant, condition or provision of this MC nor construed as a waiver or relinquishment of any such term, covenant, condition or provision. No term or condition of this MC shall be held to be waived, modified, or deleted except by written amendment to this MC signed by the parties hereto.
D.12 Independent EPC

D12.1 The parties hereto, in the performance of this MC, shall not act as employees, partners, joint venturers, or associates of one another. It is expressly acknowledged by the parties hereto that such parties are independent contracting entities and that nothing in this MC shall be construed to create an employer/employee relationship or to allow either to exercise control or direction over the manner or method by which the other transacts its business affairs or provides its usual services. The employees or agents of one party shall not be deemed or construed to be the employees or agents of the other party for any purpose whatsoever.

D.13 Owner Liability

D.13.1 The Owner shall have no liability except as specifically provided in this MC and the executed form of MC Attachment 1.C.

D.14 Hold Harmless

D14.1 The ESCo agrees to indemnify and hold harmless the Owner as well as its officers, agents and employees from and against any and all claims, liabilities, losses, and causes of action which may arise or result to any person, firm, corporation, or other entity which may be injured or damaged as a result of any acts, omissions, bad faith, negligence, or willful misconduct on the part of the ESCo, its employees, or any person acting for or on its or their behalf during all phases of the MC. The ESCo further agrees to: (a) reimburse the Owner for reasonable attorney fees incurred by the Owner in defending and such suit or claim; (b) give the Owner prompt notice of any such claim or suit; and (c) provide the Owner all reasonable assistance in defending such claim or suit.

D14.2 The ESCo agrees that it shall be liable for all costs, including reasonable attorney fees incurred by Owner to enforce the terms of this MC against the ESCo or the obligations of the ESCo under this MC.

D.15 State and Federal Compliance

D15.1 The ESCo shall comply with all applicable State and Federal laws and regulations in the performance of this MC.

D.16 Governing Law

D16.1 This MC shall be governed by and construed in accordance with the laws of the State of Tennessee. The ESCo agrees that it will be subject to the exclusive jurisdiction of the courts of the State of Tennessee in actions that may arise under this MC. The ESCo acknowledges and agrees that any rights or claims against the Owner or its employees hereunder, and any remedies arising therefrom, shall be subject to and limited to those rights and remedies, available under Tennessee Code Annotated, Sections 9-8-101 through 9-8-407.

D.17 Completeness

D17.1 This MC is complete and contains the entire understanding between the parties relating to the subject matter contained herein, including all the terms and conditions of the parties’ agreement. This MC supersedes any and all prior understandings, representations, negotiations, and agreements between the parties relating hereto, whether written or oral. With respect to the construction phase services, all terms and
conditions of this MC shall, however, be subject and subordinate to the terms and conditions of MC Attachment 1.C in the form negotiated and executed by the parties.

D.18 Severability
D18.1 If any terms and conditions of this MC are held to be invalid or unenforceable as a matter of law, the other terms and conditions hereof shall not be affected thereby and shall remain in full force and effect. To this end, the terms and conditions of this MC are declared severable.

D.19 Headings
D19.1 Section headings of this MC are for reference purposes only and shall not be construed as part of this MC.

E. SPECIAL TERMS AND CONDITIONS:

E.1 Conflicting Terms and Conditions
E.1.1 Should any of these special terms and conditions conflict with any other terms and conditions of this MC, these special terms and conditions shall control.

E.2 MC Documents and Priority
E.2.1 The MC documents listed below form the contract and constitute the entire Agreement between the Owner and the EPC and are as fully part of the MC as if attached to this Agreement or repeated herein. Should any conflict arise within any of the requirements of these MC documents, the documents shall be interpreted in priority in the order shown.

1. MC Attachment 1.C, Pro Forma Delivery Order Contract (DOC) Between Owner and ESCo/Contractor for a lump sum fee for each subproject, and associated Contract Documents including Standard Bidding and Construction Documents which are represented pro forma in MC Attachment 1.D or if said pro forma documents are executed the executed versions supersede the pro forma versions.

2. Addenda or amendments to the documents referenced in 3 and 4 below with priority for addenda or amendments the same as the document priority.

3. This MC.

4. MC Attachment 1.A.

5. MC Attachment 1.B.

6. The RFP.

7. The ESCo’s Proposal for services in response to the RFP.

E.3 Rights to Ideas and Technical Approach
E.3.1 The Owner shall own all ideas, technical approaches and ESCo deliverables developed as a part of this MC.

E.4 ESCo Developed Programs
E.5.1 Upon completion or termination of this Contract, application programs and systems and other management systems developed and used by the Consultant solely for the
implementation of this MC shall be licensed to the Owner at no fee or otherwise remain with the Owner for use in management of other capital projects.

E.5 Patents or Copyrights

E.6.1 The ESCo shall indemnify and hold the Owner harmless of all claims or suits which may be brought against the Owner for infringement of any laws regarding patents or copyrights which may arise from the performance of the ESCo under the MC. In any such action brought against the Owner, the ESCo shall satisfy and indemnify the Owner for the amount of any final judgment against the Owner, or settlement entered into in good faith by the Owner for infringement.

E.6 Subject to Funds Availability

E.6.1 The MC is subject to the appropriation and availability of State and/or Federal funds. In the event that the funds are not appropriated or are otherwise unavailable, the Owner reserves the right to terminate the MC upon written notice to the ESCo. Said termination shall not be deemed a breach of Contract by the Owner. Upon receipt of the written notice, the ESCo shall cease all work associated with this MC. Should such an event occur, the ESCo shall be entitled to compensation for all approved and authorized services completed as of the termination date. Upon such termination, the ESCo shall have no right to recover from the Owner any actual, general, special, incidental, consequential, or any other damages whatsoever of any description or amount.

E.7 Communications and Contacts

E.7.1 All instructions, notices, consents, demands, or other communications addressing decisions, commitments, or actions required or contemplated by this MC shall be in writing and shall be made by email, by overnight courier service, or by first class mail, postage prepaid, addressed to the respective party at the appropriate email address or postal address as set forth below or to such other party, email address, or postal address as may be hereafter specified by written notice.

The Owner:
John K. Sealy, Director
Division of Facilities Planning
University of Tennessee
5723 Middlebrook Pike, Suite 119
Knoxville, TN 37996-0040
designer@tennessee.edu and jsealy@utk.edu

The ESCo:
<<Name of individual authorized to obligate ESCo >>
<<Firm name>>
<<Address line 1>>
<<Address line 2>>
<<Email address>>

E.7.2 All such communications shall be considered effectively given as of the day of delivery; as of the date specified for overnight courier service delivery; as of three business days after the date of mailing; or on the day the email is acknowledged by return email. Any such communication by email shall also be sent by United States mail on the same date of the email.
This Agreement entered into as of the day and year first written above as witnessed:

BY STATE ARCHITECT:

Signature: __________________________________________

Ann McGauran, State Architect

BY Energy Performance Contractor:

<<ESCO FIRM NAME>>

Signature: __________________________________________

<<ESCo Approving Official Name, Title>>

AND BY OWNER:  The University of Tennessee

Signature: __________________________________________

Michelle L. Crowder, Interim Executive Director

Approved as to Form and Legality:

Signature: __________________________________________

C. Ryan Stinnett, Associate General Counsel

END OF PRO FORMA MASTER CONTRACT AGREEMENT
Scope of Services

The chosen respondent will plan, assess, and evaluate campus wide buildings and systems identifying improvements to reduce campus utility costs. It may also include replacement of mechanical, electrical, and plumbing equipment. Approved work is to be executed in Delivery Order Contracts (DOCs).

Project Overview

Develop a narrative savings guarantee description for the campus summarizing the energy conservation measures which detail the energy, water, and related cost savings, implementation price, and financial summary. This guarantee shall be a first party direct guarantee from the performance ESCo.

Project Budget

The total maximum contract value, defined as the sum of ESCo / Contractor payment streams associated with the MC and all DOC, pending SBC approval shall not exceed $4,917,000. An estimated budget for the initial Construction Development Phase Services and subprojects is $4,470,000.

Project Target Schedule

This work shall be effective for a three (3) year period with each DOC under a separate duration.
Construction Development Phase Administrative Services

The ESCo shall provide Construction Development Phase Services for the project described above as required herein, including, but not limited to, development of Construction Services on designated DOCs for review by the Owner. Services shall be provided by the personnel designated in the Contractor’s Qualifications and Technical Proposal or by substitute personnel approved in writing by the Owner. Requests for substitute personnel shall include justification for the substitution and qualifications of the substitute personnel in similar form and content as required for the Qualifications and Technical Proposal.

1. Review Project Information and Develop Procedures

1.1. Meet with the Owner and any Owner Designated Representatives and review documents to gain a full understanding of the potential project scopes and all other aspects of the Project.

1.2. Develop written Project procedures, in cooperation with the Owner, which will augment the Owner’s requirements, as necessary, to be used as a guide for the management and coordination of the Project.

1.3. Follow applicable procedures outlined in the University of Tennessee Designer’s Manual in the execution of design and construction services. The UT Designer’s Manual can be located on the UT Division of Facilities Planning website.

2. Administer Meetings and Provide Key Contractor Personnel Participation

2.1. Provide the designated key personnel and alternates who shall consistently attend and participate in Owner scheduled meetings with the Owner and consultants throughout the duration of Construction Development Phase Services. Such meetings shall be every two weeks at a minimum and more frequently as needed to support Project progress.

2.2. Provide the designated Construction Development Phase Services project manager to chair, administer, and facilitate such meetings.

2.3. Prepare and distribute an agenda prior to scheduled meetings to allow the team to arrange for appropriate attendees and information to be available at the meeting.

2.4. Record and distribute meeting notes to the team and other attendees.

3. Provide Consultation

3.1. Recommend to the Owner any opportunities to phase issuance of drawings and specifications to facilitate phasing or sequencing to improve economies, performance time, and responses to construction resource conditions.

3.2. Submit recommendations to the Owner in writing.

4. Prepare Schedules

4.1. Two types of schedule deliverables are required of the ESCo in the Construction Development Phase Services as described in the following sections, (1) the Project
Construction Development Phase Services Schedule and (2) the Preliminary Project Construction Schedule for DOCs. Prepare, maintain, and communicate these schedules in appropriate detail to enable determination of critical paths and enable Project decision-making throughout the duration of the project. Develop the schedules on industry standard computer-based software that has proven compatibility or capability for Project construction scheduling. Monitor these schedules throughout the duration of the project and advise the Owner of any deficiencies in adhering to these schedules by any party. Provide all schedule deliverables in written form.

4.2. In collaboration with the Owner, prepare and maintain a Project Construction Development Phase Services Schedule detailing the services and activities, durations, and sequences of the remaining ESCo and Owner activities leading to the negotiation and execution of a proposed DOCs between Owner and ESCo. Within 7 days from the execution of the MC or on a date approved by the Owner, submit an initial version of the Construction Development Phase Services Schedule. This schedule and subsequent versions of this schedule is subject to approval by the Owner.

Construction Development Services Phase for Delivery Order Contracts

The purpose of the Construction Development Services Phase is to define the process and requirement for identification, development, and implementation of energy conservation (or cost savings) measures (ECM) through Delivery Order Contracts (DOC). A DOC may include one or more ECMs or subprojects (SP). Subprojects may include various facility improvement measures (FIM) necessary for building’s life cycle yet not likely to yield attractive or desired rate of return.

The Owner will assign a Project Manager who will serve as the Contractor’s main contact and coordinator for all DOC subprojects. All correspondence / communications should include the Project Name and SBC Project No. 540/013-05-2016.

This Phase is a combination of activities as listed below to identity and develop subprojects implemented in a DOC. Once ECM potential is identified, the Contractor shall submit to the Owner a DOC Proposal showing how this ECM can be realized.

The Contractor should not proceed from one phase in the project to the next phase without written approval from the Owner. In some instances, certain steps in the sequence may be abbreviated, consolidated or waived as directed by the Owner.

This DOC Process is structured to prevent the Contractor from pursuing projects that the Owner cannot accept. This allows for the negotiation of study and design estimated costs and scope of work prior to the Contractor placing funds at risk on a potential project the Owner might not accept due to technical or cost factors.

Steps for DOC and Implementation

1. Potential DOC Proposal submitted to Owner for Review
2. Owner Reviews and if acceptable issues an acceptance letter
3. Contractor Performs an Initial Site Survey and Preliminary Analysis
4. Contractor Submits an Initial Proposal for Review and Approval
5. Contractor Performs a Detailed Energy Study (DES)
6. Contractor Submits Final Proposal for Review and Approval
7. Owner Reviews, Negotiates, and Determines Final Scope
8. Contractor is approved to begin Design/Construction Documents
9. DOC is issued
10. Contractor begins Design and Construction Work
11. At Substantial Completion of Construction Work Close out Documents are submitted and Contractor issues Close Out Report
12. Performance Period Begins
13. Performance Period Close Out and Final Report is Issued

**Delivery Order Contract Requirements**

1. **Potential DOC Proposals**
   1.1. The Owner will initiate the DOC process by issuing a written notice to the Contractor.

2. **Team Meetings**
   2.1. Each DOC process will require initial meetings between the Contractor and the Owner to discuss and identify potential savings. The intent of these meetings is to exchange information, coordinate efforts, and maximize the Contractor’s efforts by steering the Contractor to energy cost saving potentials and away from areas that the Owner knows it will not consider for a DOC.
   2.2. From the initial meeting’s documentation and discussion, Contractor is to submit a Cost Proposal to the Owner for initial site survey and project proposal.
   2.3. Subsequent meetings will be held as often as the Contractor and/or Owner deem necessary throughout the life of the project and in accordance with UT Designer’s Manual.
   2.4. The Contractor will document these meetings and provide a summary report of all issues discussed and decisions made.

3. **Site Survey(s)**
   3.1. The Contractor may perform an initial site survey of the Owner’s facilities and / or systems in order to identify areas of potential savings and to assist in the development of the DOC. After an initial site survey, subsequent surveys are allowed and encouraged in ongoing project development subject to coordination and approval of the Owner.
   3.2. Prior to beginning any survey, the Contractor shall:
      3.2.1. Identify the building or area(s) to be surveyed
      3.2.2. Describe any measuring or metering that the Contractor intends to perform, the method in which such tasks will be accomplished, and the duration of such tasks.
      3.2.3. Specify any support that the Contractor may require from the Owner
   3.3. Format the Content for Site Survey
      3.3.1. A list of technologies investigated
      3.3.2. Names of personnel interviewed
      3.3.3. Identification of documents reviewed
      3.3.4. Utility billing data and rate schedules obtained
      3.3.5. Facility and equipment operating schedules
      3.3.6. Potential energy conservation measures
3.3.7. Baseline Measurements, Metering, or Trending.
3.3.8. Any other pertinent facility information identified

4. Initial Proposal

4.1. The Contractor will submit to the Owner an Initial DOC detailing the scope, including technical and economic performance factors as agreed to or indicated herein.

4.2. Format and Content for Initial DOC Proposal should include:

4.2.1. Cover page with Project Name, SBC Project No., DOC No., and Date
4.2.2. Executive Overview which will summarize the DOC scope, economics, and other relevant information.

4.2.3. Energy Conservation Measures (ECMs)

4.2.3.1. Technology Category
4.2.3.2. Specific DOC Number
4.2.3.3. Specific DOC Project Title
4.2.3.4. DOC Scope Description

4.2.3.4.1. Technical Scope that provides a narrative and justification of the proposed ECM or related project(s) including existing as-found conditions, any proposed system or component upgrades, deficiency corrections, repairs or replacements, and any proposed system operational changes.

4.2.3.4.2. Interface with Owner equipment which describes the interface between the proposed DOC and Owner equipment or systems; including impacts such as increased or decreased loads, reduced runtimes, decreased or increased operations and maintenance (O&M), etc.

4.2.3.4.3. Physical Changes which identify any major physical changes to equipment, facilities or surroundings, required in order to install proposed DOC’s and shall address any impacts on building occupants, working environment, or critical equipment (i.e., computer systems and associated environmental controls).

4.2.3.4.4. Utility Interruptions and Owner Coordination should address any utility interruptions that might be required for installation of the DOC by type (e.g., gas, electricity, water, etc.), the extent (e.g., streets, rooms, entire buildings, etc.), requirements for any temporary services, and the duration of interrupted service. Any anticipated Owner coordination required during installation shall be identified.

4.2.3.4.5. Environmental Impacts identifies any anticipated or potential environmental impacts that would have an adverse effect upon the quality of the human environment. The Contractor will consider the resource use, waste production, mitigation measures, and environmental regulations in preparation of this section.

4.2.3.4.6. Salvage and Disposal identifies the materials and equipment to be removed or disconnected during the installation of the DOC. The Contractor will identify all items with potential salvage value and/or reuse/re-location.
4.2.3.5. DOC’s will include a summary of the estimated energy and cost savings and any other pertinent data for ECM or SP. The Contractor should submit the following:

4.2.3.5.1. Completed Schedule 5

4.2.3.5.2. The Contractor’s known inputs and estimations (along with basis or justification for those estimates) on current facility or energy system operating conditions.

4.2.3.5.3. Estimations on proposed facility or system operating conditions and any related basis or justification.

4.2.3.5.4. Energy savings calculations using formulas and procedures based upon generally accepted engineering principles, including synergistic effects of other ECMS, SPs, or DOCs with all related key inputs and estimations clearly stated.

4.2.3.5.5. References used for data, inputs in empirical formulas, utility rates used in calculations, etc. This section should contain sufficient information for the Owner to determine if it is a feasible project.

4.2.3.5.6. Estimated Total DOC cost and cost basis.

4.2.4. Schedule will include a preliminary schedule for the DES, Design and Construction Documents, Construction, and Close-out.

4.2.5. Initial Proposal will include an estimate of the DES cost, margin, and estimated total estimated project construction cost and simple payback.

4.2.6. ECMs or SPs considered by the Contractor that are not included in the submitted proposal. In the submitted initial proposal, provide a brief description of the project(s), rational for exclusion from proposal, and energy and cost saving calculations if available or applicable.

4.2.7. Architect / Engineer / Technical Professional Personnel Plan will state whether the Contractor intends to use any licensed professionals – if so, clearly identify the names of the professionals along with the complete mailing address, email, amount of contract, and the scope and portions of the work the professional shall perform.

4.2.8. Subcontracting Plan will state whether the Contractor intends to use subcontractors – if so, clearly identify the names of the subcontractors along with complete mailing addresses, email, amount of contract, and the scope and portions of the work the subcontractors shall perform.

5. Owner Review of Initial Proposal

5.1. The Owner will review the proposed initial proposal of the DOC and make a determination as to whether the DOC merits further consideration.

5.2. Should the Owner determine that the proposed DOC has merit, an Acceptance Letter will be issued to the contractor including requirements for completion of a DES.

6. Site Requirements Document

6.1. After an Acceptance Letter is issued the Owner will issue a Site Requirements Document which will identify site-specific requirements and constraints. Examples of the requirements include: facility access and security, facility administration, utility rates and contract information, traffic and construction constraints, financial information, etc.

7. Detailed Energy Study and Report
7.1. The Contractor will perform a DES at the subject site equivalent to an investment grade energy audit to be submitted with the Final Proposal. The DES must adhere to and include requirements indicated herein.

7.2. Format and Content of DES:

7.2.1. Cover page with Project Name, SBC Project No., DOC No., and Date

7.2.2. Executive Overview which will summarize the DOC scope, economics, and other relevant information.

7.2.3. Energy and Cost Savings Measure Summary (ECM)

7.2.3.1. Technology Category

7.2.3.2. ECM Number

7.2.3.3. ECM Title

7.2.3.4. Brief ECM Description

7.2.4. DES should include a complete energy and cost savings analysis for each ECM or SP considered including total construction or implementation costs. The contractor should submit the following:

7.2.4.1. Completed Schedules 2, 4, and 5

7.2.4.2. Current facility or system operating conditions

7.2.4.3. Energy savings calculations using formulas and procedures based upon generally accepted engineering principles, including the synergistic effects of other energy cost savings measurements and the energy simulation and accounting tools used to predict savings.

7.2.4.4. All key inputs and engineering estimations along with basis/methods, justification, and source.

7.2.4.5. References to sources of data, assumptions or empirical formulas.

8. Final Proposal

8.1. The Contractor shall submit a Final Proposal detailing the DOC Scope including all technical, managerial, and economic performance factors as agreed to or indicated herein.

8.2. Format and Content for Final Proposal

8.2.1. Cover page with Project Name, SBC Project No., DOC No., and Date

8.2.2. Executive Overview which will summarize the DOC scope, economics, and other relevant information.

8.2.3. ECM Description(s) – For each ECM or SP presented

8.2.3.1.1. Technical Scope that provides a narrative of the proposed ECM including any existing as-found conditions, proposed system or component upgrades, deficiency corrections, repairs or replacements, and any proposed system operational changes.

8.2.3.1.2. Interface with Owner equipment which describes the interface between the proposed DOC and Owner equipment or systems; including impacts such as increased or decreased loads, decreased or increased operations and maintenance (O&M), reduced runtimes, etc.
8.2.3.1.3. **Physical Changes** which identify any major physical changes to equipment, facilities or surroundings, required in order to install proposed DOC’s and shall address any impacts on building occupants, working environment, or critical equipment (i.e., computer systems and associated environmental controls).

8.2.3.1.4. **Utility Interruptions and Owner Coordination** should address any utility interruptions that might be required for installation of the DOC by type (e.g., gas, electricity, water, etc.), the extent (e.g., streets, rooms, entire buildings, etc.) and the duration of interrupted service, and any requirements for temporary services. Any anticipated Owner coordination required during installation shall be identified.

8.2.3.1.5. **Environmental Impacts** identifies any anticipated or potential environmental impacts that would have an adverse effect upon the quality of the human environment. The Contractor will consider the resource use, waste production, mitigation measures, and environmental regulations in preparation of this section.

8.2.3.1.6. **Salvage and Disposal** identifies the materials and equipment to be removed or disconnected during the installation of the ECM. The Contractor will identify all items with potential salvage value and/or reuse/re-location.

8.2.4. **DOC** should include a complete energy and cost savings analysis for each energy conservation measure or special project considered. The contractor should submit the following:

- 8.2.4.1. Completed Schedules 1-5
- 8.2.4.2. DES
- 8.2.4.3. A detailed estimate of the installation cost

8.2.5. The Final Proposal will include a complete Measurement and Verification (M&V) Plan for each ECM and/or SP through the Performance Period or a length of time mutually agreed to by Owner and Contractor. The Contractor must submit the following:

- 8.2.5.1. M&V Overview
  - 8.2.5.1.1. Objectives statement of what is being determined (i.e., gross annual kWh savings on a project basis).
  - 8.2.5.1.2. Description of M&V option(s) selected on a project basis will be referenced to the “International Performance Measurement and Verification Protocol” publication, DOE/EE-0157, latest version.
  - 8.2.5.1.3. Sampling Plan (if required), including:
    - 8.2.5.1.3.1. Designation of usage groups. Define usage groups for areas with similar characteristics.
    - 8.2.5.1.3.2. Calculation of population(s) and sample size(s) by usage group. Present the calculation and assumptions used to determine sample size by each usage group area.
  - 8.2.5.1.4. Utility Rate Analysis including, but not limited to, utility rate schedules, billing meter designations and locations, billing meter service, and incremental rate analysis stating those rates used in the final calculations and M&V plan.
8.2.5.2. Data Collection Plan specifies data to be measured or collected for each applicable project in terms of parameters, unit of measurement, points of measurements, length of time and intervals of measurements (i.e. pre and post); raw, meter data (if available) as well as analyzed and summary data must be obtained. Indicate any submetering or control point trending proposed or required and any related work that will be incorporated into the installation scope (i.e. installation of temporary meters, data loggers, and/or test ports/fittings).

8.2.5.2.1. Identification of instrumentation and metering equipment. Name and documentation on equipment specifications of monitoring devices.

8.2.5.2.2. Calibration of equipment describes protocols for calibrating equipment.

8.2.5.2.3. Data gathering and quality control procedures for checking completeness and accuracy of the recorded data.

8.2.5.2.4. Period of monitoring including duration and frequency for both pre- and post-data collection.

8.2.5.2.5. Include any Owner resources required, control point trending, etc.

8.2.5.3. Analysis Method describes in detail the method of analysis to estimate the annual energy savings for each applicable project based on collected or recorded data; include a discussion on relevant equations and assumptions, and document all calculations and assumptions, and adjustments.

8.2.5.3.1. Pre-Installation energy and facility performance baseline including:

8.2.5.3.1.1. Equipment/systems
8.2.5.3.1.2. System performance factors (e.g., lighting levels, temperature set points, occupant comfort)
8.2.5.3.1.3. Baseline energy use – Building or Meter
8.2.5.3.1.4. Baseline Energy Use – Project Specific
8.2.5.3.1.5. Factors that influence baseline energy use and how used in any adjustments to the baseline.

8.2.5.3.2. Post-Installation facility conditions including:

8.2.5.3.2.1. Equipment/systems
8.2.5.3.2.2. System performance factors (e.g., lighting levels, temperature set points, occupant comfort)
8.2.5.3.2.3. Baseline energy use (both building or meter and project specific)
8.2.5.3.2.4. Factors that influence baseline energy use and how used in any adjustments to the baseline.

8.2.5.3.3. Determination of ECM which are based upon the selected approach(es) and the pre and post installation conditions.

8.2.5.3.4. System performance factors can be specifically established in the project development but would include such items as actual equipment efficiency, adherence to established sequences of operation, noise, etc. Occupant comfort factors may include such items as adherence to ASHRAE 55 standards, number of occupant complaints, light levels, drafts, etc.

8.2.5.4. Measurement and Verification (M&V) Report. Contractor shall provide a sample M&V report detailing all aspects of the Plan requested herein as well as the format and presentation of verified savings and any shortfalls. Report
shall also include, in the event of any shortfalls, the Contractor’s plan for reconciling the savings through corrective action or other approved methods.

8.2.5.5. Operations and Maintenance Plan. Contractor to provide a detailed O&M plan for establishing preventive and scheduled maintenance requirements for the Owner. This plan should detail roles and responsibilities (i.e. Owner does maintenance or through service contract with Contractor) of each and all parties as well as recourse for non-compliance.

8.2.5.5.1. Equipment Replacement Costs. These costs must be identified in the life cycle of the equipment particularly if they fall within the performance period. Conversely, if mutually agreed to by all parties, and avoided replacement costs should also be included with appropriate cost basis (i.e. median service life). These costs should be included in Schedule 3 under “Repair and Replacement” for the applicable year.

8.2.5.5.2. Operating Logs. Contractor must indicate the maintaining of any operating logs to assist in the M&V process and whose responsibility (i.e. Owner or Contractor or third party) and any related costs.

8.2.5.5.3. Control Point Trending/Data Logging. Contractor to indicate the methods related to any required control point trending or data logging including frequency and documentation.

8.2.6. Management Approach and Schedule will include the Contractor’s management approach and schedule for the Design and Construction Documents, Construction, Close-out, and Performance Period phases.

8.2.6.1.1. An organizational chart that designates the positions and functions of the organizations and individuals responsible for the completion of each service component for each phase of the DOC.

8.2.6.1.2. A preliminary schedule that indicates the sequence and duration of each activity listed below:

8.2.6.1.2.1. Design and Construction Documents (allow sixty days for the DOC award)

8.2.6.1.2.2. Construction (by ECM)

8.2.6.1.2.3. Close-Out (by ECM)

8.3. Final DOC Conditions

8.3.1. By delivering the final DOC for Owner approval, the Contractor acknowledges that the DOC Contract is satisfied with respect to the following:

8.3.1.1. The nature and location of the work

8.3.1.2. The general and local conditions, particularly those bearing upon availability of transportation, disposal, handling, storage of material; availability of labor, water, and electrical power; uncertainties of weather or similar physical conditions at the site

8.3.1.3. The site conditions of the grounds
8.3.1.4. The nature of equipment and facilities needed preliminary to and during execution of the work

8.3.1.5. The nature of use and the state of repair of the equipment, systems, and facilities

8.3.1.6. The cost and costing of fuels and utilities

8.3.1.7. The availability of historical data and documents

8.3.1.8. All other matters which can in any way affect the work, the cost thereof, or the saving generated under this DOC.

8.3.2. The Contractor further acknowledges that, through inspecting the site, the Contractor is satisfied with respect to the nature and quantity of surface and subsurface material to be encountered.

8.3.2.1. Any failure by the Contractor to become knowledgeable with respect to available information for a site, or for any information which can be obtained or produced by the Contractor, such as through surveys, testing, monitoring, soil boring, etc., will not relieve the Contractor from responsibility for properly estimating the difficulty or cost of successfully performing the work, or from proceeding to successfully perform the work.

8.3.2.2. Successful performance of work will be accomplished without additional expense to the Owner, subject to the provisions of the DOC.

8.3.2.3. Information derived from inspection of logs of test borings, of topographic maps, or of plans showing the location of utilities and structures will not in any way relieve the Contractor from risk, or from responsibility for properly examining the terms of the DOC.

8.4. Final DOC Review and Negotiation

8.4.1. The Owner will review the DOC Proposal and the DES to determine if the DOC should be recommended for funding, revised through negotiations, delayed, or rejected.

8.4.1.1. Review Criteria will be based upon the following criteria

8.4.1.1.1. Technically acceptable

8.4.1.1.2. Economically acceptable

8.4.1.1.3. Conformity to initial proposal

8.4.1.1.4. Health and Safety acceptability
Design and Construction Document Requirements

1. Preparation of Construction Documents

1.1. Upon DOC acceptance by the Owner, the Contractor will provide the services as required for the preparation of the Construction Documents in accordance with the DOC Design and Construction Guide.

1.2. The Contractor will submit to the Owner, Construction Documents, including working drawings and a Project Manual.

2. Designer

2.1. The Contractor will provide a qualified professional representative licensed in the discipline of engineering in the State of Tennessee capable of managing all services required in the UT Division of Facilities Planning Designer’s Manual located on the University’s website. This professional representative shall hereinafter be referred to as the Designer and shall work directly for the ESCo.

2.2. The Designer will coordinate the technical aspects of the Design and Construction Documents Phase, Construction Phase, and the Closeout Phase. The Designer shall coordinate the activities of Professional Engineers and Architects as required in the DOC.

2.3. The Designer agrees that no approval of the Construction Documents by any person, body or agency, shall relieve the Designer of the responsibility for the adequacy, fitness, suitability, and correctness of architectural and engineering designs and for designing the work in accordance with sound and accepted engineering and architectural practices.

2.4. The Designer shall provide professional liability insurance as set forth below on a DOC basis:

Commercial General Liability

<table>
<thead>
<tr>
<th>Each Occurrence</th>
<th>$ 1,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate</td>
<td>$ 1,000,000</td>
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</table>

Commercial Automobile Liability

| Any Auto – Each Accident, Combined Single Limit | $ 1,000,000 |

Workers’ Compensation as required by statute, including employers’ liability with limits of:

| Each Accident | $ 100,000 |
| Disease, each employee | $ 100,000 |
| Disease, policy limits | $ 500,000 |

Professional Liability Insurance

| Each Claim | $ 1,000,000 * |
| Annual Aggregate | $ 1,000,000 * |
* For projects with a DOC less than $3M the PLI shall be $1M per claim, $1M annual aggregate, for projects with a DOC equal to or greater than $3M but less than $20M, the PLI shall be $1M per claim, $2M annual aggregate, for projects with a DOC equal to or greater than $20M but less than $100M, the PLI shall be $2M per claim, $4M annual aggregate, all other projects have a PLI of $3M per claim and $5M annual aggregate.

2.5. Tennessee Code Annotated Title 62 (TCA)

2.5.1. The TCA sets forth the requirements for practicing Architecture and Engineering in the State of Tennessee. The Contractor will provide the services of licensed professionals as required to complete the Design and Construction Document Phase, Construction Phase, and Closeout Phase.

2.5.2. All documents requiring a seal in accordance with TCA § 62-2-101 shall be prepared or performed by or under the direct supervision of professionals licensed in the State of Tennessee in each discipline required by the scope of services. These licensed professionals in the disciplines of Architecture, Civil Engineering, Structural Engineering, Mechanical Engineering, and Electrical Engineering shall affix their seals in accordance with TCA § 62-2-102, et. seq.

2.6. Building Codes and Fire Marshal Review

2.6.1. Building Codes and Regulatory Requirements used for State Building Commission projects, and their sources, are identified in the UT Designer's Manual, Appendix 3, Specification Section 01 41 15 - Basic Regulatory Requirements. Depending on the use of the building, other codes or regulations may also apply. The Owner will work together with the Designer to develop a solution to conflicts between codes or use requirements that meets the criteria for the project. Code usage may be revised or augmented, and the Designer shall stay apprised of current codes and adoption dates.

2.6.2. Owner Fire Marshal Review

2.6.2.1. If documents review by the Owner Fire Marshal is required, the Designer shall submit documentation as required to the State Fire Marshal submission portal. [https://apps.tn.gov/tnsfmo/](https://apps.tn.gov/tnsfmo/)

2.7. Approval of the Construction Documents and Development of the DOC

2.7.1. Submit preliminary Construction Documents to the Owner for review. Verify with Owner the number of sets desired as well as electronic documents needed for review. Upon submission, a review meeting will be scheduled, normally within seven (7) days.

2.7.2. The Owner and/or Owner’s Representative will submit written review comments to the Contractor that must be reviewed prior to any review meetings. The Contractor is required to provide written responses, noting any corrective action or dispute, to the Owner at least 3 days prior to the review meeting.

2.7.3. Contractor is to allow for up to three design review submissions and on-site review meetings including schematic phase, design development phase, and draft
final. A review process as detailed in this section and applicable sections of the UT Designer’s Manual will be required for each phase.

2.7.4. Upon approval of the Construction Documents by the Owner, the Contractor shall submit all information and documents required to develop the DOC.

**Construction Requirements**

1. **Construction Services**

   1.1. Upon execution of each DOC, the Contractor shall provide the construction services as required to complete construction in accordance with the Contractor Master Contract, the DOC, and the UT Facilities Planning Designer’s Manual.

   1.2. The Designer’s relationships to the Contractor shall include those set forth in the AIA A201 General Conditions of the Contract between Owner and Contractor in accordance with the UT Designer’s Manual; utilizing such editions as modified and approved by the Owner and included in the Contract Documents.

   1.3. The Construction Phase includes the professional services required to direct the two components of construction “office” and “field”.

   1.3.1. The professional services performed during the office components include the complete administration of all construction contracts; the review of contractor's payments applications and certifications of the amount due the contractor; the review, approval or the taking of other appropriate action upon the contractor's submittals, such as shop drawings to determine conformance with the design intent, the making of revisions, corrections or classifications in the contract documents by supplemental instructions or change orders, together with all correspondence, and clerical work in connection therewith and sufficient on-site project observations during construction to substantiate any of the above and substantial completion inspections and accepting the completed project, together with such certificates, manuals, and guarantees as provided in the contract documents.

   1.3.2. The professional services performed during the field component comprise on-site project observations during construction by the Designer as well as substantial completion inspections to guard against nonconformity of the work with the Contract Documents and to observe and report on compliance with construction schedules. The Designer shall make on-site project observations as needed during the critical phases of construction and shall make requisite substantial completion inspections. The Designer shall monitor the contractor’s development of Record Documents. The Designer may approve or reject work as failing to conform to the Contract Documents.

   1.3.3. Project observations shall be done by the Designer at a minimum of twice a month. For all visits to the site, a written project observation report shall be submitted to the Owner. The Designer shall attend all progress meetings and the Designer shall submit promptly a written report to the Owner containing a summary of the substance of each meeting.

   1.4. The Designer shall be, in the first instance, the interpreter of the requirements of the Contract Documents and the impartial judge of the performance thereunder by both the Owner and ECP. The Designer shall make decisions on all claims of the Owner or
Contractor relating to the execution and progress of the work and on all other matters or questions related thereto. The Designer shall make recommendations in matters relating to artistic effect that are consistent with the intent of the Contract Documents with the Owner’s decision being final.

1.5. The Designer will not issue any oral or written orders for changes to the Contract Documents until approved in writing by the Owner.

2. Acceptance Certificate

2.1. Upon completion of each project contained in the DOC scope of work, the Designer, with a representative of the Owner present, shall verify the energy savings and cost measurement and complete an Acceptance Certificate Attachment 1A Schedule 6.

2.2. All Acceptance Certificates shall be attached to the contractor’s written assertion that the work is substantially complete when requesting the Substantial Completion Inspection.

Close-Out Requirements

1. Construction Close-Out Phase

1.1. Upon substantial completion of each DOC, the Contractor shall provide the Close-out services in accordance with the Contractor Master Contract, the DOC, and the UT Designer’s Manual.

1.2. When the work is complete and a request is made by the Contractor, the Designer, with a representative of the Owner present, shall conduct a Final Completion inspection to verify, to the best of the Designer’s knowledge, information and belief, to the Owner that the completion of the project is in compliance with the Contract Documents. Prior to issuing a Final Certificate for Payment the Designer shall verify that all items required by the DOC are complete. When the Work is certified complete, the Designer shall issue a Final Certificate for Payment.

1.3. The Designer shall prepare and submit Record Documents to the Owner. These documents shall be drawings in PDF format and suitable for reproduction, and a corrected (marked-up) Project Manual reflecting changes caused by addenda, modifications, and observed changes as recorded by the Contractor. The Designer shall prepare and submit to the Owner a completed SBC-25 form with the Record Documents and final request for payment to complete the Close-Out Phase.

2. Final Energy Cost Savings Measure Report

2.1. As part of the Construction Close-out Phase, the Contractor shall provide a Final Report of all ECMs. This report shall summarize the ECMs, document pertinent information, and make recommendations.

2.1.1. Format and Content for Final ECM Report:
   2.1.1.1. Cover page with Project Name, SBC Project No., DOC No., and Date
   2.1.1.2. ECM which will identify and list all ECMs implemented, including ECM number, technology category, and ECM description.

2.2. Lessons Learned will document any changes and subsequent lessons learned, by ECMs, resulting from information gained in the performance of the DOC Construction and Close-out Phase activities, including the nature of problems and positive or negative results.
2.3. Final Proposal Deviations will detail any deviations from the Final Proposal and their subsequent impacts.

2.4. Schedule Updates will provide the original Schedules 1 - 5 from the Final Proposal and provide any changes or updates.

2.5. Recommendations will describe any Contractor recommendations concerning the activities and methods of the DOC for the current and any future Delivery Orders.

**Performance Period Requirements**

1. Operations

   1.1. The Contractor shall provide the Performance Period Services in accordance with the ESCo Master Contract and as defined and mutually agreed to in each DOC.

   1.2. The Owner shall be responsible for operation of any Contractor provided equipment, material, and software. The Owner shall operate the equipment in conformance with the requirements of the ECM(s) established by the DOC(s). The Owner may deviate from these requirements as necessary to meet an operational need of the facility. Subsequent impacts to the ECM performance will be documented/calculated by the ESCo as part of their M&V efforts as mutually agreed to by the Owner.

2. Maintenance and Repair

   2.1. Corrective Maintenance and Repair

      2.1.1. Corrective maintenance and repair of the equipment and systems installed by the Contractor and existing equipment and systems which are modified, upgraded, or otherwise enhanced by the Contractor shall be the Contractor’s responsibility and shall be performed at the Contractor’s expense during the performance period. The required response time for maintenance and repair will be indicated within each ECM. In critical areas of facilities, a response time of one hour may be required.

   2.2. Emergency Operations

      2.2.1. The Owner will not move, turn off, or otherwise change any equipment for which the Contractor is responsible without the consent of the Contractor, unless it becomes necessary to do so in an emergency to prevent loss of life, injury, or damage to property. However, the Owner may perform these functions in accordance with the provisions of approved ECMs, in which cases the Owner will not be responsible for any lost savings or equipment damage which may result from its actions.

2.3. Preventive Maintenance

   2.3.1. The degree of preventive maintenance effort performed by the Owner shall be negotiated by the Owner and the Contractor and defined in each ECM. Preventive maintenance shall be scheduled. The Contractor shall submit to the Owner for review and approval the Contractor’s plan for maintenance and repair relative to the approved ECM. All work shall be completed in accordance with the approved M&V plan.
2.3.2. Preventive Maintenance Effort Performed by Contractor

2.3.2.1. The Contractor shall provide the Owner with up-to-date maintenance and repair schedules and confirmation of completed work. The original copy of such materials shall be kept on record in the Contractor's files and available for inspection by the Owner.

2.3.2.2. Preventive Maintenance Effort Performed by Owner

2.3.2.2.1. Up-to-date maintenance and repair schedules and confirmation of completed work shall be kept on record in Owner files and be available for inspection by the Owner and the Contractor.

3. Measurement and Verification

3.1. The Contractor shall accomplish all of the work described in the approved Measurement and Verification Plan.

3.2. The Contractor shall, on an annual basis, verify that the installed/modified equipment components or systems have been properly maintained, continues to operate correctly, and generate the proposed savings.

3.3. The energy savings and cost savings will be determined in accordance with the measurement and verification techniques defined in the individual Delivery Orders. The verification results will be documented in the form of an annual report submitted to the Owner.

3.4. The annual report shall also include energy baseline adjustments as required due to the following:
   3.4.1. Physical changes to the building;
   3.4.2. Hours of use or occupancy;
   3.4.3. Area of conditioned space;
   3.4.4. Addition or removal of energy consuming equipment or systems;
   3.4.5. Energy consuming equipment operating conditions;
   3.4.6. Normalized Weather (i.e., cooling and heating degree days); and
   3.4.7. Utility Rates.

3.5. The Owner reserves the right to adjust, reduce, or eliminate the Contractors Measurement and Verification activities at any time during the Performance Period.

3.6. The Owner reserves the right to review and comment on the submitted M&V report in regards to the inputs, methodology, and results as pertains to the approved M&V plan; thus requiring Contractor revision and re-submission.

4. Performance Period Costs and Payments

4.1. Performance Period payments to the Contractor shall begin only after the final completion of the ECM identified by the executed Acceptance Certificate.

4.2. Consideration will be given to the Contractor for increases in performance period activities requested by the Owner after the Performance Period has begun.

4.3. Payments to the Contractor will be reduced or eliminated following a reduction or elimination of Performance Period activities requested by the Owner after the Performance Period has begun.

4.4. Any discrepancies or disagreements regarding the M&V results and thus payment are to be dealt with according to the A201 General Conditions Article 15.2 Resolution of Claims and Disputes. The assigned Owner's Designer on this project is Barham Cain Mynatt, Inc.
Additional Requirements and Definitions for Contractor Scope of Services

Delivery Order Contract (DOC)

A DOC is a written agreement to proceed with a group of one or more ECM (Attachment 1C).

Each DOC shall incorporate the terms and conditions of the Contractor Master Contract and the negotiated and approved DOC by reference.

Contractor’s Responsibility

The Contractor shall supply all resources (technical and administrative) needed to accomplish the work described in the DOC.

The Contractor’s duties include performance of site investigations; performance of economic and technical studies; production of project designs; and provisions for management, installation, and operation of energy conservation measures or other approved projects. The Contractor shall deal openly with the Owner, develop Owner resources prudently, and pursue projects that provide the maximum return to the Owner.

The Contractor shall implement, maintain, and control a business operations system for identification, preparation, reproduction, distribution, and maintenance of all documentation.

Project Teamwork

The DOC process advances the practice of teamwork between the Owner and private industry as members of an energy cost-saving team. Close coordination between the Owner and the Contractor at every phase of the project shall be a regular component of project business, from initial development through design, construction, and operation and maintenance.

The Owner will offer facility sites for survey, records for research, collective employee knowledge base for review and interview by the Contractor, and aid in the search for projects to pursue.

Teamwork incentive is provided in that failure of either participant to perform properly will result in decreased or lost opportunity for investments.

Pricing Verification

Working documents, accounting records, and other materials related to all DOC costs and pricing shall be made available to the Owner upon request.

The Contractor’s installation cost as submitted in the DOC will be reviewed by the Owner. It may be verified by an independent Owner estimate.

ECM Guaranteed Savings

The Contractor shall provide a guarantee of cost savings and shall establish payment schedules reflecting such guarantees, taking into account any capital costs under the DOC. Each year shall be mutually exclusive with excess savings in one year not being able to offset shortfalls in other years.

When a guarantee is provided by the Contractor and the actual cost savings in any year of performance of a DOC are less than the guaranteed annual cost savings set forth in the DOC,
the Contractor shall reimburse the Owner for the shortfall within thirty (30) days. Any excess savings are maintained by the Owner.

Terminology

1. Ancillary Savings

1.1. Measurable and verifiable cost savings, other than energy cost savings, which directly result from the Contractor’s efforts to save energy costs directly related to the system being modified.

1.1.1. Ancillary savings must be real savings; i.e., the Owner must either be spending the money currently or budgeted to spend the money in the future. Additionally, the money must be available in the budget for payments against the DOC. Ancillary savings may be either recurring or one-time cost savings.

1.1.2. Examples of recurring ancillary cost savings include, but are not limited to, operation, maintenance, and repair tasks directly related to the systems being modified which are currently being performed by the Owner or a contractor hired by the Owner. The savings associated with these tasks are ancillary savings if the Contractor assumes the task, reduces the task, or eliminates the task.

1.1.3. The Owner will determine whether a Contractor-proposed assumption, reduction, or elimination of a current task is acceptable and should therefore be considered as recurring ancillary cost savings. The dollar value of the recurring ancillary cost savings shall be provided by the Owner.

1.1.4. The Owner may also consider one-time ancillary cost savings. Should the money be available for a designated project or task related to the energy systems being modified by the Contractor, and that designated project or task need not be accomplished by the Owner due to the Contractor’s performance of the proposed DOC, then those savings can be considered as one-time ancillary savings provided the money is in the budget and available for payment to the Contractor.

1.1.5. Utility company rebates and other incentives identified by the Contractor while developing ECMs shall be the property of the Owner, and the Contractor shall provide support as needed to enable the Owner to apply for and receive such incentives for the Owner.

2. Energy Baseline

The amount of energy that would be consumed annually without implementation of ECM(s) based upon historical metered data, engineering calculations, sub-metering of buildings or energy consuming systems, building load simulation models, statistical regression analysis, or some combination of these methods. Note that an energy baseline for the building should be established as well as project or equipment system baselines used for M&V purposes.

3. Energy Conservation Measure (ECM)

A procedure, course of action, step taken, repair made, or equipment modification, which lowers energy costs. ECM may also be used to refer to the portion of the contract consisting of individual proposals submitted to the Owner throughout the term of the contract, accepted by the Owner, and incorporated into the contract by DOC.
4. ECM by a DOC

The dollar value of the energy savings resulting from the implementation of ECMs through DOCS.

4.1. The energy savings measurement technique shall be based upon project complexity. The savings from the replacement of electrical equipment may not need to be metered and may be calculated, whereas heating modifications may require metering.

4.2. The savings determination method shall not be limited, but shall be the best practical method of determining the savings generated by the ECM. The best practical method will be dependent upon the complexity of the ECM and shall be defined in each initial project scope. Consideration must be given to all factors that can affect energy demand, such as changes in mission, population, space utilization or weather.

4.3. The savings determination method shall be based upon estimates, calculations, or dynamic computer modeling if metering is not practical.

4.4. The method to be used for determining the unit energy costs by which the energy baseline and the energy savings are multiplied shall be defined in each initial project scope and must be based on the incremental cost.

4.5. The energy cost-savings determination method and the unit energy costs are subject to approval by the Owner. The savings determination method shall be modified if the Owner determines that the changed conditions require a modification.

5. Design and Construction Documents Cost

5.1. The Design and Construction Documents cost shall be the approved direct cost of providing the services required to accomplish the ECM(s) and any other projects design and construction document preparation.

5.2. The Design and Construction Document cost shall include and be limited to the following:

5.2.1. Direct Payroll Expense of employees engaged on the project by the Contractor, including architects, engineers, designers, drafting technicians, specification writers, field administrators and clerical staff in consultation, research, design, and production of the Design and Construction Documents. Hourly rates shall be subject to prior written approval by the Owner;

5.2.2. Authorized actual printing and reproduction costs; and,

6. Design and Construction Documents Margin

6.1. The Design and Construction Documents margin, designated as a percent of the Design and Construction Documents cost, is the means by which the Contractor recovers overhead and profit on the services provided as well as additional expenses incurred above those allowed in the Design and Construction Documents cost to accomplish the Design and Construction Documents.

6.1.1. The Design and Construction Documents margin shall include:

6.1.1.1. Overhead and profit for the Contractor
6.1.1.2. Overhead and profit for the sub-contractors employed by the Contractor

6.1.1.3. Anticipated expenses incurred by the Contractor in addition to or above the expenses cited in the Design and Construction Documents cost.

7. Design and Construction Documents Price

The Design and Construction Documents price is the Contractor price delivered to the Owner equal to the Design and Construction Documents cost multiplied by (1+the Design and Construction Documents margin).

8. Detailed Energy Study (DES)

The DES cost shall be the approved direct cost of providing the services required to accomplish that portion of the DOC.

8.1. The DES cost shall include and be limited to the following:

8.1.1. Direct Payroll Expense of employees engaged on the project by the Contractor, including architects, engineers, designers, drafting technicians, specification writers, field administrators and clerical staff in consultation, research, design, and production of the Energy Study Cost. Hourly rates shall be subject to prior written approval by the Owner;

8.1.2. Authorized actual printing and reproduction costs; and,

8.1.3. Allowable travel expenses, not to exceed five percent (5%) of the total Design and Construction Documents cost (RFP Attachment 1 Pro Forma Contractor Master Contract).

9. Detailed Energy Study (DES) Margin

The DES margin, designated as a percent of the ECSM cost, is the means by which the Contractor recovers overhead and profit on the services provided as well as additional expenses incurred above those allowed in the DES cost to accomplish the DES. The DES margin shall include:

9.1. Overhead and profit for the Contractor,

9.2. Overhead and profit for the sub-contractors employed by the Contractor, and

9.3. Anticipated expenses incurred by the Contractor in addition to or above the expenses cited in the Energy Study cost.

10. Detailed Energy Study Price

The DES price is the Contractor price delivered to the Owner equal to the energy study cost multiplied by (1+the DES margin).

11. Direct Payroll Expense (DPE)

Direct payroll expense (DPE) costs shall be limited to base salary or hourly wage plus a maximum of thirty percent (30%) of base salary or hourly wage, and further limited to a maximum of seventy five dollars ($75) per hour, to cover social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers’ compensation insurance.
12. Energy Savings Performance Period

The energy savings performance period is that period (typically in years) from the date an energy savings cost measure is operational and accepted by the Owner to the end of the Contract term as defined in the Subproject Proposal Contract.

13. Guaranteed Annual Cost Savings

The guaranteed annual cost savings are the portion of the energy cost savings the Contractor is willing to guarantee. These cost savings shall include both energy cost savings and ancillary cost savings. If this savings level is not achieved, the Contractor shall reimburse the Owner for the shortfall.

14. Installation Cost

The installation cost shall be the direct costs of providing the construction services as required by the DOC, Construction Documents, and the UTFP Designer’s Manual.

14.1. The installation cost shall include and be limited to the following:

14.1.1. Direct Payroll Expense of labor;

14.1.2. Costs of materials, supplies, and equipment, including cost of transportation thereof, whether incorporated or consumed (work performed by a sub-contractor shall be limited to an allowance of 10% overhead and 5% profit);

14.1.3. Rental costs of machinery and equipment rented from others, and not more than eighty percent (80%) of the Associated Equipment Distributors Nationally Averaged Rental Rates for Construction Equipment for machinery and equipment belonging to Contractor; and,

14.1.4. Costs of premiums for bonds and insurance to the extent required by Contract Documents, permit fees, and sales, use, or other similar taxes related to the Work.

15. Installation Margin

15.1. The installation margins, designated as a percent of the installation cost by technology, are the means by which the Contractor recovers their direct expenses, indirect expenses, and profit for the activities provided under the construction phase and closeout phase, as well as the at risk expenses incurred in the Subproject Proposal Development phase.

15.2. The margin shall include:

15.2.1. Total cost to perform all activities prior to the Acceptance Letter,

15.2.2. Total cost to prepare and submit the Final Proposal

15.2.3. Total cost to perform required construction management activities during the construction and closeout phase,

15.2.4. All other activities performed by the Contractor not specifically identified as a directly recoverable cost, and
15.2.5. Overhead and profit on activities and services

15.3. Firms, which are wholly or partly owned by the Contractor or the Contractor’s parent company, shall not be considered sub-contractors as the term relates to Installation Costs and Installation Margin and to Energy Savings Performance Period Cost and Energy Savings Performance Period Margin.

15.4. Installation margins are offered at the RFP submission and are fixed amounts for the duration of any Contract resulting from the RFP process.

15.5. Multiple Technology Category Projects

15.5.1. To determine the margin for projects that involve multiple technologies, the costs will be broken down into technology categories in accordance with Schedule 2. The percent margin for each technology category will be applied to that category’s cost for each part of the project and summed to obtain the proposed Installation Price.

15.5.2. Should a project be proposed which does not match the technologies listed, the percent margin for the most closely related technology or the percent margin for miscellaneous work will be used, subject to the approval of the Owner.

16. Installation Price

The installation price is the Contractor price delivered to the Owner equal to the Installation Cost multiplied by (1+the installation margin).

17. Performance Period Cost

The Performance Period cost shall be the costs incurred by the Contractor each year during the Performance Period. The Performance Period cost shall include and be limited to the following:

17.1. Direct Payroll Expense of employees engaged in the project by the Contractor to provide the Performance Period services. Hourly rates shall be subject to prior written approval by the Owner

17.2. Authorized actual reproduction costs

18. Performance Period Margin

The Performance Period margin, designated as a percent of the Performance Period cost, is the means by which the Contractor recovers overhead and profit on the services provided as well as additional expenses incurred above those allowed in the Performance Period cost to accomplish the Performance Period services.

19. Performance Period Price

The performance period price is the Contractor price delivered to the Owner, equal to the performance period cost multiplied by (1+the performance period margin).

END OF SCOPE OF CONTRACTOR
Proposed Performance and Annual Payments

Contractor Name: *(your company here)*

The Contractor shall complete the following statement:
If selected the Contractor shall complete the installation of all proposed ECMs not later than_________ months after DOC Award.

<table>
<thead>
<tr>
<th>Project Location</th>
<th>(campus name here)</th>
<th>Delivery Order no.</th>
<th>(enter DO #)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year</strong></td>
<td>(a) Estimated Annual Cost Savings</td>
<td>(b) Proposed Guaranteed Annual Cost Savings</td>
<td>(c) Annual Debt Service and Performance Period Payments</td>
</tr>
<tr>
<td></td>
<td>(From Schedule 5) $</td>
<td>(if applicable) $</td>
<td>(From Schedule 3) $</td>
</tr>
<tr>
<td>ONE</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
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<tr>
<td>TWO</td>
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<td>TOTALS</td>
<td>$ -</td>
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</tbody>
</table>

(a) The technical proposal supports this estimate of annual cost savings as "REASONABLE"
(b) The Proposed Guaranteed Annual Savings is based on achieving contractor guaranteed performance per site-specific M&V plan agreed to in Delivery Order.
(c) This represents the Delivery Order price and should be supported by information submitted in Schedule 3
(d) Please attach explanation if estimated annual cost savings varies.
# ECMs – Total Investment

<table>
<thead>
<tr>
<th>Project Location</th>
<th>Delivery Order no.</th>
<th>Total Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(campus name here)</td>
<td>(enter DO #)</td>
<td></td>
</tr>
<tr>
<td><strong>Tech. Cat. #</strong></td>
<td><strong>ECM No.</strong></td>
<td><strong>Equipment Description - Title</strong></td>
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<tr>
<td><strong>Total</strong></td>
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</tbody>
</table>

The installation price for each ECM shall include design, project management, labor, material, shipping, testing and start-up involved to complete the installation of the ECM. This figure shall not include any expenses incurred during the Energy Savings Performance Period (e.g. O&M of ECMs) of the Delivery Order. The Energy Savings Performance Period of the Delivery Order begins upon final acceptance by the Owner (identified in the Acceptance Certificates), which indicates the ECMs are operational and comply with Delivery Order requirements. Total Installation Price for all ECMs will be used to Establish Payment and Contract Bond Requirements.

**Installation Price = Installation Cost x (1+ Margin)**
# MASTER CONTRACT (MC) ATTACHMENT 1.A

Schedule 3, Delivery Order

For an Energy Service Company for the
Energy Performance Contract

UT Health Science Center
SBC No. 540/013-05-2016

## Performance Period Cash Flow

<table>
<thead>
<tr>
<th>Project Capitalization</th>
<th>Project Location:</th>
<th>Delivery Order No.</th>
<th>{enter DO #}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Investment (Schedule 2, Total)</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL CAPITAL REQUIRED</strong></td>
<td>$</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>N</th>
<th><strong>TOTALS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Cash Flow (Service Phase)</td>
<td>Debt Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest</td>
<td>$</td>
<td>-</td>
<td>$</td>
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<tr>
<td>Principal Repayment</td>
<td>$</td>
<td>-</td>
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<tr>
<td><strong>TOTAL DEBT SERVICE</strong></td>
<td>$</td>
<td>-</td>
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</table>

## Performance Period Expenses:

- Management/Administration: $ - $ - $ - $ -
- Operation: $ - $ - $ - $ -
- Maintenance: $ - $ - $ - $ -
- Repair and Replacement: $ - $ - $ - $ -
- Measurement and Verification: $ - $ - $ - $ -
- Permits and Licenses: $ - $ - $ - $ -
- Other: $ - $ - $ - $ -
- **SUBTOTAL SERVICE PH. EXPENSES** | $ | $ | $ | $ |

## Performance Period Mark-Up:

<table>
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<tr>
<th>%</th>
<th>%</th>
<th>%</th>
<th>%</th>
<th>%</th>
</tr>
</thead>
</table>

## Total Annual Contractor Payments:

(Total Debt Service + Total Service Expenses) | $ | - | $ | - | $ |

Submit the following as applicable to above debt service:

- **Total Finance Charge:**
- **Term (years):**
- **Issue Date:**
- **Interest Rate Source:**

The University of Tennessee  
Energy Performance Contract, UT Health Science Center, SBC No. 540/005-13-2016  
September 6, 2017
### Annual Cost Savings

The Contractor shall complete the following statement:

If selected, the Contractor shall complete the installation of all proposed ECMs no later than ________ months after Delivery Order Contract award.

<table>
<thead>
<tr>
<th>Project Title: {Building name here}</th>
<th>Delivery Order No. {enter DO #}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>(a) Annual Cost Savings</td>
</tr>
<tr>
<td>ONE</td>
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<td>TWO</td>
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<td>TOTALS</td>
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</table>

(a) The “GUARANTEED ANNUAL COST SAVINGS” is based on achieving contractor performance, per site-specific M&V plan agreed to in Delivery Order.

(b) This represents the approved escalations for the utility rates. Please provide basis or source of such factors.
MASTER CONTRACT (MC) ATTACHMENT 1.A
Schedule 5, Delivery Order
For an Energy Service Company for the
Energy Performance Contract
UT Health Science Center
SBC No. 540/013-05-2016

ECM Description
And Projected Energy Savings Table

<table>
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<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
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<th>f</th>
<th>g</th>
<th>h</th>
<th>i</th>
<th>j</th>
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</thead>
<tbody>
<tr>
<td>Tech. Cat. No.*</td>
<td>ECM.No.</td>
<td>(kWh, therms, etc.)</td>
<td>(Equiv. Btu's)</td>
<td>Demand Reduction</td>
<td>Energy Dollar Savings</td>
<td>O&amp;M or Other Cost/Savings</td>
<td>Total Savings</td>
<td>Simple ECM Payback</td>
<td>ECSM Cost</td>
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</table>

Equivalent Btu's - Use 1 kWh equals 3,414 Btu
Energy Dollars Savings - Based on rate structure provided in site requirements document and calculated energy and demand reductions.
Simple ECM Payback - Schedule 2, Installation Price divided by Energy Dollars Saved.
For ESMs, with multiple energy type impacts, show each impact on a separate line using the same ECM no.
Fuel switching impacts should be treated the same by showing both the energy use increase and decrease.

NOTE: Attach supporting calculations and data for each ECM proposed herein, and include both energy and costs calculations.
## Acceptance Certificate

The Contractor hereby certifies that the Energy Conservation Measure or special project captioned below has been delivered, installed, and completed as of the date indicated, in accordance with the Agreement.

<table>
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Certification must be by an architect or engineer registered in Tennessee, if the Initiative required such design or supervision.

License Number: If not accepted, the reasons should be stated or summarized below.

License:

If not accepted, the reasons should be stated or summarized below.
RFP EXHIBIT 2
For an Energy Service Company for the
Energy Performance Contract
UT Health Science Center
SBC No. 540/013-05-2016

PROGRAM INFORMATION
The project will provide a comprehensive, performance based energy conservation program on the UT Health Science Center campus. The University with their consultant OGCB completed an Energy Study across the campus to help prioritize, survey, and provide general estimates for possible items which could be further developed into a construction project as well as providing general system descriptions for each building. The Report is included within this section. This report is for reference and informational purposes only and the Contractor is fully expected to provide their own project development scopes and costs. The Owner expects the Contractor to submit or present any and all applicable/reasonable projects not limited to or inclusive of these included herein this previous study.
UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER ENERGY CONSERVATION MEASURES

ENERGY STUDY

UT Contract No.: 8500050564
OGCB Project No.: 1501H

AUGUST 5, 2016

OWNER:
University of Tennessee Health Science Center
920 Madison Ave,
Memphis, TN 38103
## REPORT INDEX

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Executive Summary

The University of Tennessee Health Science Center Energy Conservation Measures project is intended to collect and assemble detailed information on building operations. The project will then use that information to identify recommended energy conservation measures for each building in the study. It was determined by UTHSC that a focused analysis of a significant number of buildings on the campus was necessary to identify energy conservation opportunities. UT personnel identified 18 buildings that were considered to be necessary for inclusion in the study, and OGCB, Inc. was tasked with the following:

- Surveying the building
- Reviewing their operation and the condition of the equipment
- Preparing energy conservation measures for each building.

OGCB’s survey of the 18 buildings identified 60 possible Energy Conservation Measures (ECMs). It also identified 40 possible Functional Improvement Measures (FIMs) that would benefit the campus but might not produce measurable energy savings. Each of the ECMs will be described in the report, with supporting estimates of implementation cost and a simple payback for electrical ECMs.

The ECM estimates were derived from building surveys, meetings with UT personnel, and review of plans of the buildings wherever possible.
Definitions

The following terms and abbreviations will be used throughout the energy study report. They are defined here for clarity.

**DDC:** Direct Digital Controlled, a type of HVAC temperature controls equipment that uses electronics in place of pneumatics to receive input from sensors and control components such as valves, dampers, motors, and relays.

**ECM:** Energy Conservation Measure, a change to building energy systems that is intended to reduce energy consumption or operating costs.

**BMS:** Building Management System, a direct digital controlled (DDC) controls system for building HVAC equipment. BMS can also be used to control lighting and domestic water heating systems. References to the “Campus BMS” refer to the system that links and monitors the buildings on the UTHSC campus.

**FIM:** Functional Improvement Measure, a change to building envelope, systems, or sequence of operations that is intended to improve maintenance or operations of the facility. FIM may not provide a measurable reduction in energy consumption or operating costs.

**HVAC:** Heating, Ventilation, and Air Conditioning.

**LED:** Light Emitting Diode, a semiconductor light source used as a replacement for traditional light sources such as fluorescent, incandescent, and HID light sources.

**OS:** Occupancy Sensor, a device that uses passive infrared motion sensing, ultrasonic motion sensing, or a combination of the two (dual-technology) to monitor room occupancy. Sensors can be used to control lighting, ventilation, or other systems, with lighting control being the most common application.

**OSA:** Outside Air, the ventilation air introduced into a building. This air is provided both to maintain a positive building pressure and to provide good indoor air quality for the building occupants. It can be introduced mechanically (through the HVAC system) or naturally (through openings in the building envelope).

**T12:** Class of fluorescent lamp used in lighting systems, commonly used in building lighting until the 1990s. A 4’ long T12 lamp typically is rated to consume 40 watts.

**T8:** Class of fluorescent lamp used in lighting systems, replaced the T12 lamp during the 1990s due to higher efficiency. A 4’ long T8 lamp typically is rated to consume 32 watts.

**T5:** Class of fluorescent lamp used in lighting systems, often used in place of T8 lamps in new construction. Available in both HE (high efficiency) and HO (high output) versions. Standard 4’ long T5 lamps consume 28 watts, while 4’ T5HO lamps consume 54 watts.

**VAV:** Variable Air Volume, an HVAC term describing air handling systems that vary the airflow. For supply air systems, VAV systems maintain a constant supply air temperature and vary the airflow to satisfy the space temperature setpoint. Exhaust, relief, and outside air systems can also be configured for variable air volume.

**VFC:** Variable Frequency Controller, an electrical device that allows motor speed to be varied. VFCs are used in VAV systems and to vary pump speed in variable flow chilled water and hot water systems.
Building List

This energy study was tasked with evaluating 18 buildings with a total area of 1,673,390 square feet. The buildings included in the study are listed below.

1. Van Vleet Cancer Center
2. Student-Alumni Center
3. Johnson Building
4. Hyman Administration Building
5. Dunn Building
6. Molecular Sciences Building
7. Wittenborg Anatomy Building
8. Doctor’s Office Building
9. Cancer Research Building
10. Coleman Building
11. 910 Madison Building
12. 920 Madison Building
13. 930 Madison Building
14. Madison Plaza Building
15. Physical Plant Building
16. 740 Court Building
17. Pauline Annex Building
18. Boling Center for Developmental Disabilities

Recommendations

Based on visits to each building and interviews with UTHSC facilities personnel, a systems summary and list of recommendations has been prepared for each building. Separate reports are provided for electrical and mechanical on each building.
Mechanical System Summaries and Recommendations

2113 - Van Vleet Cancer Center:

The building is a 81,150 SF three story building with a basement. The original structure was built in 1950 and a new addition was built approximately 20 years ago. The building has a central plant that includes one water-cooled chiller, one cooling tower, one gas-fired low pressure cast iron steam boiler and one gas-fired atmospheric hydronic boiler. Boilers are nearing the end of their expected service life. Temperature controls are pneumatic in the older portions of the building.

The chilled water system is a primary/secondary arrangement. The secondary chilled water pump is controlled through a VFC to vary chilled water flows to meet demand at air handling units. The primary chilled water loop pump maintains constant flow through the chiller. The cooling tower fan is controlled by a VFC with a high speed and low speed setpoint. Equipment is nearing the end of the expected service life.

The low pressure steam boiler provides steam for the air handling unit humidifier located in the 1997 addition and radiators in older portions of the building. Three electric steam generators in the 1997 addition provide medium pressure steam for the sterilizers, washers and clean room. The electric steam generators have been problematic. Equipment is nearing the end of the expected service life.

The hot water boiler provides hot water for variable volume terminal unit reheat coils and air handling unit heating coils. Hot water is distributed to the building with two hot water pumps (1 standby) controlled by a VFC with pump alternation controls. Equipment is nearing the end of the expected service life.

The north and east areas of the original building are served by three air handling units located in the basement. AHU-1 and AHU-2 are cooling only units and include a return air fan and an economizer cycle. AHU-1 and AHU-2 supply and return fans are controlled with VFCs to vary airflow based on demand. AHU-1 and AHU-2 cooling coils have 3-way control valves with the bypass valved off to provide variable flow. AHU-3 is a heating only unit controlled with a VFC to vary airflow based on demand. The heating coil for AHU-3 has a 3-way control valve with the bypass capped. VAV terminal units are located on each floor level. Single duct units serve interior zones and dual duct units serve perimeter zones. AHU-1, AHU-2 and AHU-3 are in poor condition.

The south area of the original building is served by rooftop units and a constant volume dedicated outside air unit (AHU-5) located in the basement that provides neutral temperature (75°F) air. AHU-5 includes a preheat coil, cooling coil and reheat coil. AHU-5 coils have 2-way valves. Rooftop units are in poor condition and have been abandoned. Rooms in the oldest portion of the building have window air conditioners.

The 1997 addition is served by a 100% outside air VAV air handling unit on the first floor. The unit includes a heat recovery coil, preheat coil, cooling coil and humidifier. The cooling coil has a 2-way valve. The preheat coil and heat recovery coil have 3-way valves. VAV terminal units are located on each floor and are provided with hot water reheat coils with two-way valves. Exhaust VAV terminals provided in lab spaces for general purpose fume hoods are ducted to a reheat coil and constant volume Strobic lab exhaust fan on the roof. Biological safety cabinets are exhausted with constant volume exhaust fans located on the roof. Radioisotope fume hoods are exhausted with variable volume exhaust fans located on the roof. Mini-split D-X units have been added in some spaces for supplementary cooling.
A 14.5 Ton air cooled chiller located on the roof provides chilled water for an air handling unit in the clean room facility. Chilled water is distributed with a constant speed pump. The chilled water system is manually operated. Support spaces in the clean room facility are also served from AHU-2.

Fume hoods in original portion of building are controlled with a manual switch mounted on the fume hood. General purpose fume hoods in the 1997 addition operate at minimum or maximum airflow based on sash position. Exhaust fans for biological safety cabinets and radioisotope fume hoods operate continuously. Toilet exhaust fans operate continuously.

Domestic water is provided by a gas fired atmospheric storage type water heater. Two recirculating pumps controlled by an aquastat maintain constant domestic water temperature.

**ECM 1:** Replace cast iron steam boiler with high efficiency steam boiler. Consider using high efficiency gas fired steam boiler for humidifiers, sterilizers and washing area and electric steam generators for clean room facility.

**Implementation Cost**
Replacing the cast iron boiler with a 1,000 MBH flexible watertube steam boiler will cost approximately $60,000.

**ECM 2:** Replace atmospheric hydronic boiler with high efficiency boiler.

**Implementation Cost**
Replacing the hydronic boiler with a 4,800 MBH high efficiency boiler will cost approximately $150,000.

**ECM 3:** Replace atmospheric gas fired water heater with high efficiency water heater.

**Implementation Cost**
Replacing the atmospheric water heater with a condensing water heater will cost approximately $40,000.

**ECM 4:** Replace dual duct VAV system with single duct VAV terminal units including hot water reheat.

**Implementation Cost**
Replacing the dual duct VAV system with single duct VAV including reheat will cost approximately $324,000.

**ECM 5:** Consider an equipment replacement project that would provide a new HVAC system appropriate for the building usage. The building mechanical system is composed of a variety of equipment types which are in poor condition and obsolete. Window air conditioners are utilized in the oldest portion of the building.

**Implementation Cost**
Replacing the HVAC system will cost approximately $3,246,000.

**FIM 1:** Remove abandoned rooftop units and exhaust fans.

**Implementation Cost**
Removal of unused equipment will cost approximately $12,000.
**FIM 2:** Cooling tower fill media is failing. Replace cooling tower or rebuild fill media.

**Implementation Cost**
Replacing the cooling tower will cost approximately $120,000.

**FIM 3:** Replace obsolete Phoenix controls.

**Implementation Cost**
Upgrading 18 Phoenix control air valves will cost approximately $48,600.
2165 - Student-Alumni Center:

The building is a 104,880 SF three story building. The building is 45 to 50 years old and constructed as a three story wing and a two story recreational wing connected by a covered walkway. The building has a central plant that includes one water-cooled chiller, one cooling tower (wood construction) and two dual fuel forced draft hydronic boilers.

The chilled water system is constant volume. The chilled water pump and condenser water pump are controlled by motor starter to maintain constant water flow. The condenser water loop includes a bypass to maintain the condenser water temperature. The system includes a standby pump that can be used for the condenser loop or chilled water loop. Equipment is nearing the end of the expected service life.

The hot water boiler provides hot water for constant volume air handling unit heating coils, fan coil units, constant volume terminal unit reheat coils, radiant heating, domestic water heat exchangers and a pool heat exchanger. Two constant speed hot water pumps distribute hydronic hot water to the building. A constant speed pump at each heat exchanger delivers water to the other systems. Equipment is nearing the end of the expected service life.

The building is served by constant volume air handling units and ducted fan coil units. Locker rooms are served by 100% outside air units and exhausted with constant speed exhaust fans. The pool is served by a Dectron dehumidification unit. Cooling coils and heating coils have 3-way valves. 14 of the original air handling units and 2 fan coil units are still in operation and include pneumatic temperature controls. The original units are in poor condition. The units installed during the 2002 renovations (AHUs-1-6 and SPU-1) include DDC temperature controls. AHU-2 installed during the 2002 renovations includes an economizer.

The domestic water system includes a triplex booster pumping package with a lead-lag constant speed pump arrangement and a simplex booster pump. Both systems are valved off due to the demolition of Randolph Towers.

Domestic water is provided by two hot water heat exchangers. There is a recirculating pump controlled by an aquastat to maintain constant domestic water temperature.

**ECM 1:** Add VFCs to the two hot water pumps serving the building hydronic system. Replace motors with motors compatible with VFCs. Close hot water coil 3-way valve bypass or replace with 2-way valve on equipment except where located at the end of a main.

**Implementation Cost**
Adding VFCs to hot water pumps, replacing motors and replacing control valves will cost approximately $65,000.

**ECM 2:** Consider adding waterside economizer to chilled water plant.

**Implementation Cost**
Adding a plate and frame heat exchanger, piping and controls will cost approximately $375,000.
ECM 3: Consider revising chilled water system piping arrangement to primary/secondary with VFDs on the secondary pumps.

Implementation Cost
Revising the piping and replacing pumps to incorporate a primary/secondary arrangement with variable secondary will cost approximately $100,000.

ECM 4: Consider incorporating a controls sequence to close AHU-6 outside air damper to the minimum required position when the dishwasher exhaust fan and grease exhaust fan are off.

Implementation Cost
Revising controls sequence and adding sensors will cost approximately $5,000.

ECM 5: Add VFCs to single zone air handling units AHU-2 (Meeting Rm.), AHU-7 (Auditorium) and AHU-15 (Gymnasium). Replace motors with motors compatible with VFCs.

Implementation Cost
Adding VFCs to AHUs, replacing motors and control valves will cost approximately $25,000.

ECM 6: Consider adding heat recovery coil for men’s and women’s locker rooms.

Implementation Cost
Adding heat recovery to two AHUs and exhaust fans will cost approximately $40,000.

ECM 7: Replace AHU-11 (Lounge) and AHU-17 (Gym Area) multi-zone unit with a VAV air handling unit and terminal units.

Implementation Cost
Replacing AHU-11 and AHU-17 with VAV systems will cost approximately $230,000.

ECM 8: Consider an equipment replacement project that would provide a new HVAC system appropriate for the building usage. Chiller plant and boiler plant is oversized for current building usage due to demolition of Randolph dorms.

Implementation Cost
Replacing the HVAC system will cost approximately $3,670,800.

ECM 9: Add VFC to AHU-3 (Private Dining) and revise terminal unit sequence for VAV operation.

Implementation Cost
Adding a VFC, replacing motor and replacing the control valve will cost approximately $8,500.

FIM 1: Replace remaining pneumatic temperature controls with DDC controls.

Implementation Cost
Replacing pneumatic temperature controls will cost approximately $85,000.
**FIM 2:** AHU-19 is abandoned. Remove abandoned unit.

**Implementation Cost**
Removal of abandoned AHU will cost approximately **$1,500.**

**FIM 3:** Repair AHU-18 disconnect switch.

**Implementation Cost**
Replacement of disconnect switch will cost approximately **$500.**

**FIM 4:** Original piping is in poor condition. Replace deteriorated piping systems.

**Implementation Cost**
Replacement of hydronic piping (based on square footage) will cost approximately **$1,050,000.**
**2109 - Johnson Building:**

The building is a 73,875 SF five story building built in 1946 and renovated in the late 80s. The building is served by two 100% outside air custom VAV air handling units. These units provide air to supply and exhaust VAV terminals on each floor. The Johnson Building air handling units and hot water piping system are located in the Link Building penthouse. These units are being renovated in a project that is to be bid in the summer of 2016.

Each laboratory space is heated using fin-tube radiation. VAV supply terminals with reheat and exhaust terminals maintain proper space pressure relationships based on fume hood exhaust operations. Fume hoods on Levels 2-5 are operated manually and do not have modulating controls (Phoenix). Fume hoods on Level 1 have modulating Phoenix controls. The fin-tube radiation does not have adequate flow to maintain minimum velocity in the fin-tube heating element.

Temperature controls on Levels 1 and 2 are DDC. Temperature controls on Levels 3-5 are pneumatic.

Domestic hot water is provided by steam-to-water heat exchangers located in the Link Building. There is a recirculating pump controlled by an aquastat to maintain constant domestic water temperature.

**ECM 1: Renovate lab areas using laboratory type DDC control air valves and modulating fume hood control.**

**Implementation Cost**

Renovation of mechanical system using Phoenix supply and exhaust air valves, sash controls and adding VFCs to fume hood exhaust fans will cost approximately $1,016,000.

**FIM 1: Modify fin-tube radiation same as the 2010 Wittenborg Renovation Project to increase flow and achieve desired heating capacities.**

**Implementation Cost**

Modification of finned tube radiation to increase flow will cost approximately $75,000.

**FIM 2: Replace obsolete Phoenix controls.**

**Implementation Cost**

Upgrading 25 Phoenix control air valves will cost approximately $67,500.

**FIM 3: Replace VAV terminals with VAV terminals with hot water reheat.**

**Implementation Cost**

Replacement of 49 VAV terminals and extension of the hot water piping system will cost approximately $294,000.
2101 - Hyman Administration Building:

The building is a 50,885 SF five story building. The building is 60+ years old. The building is served by two pipe fan coil units. Chilled water is provided by the Campus chilled water system. Chilled water is distributed to the building by two chilled water pumps with VFCs. Hot water is provided by two steam-to-hot water heat exchangers. Steam is connected to the Campus steam distribution system. Dual temperature water is distributed to the fan coil units using a constant flow pump. The dual temperature water piping system is in poor condition. Leaks have developed at an increasing rate. Hot water for radiant heaters is distributed with a constant speed inline pump and a separate piping system.

Ventilation air is introduced to the corridors on each floor by a 100% outside air unit located in a mechanical room on the roof. The unit has a cooling coil, steam preheat coil, and steam reheat coil.

All equipment is original equipment with pneumatic controls.

Domestic hot water is provided by steam-to-water heat exchangers located in the Link Building. There is a recirculating pump controlled by an aquastat to maintain constant domestic water temperature.

**ECM 1: Install VFC on dual temperature water pump.**

**Implementation Cost**
Adding a VFC to the dual temperature water pump, replacing motor and replacing FCU control valves will cost approximately $162,000.

**ECM 2: Replace 100% outside air unit with unit including a heat wheel.**

**Implementation Cost**
Replacing the dedicated outside air unit will cost approximately $50,000.

**FIM 1: Replace pneumatic temperature controls with DDC controls.**

**Implementation Cost**
Replacing pneumatic temperature controls will cost approximately $186,000.

**FIM 2: Address dual temperature piping system problems. Replace piping as required to prevent further leak issues.**

**Implementation Cost**
Replacement of dual temperature piping (based on square footage) will cost approximately $255,000.

**FIM 3: Consider an equipment replacement project that would provide a new HVAC system appropriate for the building usage.**

**Implementation Cost**
Replacing the HVAC system will cost approximately $1,780,975.
2110 - Dunn Building:

The building is a 129,270 SF five story building. The building is 40+ years old. The building is served from the Campus Central Plant. Two chilled water pumps with VFCs provide chilled water to VAV air handling units. Each floor is served by a cooling only VAV air handling unit. The air handling unit cooling coils have 3-way control valves with the bypass valved off to provide variable flow. Each air handling unit is provided with a return air fan and an economizer cycle. The economizer cycle is inoperable due to a large negative pressure exerted on the building. When the economizer dampers are opened the amount of outside air is so large it cannot be controlled. The air handling units serve cooling only VAV terminal units.

Heating is provided by a VAV heating only air handling unit. A steam-to water heat exchanger provides hot water to a constant flow hot water pump. The air handling unit heating coil has a 3-way control valve. The air handling unit serves heating only VAV terminal units. Lobbies are heated using fin-tube radiation. The fin-tube radiation is served by a separate constant speed hot water pump.

In recent renovation work in the Dunn Building cooling only VAV terminals have been replaced with VAV terminals with reheat coils. These coils will be connected to a future hot water piping system.

In 2010 OGCB prepared a Scope of Work and cost estimate to replace the cooling only air handling units and heating system in the Dunn Building with custom air handling units serving VAV terminals with reheat. The existing VAV heating only air handling unit will be replaced with a new hot water system that will serve the new VAV reheat terminals. All building heat will be provided by the reheat terminals. A copy of the Scope Document and Cost Estimate are attached to this study.

Domestic hot water is provided by a steam-to-water heat exchanger. There is a recirculating pump that maintains constant domestic water temperature.

**ECM 1: Add VFCs to the hot water pump.** Replace motors with motors compatible with VFD’s. Replace 3-way control valve on the heating coil for AHU-6.

**Implementation Cost**
Adding VFCs to hot water pumps, replacing motors and replacing AHU-6 control valves will cost approximately $9,000.

**ECM 2: Resolve the negative pressure issue and activate the economizer cycle on all cooling only VAV air handling units.**

**Implementation Cost**
The cost will depend on the scope of work required to correct the air balance. A study to determine the cause of the negative pressure will cost approximately $20,000. The cost to activate the economizer cycle on 5 AHUs will cost approximately $25,000.

**ECM 3: Vary the flow of outside air at air handling units based on fume hood operation.**

**Implementation Cost**
Revising controls sequence and adding sensors will cost approximately $20,000.
**FIM 1:** Replace pneumatic temperature controls with DDC controls.

**Implementation Cost**
Replacing pneumatic temperature controls including VAV terminals and air handling units will cost approximately $726,000.

**FIM 2:** Implement the 2010 Scope of Work that replaces air handling units and installs a new heating system. See attachments.

**FIM 3:** The perimeter heating ductwork was removed on the south side of the 3rd floor during a remodel, leaving the perimeter spaces without heat until a hot water piping system is installed. Serve perimeter terminals from heating ductwork or implement 2010 Scope of Work.

**Implementation Cost**
Providing perimeter VAV terminals connected to the heating ductwork system will cost approximately $96,000.

**FIM 4:** Replace domestic water heat exchanger. The domestic steam-to-water heat exchanger is in poor condition.

**Implementation Cost**
Replacing the domestic water heater will cost approximately $20,000.
2129 - Molecular Sciences Building:

The building is a 99,800 SF eight story building with a basement. The building is 60+ years old. The building is served from the Campus Central Plant. Tertiary chilled water pumps controlled by a VFC distribute chilled water to the building. Hot water is provided by a steam-to-water heat exchanger and distributed to the building with two hot water pumps controlled by motor starters. Steam is connected to the Campus steam distribution system. Temperature controls are approximately 95% pneumatic.

The building is served by six VAV air handling units and fin-tube radiation at the building perimeter. The fin-tube radiation is in poor condition with plugged coils and failing control valves. AHU-1, AHU-2 and AHU-3 are located in the penthouse and serve floors 2-8. AHU-1, 2 and 3 include a return air fan and an economizer cycle. AHU-1 and AHU-2 heating and cooling coils have 3-way control valves. The chilled water 3-way control valve bypass is capped on AHU-1 and AHU-2 to provide variable flow. AHU-3 is a cooling only unit with a 2-way valve. AHU-1 and AHU-2 outside air damper and return air fan is interlocked with constant volume unconditioned make-up air fans to maintain building pressures when fume hoods are operated. AHU-4 and AHU-5 are located on the first floor and include a relief air fan and an economizer cycle. AHU-4 has a 3-way control valve on the heating coil and a 2-way control valve on the cooling coil. AHU-5 is a cooling only unit with a 2-way valve. AHU-6 is located on the ground floor and serves the Animal Facility. AHU-6 is constant volume and includes a heating coil with 3-way valves and a DX coiling coil. AHU-1, AHU-2, AHU-4 and AHU-5 have a constant speed inline pump to maintain constant volume flow through the heating coil for freeze protection. The south entrance is served by three fan coil units with 3-way cooling coil and heating coil control valves. The 8th floor BL3 lab area is served by an Aaon unit with two constant speed inline hot water reheat pumps.

VAV terminal units are located on each floor level. Terminal units on floors 2-8 do not have reheat coils, fin-tube radiation provides heating. Labs on floors 2-8 are provided with fume hood make-up terminal units to provide conditioned make-up air to the fume hood when the outside temperature is below 50°F. When the outside air temperature is 50°F or above, fume hood make-up air is designed to be provided by the unconditioned makeup air system. The unconditioned make-up air system is no longer used. Terminal units on the ground floor and first floor have a reheat coil for perimeter zones and labs, but no reheat coil for interior spaces. Lab terminal units on the ground floor and first floor operate at maximum CFM when associated fume hood is operated. The animal facility is served by constant volume terminals with reheat coils. All fume hoods are provided with a constant volume exhaust fan controlled from a switch on the face of the hood.

The domestic water system includes a duplex booster pumping package with a lead-lag constant speed pump arrangement.

Domestic water is provided by a steam-to-water heat exchanger. There is a recirculating pump that operates continuously to maintain constant domestic water temperature.

**ECM 1: Add VFCs to the two hot water pumps serving the building hydronic system.** Replace motors with motors compatible with VFCs. Close hot water coil 3-way valve bypass or replace with 2-way valve on equipment except where located at the end of a main.

**Implementation Cost**

Adding VFCs to hot water pumps, replacing motors and replacing control valves will cost approximately $250,000.
ECM 2: Renovate lab areas using laboratory type DDC control air valves and modulating fume hood control.

Implementation Cost
Renovation of mechanical system using Phoenix supply and exhaust air valves, sash controls and adding VFCs to fume hood exhaust fans will cost approximately $1,900,000.

FIM 1: Replace AHUs that are in poor condition.

Implementation Cost
Replacing six existing AHUs will cost approximately $720,000.

FIM 2: Repair clogged fin tube radiation.

Implementation Cost
Cleaning and repair of existing fin tube radiation will cost approximately $48,000.

FIM 3: Replace lab compressed air and lab vacuum systems that are in poor condition.

Implementation Cost
Replacement of lab compressed air and lab vacuum equipment will cost approximately $150,000.
2103 - Wittenborg Anatomy Building:

The building is a 61,000 SF five story building with storage rooms on the sixth floor. The building is 90 years old and was renovated in the late 80s. The building is served by two 100% outside air custom VAV air handling units. These units provide air to supply and exhaust VAV terminals on each floor. The Wittenborg Building air handling units and hot water piping system are located in the Link Building penthouse. These units are being renovated in a project that is to be bid in the summer of 2016.

Two renovations, one in 1998 and one in 2010, provided each laboratory on levels 2-5 with laboratory air valves that maintain proper pressure relationships in the laboratory spaces. Each laboratory space is heated using fin-tube radiation. The VAV supply terminals with reheat and exhaust terminals maintain proper space pressure relationships based on fume hood exhaust operations. Fume hoods face velocities are maintained at every sash position by modulating the fume hood exhaust fan motor speed. The fin-tube radiation flow was increased in the 2010 project to maintain minimum velocity in the fin-tube heating element.

The Level 1 Animal Facility and the Level 1 Gross Anatomy area are served by constant volume air handling units. AHU-4 (Gross Anatomy) and AHU-7 (Animal Facility) provide cooling airflow to VAV terminals with hot water reheat coils. Level 1 VAV terminals are original equipment with pneumatic controls. AHU-7 is in poor condition. Coil leaks have diminished coil capacity. AHU-4 is located in the Link Building and will be renovated in the project that is to be bid in the summer of 2016.

Domestic hot water is provided by steam-to-water heat exchangers located in the Link Building. There is a recirculating pump controlled by an aquastat to maintain constant domestic water temperature.

**FIM 1: Replace AHU-7.**

**Implementation Cost**
Replacing AHU-7 will cost approximately **$88,000**.

**FIM 2: Replace existing VAV terminals in the Animal Facility and Gross Anatomy with new terminals with DDC controls. Replace air handling unit controls with DDC controls if FIM 1 is not implemented.**

**Implementation Cost**
Replacing VAV terminals will cost approximately **$140,000**. Upgrading AHU-7 controls to DDC will cost approximately **$6,000**.

**FIM 3: Replace obsolete Phoenix controls.**

**Implementation Cost**
Upgrading 216 Phoenix control air valves will cost approximately **$585,000**.
**2181 - Doctor’s Office Building:**

The building is a 83,730 SF six story building. The building is 40 years old. The building is served by two D-X VAV cooling only air handling units located in the penthouse. These units provide cooling to VAV terminal units on occupied floors. The air handling unit fans are controlled through VFCs that vary the airflow based on demand. Temperature controls are pneumatic.

Heating is provided by electric baseboard heaters located in exterior zones on each floor. Two entrances on the first floor are heated by 10 KW duct mounted heating coils. Two studies, one performed by Hnedak Bobo Group in 2005 and one performed by OGCB in 2010 document that the building heating system is inadequate. Several tenant renovations have added electric heat to selected spaces.

Domestic hot water is provided by an electric storage type water heater. There is a recirculating pump to maintain constant domestic water temperature.

**ECM 1: Replace baseboard electric heat and existing cooling only VAV terminals in perimeter spaces with new VAV terminal units with electric heat.**

**Implementation Cost**  
Replacing baseboard heat and cooling only VAV terminals with VAV terminals including electric heat will cost approximately **$336,000.**

**ECM 2: Compare electric heat with hot water heat using gas fired boilers located in the penthouse. Expand penthouse as required for new boilers. Replace existing VAV terminals serving interior spaces with new VAV terminals with reheat.**

**Implementation Cost**  
A study to determine the cost and payback will cost approximately **$20,000.**
2125 - Cancer Research Building:

The building is a 104,000 SF four story building with a basement. The building is 10 years old. The building has a central plant that includes two water-cooled chillers, one cooling tower and two gas-fired medium pressure steam boilers.

The chilled water system is a primary/secondary arrangement. The secondary chilled water pumps (1 standby) are controlled through a VFC to vary chilled water flows to meet demand. The primary chilled water loop pumps maintain constant flow through the chillers.

The medium pressure steam boiler provides 75 PSIG steam for laboratory equipment. A pressure reducing station provides 15 PSIG steam for a hydronic steam-to-hot water heat exchanger, domestic water heat exchangers and humidifiers.

The hydronic steam-to-water heat exchanger provides hot water for variable volume air handling unit preheat coils and variable air volume terminal unit reheat coils. Hot water is distributed to the building with two hot water pumps (1 standby) controlled by VFCs.

The building is served by seven VAV air handling units in the basement. Cooling coils and heating coils have two-way control valves. Heat recovery coils have three-way control valves. AHU-1, AHU-2, and AHU-5 are 100% outside air units with a heat recovery coil, preheat coil, cooling coil and humidifier. AHU-4 is a 100% outside air unit with a heat recovery coil, preheat coil, DX cooling coil and humidifier. AHU-3, AHU-6 and AHU-7 have a preheat coil, cooling coil, return air fan and economizer cycle. VAV terminal units are located on each floor and are provided with hot water reheat coils with two-way valves. Exhaust VAV terminals provided in lab spaces are ducted to reheat coils and constant volume Strobic lab exhaust fans on the roof. Lab fume hoods with individual exhaust fans are variable volume.

Temperature controls are DDC.

The domestic water system includes a triplex booster pumping package with a lead-lag constant speed pump arrangement. A jockey pump and hydro-pneumatic tank is used for low flow operation.

Non-potable domestic water is provided by two steam-to-water heat exchangers. Potable domestic water is provided by one electric storage type water heater. Each water heater is provided with a recirculating pump that maintains constant domestic water temperature.

Mechanical systems are modern and include energy efficient features such as variable frequency controllers for air handling units, pumps and exhaust fans. See Global ECMs for potential energy conservation measures.
2116 - Coleman Building:

The building is a 158,000 SF four story building. The building is 36 years old. The building has a central plant that contains two water-cooled chillers and two gas-fired 100 PSIG steam boilers. The chilled water system is primary/secondary. Secondary chilled water pumps controlled through VFCs vary chilled water flow to meet demand. Primary chilled water loop pumps maintain constant flow through the chillers.

A steam-to-water heat exchanger provides hot water for constant volume and variable volume terminal units with reheat. Hot water is also provided to miscellaneous heating coils. Hot water pumps are constant flow type.

The animal research area is served by a constant volume, custom air handling unit with glycol runaround coils, chilled water coils and hot water coils. Steam humidifiers in the unit maintain animal area humidity at desired levels. Terminal units with hot water reheat maintain constant airflow to the animal area zones. Duct liner in the supply ductwork at heating coils, in the animal area, has deteriorated and fallen into the airstream, clogging up the heating coils. Cleaning the coils is difficult due to limited access. The duct liner has deteriorated to the point that this is a common occurrence.

The first floor east and offices for Comparative Medicine are served by two air handling units with original controls. The VAV terminals in this area are also original equipment with obsolete controls.

The lecture halls on the first floor are served by variable volume air handling units with chilled water cooling coils and hot water heating coils.

The second and third floors are served by variable volume air handling units that are connected to VAV terminals with hot water reheat in offices and labs. There are two air handling units per floor. Perimeter office VAV terminals have DDC controls. Interior Lab spaces are served by VAV terminals units that are original equipment with obsolete controls.

Lab fume hoods are operated manually and do not have modulating pressure controls.

General exhaust system is constant volume and in poor operating condition.

Numerous low temperature freezers have been added to rooms in the building without updating HVAC to accommodate for the heat gain added to the space by the freezers.

Domestic hot water is provided by two steam-to-water heat exchangers and an electric storage type water heater. There is a recirculating pump that maintains constant domestic water temperature.

**ECM 1: Add VFCs to the three hot water pumps.** Replace motors with motors compatible with VFDs.

**Implementation Cost**
Adding VFCs to hot water pumps, replacing motors and replacing control valves will cost approximately $385,000.

**ECM 2: Change out lab terminals and fume hood fan controls. Provide lab pressure control system with modulating fume hood control.**

**Implementation Cost**
Renovation of mechanical system using Phoenix supply and exhaust air valves, sash controls and adding VFCs to fume hood exhaust fans will cost approximately $1,140,000.
**FIM 1: Consider replacing hot water pumps.** The hot water pumps are original. Replace motors with motors compatible with VFDs.

**Implementation Cost**
Replacing three hot water pumps, including motors will cost approximately **$24,000**.

**FIM 2:** Consider evaluating current needs with Dr. Mandrell’s staff and installing new ductwork, air distribution and local humidity control as appropriate in animal research area. The ductwork and terminal units serving the animal research area are at the end of their useful life. Duct liner is clogging up heating coils at an increasing rate. There have also been complaints that humidity control in specific areas cannot be maintained at different setpoints.

**Implementation Cost**
Replacing the HVAC system in Dr. Mandrell’s area will cost approximately **$1,135,000**.

**FIM 3:** Plan space and HVAC for low temperature freezers.

**Implementation Cost**
A study to determine the scope of changes needed will cost approximately **$15,000**.

**FIM 4:** Consider separating boilers from other equipment and adding fan coil units to equipment room. Equipment room is hot which reduces equipment service life.

**Implementation Cost**
Adding a separating wall and fan coil units will cost approximately **$50,000**.
2242 - 910 Madison Building:

The building is a 125,700 SF ten story building. The building is 50 years old. The building is served by two large VAV air handling units located in the basement. The air handling units have chilled water coils with 2-way control valves. The heating coils have 3-way control valves with inline pumps. The air handling unit supply airflow is controlled by a VFC which varies airflow based on demand. The air handling units serve VAV and constant volume terminals on each floor. Approximately 60% of the existing terminals are constant volume type with pneumatic controls. The VAV terminals that have been updated have hot water reheat coils. The south air handling unit preheat coil has a damaged header. The coil is inoperable. The two large air handling units have economizer controls which are inoperable.

The building heat was originally provided by fin-tube radiation at the building perimeter. The fin tube radiation was served by a pump that provided hot water to the fin-tube radiation and the preheat coils in the air handling units. The preheat coils are not used at this time because the economizer cycle is not operated. This system has numerous problems including leaking fin-tube units, units with corroded coils that block water circulation and leaking piping. The system has been abandoned in place. The Concourse fin-tube radiation has been connected to the 920 Madison heating system.

Heating is now provided by VAV terminals units with hot water reheat coils. Hot water is provided by a steam-to-water heat exchanger. Two hot water pumps do not have VFCs to modulate flow based on demand.

Chilled water is provided from the 900 Building Complex Central Chilled Water Plant. There are no secondary pumps in the 910 Madison Building.

Temperature controls for the HVAC system are connected to the Campus BMS.

The building HVAC systems operate 24 hours a day, seven days a week.

The domestic water system includes a duplex booster pumping package with variable speed pump controls and a local pressure transducer.

Domestic hot water is provided by steam-to-water heat exchangers. There is a recirculating pump that maintains constant domestic water temperature.

**ECM 1: Add VFCs to the two hot water reheat pumps.** Replace motors with motors compatible with VFCs.

**Implementation Cost**
Adding VFCs to hot water reheat pumps, replacing motors and replacing control valves will cost approximately $235,000.

**ECM 2: Incorporate an unoccupied sequence to the building controls that will allow setback and set up of building temperatures during unoccupied times.**

**Implementation Cost**
Modifying controls to incorporate night setback will cost approximately $5,000.
**ECM 3:** Activate the economizer cycle on the two large air handling units. Verify all outside air dampers including economizer dampers operate properly. When economizer cycle is activated, radiant heating pump shall be activated or AHUs shall be added to new hot water system described in FIM 1.

**Implementation Cost**
Replacing economizer dampers and activating economizer cycle will cost approximately $30,000.

**ECM 4:** Replace pneumatic temperature controls with DDC controls.

**Implementation Cost**
Replacing pneumatic VAV controls with DDC controls (approximately 60% of total) will cost approximately $378,000.

**ECM 5:** Evaluate converting constant volume terminal units to VAV terminal units.

**Implementation Cost**
Replacing constant volume terminal units with VAV terminal units (approximately 60% of total) will cost approximately $756,000.

**FIM 1:** Evaluate the capacity of the steam-to-water heat exchanger and hot water pumps serving terminal units. As new terminal units with reheat are added to the existing system, the heating load will exceed the existing system capacity. Provide pumps with VFCs.

**Implementation Cost**
Replacing the hot water system including the heat exchanger, pumps, and hot water risers will cost approximately $192,000.

**FIM 2:** Repair south air handling unit preheat coil. Connect the air handling unit preheat coils to the terminal unit heat exchanger if capacity is available or reactivate radiant heating system pump.

**Implementation Cost**
Replacing preheat coil will cost approximately $30,000.

**FIM 3:** Consider replacing two large built-up air handling units located in the basement. Air handling units are at the end of their useful life.

**Implementation Cost**
Replacing the built-up air handling units will cost approximately $1,138,000.
2275 - 920 Madison Building and Madison Plaza:

The 920 building is a 125,700 SF ten story building. The building is 40 years old. The attached Plaza building is 73,000 SF and is served from the 920 building mechanical systems. The buildings are served by two sets of air handling units in the basement. AHU-1 and AHU-2 are cooling only units that serve VAV terminals on each floor. AHU-1 and AHU-2 cooling coils have 2-way control valves that vary the flow based on cooling demand. AHU-3 and AHU-4 are heating only units with steam heating coils that serve perimeter reheat terminal units. All four air handling units have VFCs which vary airflow based on demand. AHU-1 and AHU-2 have economizer controls which are inoperable. The cooling coils in AHU-1 are plugged and cannot be cleaned.

There is one perimeter VAV terminal unit per exposure on each floor which is difficult to control. Existing terminal unit controls are pneumatic. As the building is renovated these terminals are being replaced by VAV terminals with hot water reheat coils and DDC controls. These units are connected to the cooling only air handling units, AHU-1 and AHU-2.

The cooling only terminal units serving the original building are VVT system powered units that are slot type air distribution devices with a bladder inside the slot that expands and contracts based on cooling requirements. There are still some of these devices in the building. They are obsolete units and cannot be repaired. They also consume more energy than a VAV terminal. These VVT units are being replaced as tenant spaces are being renovated.

The second and third floors are served by VAV terminals with electric reheat. The Plaza Concourse seating areas are served by terminals with electric heat and pneumatic controls.

Chilled water is provided from the 900 Building Complex Central Chilled Water Plant. There are no secondary pumps in the 920 Madison Building.

The original hot water system was replaced in 2013 with a system consisting of a steam-to-water heat exchanger and variable flow hot water pumps. New pipe risers, sized to serve all heating needs, were installed in the existing pipe chase. All new and existing VAV terminal reheat units are connected to the new heating system.

Temperature controls for the HVAC system are connected to the campus BMS.

The building HVAC systems operate 24 hours a day, seven days a week.

The domestic water system includes a simplex booster pump controlled by a VFC with a local pressure transducer.

Domestic hot water is provided by a steam-to-water heat exchanger. There is a recirculating pump that maintains constant domestic water temperature.

**ECM 1:** Activate economizer controls on AHU-1 and AHU-2. Verify all outside air dampers including economizer dampers operate properly.

**Implementation Cost**
Replacing economizer dampers and activating economizer cycle will cost approximately $30,000.
**ECM 2:** Incorporate an unoccupied sequence to the building controls that will allow setback and setup of building temperatures during unoccupied times.

**Implementation Cost**
Modifying controls to incorporate night setback will cost approximately **$5,000.**

**ECM 3:** Eliminate electric reheat on the second and third floors and Plaza Concourse by replacing terminals with VAV terminals with hot water reheat.

**Implementation Cost**
Replacing electric heat VAV terminal units will cost approximately **$486,000.**

**ECM 4:** Continue replacing all original cooling only VVT units and original perimeter terminals. When renovations are complete remove AHU-3 and AHU-4. Include DDC controls on new terminal units.

**Implementation Cost**
Replacing VVT units and perimeter terminal units with VAV terminal units with reheat will cost approximately **$1,554,000.** Demolition of AHU-3 and AHU-4 will cost approximately **$20,000.**

**ECM 5:** Replace outdated temperature controls with DDC controls.

**Implementation Cost**
Replacing VAV terminal unit controls for 25% of the terminal units will cost approximately **$255,000.**

**FIM 1:** Replace cooling coils in AHU-1.

**Implementation Cost**
Replacing the cooling coils will cost approximately **$50,000.**

**FIM 2:** Consider replacing two large built-up air handling units located in the basement. Air handling units are at the end of their useful life.

**Implementation Cost**
Replacing the built-up air handling units will cost approximately **$840,000.**
**2243 - 930 Madison Building:**

The building is a 188,500 SF eight story building. The building is 25 years old. The building is served by air handling units located on each floor. Typically, the air handling units are VAV units with VFCs that vary flow based on demand. The air handling units are connected to VAV terminal units. Air handling unit cooling coils have 2-way controls valves that modulate based on demand.

The penthouse houses a gas fired steam boiler system that has four steam boilers that are operated in sequence to provide steam for the entire Madison Building complex. The system is currently operated to maintain 50 to 60 PSIG steam pressure. The system has the capability to setback steam pressure at night, but this feature is not being implemented now. The boiler Hawk controllers that control firing rate are obsolete. There is a steam-to-hot water heat exchanger in the penthouse that provides hot water for the 930 Madison Building. Two hot water pumps controlled form VFCs provide hydronic hot water to VAV terminals and air handling unit hot water coils in the building.

Chilled water is provided from the 900 Building Complex Central Chilled Water Plant or a water cooled chiller located in the basement. Currently the 930 Madison Building is served from the Central Plant Chiller System and the basement chiller is a back-up chiller. The water cooled chiller is served by a cooling tower located on the roof of the building. The cooling tower also provides cooling for the emergency generator through a condenser water heat exchanger. The cooling tower is reported to be in poor condition and should be replaced as soon as possible. This system has a waterside economizer plate and frame heat exchanger that operates at night when the outside air temperature is below 40ºF. The water side economizer is used for the 930 Madison Building. Shut-off valves isolate the 930 Building from the central plant when the economizer is activated.

There is an air-cooled chiller on the roof that provides back-up cooling for the seventh floor. The air cooled chiller is not operable at this time and is not connected to the Campus BMS. When it is operable it is manually operated.

The third floor Eye Clinic needs cooling 24/7 to maintain cool temperatures in the OR suites. The deadband for the waterside economizer changeover is not adequate to maintain operating room suite temperatures so chillers have to be operated for longer periods during changeover.

AHU-7 has a steam preheat coil that freezes in cold weather because proper steam pressure is not being maintained. The AHU access door is left open to prevent freezing.

The building HVAC systems operate 24 hours a day seven days a week.

The domestic water system includes a duplex booster pumping package with a lead-lag constant speed pump arrangement.

Domestic hot water is provided by a steam-to-water heat exchanger. There is a heat tracing system that maintains constant domestic water temperature.

**ECM 1: Incorporate night setback steam pressure in Boiler Plant.**

**Implementation Cost**

Modifying controls to incorporate night steam pressure setback will cost approximately $5,000.
**ECM 2:** Provide airside economizer cycle for the Third Floor Eye Clinic air handling unit. This will eliminate need for chiller operation in temperatures below 55°F outside air temperatures.

**Implementation Cost**
Adding an airside economizer to the air handling unit will cost approximately $40,000.

**ECM 3:** Incorporate an unoccupied sequence to the building controls that will allow setback and set up of building temperatures during unoccupied times.

**Implementation Cost**
Modifying controls to incorporate night setback will cost approximately $5,000.

**ECM 4:** Replace pneumatic temperature controls with DDC controls.

**Implementation Cost**
Replacing pneumatic VAV controls with DDC controls (approximately 60% of total) will cost approximately $659,000.

**FIM 1:** Replace damaged cooling tower on roof.

**Implementation Cost**
Replacing the cooling tower will cost approximately $280,000.

**FIM 2:** Add air cooled chiller to Campus BMS.

**Implementation Cost**
Modifying controls and adding sensors to add chiller to Campus BMS will cost approximately $5,000.

**FIM 3:** Investigate steam pressure issue and resolve so that proper operation of AHU-7 preheat coil can be obtained with all access doors shut.

**Implementation Cost**
The cost of the repair will depend on the system diagnosis. Replacement of a steam control valve will cost approximately $5,000.

**FIM 4:** Replace obsolete Phoenix controls.

**Implementation Cost**
Upgrading 10 Phoenix control air valves will cost approximately $27,000.
Madison Building Complex Central Chilled Water Plant:

The Central Plant serves the 910, 920 and 930 buildings. System components include:

1. Two centrifugal chillers.
2. Two constant volume primary chiller water pumps.
3. Two water-cooled cooling towers with cooling tower fans controlled through VFCs.
4. Two chilled water secondary pumps controlled through VFCs.

The chiller plant control system is connected to the campus BMS. The central plant is shut off at outside air temperatures below 40°F. Although the 910 and 920 building airside economizers are not operational, the existing outside air dampers are old and have high leakage rate. The 930 building chilled water system is isolated from the central plant at temperatures below 40°F and the waterside economizer is operated.

**ECM 1: Evaluate using chiller optimization program that evaluates all components maximum efficiency points of operation.**

**Implementation Cost**

Chiller optimization program and installation will cost approximately $15,000.
2180 - Physical Plant Building:

The building is a 33,900 SF two story building. The building is 41 years old. The offices are served by packaged rooftop units with gas heat. A D-X split system air condition unit serves the HVAC shop and office area. Storage areas are heated using hot water unit heaters. Hot water is provided by a gas fired water tube boiler located in a second floor mechanical room. An inline pump distributes hot water to the unit heaters. There are several duct mounted electric heaters that provide zone control for office spaces and one electric unit heater in the first floor storage area. The Biomedical area and part of the first floor storage area is served by a D-X split system air conditioning unit. The Biomedical area has a welding hood. There is a welding hood in the second floor HVAC shop. Makeup air is not provided for the welding hoods. The stock room is served by a D-X split system air conditioning unit.

Building has pneumatic temperature controls on boiler and programmable thermostats for rooftop units and split systems.

Domestic hot water is provided by an electric storage type water heater. There is a recirculating pump to maintain constant domestic water temperature.

**ECM 1: Replace hot water boiler with gas fired condensing boiler.**

**Implementation Cost**
Replacing the hydronic boiler will cost approximately $100,000.

**ECM 2: Replace all electric heat with hot water heat.**

**Implementation Cost**
Replacing ten electric duct heating coils with hot water coils including piping and controls will cost approximately $40,000.

**ECM 3: Evaluate providing make-up air for welding hoods.** Consider amount of time hoods are in operation and capacity of hood fans.

**Implementation Cost**
A study to determine the scope of changes needed will cost approximately $7,500.
2606 - 740 Court Building:

The building is a 10,000 SF one story building. The building is 46 years old. The building is served by four constant volume D-X gas-fired rooftop units, two ductless D-X split systems and one standard D-X split system.

Rooftop units and split systems are controlled by programmable thermostats.

Domestic water is provided by an electric storage type water heater.

**ECM 1: Program thermostats to include unoccupied temperature set back.**

**Implementation Cost**
A service call for thermostat programming will cost approximately $150.
**2182 - Pauline Annex:**

The Pauline Annex Building is a one story structure. The building is served by two constant volume DX rooftop units with electric heat.

Rooftop units are controlled by programmable thermostats.

Domestic water is provided by an electric storage type water heater.

**ECM 1: Program thermostats to include unoccupied temperature set back.**

**Implementation Cost**
A service call for thermostat programming will cost approximately $150.
2167 - Boling Center for Developmental Disabilities:

The building is a 160,000 SF six story building with two basement levels and ground level. The building is 50 years old. The building has a central plant that includes two water-cooled chillers, one cooling tower and three gas-fired atmospheric hydronic boilers. Temperature controls are a combination of DDC and pneumatic.

The chilled water system is a primary/secondary arrangement. The secondary chilled water pumps are controlled through a VFC to vary chilled water flows to meet demand at air handling units. The primary chilled water loop pumps maintain constant flow through the chillers.

The hot water boilers provide hot water for variable volume terminal unit reheat coils, air handling unit heating coils and radiant heating. Hot water for reheat coils and AHU heating coils is distributed to the building with two constant speed hot water pumps. Hot water for radiant heating is distributed to the building with one constant speed hot water pump. The hot water system includes a pneumatic differential pressure sensor and 3-way bypass to maintain flow.

The south area of the building is served by four VAV air handling units located on level 3. AHU-1, AHU-2, AHU-3 and AHU-4 are cooling only units and include a return air fan and an economizer cycle. AHU-1, AHU-2, AHU-3 and AHU-4 supply and return fans are controlled with VFCs to vary airflow based on demand. The north area of the building is served by two air handling units located in the basement and two air handling units located on level 2. AHU-5 and AHU-6 are VAV air handling units with a preheat coil, cooling coil and an economizer cycle. AHU-5 and AHU-6 supply fans are controlled with a VFC to vary airflow based on demand. AHU-7 and AHU-8 are constant volume cooling only air handling units and include a supply fan controlled by a VFC (100% speed) located in the generator room and an economizer cycle. AHU 1-6 cooling and heating coils have 2-way control valves to provide variable flow. AHU-7 & 8 have 3-way control valves with the bypass valved off. Floor areas served from AHUs 1-6 include VAV terminal units located on each floor with hot water reheat coils and two-way valves. The one story northeast area of the building is served by AHU-7 and AHU-8 and includes constant volume boxes with hot water reheat coils in the ductwork system. AHU-7 and AHU-8 are in poor condition.

Domestic water is provided by one gas fired atmospheric storage type water heater connected to two auxiliary storage tanks with constant speed inline circulator pumps. Two recirculating pumps controlled by aquastats maintain constant domestic water temperature in the building.

**ECM 1:** Evaluate replacing AHU-7 and AHU-8 systems with VAV system.

**Implementation Cost**
Replacing AHU-7 and AHU-8 with VAV systems will cost approximately $155,000.

**ECM 2:** Replace hydronic boilers with high efficiency boilers.

**Implementation Cost**
Replacing the hydronic boilers will cost approximately $234,000.

**ECM 3:** Replace gas fired water heater with high efficiency water heaters.

**Implementation Cost**
Replacing the atmospheric water heater with a condensing water heater will cost approximately $40,000.
**ECM 4:** Replace pneumatic temperature controls with DDC controls.

**Implementation Cost**
Replacing VAV terminal unit controls will cost approximately **$543,000.**

**ECM 5:** Add VFC to the radiant hot water pump. Replace motor with motor compatible with VFC. Close hot water coil 3-way valve bypass or replace with 2-way valve on equipment except where located at the end of a main.

**Implementation Cost**
Adding VFC to hot water pump, replacing the motor and replacing control valves will cost approximately **$43,000.**

**ECM 6:** Add VFCs to the two reheat hot water pumps. Replace motors with motors compatible with VFCs. Close hot water coil 3-way valve bypass or replace with 2-way valve on equipment except where located at the end of a main.

**Implementation Cost**
Adding VFCs to hot water pumps, replacing motors and replacing control valves will cost approximately **$540,000.**

**FIM 1:** Replace AHU-7 and AHU-8. AHU-7 and AHU-8 are in poor condition and are located in mechanical rooms with limited access. Consider relocating units to more accessible location.

**Implementation Cost**
Replacing AHU-7 and AHU-8 will cost approximately **$56,000.** Study to determine more accessible location will cost approximately **$15,000.**

**FIM 2:** Replace VAV terminal units that are in poor condition.

**Implementation Cost**
Replacing VAV terminal units that are in poor condition (approximately 50%) will cost approximately **$744,000.**

**FIM 3:** Remove abandoned boiler from boiler room.

**Implementation Cost**
Removal of abandoned boiler and pad will cost approximately **$3,000.**

**FIM 4:** Evaluate cooling tower capacity. Cooling tower is not adequate for chiller capacity.

**Implementation Cost**
Replacing the cooling tower will cost approximately **$226,000.**
**Campus Central Heating and Cooling Plants:**

In discussions with UT maintenance staff it was noted that there are no up to date plans that show the entire chilled water and steam distribution systems. As buildings are renovated and new buildings added these changes are not documented and the effects on the distribution system are not known. Also the chilled water system has never been balanced at the building level.

It is recommended that UT initiate an effort to document all chilled water and steam usages connected to the chilled water and steam systems and prepare diagrams that show pipe sizes and flows to all buildings connected to the two systems. Also a test and balance of the chilled water distribution system is recommended that will verify proper flows to each building.
Global ECMs and FIMs:

**ECM 1:** The Van Vleet, Student Alumni Center, Dunn Dental, Molecular Science and Hyman buildings are served by obsolete mechanical systems. Consider an equipment replacement project that would provide a new HVAC system appropriate for the building usage.

**Implementation Cost**
- Van Vleet $3,246,000.
- Student Alumni Center $3,670,800.
- Dunn Dental $7,109,850.
- Molecular Science $5,489,000.
- Hyman $1,780,975.

**ECM 2:** When an existing building’s entire control system is changed to DDC controls, consider controlling AHU supply (and return) fan VFCs utilizing the most open air valve strategy.

**Implementation Cost**
Modifying controls will require a software change that will cost approximately $5,000.

**ECM 3:** When an existing building’s entire control system is changed to DDC controls, consider controlling pump VFCs utilizing the most open control valve strategy.

**Implementation Cost**
Modifying controls will require a software change that will cost approximately $5,000.

**ECM 4:** Evaluate using low flow fume hoods with laboratory VAV controls in buildings with large quantities of fume hoods. The use of low flow fume hoods will require UT staff and fume hood suppliers input. Low flow fume hoods will impact HVAC design. The use of low flow hoods will impact the lab equipment budget.

**ECM 5:** Utilize unoccupied sequences wherever practical.

**Implementation Cost**
Cost will depend on building control system features.

**FIM 1:** Phoenix valves installed in Wittenborg, Johnson, Van Vleet and 930 Madison will be obsolete soon. Retrofit buildings with new Phoenix terminal units and controls.

**Implementation Cost**
Upgrading 269 Phoenix control air valves will cost approximately $726,300.
Electrical System Summaries and Recommendations

2113 - Van Vleet Cancer Center:

The building is a 81,150 SF three story building. The original structure was built in 1950 and a new addition was built approximately 20 years ago. There are two 120/208 volt services, one on the south side and one on the north side of the building.

The lighting fixtures in the original building are 2’x4’ troffers and striplights with T12 fluorescent lamps, and old incandescent type fixtures with A19 bulbs or with spiral fluorescent lamps (in the basement level). In the newer part of the building, most rooms have 2’x4’ lensed and parabolic troffers with T8 and T12 fluorescent lamps. Downlights with metal halide lamps are installed in Lobby N199A. On the third floor in Corridor C399A, C399C and in Restrooms C347 and C348, original T12 lamp fixtures have been replaced with new LED type recessed 1’x4’ lights. Manual toggle type switches are used to control lighting in all spaces in the building. There is no automatic control of existing lighting in the building.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. **We recommend that occupancy sensors be added in common areas, offices, labs, storage rooms, corridors, and restrooms.** This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (140) ceiling mounted sensors with power packs and (90) wall mounted sensors will cost approximately $49,000.

**Payback**
The payback for installing occupancy sensors is 3-5 years.

**ECM 2: Replace existing lighting fixtures furnished with fluorescent, A19 and metal halide lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved on maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant savings in energy and maintenance cost. **We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.**

**Implementation Cost**
Replacing existing fixtures with LED type fixtures will cost approximately $145,820.

**Payback**
The payback for installing LED fixtures is 8-10 years.
ECM 3: Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures. These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.

Implementation Cost
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $43,200.

Payback
The payback for installing T8 LED tubes is 3 years.
2165 - Student-Alumni Center:

The building is a 104,880 SF three story building. The building is 45 to 50 years old and constructed as a three story wing and a two story recreational wing connected by a covered walkway. Electrical service is 277/480 volt and serves 3000 Amp main distribution switchboard.

The lighting fixtures in the building are 2’x4’ and 2’x2’ lensed troffers with T12 and T8 fluorescent lamps in Locker Rooms, Gym, Restrooms, Corridors and in some Offices; downlights with screw-in LED bulbs in Auditorium, Lobbies, Stairwells, some Corridors and some Offices; indirect LED fixtures in Pool; direct LED high bay type fixtures in Basketball Gym: downlights with CF type lamps in a few Offices; indirect linear LED fixture in Large Meeting Rm.; 2’x2’ fluorescent fixtures in Basketball Courts; striplights with T12 lamps in Mechanical/Electrical Rooms and Storages. Manual toggle type switches are used to control lighting in all spaces in the building. There is no automatic control of existing lighting in the building.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. We recommend that occupancy sensors be added in common areas, locker rooms, offices, gyms, basketball courts, storage rooms, corridors, and restrooms. This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (150) ceiling mounted sensors with power packs and (42) wall mounted sensors will cost approximately $44,880.

**Payback**
The payback for installing occupancy sensors is 3-5 years.

**ECM 2: Replace existing lighting fixtures furnished with fluorescent, A19 and metal halide lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved on maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant savings in energy and maintenance cost. We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.

**Implementation Cost**
Replacing existing fixtures with LED type fixtures will cost approximately $57,500.

**Payback**
The payback for installing LED fixtures is 8-10 years.
**ECM 3:** Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures. These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**

**Implementation Cost**
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $15,000.

**Payback**
The payback for installing T8 LED tubes is 3 years.
2109 - Johnson Building:

The building is a 73,875 SF five story building built in 1946. There is a mechanical room located in the basement. Electrical service is 277/480 volt and serves 2500 Amp main switchgear.

Existing light fixtures are 2’x4’ lensed troffers with T8 fluorescent lamps in 90% of the rooms. Some fixtures still have T12 lamps. Mechanical and electrical rooms have striplights with T12 lamps. One area of approx. 1000 SF on the first floor has new LED fixtures. All corridors and most rooms have wall or ceiling mounted occupancy sensors for lighting control in these spaces. Manual toggle type switches are used in mechanical and electrical rooms.

**ECM 1:** Replace existing lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures. LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant savings in energy and maintenance cost. **We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.**

**Implementation Cost**
Replacing existing fixtures with LED type fixtures will cost approximately $161,000.

**Payback**
The payback for installing LED fixtures is **8-10 years.**

**ECM 2:** Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures. These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**

**Implementation Cost**
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $42,000.

**Payback**
The payback for installing T8 LED tubes is **3 years.**
2101 - Hyman Administration Building:

The building is a 50,885 SF five story building. The building is 60+ years old. Electrical service is 120/208 volt and serves new 2000 Amp main distribution switchgear.

The lighting fixtures in the building are 2’x4’ lensed troffers retrofitted with (2) T8 LED tubes and with bypassed ballasts. One area of approx. 300 SF on the second floor has new 2’x2’ LED fixtures. Manual toggle type switches are used to control lighting in all spaces in the building. There is no automatic control of existing lighting in the building.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. We recommend that occupancy sensors be added in common areas, offices, storage rooms, corridors, and restrooms. This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (90) ceiling mounted sensors with power packs and (35) wall mounted sensors will cost approximately $28,300.

**Payback**
The payback for installing occupancy sensors is 3-5 years.
2110 - Dunn Building:
The building is a 129,270 SF five story building. The building is 40+ years old. Electrical service is 277/480 volt and serves 4000 Amp main distribution switchgear.

Original 2’x4’ troffers with T12 lamps were recently replaced with new 2’x4’ basket type fixtures furnished with T8 lamps in many spaces on all floors. Lighting in two areas on the first floor (approx. 4,000 SF) and in one area on the third floor (approx. 2,000 SF) was updated with new LED troffers. Some spaces on all levels still have original 2’x4’ fixtures with T12 or T8 lamps: 60% of square footage on the first floor, 65% on the second floor, 40% on the third floor, 15% on the fourth floor and 40% on the fifth floor. Manual toggle type switches are used to control lighting in most spaces in the building. Lights in corridors are controlled by low voltage switches through relays. There is no automatic control of existing lighting in the building except in one 2,000 SF renovated area with LED fixtures on the third floor where occupancy sensors were recently installed.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. We recommend that occupancy sensors be added in common areas, offices, labs, storage rooms, corridors, and restrooms. This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (280) ceiling mounted sensors with power packs and (150) wall mounted sensors will cost approximately $93,800.

**Payback**
The payback for installing occupancy sensors is 3-5 years.

**ECM 2: Replace existing old lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant savings in energy and maintenance cost. We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.

**Implementation Cost**
Replacing existing fixtures with LED type fixtures will cost approximately $144,601.

**Payback**
The payback for installing LED fixtures is 8-10 years.
**ECM 3:** Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures. These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**

**Implementation Cost**
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately **$70,782**.

**Payback**
The payback for installing T8 LED tubes is **3 years**.
2129 - Molecular Sciences Building:

The building is a 99,800 SF eight story building. The building is 60+ years old. Electrical service is 120/208 volt service.

The lighting fixtures in the building are 2’x4’ lensed troffers retrofitted with T8 LED tubes and drivers. Manual toggle type switches are used to control lighting in all spaces in the building. There is no automatic control of existing lighting in the building.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. We recommend that occupancy sensors be added in common areas, offices, labs, storage rooms, corridors, and restrooms. This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (180) ceiling mounted sensors with power packs and (140) wall mounted sensors will cost approximately $66,400.

**Payback**
The payback for installing occupancy sensors is 3-5 years.
2103 - Wittenborg Anatomy Building:

The building is a 61,000 SF five story building with storage rooms on the sixth floor. The building is 90 years old. Electrical service is 120/208 volt and serves 3000 Amp main switchgear.

Existing light fixtures are 2’x4’ lensed troffers with T12 fluorescent lamps on the first floor and with T8 lamps on the upper floors. Mechanical and electrical rooms have striplights with T12 lamps. All corridors and most rooms on levels two through five have wall or ceiling mounted occupancy sensors for lighting control in these spaces. Manual toggle type switches are used in mechanical and electrical rooms, on the first floor and on level six. Animal rooms on the first floor have timers to control lights.

**ECM 1: Replace existing lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant savings in energy and maintenance cost. **We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.**

**Implementation Cost**
Replacing existing fixtures with LED type fixtures will cost approximately $138,000.

**Payback**
The payback for installing LED fixtures is **8-10 years.**

**ECM 2: Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures.** These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**

**Implementation Cost**
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $36,000.

**Payback**
The payback for installing T8 LED tubes is **3 years.**
2181 - Doctor’s Office Building:

The building is a 83,730 SF six story building. The building is 40 years old. Electrical service is 277/480 volt and serves 2000 Amp main distribution switchgear.

Existing light fixtures are 2’x4’ lensed troffers with T8 or T12 fluorescent lamps in 90% of the rooms. Newer 2’x4’ basket type troffers with T8 lamps are installed in one 1,200 SF space on the first floor. Mechanical and electrical rooms have striplights with T12 lamps. Manual toggle type switches control lights in all rooms. There are no controls for lighting fixtures in corridors, as circuit breakers in panelboard control lights.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. **We recommend that occupancy sensors be added in common areas, offices, storage rooms, corridors, and restrooms.** This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**

Installing (180) ceiling mounted sensors with power packs and (210) wall mounted sensors will cost approximately $76,200.

**Payback**

The payback for installing occupancy sensors is **3-5 years.**

**ECM 2:** Replace existing lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures. LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant savings in energy and maintenance cost. **We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.**

**Implementation Cost**

Replacing existing fixtures with LED type fixtures will cost approximately **$184,000.**

**Payback**

The payback for installing LED fixtures is **8-10 years.**

**ECM 3:** Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures. These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**
Implementation Cost
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $49,200.

Payback
The payback for installing T8 LED tubes is 3 years.
**2125 - Cancer Research Building:**

The building is a 104,000 SF four story building. The building is 10 years old. There is a mechanical room located in the basement. Electrical service is 277/480 volt and serves 3000 Amp main distribution switchgear.

Existing light fixtures are 2’x4’ parabolic and lensed troffers with T8 fluorescent lamps in 85% of the rooms and spaces on the first, second and third floor. Large and small meeting rooms on the first floor and all elevator lobbies have downlights with incandescent lamps. Mechanical space in the basement and open space on level four have striplights furnished with T8 lamps. Manual toggle type switches control lights in almost all rooms and spaces. Rooms in animal suite have wall mounted occupancy sensors and timer switch.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. We recommend that occupancy sensors be added in common areas, offices, labs, storage rooms, corridors, and restrooms. This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (140) ceiling mounted sensors with power packs and (80) wall mounted sensors will cost approximately $47,600.

**Payback**
The payback for installing occupancy sensors is **3-5 years**.

**ECM 2: Replace existing fluorescent T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures.** These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.

**Implementation Cost**
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $57,600.

**Payback**
The payback for installing T8 LED tubes is **3 years**.
**2116 - Coleman Building:**

The building is a 158,000 SF four story building. The building is 36 years old. Electrical service is 277/480 volt and serves 4000 Amp main distribution switchgear.

Approximately 60% of all rooms and spaces in the building have 2’x4’ lensed troffers with T12 fluorescent lamps. On the second and third floors, all rooms on the perimeter and adjacent corridors have newer 2’x4’ lensed troffers with T8 fluorescent lamps. Two auditoriums and a few smaller rooms on the first floor have downlights with incandescent lamps. Mechanical and electrical rooms have striplights with T12 lamps. Manual low voltage and line voltage toggle type switches control lights in all rooms and spaces. Rooms in animal suite have timer switches.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. **We recommend that occupancy sensors be added in common areas, offices, classrooms, labs, storage rooms, corridors, and restrooms.** This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (270) ceiling mounted sensors with power packs and (320) wall mounted sensors will cost approximately $115,000.

**Payback**
The payback for installing occupancy sensors is **3-5 years.**

**ECM 2: Replace existing lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant savings in energy and maintenance cost. **We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.**

**Implementation Cost**
Replacing existing fixtures with LED type fixtures will cost approximately $253,000.

**Payback**
The payback for installing LED fixtures is **8-10 years.**

**ECM 3: Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures.** These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp
replacement cost as well as additional savings due to reduced cooling loads. We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.

Implementation Cost
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $90,000.

Payback
The payback for installing T8 LED tubes is 3 years.
**2242 - 910 Madison Building:**

The building is a 125,700 SF ten story building. The building is 50 years old. Electrical service is 277/480 volt and serves 3000 Amp main distribution switchgear.

There is a variety of older and newer types of lighting fixtures in the building. On the first floor, most rooms have newer fixtures: 2’x2’ basket type troffers with T8 lamps and 2’x2’ LED troffers. A few rooms still have 2’x4’ troffers and striplights with T12 lamps. On the second, third and fourth floors, newer 1’x4’ pendant mounted direct/indirect fixtures with T8 lamps are in most rooms. All corridors have old 2’x2’ parabolic troffers with T12 lamps. On levels five through ten, most rooms have 2’x4’ and 2’x2’ lensed troffers with T12 and T8 lamps. There are several areas, on levels seven, nine and ten, which have been recently renovated with new fluorescent type lights. Mechanical and electrical rooms have striplights with T12 lamps. Manual toggle type switches are used to control lighting in most spaces in the building. Lights in corridors are controlled by circuit breakers in panelboards. There is no automatic control of existing lighting in the building except in several rooms on level ten. These rooms have wall mounted occupancy sensors.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. We recommend that occupancy sensors be added in common areas, offices, storage rooms, corridors, and restrooms. This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**

Installing (250) ceiling mounted sensors with power packs and (450) wall mounted sensors will cost approximately $137,000.

**Payback**

The payback for installing occupancy sensors is **3-5 years.**

**ECM 2: Replace existing old lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant saving in energy and maintenance cost. We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.

**Implementation Cost**

Replacing existing fixtures with LED type fixtures will cost approximately $147,430.

**Payback**

The payback for installing LED fixtures is **8-10 years.**
ECM 3: Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures. These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.

Implementation Cost
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $66,000.

Payback
The payback for installing T8 LED tubes is 3 years.
2275 - 920 Madison Building:

The building is a 125,700 SF ten story building. The building is 40 years old. Electrical service is 277/480 volt and serves 4000 Amp main distribution switchgear.

There is a variety of older and newer types of lighting fixtures in the building. Most rooms and spaces have 2’x4’ and 2’x2’ lensed troffers with T8 lamps. Many areas on all floors have been renovated with newer lensed troffers having T8 lamps. Some rooms still have older troffers and striplights with T12 lamps. Elevator lobbies and adjacent corridors on all floors have old 2’x2’ parabolic troffers with T12 lamps. Mechanical and electrical rooms have striplights with T12 lamps. Manual toggle type switches are used to control lighting in most spaces in the building. Lights in corridors on several floors are controlled by circuit breakers in panelboards. There is no automatic control of existing lighting in the building.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. *We recommend that occupancy sensors be added in common areas, offices, storage rooms, corridors, and restrooms.* This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**

Installing (260) ceiling mounted sensors with power packs and (360) wall mounted sensors will cost approximately **$118,000.**

**Payback**

The payback for installing occupancy sensors is **3-5 years.**

**ECM 2: Replace existing old lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant saving in energy and maintenance cost. *We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.*

**Implementation Cost**

Replacing existing fixtures with LED type fixtures will cost approximately **$138,000.**

**Payback**

The payback for installing LED fixtures is **8-10 years.**

**ECM 3: Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures.** These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to
use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**

**Implementation Cost**
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $72,000.

**Payback**
The payback for installing T8 LED tubes is 3 years.
2243 - 930 Madison Building:

The building is a 188,500 SF eight story building. The building is 25 years old. Electrical service is 277/480 volt and serves 4000 Amp main distribution switchgear.

Most rooms and spaces have 2’x4’ and 2’x2’ lensed troffers with T12 and T8 lamps. Some areas on several floors have been renovated with newer lensed troffers having T8 lamps. 2’x2’ parabolic troffers with U-lamps are installed in corridors on level five. Also, some rooms on all levels have 2’x4’ parabolic troffers with T12 lamps. Atrium on levels 5-6 has metal halide downlights. T12 fluorescent cove lights are installed in elevator lobbies on all floors. Some rooms and spaces on levels two through eight have downlights with CF lamps. Mechanical and electrical rooms have striplights with T12 lamps. Manual toggle type switches are used to control lighting in all spaces in the building. There is no automatic control of existing lighting in the building.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. We recommend that occupancy sensors be added in common areas, offices, labs, storage rooms, corridors, and restrooms. This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (310) ceiling mounted sensors with power packs and (330) wall mounted sensors will cost approximately $126,800.

**Payback**
The payback for installing occupancy sensors is **3-5 years**.

**ECM 2: Replace existing old lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant saving in energy and maintenance cost. We recommend replacing existing fixtures in areas with 25 years old fixtures with new LED lights.

**Implementation Cost**
Replacing existing fixtures with LED type fixtures will cost approximately **$387,550**.

**Payback**
The payback for installing LED fixtures is **8-10 years**.

**ECM 3: Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures.** These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to
use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**

**Implementation Cost**
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $96,000.

**Payback**
The payback for installing T8 LED tubes is 3 years.
2120 - Madison Plaza Building:

The 73,000 SF building is a part of the 910, 920 and 930 Madison Buildings complex and serves as a lower level of all three buildings with some common area in the center of the complex.

Lighting fixtures in all rooms and spaces on the concourse level are original fluorescent 2’x4’, 2’x2’ and striplights with T12 and T8 lamps. Manual toggle type switches are used to control lighting in all spaces in the building. There is no automatic control of existing lighting in the building.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. **We recommend that occupancy sensors be added in common areas, offices, storage rooms, corridors, and restrooms.** This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (60) ceiling mounted sensors with power packs and (40) wall mounted sensors will cost approximately $21,200.

**Payback**
The payback for installing occupancy sensors is **3-5 years.**

**ECM 2: Replace existing old lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant saving in energy and maintenance cost. **We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.**

**Implementation Cost**
Replacing existing fixtures with LED type fixtures will cost approximately $167,900.

**Payback**
The payback for installing LED fixtures is **8-10 years.**

**ECM 3: Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures.** These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**
Implementation Cost
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $39,000.

Payback
The payback for installing T8 LED tubes is 3 years.
2180 - Physical Plant Building:

The building is a 33,900 SF two story building. The building is 41 years old. Electrical service is 120/208 volt and serves 1200 Amp main distribution switchgear.

Lighting fixtures are recessed fluorescent troffers in most offices and fluorescent strip lights in the shop with T12 lamps. Most rooms and spaces have 2’x4’ and 2’x2’ lensed troffers with T12 and T8 lamps. A few offices on the first floor and northern office area on the second floor have new LED recessed troffers. Manual toggle type switches control lights on the first floor and about 50% of spaces on the second floor. Offices in the northwest wing of the building have wall mounted occupancy sensors.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. **We recommend that occupancy sensors be added in common areas, offices, storage rooms, corridors, and restrooms.** This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (60) ceiling mounted sensors with power packs and (40) wall mounted sensors will cost approximately $21,200.

**Payback**
The payback for installing occupancy sensors is 3-5 years.

**ECM 2: Replace existing old lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant saving in energy and maintenance cost. **We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.**

**Implementation Cost**
Replacing existing fixtures with LED type fixtures will cost approximately $69,000.

**Payback**
The payback for installing LED fixtures is 8-10 years.

**ECM 3: Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures.** These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**
**Implementation Cost**
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $18,000.

**Payback**
The payback for installing T8 LED tubes is 3 years.
2606 - 740 Court Building:

The building is a 10,000 SF one story building. The building is 46 years old. Electrical service is 120/208 volt and serves 400 Amp main circuit breaker.

In most rooms, lighting fixtures are pendant mounted linear direct/indirect fluorescent fixtures with T8 lamps. Downlights with incandescent lamps are in the auditorium, vestibule and in a few other small rooms in the building. Manual toggle type switches control lights on all rooms. There is no automatic control of existing lighting in the building.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. **We recommend that occupancy sensors be added in common areas, offices, storage rooms, corridors, and restrooms.** This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (25) ceiling mounted sensors with power packs and (15) wall mounted sensors will cost approximately $8,600.

**Payback**
The payback for installing occupancy sensors is **3-5 years.**

**ECM 2: Replace existing old lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant saving in energy and maintenance cost. **We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.**

**Implementation Cost**
Replacing existing fixtures with LED type fixtures will cost approximately $6,900.

**Payback**
The payback for installing LED fixtures is **8-10 years.**

**ECM 3: Replace existing fluorescent T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures.** These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**
**Implementation Cost**
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $4,200.

**Payback**
The payback for installing T8 LED tubes is 3 years.
2182 - Pauline Annex Building:

The building is a small one story old building. Electrical service is 120/208 volt and serves (2) 200 Amp panels.

All rooms have 2’x4’ lensed and parabolic fluorescent troffers with T12 lamps. Downlights with incandescent lamps are in the foyer. Manual toggle type switches control lights in all rooms. There is no automatic control of existing lighting in the building.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. **We recommend that occupancy sensors be added in common areas, offices, storage rooms, corridors, and restrooms.** This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**
Installing (5) ceiling mounted sensors with power packs and (6) wall mounted sensors will cost approximately $2,140.

**Payback**
The payback for installing occupancy sensors is 3-5 years.

**ECM 2: Replace existing old lighting fixtures furnished with fluorescent lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved in maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant savings in energy and maintenance cost. **We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.**

**Implementation Cost**
Replacing existing fixtures with LED type fixtures will cost approximately $9,200.

**Payback**
The payback for installing LED fixtures is 8-10 years.

**ECM 3: Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures.** These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**
Implementation Cost
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately $2,400.

Payback
The payback for installing T8 LED tubes is 3 years.
**2167 - Boling Center for Developmental Disabilities:**

The building is a 160,000 SF six story building with two basement levels and ground level. The building is 50 years old. Electrical service is 277/480 volt and serves 4000 Amp main distribution switchboard.

Existing light fixtures are 2’x4’ lensed troffers with T12 fluorescent lamps in 90% of the rooms. Some 2’x4’ and 1’x4’ fixtures have T8 and T5 lamps. Mechanical and electrical rooms have striplights with T12 lamps and standard pendant dome type industrial fixtures with LED bulbs or with spiral fluorescent lamps. Most corridors in the building and several rooms on the ground, first and second levels have recessed downlights with CF fluorescent lamps. Elevator lobbies and a few other common spaces have recessed downlights retrofitted with LED bulbs. Several restrooms have 2’x2’ recessed troffers with U-shape T12 lamps. Two auditoriums on the basement level have recessed downlights with incandescent PAR38 type lamps. Also, incandescent type lamps are installed in fixtures in a few rooms on the upper levels. Manual toggle type switches are used to control lighting in all rooms in the building. There are no controls for lighting fixtures in corridors, as circuit breakers in panelboard control lights. A few common spaces on the first, second and fifth floors have local manual switches. There is no automatic control of existing lighting in the building.

**ECM 1: Add occupancy sensors.** Because lighting accounts for a significant portion of building energy use, occupancy sensors which can automatically turn off lighting when spaces are unoccupied are effective techniques for reducing energy use. Dual-technology occupancy sensors use both passive infrared and ultrasonic sensing to determine if a space is occupied, reducing the potential for errors in automatic lighting control. We recommend that occupancy sensors be added in common areas, offices, classrooms, storage rooms, corridors, and restrooms. This measure will allow lighting to be automatically turned off by sensors when there are no occupants in the individual spaces.

**Implementation Cost**

Installing (220) ceiling mounted sensors with power packs and (250) wall mounted sensors will cost approximately $92,200.

**Payback**

The payback for installing occupancy sensors is **3-5 years.**

**ECM 2: Replace existing lighting fixtures furnished with fluorescent and incandescent lamps with non-serviceable LED type fixtures.** LED fixtures are extremely energy-efficient and consume up to 90% less power than incandescent bulbs and up to 40% less power than fluorescent lamps. There is a dramatic decrease in energy costs. Also, money and energy is saved on maintenance and replacement costs due to the long LED lifespan (up to 100,000 hours). LEDs are made from non-toxic materials, unlike fluorescent lighting which uses mercury. LEDs are also recyclable and considered “green”. Because LED lights can be switched on and off frequently without affecting the lifetime or light emission, they are well suited to being automatically controlled by occupancy sensors. These fixtures are dimmable and not sensitive to low temperature settings. Installing LED fixtures will provide significant saving in energy and maintenance cost. We recommend replacing existing fixtures in areas with 25 years and older fixtures with new LED lights.

**Implementation Cost**

Replacing existing fixtures with LED type fixtures will cost approximately **$354,200.**

**Payback**

The payback for installing LED fixtures is **8-10 years.**
**ECM 3**: Replace existing fluorescent T12 and T8 lamps with new LED T8 UL listed tubes and bypass existing ballasts in the existing fixtures. These LED T8 lamps have been engineered to work directly on 120/277 volt circuits. 18 watt tube fits any standard 4-foot T12 socket, LED driver is built directly into the tube. Existing magnetic or electronic ballast(s) shall be removed or bypassed in order to use T8 LED tubes. Installing LED lamps will provide significant savings in energy cost and lamp replacement cost as well as additional savings due to reduced cooling loads. **We recommend replacement of T12 and T8 fluorescent lamps with new T8 LED tubes in all existing fixtures.**

**Implementation Cost**
Replacing existing T12 and T8 lamps with T8 LED tubes will cost approximately **$86,400**.

**Payback**
The payback for installing T8 LED tubes is **3 years**.
## Memo

**TO:** John Sealy  
**DATE:** 9/20/10

**FROM:** Philip J. Sawaya, Jr.  
**PROJECT:** Dunn Dental Building Improvements, UTHSC #2119/10/62

**SUBJECT:** Budget Cost Estimate  
**PROJECT NO.:** 1001F  
**COPIES:** Howard Carman, Emile David, and Bruce Stiles

### Task: Per Floor  Total

<table>
<thead>
<tr>
<th>Task</th>
<th>Per Floor</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace Air Handling Units ¹</td>
<td>$161,600</td>
<td>$808,000</td>
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<tr>
<td>Remove Heating Only Air Handling Unit</td>
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<td>$5,000</td>
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<tr>
<td>Replace Existing Heat Exchanger, Pumps, Piping ²</td>
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<td>$125,000</td>
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<tr>
<td>Replace Existing VAV Terminals with Reheat Terminals ³</td>
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<td>$1,800,000</td>
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<tr>
<td>Replace Lighting and Add Occupancy Sensors - Floors 1, 2, 3 and 5</td>
<td>$142,450</td>
<td>$569,800</td>
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<tr>
<td>New Ceiling - Floors 1, 2, 3 and 5</td>
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<td>$466,200</td>
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<td>Duct Cleaning Allowance</td>
<td>$75,000</td>
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<td>$855,600</td>
<td>$4,149,000</td>
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</table>

**Total per Floor**

**Grand Total**

- $4,149,000

### Notes:

1. Includes demolition of existing unit, new piping, electrical, new DDC Controls and new relief fans installed in existing relief air louver plenum.
2. Includes demolition of existing system, new piping mains to each floor, electrical, and new DDC controls. DDC Controls cost includes the cost of a new network controller that interfaces with the GEB BMS.
3. Includes running new hot water piping to terminals, new air distribution, demolition of existing terminals, and new DDC room sensors.
4. Costs were derived from the Coleman Building HVAC Improvements Project with 3% escalation per year for 4 years.
Memo

TO: John Sealy  
FROM: Philip J. Sawaya, Jr.  
DATE: 9/20/10  
PROJECT: Dunn Dental Building Improvements, UTHSC #2119/10/62  
PROJECT NO.: 1001F  
SUBJECT: Scope of Work Narrative  
COPIES: Howard Carman, Emile David, and Bruce Stiles

Scope of Work:

1. Replace all air handling units.*
2. Remove heating only air handling unit.
3. Replace existing steam-to-water heat exchanger, hot water pumps and hot water piping system.**
4. Replace existing variable air volume (VAV) terminal units with hot water reheat VAV terminal units.
5. Replace light fixture air distribution with ceiling mounted supply and return devices.
6. Replace lighting and ceilings on floors 1, 2, 3, and 5.
7. Add occupancy sensors where applicable.
8. Duct cleaning allowance.
9. Replace existing temperature controls with direct digital control (DDC) temperature control system.

Notes:

*New air handling units are custom units with multiple plug fans (fan array). This will allow unit modules to fit through the existing louver opening without breaking down individual sections. Utilizing a fan array system minimizes fan module size.

**A location for new equipment will have to be identified, because the existing system will have to remain in service until work on all floors is completed.
RFP EXHIBIT 3
For an Energy Service Company for the
Energy Performance Contract
UT Health Science Center
SBC No. 540/013-05-2016

PRO FORMA DELIVERY ORDER CONTRACT (DOC)

BETWEEN OWNER and
ENERGY SERVICE COMPANY (ESCo)

AGREEMENT

Made as of the <<Number, e.g. “2rd”>> day of <<Month>> in the year of <<Year Number in Words>>.

BETWEEN THE OWNER:
The University of Tennessee
5723 Middlebrook Pike, Suite 119
Knoxville, Tennessee 37996-0040

AND

THE ENERGY SERVICE COMPANY, HEREINAFTER “CONTRACTOR”:

<<Contractor Name>>
<<Contractor Address>>
<<City, State Postal Code>>
Federal Taxpayer Identification Number: <<Contractor’s Number>>

THE PROJECT:
Energy Performance Contract (DOC No.)
SBC No. 540/013-05-2016
Memphis, Tennessee

THE DESIGNER:
Designer Name
Designer Address
City, State, Postal Code

THE OWNER AND THE CONTRACTOR AGREE AS SET FORTH BELOW.
ARTICLE 1
THE WORK AND THE CONTRACT DOCUMENTS

1.1 The Contractor shall perform all the Work required by the Contract Documents for the Project identified on page one.

1.2 The Contract Documents are identified in the Conditions of the Contract (General, Supplementary, and other Conditions). These form the Contract and constitute the entire agreement between the Owner and the Contractor, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. An enumeration of the Contract Documents appears in paragraph 1.4.

1.3 Terms used in this Agreement which are defined in the Conditions of the Contract shall have the meanings designated in those Conditions.

1.4 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated as follows:

   a. The Master Contract (MC) with attachments for the Project between the Owner and the EPC dated <<DATE>> which detail the requirements and definitions regarding the Scope of Work.

   b. This Agreement.

   c. The DOC Proposal for the Project dated <<DATE>>, to the extent that it does not contradict, nullify, or revise the provisions and requirements of the Project Manual as identified herein.

   d. The Project Manual for the Project dated <<DATE>>, which includes, but is not limited to, (1) UT Division of Facilities Planning Standard Bidding and Construction Documents Divisions 00 and 01 including the General Conditions and (2) the Specifications.

   e. The Drawings for the Project as listed in the <<Project Manual Section 00 01 20 List of Drawings or DOC Proposal>> for the Project dated <<DATE>>.

   f. The portions of the following Addenda as apply to the above documents:

      1. 

      2. 
ARTICLE 2
TIME OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

2.1 The Work to be performed under this Contract shall be commenced on the date stipulated in the Notice to Proceed;

and, subject to authorized adjustments, Substantial Completion shall be achieved

2.2 Liquidated Damages, as set forth in the Conditions of the Contract, are

2.3 The Performance Period shall begin at Substantial Completion and end:

ARTICLE 3
CONTRACT SUM

3.1 The Owner shall pay the Contractor in current funds for the performance of the Work, subject to additions and deductions as provided in the Contract Documents, the Contract Sum, of

\[<<\text{CONTRACT SUM IN WORDS}}>> \text{ AND } \frac{\text{NO/100 DOLLARS}}{	ext{NO/100 DOLLARS}}<<\text{CONTRACT SUM IN NUMBERS}}\]

3.2 The Contract Sum is determined as follows is determined as follows:

3.3 The following Unit Prices will be used as specified:
This Agreement entered into as of the day and year first written above as witnessed:

BY STATE ARCHITECT:

Signature:_____________________________________________________

Ann McGauran., State Architect

BY CONTRACTOR: <<Contractor Name>>

Signature:_____________________________________________________

Name: 

Title: 

AND BY OWNER: The University of Tennessee

Signature:_____________________________________________________

Michelle L. Crowder, Interim Executive Director

Approved as to Form and Legality:

Signature:_____________________________________________________

C. Ryan Stinnett, Associate General Counsel

END OF AGREEMENT FORM for the Project titled:

Energy Performance Contract  
SBC No. 540/013-05-2016  
Memphis, Tennessee

END OF PRO FORMA DELIVERY ORDER CONTRACT
DELIVERY ORDER CONTRACT ATTACHMENT 1
For an Energy Service Company for the
Energy Performance Contract
UT Health Science Center
SBC No. 540/013-05-2016

PRO FORMA STANDARD DESIGN, BIDDING, AND CONSTRUCTION DOCUMENTS
GUIDELINES

1.0 Design Guidelines

1.1 The Delivery Order Contract Design should follow the Guidelines as set forth in the
University of Tennessee Designers’ Manual located at the following link:
http://facilitiesplanning.tennessee.edu/links_designersmanual.html

1.2 The following Chapter Outline of the Designers’ Manual has been modified to
indicate the inclusion or omission of each document contained within.

<table>
<thead>
<tr>
<th>Chapter 1 Introduction</th>
<th>Information Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 2 Designer Agreements and Payments</td>
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<td>Chapter 3 Design</td>
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<td>3.1 General</td>
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<td>3.2 Regulatory</td>
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<td>3.3 Mechanical Design Criteria</td>
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<td>3.4 Sustainable Design</td>
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<td>3.5 Space Efficiency and Cost Analysis</td>
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<td>3.6 – 3.10 – Design Phases</td>
<td>Included*</td>
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<tr>
<td>3.11 – Design Phase Documents Checklist</td>
<td>Included*</td>
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<td>Chapter 4 Project Manual Guide</td>
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<td>4.1 General</td>
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<tr>
<td>4.2 Standard Bidding and Construction Documents</td>
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<td>4.3 Specifications</td>
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<td>Chapter 5 Bidding</td>
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<td>Chapter 6 Construction</td>
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<tr>
<td>6.1 Owner Contractor Agreement</td>
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<tr>
<td>6.2 Pre-Construction Conference</td>
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<td>6.3 Notice To Proceed</td>
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<td>6.4 Testing Laboratory Services</td>
<td>Include</td>
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<tr>
<td>6.5 Documents for Contract Administration</td>
<td>Include</td>
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<tr>
<td>6.6 Designer Responses</td>
<td>Include</td>
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<td>Include/Omit</td>
<td>Description</td>
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<td>Include</td>
<td>6.7 Progress Meetings</td>
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<td>6.8 Application for Payment</td>
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<td>Include</td>
<td>6.9 Changes and Modifications</td>
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<tr>
<td>Include</td>
<td>6.10 Substantial Completion</td>
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<tr>
<td>Omit</td>
<td>6.11 Additional Services for Installation of Furniture, Fixtures, and Equipment</td>
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2.0

The documents listed below comprise MC Attachment 1.D and are found in Appendix 3 of the UT Designers’ Manual which is on the following Web site: [http://facilitiesplanning.tennessee.edu/](http://facilitiesplanning.tennessee.edu/).

**DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS**

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<tr>
<th>Code</th>
<th>Description</th>
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<tr>
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<td>Information Available to Bidders</td>
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<td>Notice to Proceed</td>
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<td>00 61 13</td>
<td>Contract Bond</td>
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<td>Three Year Roof Bond</td>
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<td>00 72 13</td>
<td>General Conditions</td>
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**DIVISION 01 – GENERAL REQUIREMENTS**

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<td>01 29 76</td>
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<td>Reconciliation Form SDR-1</td>
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<td>01 29 76.2</td>
<td>Application for Withdrawal of Retainage Form UT T-2</td>
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<td>01 29 76.3</td>
<td>Request for Release of Securities Form UT T-5</td>
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DIVISION 01 – GENERAL REQUIREMENTS (continued)

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<td>Attestation, Personnel Used in Contract Performance</td>
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END OF PRO FORMA STANDARD BIDDING AND CONSTRUCTION DOCUMENTS