

**MASTER ENABLING AGREEMENT
COMMISSIONING**

This AGREEMENT is made and entered into this **10** day of **January, 2012** pursuant to the Public Contract Code 10700 *et seq.*, by and between the Trustees of The California State University on behalf of

University California State University	Agreement No: 2210	Amendment No: 2	Project No: Systemwide	Project Name: Monitor-Based Commissioning
hereafter referred to as Trustees, and Service Provider, The Cadmus Group, Inc.	CSU Vendor ID No. 6830	Federal ID No: 04-2793755	License No: M20954	
Address of Service Provider 16 Technology Drive, Suite 109, Irvine, CA 92618		Telephone No: 949-790-0010	Fax No: 949-790-0020	

WITNESSETH: That the Service Provider in consideration of the covenants, conditions and agreements of the Trustees herein contained, does hereby agree to furnish all labor, materials, and equipment and to perform all work necessary to complete, in a skillful manner, the following:

Agreement No. 2210, dated May 7, 2010 is hereby amended as follows:

- This amendment changes the name of the service provider from CTG Energetics, Inc. to THE CADMUS GROUP, INC.

Except as amended herein, all other terms and conditions of the original Agreement remain unchanged.

Service Provider shall report to Thomas Kennedy, Chief of Architecture and Engineering for Capital Planning, Design and Construction in the Office of the Chancellor..

The total amount to be expended under this Agreement shall be determined by the overall usage by each participating campus and the administrative office of the California State University.

IN WITNESS WHEREOF, this agreement has been executed by the parties hereto, upon date first above written.

THE TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY					SERVICE PROVIDER							
Campus California State University, Systemwide					Full Legal Name of Service Provider The Cadmus Group, Inc.							
By (Trustees' Authorized Signature) 					By (Service Provider's Authorized Signature) 							
Printed Name and Title of Person Signing for Trustees Elvyra F. San Juan, Assistant Vice Chancellor, Capital Planning,					Printed Name and Title of Person Signing for Service Provider J. CHRISTOPHER SMITH SR U.P.							
Design and Construction 401 Golden Shore, Long Beach, CA 90802					Check appropriate box below that best describes Service Provider: <input type="checkbox"/> Sole Proprietorship <input type="checkbox"/> Partnership <input checked="" type="checkbox"/> Corporation <input type="checkbox"/> Limited Liability Co. <input type="checkbox"/> Other (specify)							
SCO Account Data:		Fund	Sub Fund	Agency	Yr	Ref/Item	Category	Program Element	Component	Chapter	Fiscal Yr	Legal Reference
Fund Name Funds assigned on Service Order & Authorization to Proceed				6620							11/12	
Amount Encumbered \$0		I hereby certify upon my own personal knowledge that budgeted funds are available for the period and purpose of the expenditures stated above.										
Amount of Increase \$0		Accounting Officer signs "Service Order and Authorization to Proceed"										
Amount of Decrease \$0		I hereby certify that I have examined the written Agreement and find the same to be in accordance with the requirements of the California State University Contract Law. CHRISTINE HELWICK, General Counsel.										
Total Amount Encumbered \$0		By Attorney: 3/5/12										Date

**MASTER ENABLING AGREEMENT
 COMMISSIONING**

This AGREEMENT is made and entered into this 1 day of July, 2011 pursuant to the Public Contract Code 10700 *et seq.*, by and between the Trustees of The California State University on behalf of

University California State University	Agreement No: 2210	Amendment No: 1	Project No: Systemwide	Project Name: Monitor-Based Commissioning
hereafter referred to as Trustees, and Service Provider, CTG Energetics, Inc.	CSU Vendor ID No: 2295	Federal ID No:	License No: M20954	
Address of Service Provider 16 Technology Drive, Suite 109, Irvine, CA 92618	Telephone No: 949-790-0010	Fax No: 949-790-0020		

WITNESSETH That the Service Provider in consideration of the covenants, conditions and agreements of the Trustees herein contained, does hereby agree to furnish all labor, materials, and equipment and to perform all work necessary to complete, in a skillful manner, the following:

Agreement No. 2210, dated May 7, 2010 is hereby amended as follows:

1. This amendment exercises the option to extend the term for an additional one (1) year. The term of this Agreement shall be from July 1, 2010 through June 30, 2012 with one (1) one year extension option remaining.

Except as amended herein, all other terms and conditions of the original Agreement remain unchanged.

Service Provider shall report to Thomas Kennedy, Chief of Architecture and Engineering for Capital Planning, Design and Construction in the Office of the Chancellor.

The total amount to be expended under this Agreement shall be determined by the overall usage by each participating campus and the administrative office of the California State University.

IN WITNESS WHEREOF, this agreement has been executed by the parties hereto, upon date first above written.

THE TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY										SERVICE PROVIDER										
Campus California State University, Systemwide										Full Legal Name of Service Provider CTG Energetics, Inc.										
By (Trustees' Authorized Signature) 										By (Service Provider's Authorized Signature) 										
Printed Name and Title of Person Signing for Trustees Elvyra F. San Juan, Assistant Vice Chancellor, Capital Planning, Design and Construction 401 Golden Shore, Long Beach, CA 90802										Printed Name and Title of Person Signing for Service Provider Malcolm Lewis, CEO										
										Check appropriate box below that best describes Service Provider: <input type="checkbox"/> Sole Proprietorship <input type="checkbox"/> Partnership <input checked="" type="checkbox"/> Corporation <input type="checkbox"/> Limited Liability Co. <input type="checkbox"/> Other (specify)										
SCO Account Data:										Fund	Sub Fund	Agency	Yr	Ref/Item	Category	Program Element	Component	Chapter	Fiscal Yr	Legal Reference
Fund Name Funds assigned on Service Order & Authorization to Proceed										6620				613001	54209	1089			11/12	
Amount Encumbered \$0	I hereby certify upon my own personal knowledge that budgeted funds are available for the period and purpose of the expenditures stated above.																			
Amount of Increase \$0	Accounting Officer signs "Service Order and Authorization to Proceed"																			
Amount of Decrease \$0	I hereby certify that I have examined the written Agreement and find the same to be in accordance with the requirements of the California State University Contract Law. CHRISTINE HELLWICK, General Counsel.																			
Total Amount Encumbered \$0	By Attorney: 6/15/11																			
	Date																			

COMMISSIONING MASTER ENABLING AGREEMENT (3/10/09)

This AGREEMENT is made and entered into this 7th day of May, 2010 pursuant to the Public Contract Code 10700 et seq., by and between the Trustees of The California State University on behalf of

University California State University, Office of the Chancellor	Agreement No: 2210	Amendment No: Base	Project No:	Project Name: Cx and MBCx
hereafter referred to as Trustees, and Service Provider, CTG Energetics, Inc.		CSU Vendor ID No. 2295	Federal ID No:	License No: M20954
Address of Service Provider 16 Technology Drive, Suite 109, Irvine, CA 92618			Telephone No: 949-790-0010	Fax No: 949-790-0020

WITNESSETH: That the Service Provider in consideration of the covenants, conditions and agreements of the Trustees herein contained, does hereby agree to furnish all labor, materials, and equipment and to perform all work necessary to complete, in a skillful manner, the following:

The Service Provider is to provide Commissioning and Monitor-Based Commissioning services for Public Works Projects submitted by the California State University. This agreement is a Master Enabling Agreement under which each campus and administrative office of the CSU may engage the services of Service Provider as provided herein. The Service Provider shall perform commissioning services in accordance with the following Riders and Exhibit, which by this reference are incorporated herein and made part of this Agreement.

- Rider A - Scope of Services and Payment Schedule, consisting of twenty three (23) pages;
- Rider B - Agreement General Provisions, consisting of three (3) pages;
- Exhibit A - Sample Service Order & Authorization to Proceed, consisting of one (1) page.

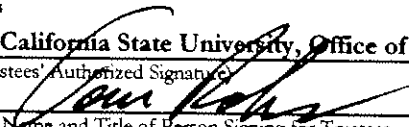
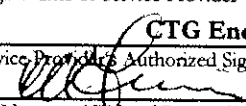

The term shall be from July 1, 2010 through June 30, 2011 with the option given the Trustees of extending the Agreement with the same terms and conditions for up to two (2) additional 1-year periods.

Service Provider shall report to Tom Kennedy, Capital Planning, Design and Construction in the Office of the Chancellor.

The total amount to be expended under this Agreement shall be determined by the overall usage by each participating campus and the California State University, Office of the Chancellor.

Payment shall be in accordance with Rider A.

IN WITNESS WHEREOF, this agreement has been executed by the parties hereto, upon date first above written.

THE TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY						SERVICE PROVIDER					
Campus California State University, Office of the Chancellor						Full Legal Name of Service Provider CTG Energetics, Inc.					
By (Trustees' Authorized Signature) 						By (Service Provider's Authorized Signature) 					
Printed Name and Title of Person Signing for Trustees Tom Roberts, Director						Printed Name and Title of Person Signing for Service Provider Malcolm Lewis, CEO/Chairman					
Contract Services & Procurement 401 Golden Shore, Long Beach, CA 90802						Check appropriate box below that best describes Service Provider: <input type="checkbox"/> Sole Proprietorship <input type="checkbox"/> Partnership <input checked="" type="checkbox"/> Corporation <input type="checkbox"/> Limited Liability Co. <input type="checkbox"/> Other (specify)					
SCO Account Data:											
Fund	Sub Fund	Agency	Yr	Ref/Item	Category	Program Element	Component	Chapter	Fiscal Yr	Legal Reference	
Funds assigned on Service Order & Authorization to Proceed				607806	PS Fund	1089	PS Program	PS Class	10-11	PS Project/Grant	
Amount Encumbered \$0	I hereby certify upon my own personal knowledge that budgeted funds are available for the period and purpose of the expenditures stated above.										
Amount of Increase \$0	Accounting Office signs "Service Order & Authorization to Proceed"										
Amount of Decrease \$0	Signature of Accounting Officer										Date
Total Amount Encumbered \$0	I hereby certify that I have examined the written Agreement and find the same to be in accordance with the requirements of the California State University Contract Law. CHRISTINE HELWICK, General Counsel.										
	By Attorney: 										Date 6/9/10

Rider A
COMMISSIONING OF CSU CAPITAL PROJECTS (Cx)
AND
MONITORING-BASED COMMISSIONING (MBCx)
SCOPE OF SERVICES AND PAYMENT SCHEDULE

I. COMMISSIONING FOR CSU CAPITAL PROJECTS (Cx)

A. OBJECTIVES

1. The California State University (CSU) requires commissioning (Cx) for all campus projects over \$6 million in construction costs regardless of the source of funding. Commissioning on projects under this amount or for projects that may not warrant commissioning, (i.e. parking structures, parking lots) and for certain ground lease projects would be at the discretion of the campus.
2. The objective of commissioning is to provide documented confirmation that the proposed projects mechanical systems achieves its anticipated performance requirements. Establishing these performance requirements is part of the commissioning process.
3. The scope of Services for the commissioning of CSU projects has been developed for small projects with a total construction cost of less than \$15,000,000; medium size projects with a total construction cost of more than \$15,000,000 and less than \$30,000,000 and large projects with a total construction cost of over \$30,000,000. The small, medium and large project thresholds are provided as a guide. The campus is free to select the scope of services they desire on the level of intricacy of the project and provide additional funds to provide higher levels of commissioning. For example, the campus may supplement additional funds and use the typical Scope of Services of a medium sized project for a project with a total construction cost of less than \$15,000,000.
4. The scope of Services for commissioning included in this master enabling agreement (MEA) has been developed for a typical CSU construction project. Campus may negotiate a reduction in the scope of services with the service provider for projects with complicated mechanical systems i.e. Science Building, Central Plant, etc. to match with the commissioning fee listed in this MEA or supplement additional fee from their campus funds for the scope of services detailed in this MEA.
5. The CSU commissioning process will appoint a commissioning Agent (CxA) that acts as campus consultant and provides input to the design team and the contractor on commissioning. The CxA is not responsible for design or general construction scheduling, cost estimating, or construction management, but may assist with problem-solving or resolving non-conformance issues or deficiencies. The respective design architects and engineers remain the professionals responsible for their design. The CxA will use the Cx guidelines available on CSU website at <http://www.calstate.edu/CPDC/ae/gsf/guidelines.shtml> as the reference.
6. The CxA shall be involved through the project from design phase through the warranty phase.
 - a. The primary role of the CxA during the design phase is to develop detailed commissioning specifications and review the design for quality, constructability and to ensure it meets the campus objectives.
 - b. During construction the CxA will review pertinent submittals to see that commissioning is properly incorporated. The CxA develops and coordinates the execution of a testing plan, which includes observing and documenting that performance of all applicable equipment

and systems to ensure that systems are functioning in accordance with the Campus Project Requirements previously established and the contract documents.

- c. During the warranty period the CxA will identify problems or concerns that the campus facility staff has with operating the facility as originally intended and make suggestions for improvements and for recording these changes in the O&M manuals. CxA will identify areas that may come under warranty or under the original construction contract.

7. The specific details are outlined in the following commissioning scope of services.

B. SCOPE OF SERVICES - SMALL PROJECTS (<\$15MM)

The CxA shall be responsible for carrying out the following commissioning tasks during the design phase, construction phase, and the warranty period.

[The Commissioning Agents' activities do not start until the beginning of the construction documents phase and commissioning is limited to only systems listed in paragraph B.5.]

1. Design Phase

- a. Coordinate the commissioning work during design.
- b. Develop or update the design phase commissioning plan.
- c. Perform focused reviews of the design drawings and specifications as described in paragraph B.6.
- d. Confirm that State of California Title 24 Acceptance Certification requirements are specified in the construction documents.
- e. Develop a draft construction phase commissioning plan using a Campus-approved outline.
- f. Develop full commissioning specifications for all commissioned equipment and systems. Coordinate this with and integrate this into the design team's specifications. One or more of the following documents can be used as a guide for content, rigor and format: 1) *Model Commissioning Plan and Guide Specifications*, USDOE/FEMP; Portland Energy Conservation, Inc. (PECI), 2) *The HVAC Commissioning Process*, ASHRAE Guideline. The Peci Document can be downloaded free at <http://www.peci.org> and a copy of the ASHRAE document can be obtained by contacting ASHRAE at <http://www.ashrae.org> or 404-636-8400.

The commissioning specifications will include a detailed description of the responsibilities of all parties; details of the commissioning process; reporting and documentation requirements, including formats; alerts to coordination issues, deficiency resolution; construction checklist and startup requirements; the functional testing process; and contractor functional test requirements, including testing conditions and acceptance criteria for each piece of equipment and systems being commissioned.

2. Bid Phase

- a. Answer RFI's regarding commissioning during the bid phase.
- b. Attend Pre-bid meeting(s) to answer commissioning related questions.

3. Construction Phase

- a. Coordinate the commissioning activities in a logical, sequential and efficient manner using

- consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.
- b. Coordinate the commissioning work and, with the contractor and construction manager (CM), ensure that commissioning activities are being incorporated into the master schedule.
 - c. Revise, as necessary, the construction phase commissioning plan developed during design, including scope and schedule.
 - d. Plan and conduct a commissioning meeting and distribute minutes.
 - e. Review applicable submittals from the contractor related to commissioning. This includes HVAC and lighting submittals, testing and balancing (TAB) submittals and O&M materials. Review additional information required performing commissioning tasks, including, contractor start-up & checkout procedures and contractor's training procedures. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
 - f. Review contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews. Update Commissioning Plan to include commissioning requirements.
 - g. Review requests for information and change orders for impact on commissioning and campus objectives. Update Commissioning Plan to include commissioning requirements.
 - h. Write and distribute Pre-functional checklists for commissioned equipment.
 - i. Develop an enhanced start-up and initial systems checkout plan with contractors for selected equipment to be commissioned.
 - j. Review construction-meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
 - k. Review HVAC piping pressure test and flushing documentation, sufficient to be confident that proper procedures were followed. Include testing documentation in the Commissioning Record.
 - l. Review any ductwork testing and cleaning documentation sufficient to be confident that proper procedures were followed. Include documentation in the Commissioning Record.
 - m. Document construction checklist completion by reviewing completed Pre-functional checklists and by selected site observation.
 - n. Document systems startup by reviewing start-up reports and by selected site observation.
 - o. Review air and water balancing reports and perform selected site observation. Provide a letter of approval to CM.
 - p. With necessary assistance and review from installing contractors, write the functional performance test procedures for equipment and systems. This will include manual functional testing, energy management control system trending and may include stand-alone datalogger monitoring. Submit to CM for review and approval.
 - q. Analyze functional performance trend logs and monitoring data to verify performance. Provide a letter of the verification of performance to CM.

- r. Coordinate, witness and document manual functional performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved. The functional testing shall include operating the system and components through each of the written sequences of operation, and other significant modes and sequences, including startup, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment. Sensors and actuators shall be calibrated during construction check listing by the installing contractors, and spot-checked by the commissioning agent during functional testing.

Tests on respective HVAC equipment shall be executed, if possible, during both the heating and cooling season. However, override of certain control values to simulate conditions may be necessary. Functional testing shall be done using conventional manual methods, control system trend logs, and read-outs or stand-alone dataloggers, to provide a high level of confidence in proper system function, as deemed appropriate by the commissioning agent and the campus.

- s. Coordinate, witness and document Acceptance Certification requirements listed in State of California T24 Energy Efficiency Standards for Residential and Nonresidential Buildings.
- t. Review and comment on training material prepared by the contractor and review documentation that systems training of the campus operating personnel was successfully completed a licensed copy of the programming tool used for the controls system was included.
- u. Review and comment on the O&M manuals for commissioned equipment and systems prepared by the contractor. Provide a letter of approval to CM.
- v. Compile a Commissioning Record, which shall include:
- 1). A brief summary report that includes a list of participants and roles, brief facility and building description, overview of commissioning and testing scope, and a general description of testing and verification methods. For each piece of commissioned equipment and system, the report shall contain the assessment by the commissioning agent of the following:
 - a) Equipment and systems compliance with contract documents,
 - b) Equipment and systems installation,
 - c) Functional performance,
 - d) Equipment O &M documentation, and
 - e) Operator training.
 - 2). All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment and systems or their operations, future actions, commissioning process changes, etc. shall also be listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented.
 - 3). The Commissioning Systems Manual shall include the commissioning plan, progress reports, submittal and O&M manual reviews, training record, test schedules, Pre-functional checklists, start-up reports, functional tests, and trend log analysis.
 - 4). Forward the Commissioning Record to the CM.

- w. Compile a Systems Manual that consists of the following:
Campus Project Requirements (by campus); Basis of Design (by Design Team); Performance Metrics, if completed during design (by Design Team); space and use descriptions; single line drawings and schematics for major systems (by Design Team); control drawings, sequences of control (by contractor); recommendations for recommissioning frequency by equipment type; energy tracking recommendations; and recommended standard trend logs with a brief description of what to look for in them (by Commissioning Agent).

4. *Warranty Period*

- a. Coordinate with the campus and the contractor. Supervise the required opposite season or deferred testing and deficiency corrections; and provide the final testing documentation to CM for the Commissioning Record and O&M manuals.
- b. Return to the site at 10 months into the 12-month warranty period and review with campus facility staff the current facility operation and the condition of outstanding issues related to the original and seasonal commissioning. Also interview facility staff and identify problems or concerns they have with operating the facility as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist campus facility staff in developing reports and documents and requests for services to remedy outstanding problems.

5. *Systems to be Commissioned – Small Projects*

The following systems and assemblies shall be commissioned:

1. Building energy management and control systems.
2. Heating, ventilating and air conditioning systems
3. Laboratory, hoods and relative rooms pressurization
4. Compressed air and vacuum systems.
5. Domestic water heating systems.

6. Commissioning Agent's Scope during Design – Small Projects

The Commissioning Agent shall perform a review of the design documents for the following issues at the phases checked for each system commissioned. This table summarizes the commissioning activities during the design phase of the project. Refer to the paragraph B.1 of the scope of services for the detailed scope.

Key: SD: 100% Schematic Design Review PD: 100% Preliminary Design Review
 CD50: 50% Construction Document Review CD95: 95% Construction Document Review

Design Area	Review Description	SD	PD	CD50	CD95
<i>Basis of Design</i>	Ensure that basis of design is clear, complete, and meet the original Campus Project Requirements				✓
<i>Commissioning facilitation</i>	Review to facilitate effective commissioning (sufficient accessibility, test ports, monitoring points, etc.)				✓
<i>Energy Efficiency</i>	T24 Acceptance Certification.				✓
<i>Control system & control strategies</i>	Review HVAC, lighting, strategies and sequences of operation for adequacy and efficiency.				✓
<i>Operations and maintenance (O&M)</i>	Review specified systems and layout toward facilitating O&M (equipment accessibility, system control, etc.).				✓
<i>Indoor environmental quality</i>	Review to ensure that systems relating to thermal, visual, acoustical, air quality comfort, air distribution maximize comfort and are in accordance with the Campus Project Requirements.				✓
<i>O&M documentation</i>	Verify adequate system O&M documentation requirements.				✓
<i>Training</i>	Verify adequate operator training requirements.			✓	✓
<i>Commissioning specifications</i>	Verify that bid documents adequately specify building commissioning, including testing requirements by equipment type.			✓	✓
<i>Campus design guidelines or standards</i>	Verify that the design complies with the campus design guidelines or standards.			✓	✓
<i>Environmental sustainability</i>	Review to ensure that the building materials are in accordance with Campus Project Requirements.			✓	✓
<i>Mechanical</i>	Review the mechanical concepts/design for enhancements.			✓	✓
<i>Electrical</i>	Review the electrical concepts/systems for enhancements.			✓	✓
<i>Life cycle costs</i>	Review life cycle assessment of the primary competing mechanical systems relative to energy efficiency			✓	

C. SCOPE OF SERVICES - MEDIUM PROJECTS (>\$15MM<\$30MM)

The CxA shall be responsible for carrying out the following additional tasks. Commissioning services are required during the design phase, bid phase, construction phase, and the warranty period.

[The Commissioning Agent's activities start earlier in the schematic design phase and additional systems are included in paragraph C.5 for commissioning.]

1. Design Phase

- a. Perform project commissioning during the design phase, as described in paragraph B.1 "Scope of Services – Small Projects, Design Phase ”.
- b. Review and comment on the Design Record documentation prepared by the design team members (Campus Project Requirements, Design Narrative; Basis of Design).

2. Bid Phase

- a. Answer RFI's regarding commissioning during the bid phase
- b. Attend pre-bid meeting(s) to answer commissioning related questions.

3. Construction Phase

Perform project commissioning during the construction phase, as described in paragraph B.3 "Scope of Services – Small Projects, Construction Phase ”

4. Warranty Period

Perform project commissioning during the warranty period, as described in paragraph B.4 "scope of services – small projects, warranty period”

5. Systems to be Commissioned – Medium Projects

The following systems and assemblies shall be commissioned:

1. Building energy management and control system
2. Heating, ventilating and air conditioning systems
3. Scheduled or occupancy sensor lighting controls
4. Daylight dimming controls
5. Emergency power generators and automatic transfer switching
6. Uninterruptible power supply systems
7. Laboratory ventilation and pressurization systems including special function ventilation hoods.
8. Domestic water heating systems.

6. Commissioning Agent's Scope during Design – Medium Projects

The commissioning agent will perform a review of the design documents for the following issues at the phases checked for each system commissioned. This table summarizes the commissioning activities during the design phase of the project. Refer to paragraph C.1 of the scope of services for the detailed scope.

Key: SD: 100% Schematic Design Review PD: 100% Preliminary Design Review
 CD50: 50% Construction Document Review CD95: 95% Construction Document Review

Design Area	Review Description	SD	PD	CD50	CD95
Basis of Design	Ensure that basis of design is clear, complete, and meet the original Campus Project Requirements	✓	✓	✓	✓
Commissioning facilitation	Review to facilitate effective commissioning (sufficient accessibility, test ports, monitoring points, etc.)			✓	✓
Energy efficiency	Review for adequacy of the effectiveness of building layout and efficiency of system types and components for building shell, HVAC systems and lighting systems. T24 Acceptance Certification			✓	✓
Control system & control strategies	Review HVAC, lighting, fire control, emergency power, security control system, strategies and sequences of operation for adequacy and efficiency.			✓	✓
Operations and maintenance (O&M)	Review specified systems and layout toward facilitating O&M (equipment accessibility, system control, etc.).				✓
Indoor environmental quality	Review to ensure that systems relating to thermal, visual, acoustical, air quality comfort, air distribution maximize comfort and are in accordance with the Campus Project Requirements.				✓
O&M documentation	Verify adequate system O&M documentation requirements.				✓
Training	Verify adequate operator training requirements.			✓	✓
Commissioning specifications	Verify that bid documents adequately specify building commissioning, including testing requirements by equipment type.			✓	✓
Campus design guidelines or standards	Verify that the design complies with the campus design guidelines or standards.	✓	✓	✓	✓
Environmental sustainability	Review to ensure that the building materials, landscaping, use of water, waste management create less of an impact on the environment and are in accordance with Campus Project Requirements.			✓	✓
Mechanical	Review the mechanical concepts/design for enhancements.	✓	✓	✓	✓
Electrical	Review the electrical concepts/systems for enhancements.	✓	✓	✓	✓
Life cycle costs	Review life cycle assessment of the primary competing mechanical systems relative to energy efficiency, O&M, IEQ, functionality, sustainability.	✓	✓	✓	

D. SCOPE OF SERVICES - LARGE PROJECTS (>\$30MM)

The CxA shall be responsible for carrying out the following additional tasks. Commissioning services are required during the design phase, bid phase, construction phase, and the warranty period.

[Commissioning Agents' activities start earlier in the schematic design phase and additional systems are included in paragraph D.5 for commissioning.]

1. Design Phase

Perform project commissioning during the design phase, as described in paragraph C.1 "Scope of Services – Medium Projects, Design Phase".

2. Bid Phase

- a. Answer RFI's regarding commissioning during the bid phase
- b. Attend pre-bid meeting(s) to answer commissioning related questions.

3. Construction Phase

Perform project commissioning during the construction phase, as described in paragraph C.3 "Scope of Services – Medium Projects, Construction Phase".

4. Warranty Period

Perform project commissioning during the warranty period, as described in paragraph C.4 "Scope of Services – Medium Projects, Warranty Period".

5. Systems to be Commissioned – Large Projects

The following systems and assemblies shall be commissioned:

1. Building energy management and control systems.
2. Heating, ventilating and air conditioning systems
3. Scheduled or occupancy sensor lighting controls
4. Daylight dimming controls
5. Emergency power generators and automatic transfer switching
6. Uninterruptible power supply systems
7. Witness operational tests of the electrical equipment during initial energization.
8. Laboratory ventilation and pressurization systems including special function ventilation.
9. Calibration and certification of utility meters including gas, water, flow meters and electric meters. Electric meters shall be tested against a know standard or load to verify that the meters are measuring values correctly.
10. Interface of meters with the Energy Management System. The communications with the EMS shall be verified as well as the values being recorded by the EMS. If the campus has a central utility metering system, the address, communication and data being transferred to the central utility metering server shall be verified.
11. Domestic water heating systems
12. Data and communication evaluation of the building service fiber and copper line quality tests. Equipment within the building service room shall be commissioned including all

UPS, PDU and cooling and ventilation systems. See Attachment A “ Commissioning of Building Telecommunications Backbone”.

13. Refrigeration systems
14. Domestic water pumping and mixing systems
15. Irrigation

6. Commissioning Agent's Scope during Design – Large Projects

The commissioning agent will perform a review of the design documents for the following issues at the phases checked for each system commissioned. This table summarizes the commissioning activities during the design phase of the project. Refer to the paragraph D.1 of the scope of services for the detailed scope.

Key: SD: 100% Schematic Design Review PD: 100% Preliminary Design Review
 CD50: 50% Construction Document Review CD95: 95% Construction Document Review

Design Area	Review Description	SD	PD	CD50	CD95
<i>Basis of Design</i>	Ensure that basis of design is clear, complete, and meet the original Campus Project Requirements	✓	✓	✓	✓
<i>Commissioning facilitation</i>	Review to facilitate effective commissioning . (sufficient accessibility, test ports, monitoring points, etc.)			✓	✓
<i>Energy efficiency</i>	Review for adequacy of the effectiveness of building layout and efficiency of system types and components for building shell, HVAC systems and lighting systems. T24 Acceptance Certification			✓	✓
<i>Control system & control strategies</i>	Review HVAC, lighting, fire control, emergency power, security control system, strategies and sequences of operation for adequacy and efficiency.			✓	✓
<i>Operations and maintenance (O&M)</i>	Review specified systems and layout toward facilitating O&M (equipment accessibility, system control, etc.).				✓
<i>Indoor environmental quality</i>	Review to ensure that systems relating to thermal, visual, acoustical, air quality comfort, air distribution maximize comfort and are in accordance with the Campus Project Requirements.				✓
<i>O&M documentation</i>	Verify adequate system O&M documentation requirements.				✓
<i>Training</i>	Verify adequate operator training requirements.			✓	✓
<i>Commissioning specifications</i>	Verify that bid documents adequately specify building commissioning, including testing requirements by equipment type.			✓	✓
<i>Campus design guidelines or standards</i>	Verify that the design complies with the campus own design guidelines or standards.	✓	✓	✓	✓
<i>Environmental sustainability</i>	Review to ensure that the building materials, landscaping, use of water, waste management create less of an impact on the environment and are in accordance with Campus Project Requirements.			✓	✓
<i>Mechanical</i>	Review the mechanical concepts/design for enhancements.	✓	✓	✓	✓
<i>Electrical</i>	Review the electrical concepts/systems for enhancements.	✓	✓	✓	✓
<i>Life cycle costs</i>	Review life cycle assessment of the primary competing mechanical systems relative to energy efficiency, O&M, IEQ, functionality, sustainability.	✓	✓	✓	

The term of the service authorization shall begin concurrently with the start of the project and conclude at the end of the warranty period, which is usually one year after the construction completion.

F. FEE SCHEDULE (Cx):

[Campus may negotiate a reduction in the scope of services with the service provider for projects with complicated mechanical systems i.e. Science Building, Central Plant, etc. to match with the fee schedule below or supplement additional fee from their campus funds for the scope of services detailed in this MEA. Campus may also negotiate a reduction in the fee with the Service Provider for projects with less complicated mechanical systems and/or projects with several typical mechanical systems, i.e. Student Housing]

1. Commissioning fee for capital projects shall be computed in accordance with the fee schedule shown below. The fees are based on total project construction costs and determined as follows:

Total construction Cost	Commissioning Fee (% of the Construction Cost)
Under \$400,000	Commissioning not required
Over \$400,001 to \$2,000,000	\$15,000 (Campus Discretion)
Over \$2,000,001 to \$6,000,000	\$15,000+0.55% over \$2,000,000 (Campus Discretion)
Over \$6,000,001 to \$10,000,000	0.62% of \$6,000,000 + 0.50% over \$6,000,000
Over \$10,000,001 to \$30,000,000	0.57% of \$10,000,000 + 0.39% over \$10,000,000
Over \$30,000,001 to \$50,000,000	0.45% of \$30,000,000 + 0.30% over \$30,000,000
Over \$50,000,001 to \$90,000,000	0.39% of \$50,000,000 + 0.25% over \$50,000,000
Over \$90,000,001	0.33% of \$90,000,000 + 0.10% over \$90,000,000

2. The cost of commissioning scheduled in the above tables has been budgeted in CPDC Form 2-7. Campuses may supplement additional funds for additional commissioning services from their campus funds.
3. The total amount to be expended under this Agreement shall be determined by the overall usage by each participating campus and the California State University, Office of the Chancellor.
4. **PAYMENTS:** Payments for services shall be made in arrears for work completed to the satisfaction of the Trustees upon presentation of a written statement not exceeding the amounts specified below:

[Payment for services during the design phases and the bid phase shall be not exceed the amounts indicated below in parenthesis. When these amounts are lower than amounts based on the indicated percentages, balance of the fee shall be added to the construction completion and building occupancy]

- 5% (NTE \$12,500) upon completion and acceptance of preliminary phase design review
- 15% (NTE \$37,500) upon completion and acceptance of construction document phase design review.
- 5% (NTE 12,500) upon the completion of the construction bids evaluation
- 10% upon 30% construction completion

10% upon 60% construction completion

10% upon 90% construction completion

40% plus any excess funds from design phases and the construction bid phase upon construction completion and building occupancy

5% following the 1-year anniversary of the date of building occupancy or project acceptance as applicable. Service provider will invoice this amount to Satinder Gulati, University Engineer, Office of the Chancellor, 401 Golden Shore, 2nd Floor, Long Beach, California 90802. [*Campus shall coordinate with The Office of the Chancellor CPDC Trust Fund for this payment*].

5. INVOICING: Invoicing for services shall:

1. Be sent to the campus project manager named in the Service Order & Authorization to Proceed;
2. Identify campus, project name, and project reference number;
3. Reference the Service Order Authorization number being billed against;
4. Indicate what work and the percentage completed on each invoice; and
5. Reference only a single project per invoice.

6. REIMBURSABLE EXPENSES:

The fee for commissioning shall include normal operating expenses incidental to this work. Reimbursable expenses should not be needed in the typical course of providing commissioning services. Extra services if any shall be paid in arrears when completed

The following are not reimbursable expenses:

- a. Travel expenses incurred in the course of providing commissioning services are included in the base fee amount and are not reimbursable.
- b. Shipping charges, phone calls, faxes, consumables, etc. incurred in the course of providing commissioning services are included in the base fee amount and are not reimbursable.

G. EXTRA SERVICES:

1. Via additional Service Order Authorizations and scope of services, the Campus may authorize supplemental services related to the commissioning process. Examples of such services would include the following:
 - a. Additional Building Commissioning
 - b. Constructability Review
2. Extra services may also include reports and studies of the building mechanical systems as defined by the campus project manager.
3. Extra Services require pre-authorization in writing by the campus project manager and shall be issued as a separate Service Order & Authorization to Proceed. Campus project manager shall provide separate scope of services and fee schedule for this work. Extra Services for different tasks may be combined into one Service Order & Authorization to Proceed. Work across separate projects must be separately authorized.
4. Extra services if any shall be paid in arrears when completed

II. MONITORING BASED COMMISSIONING (MBCx)

A. OBJECTIVES

This MBCx program includes installation of permanent whole building metering, with sub-system metering in selected buildings, establishing baseline building energy use, installing permanent energy information systems to collect trend profiles on energy use and key HVAC points, using the trend data to identify energy saving opportunities, implementing the low/no cost measures immediately, and verifying the energy savings through the monitoring capability. This combination of metering and commissioning breaks new ground in many ways:

1. Campus utilities are unmetered at many buildings so the installation of electric, gas, steam, hot water and chilled water meters often provides a first time opportunity to determine exactly how much energy each building uses.
2. New or upgraded energy information systems used to collect and analyze the trend data typically far exceed the existing capability of facility energy management and control systems, thereby enabling campuses to handle large quantities of data and closely track savings for years after the modifications. Implementation of new/upgraded metering and energy information systems also enable continuous commissioning for the useful life of the facility.
3. Metered energy use profiles are used as a powerful diagnostic tool to evaluate building performance and identify commissioning opportunities. These profiles also provide a critical tool to help campuses meet their broader sustainability goals.
4. The ability to analyze the data provides graphic demonstration of building performance, such as chiller efficiency vs. load, economizer position vs. outside air temperature, hot water loop temperature vs. outside air temperature.
5. Metering and analysis allows campuses to measure and prove the savings achieved following implementation, providing a built in measurement and verification function.
6. Dedicated metering on specific systems, such as motor control centers and VFDs, provide further refinement of system performance and energy savings.
7. Meters also provide the necessary information for building benchmarking newly mandated for California commercial buildings.
8. Once the database is installed and communicating with the facility management system, new buildings can be included for only the cost of the metering.
9. Projects shall include training of campus staff through hands-on interaction with the expert consultants assisting with commissioning activities and supplemented with a complete systems manual, detailed later in this scope.

B. SCOPE OF SERVICES – MONITORING BASED COMMISSIONING

Monitoring-Based Commissioning services shall be provided for the buildings, equipment or systems including but not limited to HVAC, lighting, process, controls, monitoring, and other energy-using equipment.

1. Planning Phase

- a. Organize and facilitate a meeting to introduce the MBCx Project Team, Outline the MBCx process, and review scope of services and goals.

- b. Develop a template document to record and track issues identified during the Planning, Pre-Investigation, Investigation, and Handoff Phases. This document, called the MBCx Findings Log, will be continually updated, and the latest version shall be submitted to the MBCx Project Team at the end of each phase of development. A summary report shall also be defined to allow for quick "at-a-glance" review of the status of outstanding issues. Following is a listing of the fields that should be included in the template document. (Note that not all fields will be relevant in all cases.)
- 1) Issue Name and Assigned Number
 - 2) Description of Issue
 - 3) Date Issue was Identified
 - 4) Who Identified Issue
 - 5) Recommended Action to Address Issue
 - 6) Type of Improvement Opportunity
 - a) O&M
 - b) Repair
 - c) Capital Improvement
 - d) Other
 - 7) Estimated Impacts of Improvement Opportunity:
 - a) annual electric saving (k-Wh and \$)
 - b) annual gas saving (therms and \$)
 - c) peak demand savings (kW and \$)
 - d) O&M savings (\$)
 - e) other non-energy savings (\$ and qualitative benefits)
 - 8) Estimated Implementation Cost (\$)
 - 9) Estimated Simple Payback (years)
 - 10) Location and availability of Supporting Documentation
 - 11) Relevant trends and monitoring points
 - 12) Recommendations for Implementation Priority
 - 13) Current Status Date
 - 14) Current Status (choose one of the following as status changes)
 - a) Identified
 - b) Recommended
 - c) Reviewed
 - d) Planned for Implementation in MBCx Project
 - e) Planed for Implementation in Other Project
 - f) Implemented in MBCx Project
 - g) Implemented in Other Project
 - h) Deferred
 - 15) Responsibility to whom issue is assigned
 - 16) Notes
- c. Walk through the facility and observe the condition of the subject equipment, noting obvious indicators of potential savings, and equipment or operational problems.
- d. Meet with University representatives and determine the intended operation of the facility such as hours of operation, required space temperatures, required humidity levels, etc.
- e. Review facility operating logs or conduct interviews in order to identify the Improvement Opportunities. This might include items such as addressing EMCS/controls problems, maintenance concerns, repeated comfort complaints, indoor air quality concerns or equipment noise problems.

- f. Identify the existence of key equipment or system documentation, determine its location, and assess its accuracy and completeness. Identify any missing documentation. The identified documentation may include items such as as-built drawings, construction drawings, energy bills, equipment manuals, specifications, warranties and cut sheets, test and balance reports, control points list, and operating schedules.
- g. Determine and document the objectives for monitoring within the MBCx project, and the associated requirements. This should include items such as points to be monitored, required accuracy of data, frequency of measurement and downloads, communications capabilities, storage requirements, and pre-processing and analysis of data.
- h. Incentive Funding Applicant
 - 1) Use EMS, historical utility billing, and/or calculated estimates to estimate current facility energy consumption
 - 2) Use historical MBCx savings performance and/or calculated estimates to estimate savings achievements that will result from the project
 - 3) Estimate equipment and labor costs necessary to implement the project
 - 4) Establish a preliminary schedule for project implementation
 - 5) Use the most current version of the Higher Education/Investor Owned Utility Partnership Program MBCx Incentive Application, called Form C, submit to campus representatives and Chancellor's Office Energy Program Manager for review and approval
 - 6) The Cx agent will be responsible for addressing any questions/clarifications presented by the Partnership Program application reviewers.
- i. Develop MBCx Plan Document, to include the items listed below:
 - 1) An overview of the MBCx process
 - 2) A list of requirements, features and systems to commission
 - 3) Identification of primary MBCx participants and their responsibilities.
 - 4) A description of the management, communication, and reporting processes.
 - 5) An outline of the MBCx process scope
 - 6) A list of the expected written deliverables
 - 7) An activity schedule
 - 8) A detailed description of the rigor and scope of Functional Performance Testing
 - 9) The monitoring point list
 - 10) A list of all diagnostics
- j. Develop a Measurement and Verification Plan, to identify how the savings from the project will be measured upon completion of the project. The plan should also address ongoing savings past this date. Savings shall include both energy savings and maintenance savings. M&V plan shall include the following topics:
 - 1) Objectives
 - 2) Approach to Verifying Benefits at Conclusion of Commissioning
 - 3) Approach to Verifying Benefits at End of Year One
 - 4) Approach to Tracking Benefits Over Time
 - 5) Roles and Responsibilities
 - 6) Information to Collect
 - 7) Data Required to Establish a Baseline
 - 8) Variables to Measure

- 9) Required Accuracy
 - 10) Sampling Rates and Download Frequencies
 - 11) Data Store Requirements
 - 12) Analysis to Conduct (Diagnostic Routines)
 - 13) Documentation to Provide
- k. Revise MBCx and M&V plans as needed to implement Project Team recommendations.
- l. Review MBCx Findings Log to ensure that it is complete and that the status of issues is up-to-date.
- m. Prepare a Draft MBCx Report, including the following sections. These, and subsequent sections will be updated throughout the project as needed:
- 1) Initial Site Assessment
 - 2) Operational Requirements
 - 3) Known Improvement Opportunities
 - 4) Available and Missing Documentation
 - 5) MBCx Plan Document
 - 6) Measurement & Verification Plan
 - 7) Current Version of the Findings Log

2. Pre-Investigation Phase

- a. Identify preventative maintenance activities that must be accomplished before a meaningful investigation can be conducted. This may include items such as maintaining sensors and actuators that are known to require maintenance, or adding refrigerant charge to rooftop units.
- b. Study building plans and walk-through the building to determine the capabilities of the existing monitoring systems in comparison with the MBCx program requirements. Identify system deficiencies that will have to be addressed before monitoring can commence.
- c. Calibrate any of the sensors that are required for commissioning and in need of calibration. Document calibration activities.
- d. EMS/BMS Upgrades and Monitoring Equipment Installation
 - 1) Determine a plan for supplementing the existing monitoring capabilities which might include upgrading the existing capabilities or installing permanent monitoring equipment used to establish performance baselines.
 - 2) Develop specifications for system instrumentation to be procured and installed and identify suitable providers.
 - 3) Procure instrumentation.
 - 4) Install instrumentation.
 - 5) Commission instrumentation.
- e. Setup Trends and Data Collection Routines
 - 1) Identify the points that are to be monitored and the sampling and download frequencies. A sampling rate of five minutes or less is recommended for most points. The download frequency will depend on the analysis and diagnostics planned, but should probably be at least weekly.
 - 2) Setup trends in the EMCS software to begin collecting these data. Setup and test any necessary mechanisms to transfer data to a central platform for analysis.

- 3) If data loggers are installed, program them to collect the necessary information and subsequently transfer the information to a central platform for analysis. Test the communications mechanisms to ensure that data are transferred reliably
- f. Collect at least one day of data from the EMCS or data loggers.
- g. Assess Data Quality
 - 1) Review tables or charts of collected data to assess reasonableness. If any data seems to be providing unreasonable results, investigate any possible problems with the data.
 - 2) Fix any data problems that are found from review the data.
- h. Prepare for Data Analysis
 - 1) Set up routines to calculate factors and metrics required for commissioning of systems. Create template charts and tables of collected and calculated data.
 - 2) Make sure data meets the needs of the M&V plan.
- i. Review and update the Findings Log to ensure that it is complete and that the status of issues is up-to-date.
- j. Update the Draft MBCx Report, by updating sections 1 through 7 from the Planning Phase and by adding the following sections:
 - 8) Preventative Maintenance Activities Required and Performed
 - 9) Evaluation of Existing Monitoring System
 - 10) Sensor Calibration Required and Performed
 - 11) EMCS or monitoring Upgrades Required and Performed
 - 12) Trends and Data Collection Routines
 - 13) Sample Data Collection
 - 14) Data Quality Assessment
 - 15) Data Analysis Preparation
 - 16) Current Version of the MBCx Findings Log

3. Investigation Phase

- a. Update MBCx Plan as needed to reflect the findings or changes as a result of the Pre-Investigation Phase and submit to the MBCx Project team for review and approval.
- b. Collect sufficient data to establish baseline performance, and to identify operating characteristics of the building, system or equipment. Data collection procedures and durations should be consistent with the guidelines as set forth in the MBCx Project Requirements for the Higher Education/Investor Owned Utility Partnership Programs in place at the time of an MBCx project. This document may be provided by the CSU Chancellor's Office Energy Program Manager.
- c. Analyze Data
 - 1) Analyze data to identify issues and Improvement Opportunities, and record in the MBCx Findings Log.
 - 2) Define Functional Performance Testing needed to identify further Improvement Opportunities.
- d. Analyze utility and collected data to establish building, system, or equipment baseline performance.

- e. Conduct Functional Performance Testing
 - 1) Determine the objectives and scope of Functional Performance Testing.
 - 2) Draft and submit a Functional Performance Test protocol. See, for example, the Functional Test Guide and the Commissioning Functional Test Protocol Library at <http://peci.org/ftguide/ftg/index.htm>
 - 3) Perform Functional Performance Testing.
 - 4) Witness Functional Performance Testing.
 - 5) Collect and analyze trend data and other data generated from Functional Performance Tests to identify Improvement Opportunities. Update MBCx Findings Log accordingly.
- f. Evaluate Improvements in the MBCx Findings Log and recommend which improvements should be implemented during the course of this project, and which should be addressed through future work. Provide prioritization. Provide supporting information, including: any calculations, trend and portable logger data, functional test results, building simulation parameters and results, site visit reports, or photographs that were used to identify the problem or opportunity.
- g. Update the Draft MBCx Report by updating sections 1 through 7 of the planning phase and 8 through 16 of the pre-investigation phase and by adding the following sections:
 - 17) Data Analysis (include descriptions of analysis performed, noted discrepancies, system trends and optimization opportunities)
 - 18) Baseline
 - 19) Functional Performance Test Protocol
 - 20) Functional Performance Testing (include dates and descriptions of tests performed, noted discrepancies, system trends, and optimization opportunities.
 - 21) Analysis of Improvement Opportunities and Recommendations
 - 22) Current Version of the Findings Log
- h. Present Draft MBCx Report to the MBCx Project Team, and work with the Team to select Improvements to implement.

4. Implementation Phase

- a. Update MBCx Plan as needed to reflect the findings of the Investigation Phase.
- b. Implement Selected Improvements
 - 1) Implement selected improvements. It is expected that this may involve activities such as implementing changes in the control programming, tuning control loops, performing maintenance tasks, and implementing simple repairs of system components. The Contractor will not provide materials, and no extensive repairs will be included.
 - 2) Oversee implementation of selected improvements that are implemented by campus staff or outside contractors.
- c. Review any updated graphics, points list, and new or revised sequences of operation.
- d. Inspect and verify any improvements to equipment or systems, and repeat Functional Performance Tests and collect and review trend data as needed in order to witness and document improved performance.
- e. Document Remaining Improvement Opportunities

- 1) For the Improvement Opportunities that were not initially selected for implementation, including the more extensive or capital-intensive improvements; provide evidence of the potential benefits, and a rough estimate of the scope of effort required.
 - 2) Assist the University with obtaining hard costs for implementing the remaining Improvement Opportunities.
- f. Review Findings Log to ensure that it is complete and that the status of findings is up-to-date.
- g. Update the Draft MBCx Report, by updating sections 1 through 7 of the planning phase, 8 through 16 of the pre-investigation phase, 17 through 22 of the investigation phase, and by adding the following sections:
- 23) Improvements Implemented (Log and description)
 - 24) Performance Improvement Verification
 - 25) EMCS Update Verification
 - 26) Remaining Improvement Opportunities (description, costs, savings)
 - 27) Current Version of the Findings Log

5. Handoff Phase

- a. Update MBCx Plan as needed to reflect the findings of the Implementation Phase and submit to the MBCx Project Team for review.
- b. Based upon the findings of the investigation phase and the new instrumentation installed, work with the campus staff to develop specifications set up performance variance alerts, and implement data trending routines and controls programming for ongoing diagnostic tests to be conducted by the building operation staff or regular service contractors.
- c. Provide Training
 - 1) In the course of delivering pre-investigation and investigation phase tasks, work with campus staff with a goal of training them on the procedures. This may include topics such as identification and installation of additional monitoring points and additional ongoing diagnostic tests. To ensure the persistence of savings from the MBCx activities, campus staff should have a clear understanding of the points being monitored, the collected trends and the diagnostic routines.
 - 2) At project conclusion, train campus staff on the operation of the optimized facility and equipment, discuss maintenance procedures and review the use of documentation including the systems manual. Also discuss energy saving projections and recommended corrective actions.
- d. Work with campus staff to incorporate the findings of the project into ongoing O&M activities. Place a particular emphasis on ongoing trending and re-commissioning of systems to ensure persistence of savings.
- e. Follow the agreed-upon M&V procedures for verifying the expected benefits at the conclusion of commissioning, and estimate the operating savings achieved through the improvements implemented.
- f. Review trended data and establish a new baseline for energy performance.
- g. Review Findings Log to ensure that it is complete and that the status of findings is up-to-date.
- h. Update Draft and Submit Final MBCx Report by updating sections 1 through 7 of the planning phase, 8 through 16 of the pre-investigation phase, 17 through 22 of the investigation phase, 23 through 27 of the implementation phase and by adding the following sections:

- 28) Ongoing Diagnostics
 - 29) Training
 - 30) O&M Plan
 - 31) Report on Verification of Benefits and Estimation of Operating Savings
 - 32) Establishment of New Baseline
 - 33) Final Findings Log
- i. Draft and submit a MBCx Systems Manual, to include the following sections. Once the Final MBCx Report and Systems Manual are approved by the project team, the appropriate roject completion notification forms shall be filled out and submitted to the appropriate utility, along with a copy of the Systems Manual, for review.
- 1) Final MBCx Report
 - 2) General building or plant description
 - 3) Systems diagram
 - 4) Building and equipment schedules
 - 5) Summary of available documents
 - 6) Building control point list
 - 7) Equipment list, description
 - 8) Sequence of operation
 - 9) Control set points
 - 10) Alarm set points
 - 11) Available monitoring points and active trending capabilities
 - 12) Control graphics or diagrams
 - 13) O&M Plan
 - 14) Ongoing diagnostics
 - 15) M&V Plan

6. Oversight

- a. During the course of the project; conduct periodic (at least monthly) meetings of the MBCx Project Team. Develop and circulate meeting agendas, facilitate meetings, compile and circulate minutes.
- b. Submit monthly progress reports to the project manager. This shall include accomplishments, plans, milestones, issues and financial aspects.

C. SERVICE DURATION

Service duration shall be negotiated with the Service Provider

D. FEE SCHEDULE (MBCx)

Fee for MBCx of a building/group of buildings or a Central Plant shall be negotiated with the Service Provider based on the floor area and complexity of the systems. Service provider shall provide scope and a detailed cost breakdown of the each task. The fee developed for each task shall be based on the following hourly rate schedule:

<u>Discipline</u>	<u>Maximum Rate</u>
Senior Program/Project Mgr. PE, CLMP	\$195 Per Hour
Senior Energy Engineer PE	\$175 Per Hour
Energy Engineer	\$125 Per Hour
Energy analyst / Junior Engineer	\$90 Per Hour
Field technician	\$75 Per Hour
CAD Operator	\$75 Per Hour
Engineering/Administrative Assistant	\$60 Per Hour

E. PAYMENTS:

Payments for services shall be made in arrears for work completed to the satisfaction of the Trustees upon presentation of a written statement not exceeding the amounts specified below:

F. INVOICING:

Invoicing for services shall:

1. Be sent to the campus project manager named in the Service Order & Authorization to Proceed;
2. Identify campus, project name, and project reference number;
3. Reference the Service Order Authorization number being billed against;
4. Indicate what work and the percentage completed on each invoice; and
5. Reference only a single project per invoice.

G. REIMBURSABLE EXPENSES:

The fee for monitoring based commissioning shall include normal operating expenses incidental to this work. Reimbursable expenses should not be needed in the typical course of providing commissioning services. Extra services if any shall be paid in arrears when completed

The following are not reimbursable expenses:

- a. Travel expenses incurred in the course of providing commissioning services are included in the base fee amount and are not reimbursable.
- b. Shipping charges, phone calls, faxes, consumables, etc. incurred in the course of providing commissioning services are included in the base fee amount and are not reimbursable.

H. EXTRA SERVICES:

1. Via additional Service Order Authorizations and scope of services, the Campus may authorize supplemental services related to the commissioning process. Examples of such services would include the constructability Review
2. Extra services may also include reports and studies of the building mechanical systems as defined by the campus project manager.
3. Extra Services require pre-authorization in writing by the campus project manager and shall be issued as a separate Service Order & Authorization to Proceed. Campus project manager shall

provide separate scope of services and fee schedule for this work. Extra Services for different tasks may be combined into one Service Order & Authorization to Proceed. Work across separate projects must be separately authorized.

4. Extra services if any shall be paid in arrears when completed

Rider B - Agreement General Provisions

1. Trustees agree to pay for the services and materials to be furnished by Service Provider as provided by this Agreement. Payment in arrears shall be made upon Service Provider's completion of the services required by this Agreement to the satisfaction of the Trustees and upon Service Provider's submission of billings as shall be prescribed by the Trustees.
2. Service Provider, in the performance of this Agreement, is an independent contractor and is not an employee, agent, or officer of the Trustees.
3. Trustees may cancel this Agreement should Service Provider fail to perform as herein provided. In the event of such cancellation, Trustees shall be relieved of the obligation to make any payment to Service Provider and Trustees may proceed with the work in any manner the Trustees deem proper.
4. Trustees may terminate this Agreement either upon giving fifteen (15) days written notice or upon the immediate notice with payment of \$25.00 to Service Provider. Payment shall be complete by mailing payment to Service Provider at the address appearing on the face of this Agreement. In the event of such termination, Service Provider shall be paid only for the work satisfactorily completed.
5. Service Provider shall not assign benefits or delegate duties under this Agreement in whole or in part without the prior written approval of the Trustees. Thus, Service Provider may not assign any moneys due or to become due hereunder without the written consent of Trustees.
6. The provisions of this Agreement shall extend to and be binding upon and inure to the benefit of the heirs, executors, administrators, successors and assigns to the parties hereto.
7. No alteration or variation of the terms of this Agreement shall be valid unless made in writing and signed by the parties. Oral understandings or other agreements not incorporated herein shall not be binding.
8. Trustees may issue a written order with respect to the services to be performed under this Agreement at any time before the completion of the services. Trustees shall pay Service Provider an amount for such services as provided in this Agreement, or if not so provided, Trustees shall pay Service Provider a reasonable amount, which shall be agreed upon by the parties.
9. Any notice, which may be proper or necessary for either of the parties hereto to serve on the other, in case of Trustees, may be served effectually upon Trustees by delivering it in writing, addressed to the Trustees of the California State University, attention of the official executing this Agreement for Trustees, at 401 Golden Shore, Long Beach, CA 90802, or by depositing it in a United States mail deposit box with first class postage thereon fully prepaid and addressed to Trustees at the above-mentioned address. In the case of Service Provider, notice may be served effectually upon Service Provider by delivering it in writing to Service Provider at the address appearing on the first page of this Agreement or depositing it in a United States mail deposit box with first class postage thereon fully prepaid, and addressed to Service Provider at the Service Provider's above-mentioned address. Any notice may also be served effectually by delivering or mailing it, as in this section provided, addressed to Trustees or Service Provider at any other place or places which Trustees or Service Provider, by written notice served upon the other, may designate, provided, however, that nothing herein shall preclude the giving of notice by personal service.
10. In the performance of this Agreement, the Service Provider will not discriminate against any employee or applicant for employment because of race, color, religion, ancestry, sex, age, national origin, physical handicap, medical condition, or marital status. The Service Provider will take action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, ancestry, sex, age, national origin, physical handicap, medical condition, or marital status as prohibited by the California Fair Employment and Housing Act (Government Code Section 12900 *et seq.*).
11. Service Provider shall not utilize any information, not a matter of public record, which is received by reason of this Agreement, for pecuniary gain not contemplated by the terms of this Agreement, regardless of whether Service Provider is or is not under contract at the time such gain is realized (Education Code Section 89006).
12. The report, survey, or other product developed by Service Provider pursuant to this Agreement is the property of Trustees, and shall not be used in any manner by Service Provider unless authorized by Trustees.

13. In executing this service agreement, Service Provider swears, under penalty of perjury, that no more than one final unappealable finding of contempt of court by a federal court has been issued against Service Provider within the immediately preceding two-year period because of Service Provider's failure to comply with an order of a federal court which orders Service Provider to comply with an order of the National Labor Relations Board. Trustees may rescind this contract if Service Provider falsely swears to this statement (Public Contract Code Section 10296).
14. If the Agreement exceeds \$10,000, the contracting parties shall be subject to the examination and audit of the State Auditor of the State of California for a period of three years after final payment under the Agreement. This examination and audit shall be confined to those matters connected with the performance of this contract, including, but not limited to, the cost of administering this Agreement (Government Code Section 8546.7).
15. The Service Provider hereby certifies compliance with Government Code Sections 8355, 8356, and 8357 in matters relating to providing a drug-free workplace. In accordance with Government Code Section 8355, the Service Provider shall:
 - A. Publish a statement notifying employees that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees for violations;
 - B. Establish a Drug-Free Awareness Program to inform employees about all of the following:
 - (1) The dangers of drug abuse in the workplace,
 - (2) The Service Provider's policy of maintaining a drug-free workplace,
 - (3) Any available counseling, rehabilitation, and employee assistance programs, and
 - (4) Penalties that may be imposed upon employees for drug abuse violations;
 - C. Require that each employee engaged in the performance of the Agreement be given a copy of the statement required by subpart A, and require that each employee, as a condition of employment on the Agreement, agree to abide by the terms of the statement.
16. Responsive to direction from the State Legislature (Public Contract Code Section 10115 *et seq.*), the Trustees are seeking to increase the statewide participation of disabled veteran business enterprises in contract awards. To this end, Service Provider shall inform the Trustees of any contractual arrangements with consultants or suppliers that are certified disabled veteran business enterprises.
17. If the Service Provider is a natural person, the Service Provider certifies by signing this Agreement that s/he is a citizen or national of the United States or otherwise qualified to receive public benefits under the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (P.L. 104-193; 110 STAT. 2105, 2268-69), State of California Governor's Executive Order W-135-96.
18. If the Service Provider is a corporation, the Service Provider certifies and declares by signing this Agreement that it is eligible to contract with the State of California pursuant to the California Taxpayer and Shareholder Protection Act of 2003 (Public Contract Code Section 10286 *et seq.*).
19. The Service Provider shall not commence work until it has obtained all the insurance required in this Article, and such insurance has been approved by the Trustees.
 - A. Service Provider shall obtain and maintain the following policies and coverage. The insurance furnished by the Service Provider under this Article shall provide coverage in amounts not less than the following, unless a different amount is stated on the Cover Page of this Agreement:
 - (1) Comprehensive or Commercial Form General Liability Insurance: on an occurrence basis, covering work done or to be done by or on behalf of the Service Provider and providing insurance for bodily injury, personal injury, property damage, and contractual liability. The aggregate limit shall apply separately to the work. Limits of Liability:
\$2,000,000.00 General Aggregate
\$1,000,000.00 Each Occurrence—combined single limit for bodily injury and property damage.
 - (2) Business Automobile Liability Insurance: on an occurrence basis, covering owned, scheduled, hired, and non owned automobiles used by or on behalf of the Service Provider and providing insurance for bodily injury, property damage, and contractual liability. Limits of Liability:
\$1,000,000.00 Each Accident—combined single limit for bodily injury and property damage.
 - (3) Workers' Compensation: including Employers Liability limits of \$1,000,000.00 and other limits as required under California law.

- (4) **Errors and Omissions Insurance:** on an occurrence basis is preferred, covering work done or to be done by or on behalf of the Service Provider and providing insurance for errors and omissions in the amount of \$1,000,000.00 each occurrence. At a minimum, Service Provider shall obtain and maintain errors and omissions insurance on a claims-made basis for no less than \$1,000,000.00 each claim and \$2,000,000.00 annual aggregate, and certification of coverage shall be submitted to the Trustees upon signing of this Agreement. If the total contract amount exceeds \$1,000,000, Service Provider shall renew and keep such insurance in effect for at least five (5) years after the recordation of the notice of completion.
- B. Service Provider shall submit to the Trustees certificates of insurance and original endorsements to the policies of insurance required by the agreement as evidence of the insurance coverage. The scope of coverage and deductible shall be shown on the certificate of insurance. The certificates of insurance and endorsements shall provide for no cancellation of coverage without thirty (30) days written notice to the Trustees, as specified in Section 19-C (3). Renewal certifications and endorsements shall be timely filed by the Service Provider for all coverage until the work is accepted as complete. The Trustees reserve the right to require the Service Provider to furnish the Trustees complete, certified copies of all required insurance policies. The Service Provider shall notify the Trustees in writing of any material change in insurance coverage.
- C. The insurance policies shall contain, or be endorsed to contain, the following provisions.
- (1) For the general and automobile liability policies, the State of California, the Trustees of the California State University, the University, their officers, employees, representatives, volunteers, and agents shall be covered as additional insureds.
 - (2) For any claims related to the work, the Service Provider's insurance coverage shall be primary insurance as respects the State of California, the Trustees of the California State University, the University, their officers, employees, representatives, volunteers, and agents. Any insurance or self-insurance maintained by the State of California, the Trustees of the California State University, the University, their officers, employees, representatives, volunteers, and agents shall be in excess of the Service Provider's insurance and shall not contribute with it.
 - (3) Each insurance policy required by this Article shall state that coverage shall not be canceled by either party, except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the Trustees.
 - (4) The State of California, the Trustees of the California State University, the University, their officers, employees, representatives, volunteers, and agents shall not by reason of their inclusion as additional insureds incur liability to the insurance carriers for payment of premiums for such insurance.
- D. Insurers shall be licensed by the State of California to transact insurance and shall hold a current A.M. Best's rating of no less than A:VII or equivalent carrier otherwise acceptable to the Trustees.
- E. Miscellaneous.
- (1) Any deductible under any policy of insurance required in this Article shall be Service Provider's liability.
 - (2) Acceptance of certificates of insurance by the Trustees shall not limit the Service Provider's liability under the agreement.
 - (3) In the event the Service Provider does not comply with these insurance requirements, the Trustees may, at its option, provide insurance coverage to protect the Trustees. The Service Provider shall pay the cost of the insurance and, if prompt payment is not received by the insurance carrier from the Service Provider, the Trustees may pay for the insurance from agreement sums otherwise due the Service Provider.
 - (4) If the Trustees are damaged by the failure of Service Provider to provide or maintain the required insurance, the Service Provider shall pay the Trustees for all such damages.
 - (5) The Service Provider's obligations to obtain and maintain all required insurance are non-delegable duties under this agreement.
20. The Service Provider agrees to hold harmless, defend, and indemnify the State of California, the Trustees of the California State University, the University, and the officers, employees representatives, and agents of each of them from any and all claims, damages, losses, causes of action and demands, and all costs and expenses incurred in connection therewith, resulting from or in any manner arising out of or in connection with any negligent act or omission or willful misconduct on the part of the Service Provider, its officers, agents, and employees, in the performance of this Agreement. This provision shall survive the expiration or termination of this Agreement.
21. In accordance with Labor Code Section 1720, Service Provider must pay employees the minimum prevailing rate wages for inspection, surveying, or similar work during the design, preconstruction, and construction phases of a public works project.