

MASTER ENABLING AGREEMENT Rev. 2022-

COMMISSIONING SERVICES

This AGREEMENT is made and entered into this first day of July, 2023 pursuant to the Public Contract Code 10700, et seq., by and between the Trustees of the California State University on behalf of

<i>Campus, hereafter referred to as Trustees, and</i> California State University Office of the Chancellor	Amendment No.: N/A	Agreement No.: 22-660	Is agreement for Design Professional services: Yes (GP-8b)	Project No.: N/A
<i>Service Provider, hereafter referred to as Service Provider.</i> Kilowatt Engineering, Inc.	CSU Vendor ID No.: 13940	License No.: M35305		DIR No.: N/A

WITNESSETH: That the Service Provider in consideration of the statements and conditions herein contained, agrees to furnish labor, materials, and equipment and to perform work necessary to complete, in a skillful manner: The Service Provider shall provide new building and major renovation commissioning, retrocommissioning, and monitoring-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 the administrative office of the California State University may engage the services of Service Provider as provided herein. Campuses and the administrative office shall execute a Service Order and Authorization to Proceed (Exhibit B) to secure Service Provider's peer review services under this Agreement.

The Service Provider shall provide such services as more fully described in the following Rider, Exhibits, and Attachments, which by this reference are incorporated herein and made part of this Agreement:




Rider A	Agreement General Provisions	consisting of six (6) pages;
Exhibit A	Project Area Scope Descriptions	consisting of four (4) pages;
Attachment 1	Sample Commissioning Scope	consisting of nineteen (19) pages;
Attachment 2	Sample Retrocommissioning Scope	consisting of eleven (11) pages;
Attachment 3	Sample MBCx Scope	consisting of seven (7) pages;
Exhibit B	Service Order Authorization to Proceed Sample	consisting of one (1) page;
Exhibit C	Service Provider Rate Schedule	consisting of one (1) page;
Exhibit D	Energy Usage Intensity Report	consisting of one (1) page;
Exhibit E	Sample Commissioning Fee Table	consisting of one (1) page.

The term shall begin upon receipt of an executed Agreement from the Trustees and shall end as of June 30, 2027, with the option given the Trustees of extending the Agreement with the same terms and conditions for two (2) additional, two (2) year periods. Work elements started during the term shall continue to their completion and acceptance by the Trustees.

Service Provider shall not perform services in excess of the Agreement without prior written authorization to proceed from the Trustees.

Service Provider shall report to: California State University, Lindsey Rowell, Chief of Energy, Sustainability, and Transportation, (916) 402-1622.

The basic services amount to be expended under this Agreement shall be determined by the overall usage of each participation campus and the administrative office of the California State University. Payment shall be made in accordance with Rider A, Exhibit A, Attachment 1, Attachment 2, Attachment 3, Exhibit B, Exhibit C, Exhibit D, and Exhibit E.

Trustees of the California State University							Service Provider						
Campus California State University Office of the Chancellor							Firm Name Kilowatt Engineering, Inc.						
By (Trustees' Authorized Signature)  <small>Lindsey Rowell (Sep 25, 2023 10:29 PDT)</small>							By (Authorized Signature)  <small>Antonio Huizar (Sep 25, 2023 PST)</small>						
Printed Name and Title of Person Signing Lindsey Rowell, Chief of Energy, Sustainability, and Transportation							Printed Name and Title of Person Signing Antonio Huizar, Principal						
Address of Campus Project Administrator 401 Golden Shore; Long Beach, CA 90802							Address of Service Provider 207 E. Broadway Ste. 201; Long Beach, CA 90803						
SCO Acct:	Fund	Sub Fund	Agency	Yr.	Ref/Item	Category	Program	Element	Component	Chapter	Fiscal Yr.	Legal Ref.	
Fund Name			PS Account		PS Fund	PS Dept. ID	PS Program	PS Class	PS Project/Grant				
Amount Encumbered \$0.00		<i>I hereby certify upon my personal knowledge that budgeted funds are available for the period and purpose of the expenditures stated above.</i>											
Amount of Increase \$0.00		Signature of Accounting Officer					N/A \$0.00 MEA			Date			
Amount of Decrease \$0.00		<i>I hereby certify that I have examined the written Agreement and find the same to be in accordance with the requirements of California State University Contract Law. G. ANDREW JONES, General Counsel.</i>											
Total Amount Encumbered \$0.00		By Attorney					 <small>G. Andrew Jones (Sep 25, 2023 11:10 PDT)</small>			Date 09/25/2023			

This Agreement may be executed in counterparts all of which taken together shall constitute one and the same Agreement. The exchange of copies of this Agreement by electronic mail in "portable document format" ("PDF") form or by other similar electronic means shall constitute effective execution and delivery of this Agreement and shall have the same effect as copies executed and delivered with original signatures.

Rider A - Agreement General Provisions, Service Provider

1. Service Provider Relationship. Service Provider, in the performance of this Agreement, is an independent contractor and is not an employee, agent, or officer of the Trustees.
2. Payments. Payments under this Agreement shall be made in arrears of work increment completed to the satisfaction of the Trustees and upon submission of an invoice in CSU invoice format. If not otherwise specified payments for services rendered will be processed monthly upon presentation of invoice.
3. Services. 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.
4. 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).
5. Ownership. The report, survey, or other product developed by Service Provider pursuant to this Agreement is the property of Trustees, and shall not be disseminated to others by Service Provider unless authorized by Trustees.
6. Termination for Convenience. Trustees may terminate this Agreement upon a three (3) business-day advance written notice to Service Provider. In the event of such termination, Service Provider shall be paid only for the work satisfactorily completed.
7. Termination for Cause. Trustees may terminate this Agreement for cause should Service Provider fail to perform as herein provided. In the event of such termination, Trustees shall be relieved of the obligation to make any payment to Service Provider and Trustees may proceed by other means with the work in any manner the Trustees deem proper.
8. Indemnification.
The Indemnification subsection below, next to the checked box, applies to this agreement, while the subsection next to the unchecked box does not apply to this agreement.
 - a. Provisions of item 8a shall apply if the agreement is with a Service Provider that does **not** qualify under the provisions of California Civil Code section 2782.8. 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, including, but not limited to, attorneys' fees and costs 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.
 - b. Provisions of item 8b shall apply if the agreement is with a Service Provider that does qualify under the provisions of California Civil Code section 2782.8 and the scope of work is for design professional services. 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, including, but not limited to, attorneys' fees and costs to the extent arising out of, pertaining to, or relating to the negligence, recklessness, or willful misconduct on the part of the Service Provider, its officers, agents, and employees, in the performance of this Agreement. In no event shall the cost to defend charged to the Service Provider exceed the Service Provider's proportionate percentage of fault. However, notwithstanding the previous sentence, in the event one or more defendants is unable to pay its share of defense costs due to bankruptcy or dissolution of the business, the Service Provider shall meet and confer with other parties regarding unpaid defense costs. Service Provider's liability is not limited to recoverable insurance. This provision shall survive the expiration or termination of this Agreement.

The provisions of section 8b pertaining to the duty and cost to defend shall not apply to either of the following:

- 1) Any contract for design professional services per the provisions of California Civil Code section 2782.8, or amendment thereto, where a project-specific general liability policy insures all project participants for general liability exposures on a primary basis and also covers all design professionals for their legal liability arising out of their professional services on a primary basis.
 - 2) A design professional per the provisions of California Civil Code Section 2782.8, that provides design professional service and is party to a written design-build joint venture agreement and not the primary holder of the Trustees and Design-Builder contract.
9. Insurance Provisions. The Service Provider shall not commence work until the Trustees have received evidence of the insurance required in this section and approved it.
- a. Service Provider shall obtain the following policies and coverage. The insurance furnished by the Service Provider under this section shall provide coverage in amounts not less than the following, unless a different amount is stated in Exhibit A, Scope of Work Description:
 - 1) Comprehensive or Commercial Form General Liability Insurance:

On an occurrence basis, cover work done or to be done by or on behalf of the Service Provider and shall provide insurance coverage 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	General Aggregate
\$1,000,000	Each Claim - combined single limit for bodily injury and property damage.
 - 2) Business Automobile Liability Insurance:

On an occurrence basis, cover owned, scheduled, hired, and non-owned automobiles used by or on behalf of the Service Provider and shall provide insurance coverage for bodily injury, property damage, and contractual liability. Use Insurance Service Office (ISO) Form Number CA 0001 covering any automobile. Limits of Liability:

\$1,000,000	Each Accident - combined single limit for bodily injury and property damage.
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 - 3) Workers' Compensation Insurance:

This insurance shall include Employers Liability limits of \$1,000,000 and other limits required under California law.
 - 4) Professional Liability Insurance:

Professional liability (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 professional liability in the amount of \$1,000,000 each occurrence. The Service Provider shall obtain and maintain professional liability insurance on a claims-made basis for no less than \$1,000,000 each claim and

\$2,000,000 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 the Service Provider shall renew and keep such insurance in effect for at least ten (10) years after the recordation of the notice of completion.

For any of the insurance described in the paragraphs above, the amount of limits can be satisfied by a combination of primary and excess or umbrella insurance.

- b. Insurers shall be authorized in the State of California to transact insurance and shall hold a current A.M. Best's rating of no less than **A: VII** or alternatively a carrier acceptable to the Trustees.

Verification of coverage shall be provided as follows:

- 1) The Service Provider shall submit to the Trustees copies of certificates of insurance and endorsements to the policies of insurance required by the Agreement as evidence of the insurance coverage.
 - 2) The scope of coverage shall be shown on the certificate of insurance.
 - 3) The Service Provider shall provide written notice of cancellation of coverage within thirty (30) days to the Trustees.
 - 4) The Service Provider shall notify the Trustees in writing of any material change in insurance coverage.
 - 5) Renewal certifications shall be timely filed by the Service Provider for coverage until the work is accepted as complete.
 - 6) Trustees reserves the right to require complete, certified copies of all required insurance policies, including endorsements required by these provisions, at any time.
- c. Insurance policies except for Workers Compensation and Professional Liability insurance shall contain, or be endorsed to contain, the following provisions:
- 1) For the general 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 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. 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) 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. Additional Insurance Provisions
- 1) Any deductible under any policy of insurance required in this section shall be the 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) The Service Provider's obligations to obtain and maintain required insurance are non-delegable duties under this Agreement.
10. Personal Eligibility Certification. 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.
11. Corporate Eligibility Certification. 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.*).
12. Nondiscrimination. In the performance of this Agreement the Service Provider and its consultants shall not deny the Agreement's benefits nor shall they discriminate unlawfully against any person on the basis of religion, color, ethnic group identification, sex, actual or perceived gender identity, age, physical or mental disability, medical condition, marital status, or age (over 40). Additionally, the Service Provider and its consultants shall insure that the evaluation and treatment of employees and applicants for employment are free of such discrimination as well.
- a. Service Provider shall comply with the provisions of the Fair Employment and Housing Act (Government Code Section 12900, *et seq.*), the regulations promulgated thereunder (California Code of Regulations, Title 2, Sections 7285.0, *et seq.*), and the provisions of Article 9.5, Chapter 1, Part 1, Division 3, Title 2 of the Government Code (Government Code Sections 11135-11139.5).
 - b. Service Provider shall permit access by representatives of the California Department of Fair Employment and Housing and the Trustees upon reasonable notice at times during normal business hours with at least 24 hours' notice, to its books, records, accounts, other sources of information, and its facilities as the Department or Trustees shall require to ascertain compliance with this Agreement.
 - c. Service Provider and its consultants/subcontractors shall give written notice of their obligations under this Agreement to labor organizations with which they have a collective bargaining or other agreement.
 - d. Service Provider shall include the nondiscrimination and compliance provisions of this Agreement in subcontracts to perform work under the Agreement (Government Code Sections 12990, 11135, *et seq.*, Title 2, California Code of Regulations, Section 11105)
13. Drug Free Workplace Certification. 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.
14. Disabled Veteran Business Enterprise. 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.
 15. Assignment. Service Provider shall not assign benefits or delegate duties under this Agreement in whole or in part, nor assign any moneys due or to become due hereunder without the written consent of Trustees.
 16. Successors. 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.
 17. Notice. Notice for either party may be served by delivering it in writing to the party, or by depositing it in a U.S. mail deposit box with postage fully prepaid addressed as shown within the information block of the Agreement page. Nothing herein shall preclude the giving of notice by personal service.
 18. Audit. 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 and the California State University Auditor 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 Agreement, including, but not limited to, the cost of administering this Agreement (Government Code Section 8546.7).
 19. DIR Registration. In accordance with Labor Code Section 1720, *et seq.*, the Service Provider shall register with the Department of Industrial Relations (DIR) for this project and pay at least the prevailing wages on services/work aspects where a prevailing wage applies. Such services and/or work aspects include, but are not limited to, the Service Provider or its sub-consultant's provision of geotechnical studies, potholing involving digging, site surveying and/or construction Inspector of Record services as defined by the DIR.
 20. Agreement Changes. Alteration or variation of the terms of this Agreement shall not be valid unless made in writing and signed and dated by the parties. Oral representations, understandings, or writings not expressly incorporated in the Agreement are void. Unless identified within Exhibit A, Scope of Work, under a separate sub-heading entitled 'Modifications to Agreement', it is the intent of the Trustees to use the standard published form of this Agreement and Rider A without modification. The Agreement and Rider A shall not be modified without review and concurrence by CSU Office of General Counsel.
 21. Offshoring of CSU Contract Work. Service Provider warrants it certified under penalty of perjury in its bid for this Agreement that the Agreement, and any subcontract performed under the Agreement, will be performed solely with workers within the United States; and if this Agreement, and any subcontract performed under this Agreement, will not be performed solely with workers within the United States, Service Provider described in its bid any parts of the work to be performed by workers outside of the United States. Further, Service Provider warrants no work will be performed under the Agreement with workers outside the United States, except as described in Service Provider's bid. If Service Provider or its sub-supplier performs the Agreement with workers outside the United States during the life of the Agreement, and Service Provider did not describe such work in its bid, Service Provider acknowledges and agrees that:
 - a. CSU may terminate the Agreement without further obligation for noncompliance, and
 - b. Service Provider will forfeit to CSU the amount CSU paid for the percentage of work that was performed

with workers outside the United States and not described in Service Provider's bid.

End of Rider A

THE CALIFORNIA STATE UNIVERSITY

“EXHIBIT A” – PROJECT AREA SCOPE DESCRIPTIONS

Kilowatt Engineering, Inc.

PROJECT AREA OBJECTIVES

New Building/Major Renovation Commissioning (Cx) Objectives

Per Title 24 of the California Code of Regulations (CCR), Part 6 - California Energy Code, and Part 11 - California Green Building Standards (CALGreen), building system commissioning is required for new construction with conditioned space of 10,000 SF and greater. Commissioning shall be included in addition to the requirements of the Title 24 CCR, for all California State University (CSU) major capital construction projects.

For the New Building/Major Renovation commissioning project areas, or where another design team may be involved, the CxP acts as a campus agent and as a consulting campus advisor to the design team and contractor on issues that affect commissioning. The CxP's role is advisory, and in new building commissioning and other projects where another design review takes place, complementary to the Mechanical/Electrical Systems Reviewers' scope of work. In all applicable cases, the two parties shall coordinate to ensure no redundant reviews are performed. For Retrocommissioning and Monitoring Based Commissioning project areas, the CxP's role is usually not just advisory, but also implementation-focused to both identify and implement measures.

1. During the **pre-design activities**, the CxP will be expected to work with the campus project team, including occupants and controls end users, to define Owner's Project Requirements (OPR) suitable for use in a project RFQ/RFP. In close collaboration with CSU and the campus, the CxP may be asked to help advise and develop project and design goals, measurable performance criteria, budgets, schedules, success criteria, owner's directives, and supporting information for the OPR to form the basis from which all design, construction, acceptance, and operation decisions are made during the project lifecycle.
2. During the **design phase**, the role of the CxP will be to develop commissioning specifications and testing plan recommendations for the design team.
3. During **construction**, the CxP will be expected to monitor to ensure commissioning-related tasks are completed consistent with the approved Construction Documents and the commissioning plan, as well as facilitate building operator training.
4. During the **one-year post-occupancy period**, the CxP will be expected to provide the completed Systems Manual and any requested LEED documentation, as well as verify that the building is operating as designed, by documenting energy use intensity for the

first twelve (12) months of operations in the format specified in Exhibit B and providing this to both campus and CPDC.

Retrocommissioning (RCx) Objectives

CSU views Retrocommissioning as an important process to restore optimal functionality and efficiency to aged buildings. Over time certain systems or control components of a building can become uncalibrated and adversely affect the occupant comfort and efficiency of a building's operations. RCx pinpoints these problems and seeks to remedy them.

1. During the **planning phase**, the CxP will be expected to work with the campus project team, including occupants and controls end users, to define Owner's Project Requirements as well as develop a Retrocommissioning Plan.
2. During the **investigation phase**, the role of the CxP will be to conduct a systematic analysis of the building(s)' performance through observation, review of building documents and O&M practices, and trending and testing of building systems.
3. During the **implementation phase**, the CxP will be expected to develop an Implementation Plan for the measures selected from the investigation phase, implement said measures, and verify that the operational goals were achieved.
4. During the **handoff phase**, the CxP will be expected to provide the Final Report and Systems Manual such that the campus building operators have sufficient materials to monitor and maintain the implemented RCx measures.

Monitoring-Based Commissioning (MBCx) Objectives

The goal of an MBCx process is to maintain existing improvements and implement further improvements to building performance over time. Monitoring-based commissioning is defined as the implementation of an ongoing commissioning process with focus on monitoring and analyzing large amounts of data on a continuous basis.

1. During the **planning phase**, the CxP will be expected to work with the campus project team, including occupants and controls end users, to establish the technical plan and define the scope of how MBCx will be implemented using the energy management system (EMS) and/or energy information system (EIS).
2. During the **EMS/EIS configuration phase**, the role of the CxP will be to configure and calibrate necessary data points (e.g. fault detection, energy savings), user interfaces, and sensors for the accurate tracking of data over the course of the project.
3. During the **implementation phase**, the CxP will be expected to identify issues and opportunities for corrective action and work with the campus project team to implement these measures, and update facility documentation accordingly, as well as deliver a final report and necessary training.

APPLICABLE SYSTEMS AND ASSEMBLIES TO BE COMMISSIONED

The following includes a sample list of items anticipated to be included in any one of the three project areas.

HVAC Systems and Equipment Controls

- Chilled water system (chiller, cooling tower, piping, pumps)
- Heating water system (boilers, piping, pumps)
- Under floor air distribution system
- Air handlers (including minimum outside air control,
- CO2 monitoring, heat recovery, humidification)
- Hydronic piping (including air separators and expansion tanks)
- Ductwork
- Thermal comfort, temperature and humidity control
- Variable speed drives
- Outside air valves
- Perimeter heaters
- Unit heaters
- Air terminal boxes
- Variable refrigerant flow (VRF) system
- Computer room air conditioning units
- Fan coil units
- Restroom exhaust system
- Misc. exhaust fans
- Garage exhaust fans
- Building automation and control system (BAS)
- Data acquisition system
- Atrium smoke control system
- Radiant floor heating
- TAB work
- HVAC and envelope differential pressure relationship

Electrical Systems

- Scheduled lighting controls
- Exterior lighting controls
- Daylight dimming controls
- Lighting occupancy sensors
- Wire and cable
- Medium voltage shielded cable
- Wiring devices (switches and outlets)
- Switchgear
- Motor control centers
- Transformers
- Variable frequency drives
- Ground fault
- Secondary grounding
- Low voltage metal-enclosed switchgear
- Bus duct
- Emergency power generator system and ATS
- Whole building power outage integrated test
- Photovoltaics
- Battery Energy Storage Systems

Laboratory and Clean Room

- General lab exhaust systems

- Lab and room pressurization control
- Air terminal units (supply and exhaust valves)
- Room differential pressure controls and equipment (exhaust and makeup fans and terminals)
- Fume hood functionality (not including ASHRAE 110 tests or other certifications)
- Hood and process exhaust systems
- Exhaust scrubbers
- Biological safety cabinets
- Safety cabinets
- Cold rooms
- Bio-waste sterilization
- Lab vacuum pumps
- Lab air compressor
- Cleanroom fan filter units
- Cleanroom makeup air units
- Cleanroom certification
- Pure water systems
- Process gas systems
- Process coolers

Special Systems

- Automatic window shades
- Elevators
- Electric coiling doors and grills
- Loading dock lift
- LEED features to meet desired level of certification through:
 - Energy and Atmosphere Cx credits
 - M&V Credits
 - Environmental Quality credits
 - Water Efficiency credits
- Living Building Challenge features to meet desired petals:
 - Place petal
 - Water petal
 - Energy petal
 - Health + Happiness petal
 - Materials petal
 - Equity petal
 - Beauty petal

SPECIFIC SCOPE EXAMPLES

Selected respondents will be required to develop project-specific scopes of work, budgets, and schedules for each campus project. These project-specific items will be negotiated with individual campuses as they initiate projects requiring commissioning services. Examples of potential specific scope documents in each of the three project areas are included for reference and are expected to be used as a starting point for each campus-specific scope of work.

Attached:

1. Example New Building Commissioning Scope of Services
2. Example Retro-Commissioning Scope of Services
3. Example Monitoring Based Scope of Services

End of Exhibit "A"

THE CALIFORNIA STATE UNIVERSITY
Attachment 1 - Commissioning Scope of Work
Kilowatt Engineering, Inc.

(Sample Only – Campus to update or provide actual scope)

CSU Commissioning (Cx) Requirements and Scope

The objective of the CSU commissioning process is to provide a systematic quality assurance process that spans the entire design and construction process, including assisting the campus define Owner’s Project Requirements (OPR) verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to the applicable codes and standards as well as meet CSU’s project requirements.

The Service Provider engaged for this work is hereby designated as the Commissioning Provider (CxP) for the project. In this role the CxP acts as a campus agent and as a consulting campus advisor to the design team and contractor on issues that affect commissioning. The CxP’s role is advisory, and in new building commissioning, complementary to the Mechanical/Electrical Systems Reviewers’ scope of work. The two parties shall coordinate to ensure no redundant reviews are performed.

The Architect/Engineer and Contractor under their own separate contracts with the Campus are the respective Architect/Engineer-of-Record and Contractor-of-Record. The CxP shall perform to the selected scope of work using the most current CSU Commissioning Guidelines (available through the CSU CPDC [Resource Library](#)) as a reference. The CxP shall seek direction from the campus where guideline or scope requirements relative to the specific project are not applicable.

New Building/Major Renovation Commissioning (Cx) Objectives

Per Title 24 of the California Code of Regulations (CCR), Part 6 - California Energy Code, and Part 11 - California Green Building Standards (CALGreen), building system commissioning is required for new construction with conditioned space of 10,000 SF and greater. Commissioning shall be included in addition to the requirements of the Title 24 CCR, for all California State University (CSU) major capital construction projects.

The new building commissioning scope of work will involve the CxP from pre-design through its completion and a one-year post-occupancy period thereafter.

1. During the pre-design phase, the CxP shall work with the campus project team to define Owner’s Project Requirements suitable for use in a project RFQ/RFP.

2. During the design phase, the role of the CxP is to develop commissioning specification and testing plan recommendations for the design team.
3. During construction, the CxP shall monitor to ensure commissioning-related tasks are completed consistent with the approved Construction Documents and the commissioning plan, as well as facilitate building operator training.
4. During the one-year post-occupancy period, the CxP shall provide the completed Systems Manual and any requested LEED documentation, as well as verify that the building is operating as designed.

Scope of Work

Campus project team shall determine which scope of work is applicable to the project. Note that all new buildings with more than 10,000 SF of conditioned space are required to be commissioned (i.e. subject to the Cx Scope of Work) per Title 24 Parts 6 and 11.

1. Phase 1: Pre-Design
 - a) Deliverables
 - i. Owner's Project Requirements
 - b) Activities
 - i. Develop an Owner's Project Requirement document (OPR) to memorialize the project's functional requirements, expectations of building use and operation as it relates to systems being commissioned, consistent with Title 24 of the CCR, Part 6- California Energy Code, CALGreen, and CSU major capital project requirements. Refer to the CSU Owner's Project Requirements Guide, available through the Resource Library.
 - ii. Actively coordinate the commissioning work effort during pre-design and all design phases.
2. Phase 2: Design
 - a) Deliverables
 - i. Commissioning Plan
 - ii. Meeting with design team and campus
 - iii. Updated OPRs as appropriate
 - iv. Phased Cx Reviews (reference Table 1)
 - v. Commissioning Specifications
 - vi. Participate in controls integration meetings, as requested
 - b) Activities
 - i. Table 1 below provides an overview of Commissioning Activities during the design phase, which are detailed further below.
 - ii. Develop commissioning plan and specification recommendations for design team use. The CxP's role here is to provide advisory support.

The project A/E retains record authority for the functionality and appropriateness of the design.

- iii. Conduct a design phase planning and scoping meeting with the design team and campus.
- iv. With each design package from the Design Team, review and update the OPR as needed. Review the Basis of Design (BOD) and recommend changes to make it accurate.
- v. Perform reviews of the design and specifications against the OPR and BOD. Coordinate with Mechanical and Electrical Systems Reviewers to ensure reviews are not redundant. Submit comments and review and adjudicate concerns and responses with the Owner and Design Team. Backcheck the incorporation of comments in the next design submission.

(1) Table 1 provides guidelines for the reviews to be conducted by the CxP. Work with campus team to determine level of depth and rigor desired.

Table 1: Cx Review Phases

Phase	Systems to be Reviewed and Commented On	Scope of Reviews	Review Rigor
Schematics / Concepts	Systems that have some level of development	Moderate: Review is high level, looking for areas where the OPR may be difficult to achieve. Rigorous: Moderate, plus make comments where the concepts could be enhanced.	<input type="checkbox"/> moderate <input type="checkbox"/> rigorous

Phase	Systems to be Reviewed and Commented On	Scope of Reviews	Review Rigor
Design Development	HVAC, controls, lighting controls, domestic water heating, emergency power, building enclosure, fire alarm, fire protection, electric gear, security, telecom, other:	Moderate: Primarily review for commissioning facilitation and operations and maintenance issues and obvious areas where OPR may not be met. Rigorous: Moderate, plus a deeper look into OPR compliance, review the BOD, energy efficiency, indoor environmental quality, functionality for tenants, environmental sustainability, life cycle cost (qualitative), durability and safety.	<input type="checkbox"/> moderate <input type="checkbox"/> rigorous
Construction Documents-Mid	HVAC, controls, lighting controls, domestic water heating, emergency power, building enclosure, fire alarm, fire protection, electric gear, security, telecom, other:	Same as Design Development. And, for Moderate: Review training, O&M documentation and commissioning requirements. Rigorous: Moderate, plus review ongoing monitoring requirements, identify vague and incomplete issues likely to cause change orders and extra effort on confirming controls are well thought out, include feedback from campus facilities end-users, completely defined and workable.	<input type="checkbox"/> moderate <input type="checkbox"/> rigorous
Construction Documents-Late	Same as above, except:	Same as Mid-Construction Documents.	<input type="checkbox"/> moderate <input type="checkbox"/> rigorous

- (2) Reviews for constructability and physical coordination are not explicitly in the CxP's scope, but issues observed shall be documented.
- (3) Review to verify compliance with building codes are not explicitly in the CxP's scope, but issues observed shall be documented.
- vi. Facilitate, participate in and track outcomes of controls integration meetings with the CxP and appropriate members of the design team and controls representative of the contractor if known. Review control system features, strategies, sequences and interlocks between systems and disciplines, etc., identify and facilitate resolving conflicts and see they are incorporated into the design.
- vii. Confirm that the design team develops clear, complete and rigorous: a) sequences of operation for all dynamic equipment, b) Fire alarm response matrix, c) Emergency power response matrix, by approving formats and completed documents from the design team.
- viii. Develop project specific commissioning specifications.
 - (1) The commissioning specifications shall provide a clear and complete description of the commissioning process and the roles and responsibilities of the Contractor.
 - (2) Definitions, responsibilities by party, submittal requirements, coordination, meetings, process and requirements relative to installation, construction checklist creation and execution, start-up, test-readiness confirmation, functional test development and execution, deferred and seasonal testing, issue and non-conformance, training of Owner personnel, O&M documentation, systems manual requirements, documentation and closeout. Identify by equipment, who is writing construction checklists and functional tests, approving the forms, directing, executing, and documenting tests, etc.
 - (3) The above elements applicable to all systems commissioned shall be provided in a General Commissioning Requirements section, provided in draft during Design Development.
 - (4) Specific testing and monitoring (trends), sampling and other unique requirements shall be developed for each system in a separate appropriate specification section, e.g., mechanical, electrical, plumbing, fire alarm, envelope or enclosure.
 - (5) A few representative construction checklists and functional tests shall also be provided for reference.
 - (6) The commissioning specifications shall be updated as required for the 100% construction documents submission.
- ix. Create a Construction Phase Commissioning Plan.
 - (1) The Cx Plan shall augment the process given in the Cx specifications, providing some repeat of the general commissioning requirements.

- (2) Additionally, provided shall be more specificity for this project, including more detail on the communication, management, and access reporting and approval protocols, the submittal process, field observations, construction checklist and functional testing development, coordination, execution and documentation, air and water balancing management, meeting schedule and frequency, including controls integration meetings, communication protocols, scheduling issues, progress reporting, testing in phases, issue management, subcontractor task delineation, training, systems manual development, etc.
- (3) The Cx Plan document does not include the construction checklists and functional tests which are developed during the Construction Phase, though samples may be part of the plan.

3. Phase 3: Construction

a) Deliverables

- i. Planning meeting with Campus and General Contractor
- ii. Updated Commissioning Plan
- iii. Create and submit Cx schedule to GC
- iv. Cx kick-off meeting with GC and subcontractors
- v. Develop construction checklists and functional tests
- vi. Controls integration meeting
- vii. Commissioning issues log/progress reports
- viii. Commissioning coordination meetings
- ix. M&V Plan
- x. Functional testing reports
- xi. Facilitation and verification of operator training
- xii. Documentation of Operations and Maintenance Manual review

b) Activities

- i. Conduct a planning meeting with the Campus and General Contractor/Construction Manager.
 - ii. Update the Construction Phase Commissioning Plan.
 - iii. Create a Cx schedule and have the contractor integrate it into the construction schedule.
 - iv. Conduct a Commissioning kick-off meeting with General and subcontractors. Review the Cx Plan and specifications and process highlighting the trades' responsibilities.
 - v. Review Contractor submittals.
- (1) Review and comment for compliance with the plans, specifications, OPR and for commissioning facilitation for the equipment and systems within scope, including but not limited to air and water balancing agenda, HVAC systems, building automation system, lighting controls, emergency power and fire alarm response matrices.

- (2) Review for information only and to assist in developing construction checklists and functional tests for the applicable equipment and systems, such as coordination shop drawings and piping.
- vi. Prior to controls programming, hold a controls integration meeting where the submittal review comments of controls sequences and drawings are discussed and issues resolved. Track and submit issues.
 - (1) Test procedures shall be developed uniquely for each project and are composed of repeatable, step-by-step narrative procedures and include the test prerequisites and set up conditions, the test process of perturbing or observing the system or set points, the expected outcomes, the acceptance criteria and a place to record the results.
 - (2) Test procedures shall confirm every sequence in the building automation system sequences of operation and relevant features and sequences of on-board controllers including staging, interlocks to other equipment, alarms, manual operation, time of day schedules, off-hours operation, fire mode, loss of power and equipment failure, etc.
 - (3) All larger, more complex, process critical or life-safety equipment shall be individually tested. Testing only a sample of some equipment or assemblies may be allowed where such equipment or assemblies are small in physical size or importance, are numerous and are not complex or critical for process or life-safety.
 - (4) Systems that are monitored through an energy management system (EMS) shall be trended by the CxP after manual testing is complete. If there is no EMS, the CxP shall provide and install data loggers. Trend requirements will be included in the functional test forms. Trends shall confirm proper operation of all major control loops, equipment staging and time of day scheduling, etc.
 - (5) Provide functional test procedures to the contractor early and so they can execute the tests on their own prior to formal functional testing with the CxP. Incorporate Contractor comments into the forms.
 - (6) Test procedures developed by the Contractor or vendors shall be approved by the CxP.
- vii. Review minutes of Campus, Architect, Contractor meetings to keep abreast of project progress.
- viii. Review requests for information and change orders of commissioned equipment. Comment as warranted to maintain the OPR.
- ix. Develop and manage the Commissioning Issues Log in a spreadsheet or database application that allows sorting and filtering and efficient displaying and printing of data. Keep log updated as issues are identified. Regularly submit the log to the Campus and Contractor.
- x. Facilitate quicker and better resolution of issues by assisting the project team with resolution of issues. The CxP is not responsible for

issue resolution, but is expected to provide input when they may have a unique and valuable perspective due to their expertise or onsite familiarity with the project and when such input can be readily done without much analysis.

- xi. Conduct construction site observations beginning when the commissioned equipment is shipped to the site.
 - (1) Make observations about equipment model and features meeting submittal requirements, equipment condition, installation, scheduling, coordination and in the proper utilization of construction checklists. The observations will check things randomly in construction checklists and will target other areas deemed necessary by the CxP.
 - (2) Document issues in the Cx Issues Log that require addressing by the Contractor and forward the log to the Campus and Contractor in a timely manner. Construction progress reports are not desired.
 - (3) Frequency of visits must be sufficient for the CxP to keep abreast of progress and to allow for catching significant issues early. Attendance at part of major equipment startup is desired. Propose the frequency and number of visits by discipline.
- xii. Conduct regularly scheduled commissioning coordination meetings. Take and distribute minutes. Propose meeting frequency. For example, meetings may include planning and kickoff meetings, plus one meeting per month once ductwork has been set and twice a month once the first major piece of HVAC equipment is started. When testing begins, meetings may be weekly until occupancy. Note, for small projects these frequencies may need significant compression.
- xiii. Submit commissioning progress reports to the Campus and Contractor at one half the frequency as commissioning meetings.
- xiv. Fully develop the M&V Plan. Confirm that all points and data streams are installed and recording properly.
- xv. Review startup and factory test reports of commissioning equipment and confirm compliance with the manufacturer's recommendations and good practice.
- xvi. Observe some of the air and water balancing work sufficient to be reasonably confident it is being done correctly. Review the balance report. Back check a 5% sample of the work with the balancer using their equipment.
- xvii. Confirm formal functional test readiness through field observation, review of start-up reports and construction checklists, observation of control system and equipment operation, including trending and when required review of contractor's pre-tests of system operation.
- xviii. Schedule, direct and document functional testing.
 - (1) The Cx Team shall utilize observations, active tests and trending or monitoring of systems and assemblies to evaluate compliance with

the construction documents and OPR. The testing rigor required is described in the functional test procedure articles above.

- (2) Prior to or at the beginning of testing, critical sensor and actuator calibrations and building automation system graphics shall be confirmed accurate.
 - (3) CxP shall write, direct, execute and document tests on approved test forms per the Testing Responsibility (Table 2) below. Record issues on the Issues Log and forward to Contractor and Campus in a timely manner. CxP shall witness tests executed and documented by others per the testing table below sufficient to be reasonably confident they are being done properly and shall review completed test reports.
 - (4) Sampling. Testing only a sample of like equipment shall be conducted as follows (Contractor testing described below is in addition to the Contractor pre-tests):
 - For all sampling testing by the CxP, if there are any failures, the Contractor shall make needed corrections to all like units and to units with the same or similar elements that failed in the entire project and then show the CxP how the units' corrections and programming were made and shall document random retesting of the rest of the project of the same percentage the CxP originally tested using the CxP's forms. CxP will review retesting documentation and may use allotted retesting hours for random back-checking of the corrections.
 - Terminal boxes or radiators (air or water): CxP tests all sequences and features on 10-30%. On all units CxP executes building automation system reports or queries during heating and cooling mode to verify proper valve and damper actuation and room temperature control.
 - Lighting occupancy sensors: CxP shall test 20-30% with the Contractor, Contractor tests and documents the balance.
 - Daylight dimming controls: CxP shall test 30-50% with the Contractor, Contractor tests and documents the balance.
 - Building enclosure elements as requested.
 - Other equipment as requested.
 - For the balance of equipment the Contractor tests alone, the CxP reviews the test reports and field backchecks for 5-20%.
- xix. Trend logs of BAS controlled equipment over a week's time at no greater than 5-minute intervals of temperature, flow, speed, pressure, position, status, setpoints, etc. shall be utilized to confirm proper operation of all primary control loops (space, coil, duct and water temperature and duct and room pressure control, speed, resets, economizer functions, major equipment staging, etc.).

- (1) The CxP shall view and analyze trends and record deficiencies in the Issues Log. The Contractor shall set up the trends specified by the CxP.
 - (2) Once systems are working properly, the CxP shall print graphs demonstrating the proper operation of the primary control loops of all equipment and submit with the active functional testing reports.
 - (3) When critical data is not available through a BAS, monitoring and recording of performance data is accomplished by using stand-alone data loggers provided, set and analyzed by the CxP.
- xx. Determine with Campus the maximum number of hours to be spent on CxP retesting of deficiencies in this scope.
 - xxi. Completed tests shall be submitted to the Owner.
 - xxii. Facilitate and verify operator training.
 - (1) Develop detailed training agendas for each system and assembly and provide to the Contractor to use during their training. From Campus input, include desired training rigor and attendee type. Alternatively, the CxP may review agendas developed by the Contractor. Include a place to mark each concept taught and have a log of attendees.
 - (2) Develop questionnaires for the trainees that evaluate the training and attach to the agenda submitted to the Contractor.
 - (3) If desired by Campus, the CxP may attend a few of the trainings.
 - (4) Review completed agendas and questionnaires to confirm training adequacy. Submit documentation of this review.
 - xxiii. Review O&M manuals for compliance with the specifications parallel with the A/E review. Submit documentation of this review with any deficiencies.
 - xxiv. Confirm that the as-built drawings for specified systems have been submitted. CxP is not required to verify accuracy.

Table 2: Testing Responsibility Table (adapt to scope of project as needed)

Equipment	Write Tests	Direct Tests	Execute Tests	Document Tests	Witness Test Only
HVAC & controls	CxP	CxP	Contr	CxP	----
Lighting controls	CxP	Both**	Contr	Both**	----
Electrical gear	Certified testing co. of Contr.	Certified testing co. of Contr.	Certified testing co. of Contr.	Certified testing co. of Contr.	CxP (sample*)
Fire alarm & protection	CxP	Vendor	Vendor	Vendor	CxP (sample*)

Equipment	Write Tests	Direct Tests	Execute Tests	Document Tests	Witness Test Only
Plumbing	CxP	CxP	Contr	CxP	----
Security & Intercom	CxP	CxP	Contr	CxP	----
Building enclosure	CxP	CxP	Contr	CxP	----
Laboratory process	CxP	CxP	Contr	CxP	CxP (see exceptions)
Other:					

Contr = Contractor

**Both, indicates that some equipment has shared responsibility as delineated in the Sampling article above.

4. Phase 4: Post-Occupancy

a) Deliverables

- i. Systems Manual
- ii. LEED Certification documentation (if requested)
- iii. Peak load seasonal testing report
- iv. 10-month post-occupancy report
- v. Updated Commissioning report

b) Activities

- i. The CxP shall stay engaged for one year after project completion.
- ii. Finish outstanding functional testing and other incomplete tasks listed in the Construction Phase, including facilitating the resolution of outstanding issues.
- iii. Finish compiling the Systems Manual. The CxP receives System Manual elements electronically from others and provides some elements themselves, as noted below, and compiles them into one electronic suite of pdf documents, all organized, bookmarked and hyperlinked and submits to Campus. Bookmarks must be down to the equipment level for submittals and O&Ms, startup reports, test record, etc. The Systems Manual is also provided in hard copy to the Campus, with the Contractor submitting their contributions directly to the Campus, as does the CxP (one copy provided). The contents of the Systems Manual generally follow ASHRAE Guideline 0. Work with Campus to determine the systems to be included in the Systems Manual, which may not include all of the commissioned systems.

(1) Systems Manual Contents

- o Table of Contents (bookmarked and hyperlinked)
- o Executive Summary
- o OPR and System Narratives
 - o OPR (by CxP or Campus) and Systems Narratives (by design team)

- System flow diagrams or schematics (when part of design documents, by design team)
- Operating Requirements
 - Owner approved building occupancy schedule (by CxP).
 - Equipment run-time schedules (by CxP).
 - Minimum outside air requirements (general building wide) (by design team).
 - By space: use, temperature, humidity, lighting level and any special noise, pressure, return air, air change requirements (by design team).
- (2) Operating Parameters and Procedures
 - As-built sequence of operations for all equipment, including those with standalone controllers (by contractor).
 - As-built control drawings, including points list (by contractor).
 - A list of all user-adjustable set points and reset schedules, their purpose, and range of reasonable adjustments with energy implications when adjusting them—including the central building automation system and packaged equipment controllers (by CxP).
 - A description of and rationale for all major energy-saving features and strategies with operating instructions and caveats about their function and maintenance (by CxP).
 - Fire and emergency power response criteria in matrix format, including narratives of special procedures and sequences (format by CxP and content by contractor and design team).
 - For 24-hour facilities or those with critical processes, provide maintenance start-up and shutdown, manual, and restart operation procedures for equipment and systems controlled by the building automation system and by stand-alone equipment controllers (by CxP).
 - Special useful notes and instructions to operators not found in the O&M Manuals or control sequences that emerged from the commissioning process (by CxP).
 - Training materials from the original trainings if different than the O&M manuals and any video recordings of trainings (by contractor).
- (3) Performance Persistence and Optimization Program
 - Recommendations for recalibration frequency of sensors and actuators by type and use (by CxP).
 - Plan outline for monitored based Ongoing Commissioning or recommended frequency for periodic recommissioning testing by equipment type with reference to construction-completed tests and checklists, including blank forms (by CxP).

- Description of the primary recommended standard trend logs in the control system and control system reports that will assist in maintaining comfort, energy efficiency, and system control, including report templates and sample plots with explanations of what to look for in the graphs. These trends may include air handler functions (economizer, duct static pressure reset, supply air temp reset); boiler functions (HWST, HW pump control); chiller functions (CHWST, CWST, pump control), etc. (by CxP).
 - Description and use instructions for any installed fault detection features (by CxP).
 - Description and use of the energy management system and energy information system reports, when installed (by CxP).
 - Guidelines for establishing performance metrics and benchmarks and guidelines for tracking whole-building and primary end-use energy and efficiency (by CxP).
 - Suggestions for changes in the way things are controlled, set points, and sequence strategies for optimizing energy efficiency, comfort, and control coming out of the commissioning process to date (by CxP).
- (4) Commissioning Record (all by CxP)
- Summary commissioning report.
 - Issues log.
 - Issue resolution plan.
 - Lessons learned.
 - Cx Plan.
 - Cx Specifications.
 - Design, OPR and BOD review record.
 - Submittal reviews, including of TAB & O&Ms.
 - Testing schedule, progress reports and field observations.
 - Training record.
 - Completed and blank construction checklists and start-up reports.
 - Completed and blank functional tests and trend logs.
 - 10-month operations review and seasonal testing record.
 - 12-month energy usage intensity (EUI) report
- (5) Maintenance Procedures (all by contractor)
- O&M manuals.
 - Preventive maintenance procedures for all commissioned equipment. This shall be a link directly into the appropriate page of the respective O&M manual, but if no maintenance procedures are given in the O&Ms a list of procedures will need to be created. (O&Ms with links in pdf's made by contractor).
 - Warranties.
- (6) Construction Record (all by contractor)

- Record drawings.
 - Specifications.
 - Approved submittals.
 - Approved change orders.
- (7) Final air and water balance report
- (8) If requested, submit required documentation to USGBC for LEED certification for the Cx credits.
- (9) Conduct seasonal testing at near peak heating and cooling conditions, primarily by trending when possible. Also confirm space temperature control performance in all rooms, general building pressure and any special room differential pressure control. Submit report to Campus.
- (10) Conduct an on-site Building Operations Review about 10 months after project completion. Review work orders related to commissioned systems, review of alarm and complaint logs and review of selected trend logs of known problem areas and other critical areas to confirm proper performance and equipment operation. Document issues and proposed solutions and identify responsible parties. Submit a report of the Review to Campus. Update the Cx Report.
- (11) Document monthly EUI metrics after occupancy using the template in Exhibit B. Submit report to campus and CPDC.

Systems and Assemblies to be Commissioned

CxP shall work with campus to determine the applicable systems to be commissioned.

HVAC Systems and Equipment Controls

- Chilled water system (chiller, cooling tower, piping, pumps)
- Heating water system (boilers, piping, pumps)
- Under floor air distribution system
- Air handlers (including minimum outside air control,
- CO2 monitoring, heat recovery, humidification)
- Hydronic piping (including air separators and expansion tanks)
- Ductwork
- Thermal comfort, temperature and humidity control
- Variable speed drives
- Outside air valves
- Perimeter heaters
- Unit heaters
- Air terminal boxes
- Variable refrigerant flow (VRF) system
- Computer room air conditioning units
- Fan coil units
- Restroom exhaust system
- Misc. exhaust fans
- Garage exhaust fans

- Building automation and control system (BAS)
- Data acquisition system
- Atrium smoke control system
- Radiant floor heating
- TAB work
- HVAC and envelope differential pressure relationships

Electrical Systems

If electrical equipment other than lighting controls and emergency generators are to be tested by the CxP rather than the contractor's certified testing company, then additional detail should be provided in scope such as which tests and inspections will be required for each piece of equipment. Refer to InterNational Electrical Testing Association (NETA) testing standards and specifications online.

- Scheduled lighting controls
- Exterior lighting controls
- Daylight dimming controls
- Lighting occupancy sensors
- Wire and cable
- Medium voltage shielded cable
- Wiring devices (switches and outlets)
- Switchgear
- Motor control centers
- Transformers
- Variable frequency drives
- Ground fault
- Secondary grounding
- Low voltage metal-enclosed switchgear
- Bus duct
- Emergency power generator system and ATS
- Whole building power outage integrated test
- Photovoltaics
- Battery Energy Storage Systems

Fire Life Safety

- Fire alarm system
- Fire protection
- Stair pressurization system
- Fire smoke dampers

Plumbing

- Domestic water system (booster pumps)
- Domestic water heating system (heaters, circulation pumps, mixing valves)
- Sump and ejector pumps
- Irrigation systems and controls
- Automatic fixture control
- Grey/rainwater system
- Solar hot water

Laboratory and Clean Room

- General lab exhaust systems
- Lab and room pressurization control

- Air terminal units (supply and exhaust valves)
- Room differential pressure controls and equipment (exhaust and makeup fans and terminals)
- Fume hood functionality (not including ASHRAE 110 tests or other certifications)
- Hood and process exhaust systems
- Exhaust scrubbers
- Biological safety cabinets
- Safety cabinets
- Cold rooms
- Bio-waste sterilization
- Lab vacuum pumps
- Lab air compressor
- Cleanroom fan filter units
- Cleanroom makeup air units
- Cleanroom certification
- Pure water systems
- Process gas systems
- Process coolers

Building Enclosure

If Campus wishes to include Building Enclosure within Cx scope, determine when component inspections by CxP shall happen; pre-installation (including a conference with installers), during installation, or post-installation. CxP will inspect a sufficient fraction of components to be reasonably confident they are being installed properly. Contractor will also fill in construction checklists for each.

- Roofing system – water-proofing, insulation, roof membrane, rain and ice shield, pitch, coping, flashing, curbs for mechanical equipment, downspouts, drains, scuppers.
- Exterior wall opaque sections – curtain wall, storefront, masonry, brick / stone veneers, precast panels, metal panels, stucco, siding, sun shades, expansion joint cover assemblies.
- Walls – vapor barriers, insulation, mortar nets, weeps, joints, sealants, masonry ties, damp proofing, composite sheet waterproofing, flashing.
- Slab and landscaping on grade – slab vapor barriers & waterproofing, drainage slope, foundation drains, crystalline waterproofing.
- Concrete walls of occupied areas below grade: waterproofing, French drains.
- Doors, windows and skylights – sealants, mechanical operation, sills, flashing, end dams, hardware.
- Indicate for which assemblies performance testing will be conducted, and what fraction or quantity of each:
 - Water tests of roofs, slabs, doors, fenestration and/or exterior skin via mockups or in situ tests.
 - Infiltration evaluation via wind or pressure tests of doors, fenestration and/or exterior opaque wall sections via mockups, wind tunnel or in situ tests.
 - Building-wide air leakage via pressurization tests.
 - Thermography tests of fenestration and door perimeters, exterior opaque wall sections and joints and/or roofing.
 - Structural wind loading tests of exterior skin mockups or other elements.
 - Potential special roof conditions - green roof; roof terrace/roof garden.

Special Systems

Projection screens

- Automatic window shades
- Elevators
- Electric coiling doors and grills
- Loading dock lift

LEED features to meet desired level of certification through:

- Energy and Atmosphere Cx credits
- M&V Credits

- Environmental Quality credits
- Water Efficiency credits
- Living Building Challenge features to meet desired petals:
 - Place petal
 - Water petal
 - Energy petal
 - Health + Happiness petal
 - Materials petal
 - Equity petal
 - Beauty petal

Service Duration

The term of the service authorization shall begin at Schematic Design and conclude at the end of the Post-Occupancy phase.

Fee

- a) Commissioning fee for each project shall be provided on an hourly rate in accordance with the Billing Rate Table agreed and attached hereto as Exhibit C with a maximum ‘not to exceed’ amount identified, as calculated by Exhibit E. Invoicing for services shall be provided monthly.
- b) The work effort shall generally align to the percentage ranges below. Advise the Trustees at the earliest opportunity if it is anticipated that the required effort will vary materially from these ranges.

Percentage of fee	Milestone
25%	Completion of Schematic Phase
20%	Completion of Design Development Phase
0%	Bidding
20%	50% construction completion
25%	100% construction completion
10%	1-year Post-Occupancy review and report

Deliverables

Provide deliverables as specified in the applicable scope of commissioning work above.

- a) Note that the OPR and Commissioning Plan should be part of Campus submittal to CPDC at 75% Schematic Drawings for all major capital projects, per the Major Capital Project Transmittal Sheet, available via the Resource Library.
- b) At other milestones:
 - i. Provide electronic copies of report to Campus. Deliver via email or FTP, Dropbox, etc.
 - ii. Provide print report copies to campus as requested.

Scope Summary

This scope is modified as follows:

- No modifications
- As listed below:

- a) Attached (suggested, campus to select/provide):
 - i. Summary of deliverables at each stage
 - ii. CSU commissioning guidelines current as of MEA issuance
 - iii. OPR guidelines current as of MEA issuance

All correspondence regarding commissioning shall be sent to **NAME, TITLE**, with a copy to **NAME, TITLE**.

End of Attachment 1

THE CALIFORNIA STATE UNIVERSITY
Attachment – 2 Retrocommissioning (RCx) Scope of Work
Kilowatt Engineering, Inc.

(Sample Only – Campus to update or provide actual scope)

The objective of the CSU retrocommissioning process is to provide a systematic approach to test, document, review and make adjustments to bring building systems and components to the original design functionality, or to meet new functional requirements as they may change from original design, using current best practices to provide the intended functionality in the most efficient manner and meet CSU’s operational and project requirements.

The Service Provider engaged for this work is hereby designated as the Retrocommissioning Provider (RCxP) for the project. In this role the RCxP acts as a consultant and vendor to the campus to test, document, review and make adjustments to the building systems to accomplish the scope of work. The RCxP serves as the Engineer of Record for this retrocommissioning project.

The RCxP shall perform to the selected scope of work using the most current CSU Commissioning Guidelines (available through the CSU CPDC [Resource Library](#)) as a reference. The RCxP shall seek direction from the campus where guideline or scope requirements relative to the specific project are not applicable.

Retrocommissioning (RCx) Objectives

Retrocommissioning is an important process to restore optimal functionality and efficiency to aged buildings. Over time certain systems or control components of a building can become uncalibrated and adversely affect the occupant comfort and efficiency of a building’s operations. RCx pinpoints these problems and seeks to remedy them.

The existing building retrocommissioning scope of work will involve the RCxP through four phases of the project.

1. During the planning phase, the RCxP shall work with the campus project team to define Owner’s Project Requirements as well as develop a Retrocommissioning Plan.
2. During the investigation phase, the role of the RCxP is to conduct a systematic analysis of the building(s)’ performance through observation, review of building documents and O&M practices, and trending and testing of building systems.
3. During the implementation phase, the RCxP shall develop an Implementation Plan for the measures selected from the investigation phase,

implement said measures, and verify that the operational goals were achieved.

4. During the handoff phase, the RCxP shall provide the Final Report and Systems Manual such that the campus building operators have sufficient materials to monitor and maintain the implemented RCx measures.

Scopes of Work

Campus project team shall determine which scope of work is applicable to the project.

1. Phase 1: Planning
 - a) Deliverables
 - i. Retrocommissioning Plan
 - ii. Project kick-off meeting
 - b) Activities
 - i. The RCxP Work with Campus to determine the scope of the project, including the buildings and systems to be included in the project.
 - ii. Determine the objectives of the RCx effort, which may include reducing energy usage, solving indoor air quality problems, and troubleshooting persistent occupant comfort concerns.
 - iii. Interview campus staff and review the existing building documentation to determine the original specifications, design intent, and their relevance to current owner / user requirements
 - iv. Document current operating requirements through review of the buildings use and occupancy, as well as campus and department specific operational requirements.
 - v. Perform initial site walk-through to incorporate site conditions in the RCx planning.
 - vi. Develop retrocommissioning plan for testing and reporting on the pertinent systems, including documentation strategies. The retro-commissioning plan should include the following:
 - (1) Equipment, systems, or specific measures to be included, or selection criteria for inclusion
 - (2) Plan for reviewing existing systems and related documentation
 - (3) Define current operational requirements from original design documents and interviews with agency staff
 - (4) Detailed plan for equipment calibrations, including calibration forms
 - (5) Maintenance checks to be performed
 - (6) Detailed plan for diagnostic monitoring / trending, including data archival
 - (7) Functional tests to be performed

- (8) Methods to be used in analyzing the monitored / trended data
- (9) Plan to assess and document the current operating strategies and sequences of operation for all systems and equipment included
- (10) Strategies to be used in calculating energy impacts and implementation cost estimates for opportunities identified
- (11) Implementation schedule
- (12) Define the content of the final retro-commissioning report
- vii. Hold project kick-off meeting with all campus stakeholders. Review the RCx plan and coordinate for execution of the project plan.

2. Phase 2: Investigation

a) Deliverables

- i. Perform simple repairs
- ii. Diagnostic monitoring plan
- iii. Develop master list of findings
- iv. List of improvements

b) Activities

- i. Perform diagnostic monitoring using the trending capability of the control system for troubleshooting, testing, and data gathering (when cost-effective), or install data logger devices as per the RCx plan.
- ii. Calibrate sensors as needed according to the RCx plan:
 - (1) Test equipment used for calibration should have traceable calibration documentation provided in the final report.
 - (2) Document test equipment readings versus the EMCS sensor readings prior to adjustment.
 - (3) Document the adjustments made to match the EMCS sensor readings to the test equipment readings.
 - (4) A minimum of two points of calibration to check both slope and intercept are required for sensors seeing a wide range of conditions such as the outside air temperature sensors. Adjusting the offset may be sufficient for sensors seeing a narrow range of conditions.
 - (5) Document test equipment readings versus the EMCS sensor readings following adjustment (calibration) and note date and time of the adjustments made.
- i. Perform functional testing by changing parameters, set-points or conditions, and observing and documenting the actual system or equipment response through various modes and conditions (both simulated and real). Tests should be developed on a case-by-case basis, and be documented in the RCx plan, to ensure functionality across normal operating conditions. For equipment that is being monitored with sufficient points, manual testing may be accomplished by changing the parameters, etc., during the monitored period. The monitored data is then examined and used to document and verify correct or incorrect operation.

- Visual verification of equipment functionality may be required if feedback from the control system is not available.
- ii. Perform simple repairs that can be made on site that determined as a result of the functional performance testing.
 - iii. Develop master list of findings and actions taken. Calculate energy impacts and develop implementation cost estimates for measures Track resolution of deficiencies and necessary capital repairs.
 - iv. In collaboration with Campus staff, prioritize and select operational improvements for implementation within available budget.
3. Phase 3: Implementation
- a) Deliverables
 - i. Implementation plan
 - ii. Implementation summary report
 - b) Activities
 - i. Develop implementation plan to implement operational improvements and/or capital repairs determined in investigation. Develop resource plan and master schedule and coordinate with Campus through bi-weekly project meetings.
 - ii. Implement selected operational improvements.
 - iii. Verify results. Review trend data or repeat functional tests to ensure system is commissioned and operating as expected. Repeat adjustments or implement additional repairs as needed to resolve issues.
 - iv. Update master list of findings with actions taken and resolutions
4. Phase 4: Handoff
- a) Deliverables
 - i. Final Report
 - ii. New/Updated Systems Manual
 - iii. Recommissioning Plan
 - b) Activities
 - i. Develop final report. The final retro-commissioning report shall be issued once commissioning scoping activities are completed, and include:
 - (1) Executive summary
 - (2) Project background and scope of the commissioning project
 - (3) Overview of activities conducted
 - (4) Details of all potential improvements identified and other findings, including:
 - (5) Documentation of equipment conditions
 - (6) Any needed facility staff training
 - (7) Missing critical documentation

- (8) The estimated implementation costs and the energy impacts for each improvement
 - (9) Current system operation sequences for all equipment and systems included
 - (10) The retro-commissioning plan (appendix item)
 - (11) The EMCS / data logger trended data, analysis, and annotated results. Electronic copies of the data should be provided (appendix item)
 - (12) Completed calibration worksheets (appendix item)
 - (13) Documentation of campus witnessing, as required (appendix item)
- ii. Develop/update Systems Manual. The manual will be one electronic suite of pdf documents, all organized, bookmarked and hyperlinked. Bookmarks must be down to the equipment level for submittals and O&Ms, startup reports, test record, etc. **The Systems Manual is also provided in hard copy to the Campus (one copy provided).** The contents of the Systems Manual generally follow ASHRAE Guideline 0, and include all of the retrocommissioned systems.
- iii. Systems Manual Contents
- (1) Table of Contents (bookmarked and hyperlinked)
 - (2) Executive Summary
 - (3) OPR, System Narratives and system flow diagrams or schematics
 - (4) Operating Requirements
 - Owner approved building occupancy schedule.
 - Equipment run-time schedules.
 - Minimum outside air requirements (general building wide).
 - By space: use, temperature, humidity, lighting level and any special noise, pressure, return air, air change requirements.
 - (5) Operating Parameters and Procedures
 - As-built sequence of operations for all equipment, including those with standalone controllers.
 - As-built control drawings, including points list.
 - A list of all user-adjustable set points and reset schedules, their purpose, and range of reasonable adjustments with energy implications when adjusting them—including the central building automation system and packaged equipment controllers.
 - A description of and rationale for all major energy-saving features and strategies with operating instructions and caveats about their function and maintenance.
 - Fire and emergency power response criteria in matrix format, including narratives of special procedures and sequences.

- For 24-hour facilities or those with critical processes, provide maintenance start-up and shutdown, manual, and restart operation procedures for equipment and systems controlled by the building automation system and by stand-alone equipment controllers.
 - Special useful notes and instructions to operators not found in the O&M Manuals or control sequences that emerged from the retrocommissioning process.
 - Training materials from the original trainings if different than the O&M manuals and any video recordings of trainings.
- (6) Performance Persistence and Optimization Program
- Recommendations for recalibration frequency of sensors and actuators by type and use.
 - Plan outline for monitored based Ongoing Commissioning or recommended frequency for periodic recommissioning testing by equipment type with reference to construction-completed tests and checklists, including blank forms.
 - Description of the primary recommended standard trend logs in the control system and control system reports that will assist in maintaining comfort, energy efficiency, and system control, including report templates and sample plots with explanations of what to look for in the graphs. These trends may include air handler functions (economizer, duct static pressure reset, supply air temp reset); boiler functions (HWST, HW pump control); chiller functions (CHWST, CWST, pump control), etc.
 - Description and use instructions for any installed fault detection features.
 - Description and use of the energy management system and energy information system reports, when installed.
 - Guidelines for establishing performance metrics and benchmarks and guidelines for tracking whole-building and primary end-use energy and efficiency.
 - Suggestions for changes in the way things are controlled, set points, and sequence strategies for optimizing energy efficiency, comfort, and control coming out of the commissioning process to date.
- (7) Commissioning Record (Append RCx Final Report to original Commissioning Record)
- (8) Maintenance Procedures
- O&M manuals.
 - Preventive maintenance procedures for all retrocommissioned equipment. This shall be a link directly into the appropriate page of the respective O&M manual, but if no maintenance

procedures are given in the O&Ms a list of procedures will need to be created.

- Warranties.
- (1) Construction Record (from Cx System Manual, updated/add if any capital measures implemented)
 - Record drawings.
 - Specifications.
 - Approved submittals.
 - Approved change orders.
 - Final air and water balance report
- iv. Provide training. Conduct 8-hour hands-on training with Campus facilities/physical plant/plant operations/operations & maintenance staff and operators. Review systems retrocommissioned, actions taken, and trends set up for future monitoring. Review systems manual.
- v. Close-out meeting. Conduct final project meeting to review project results, answer final questions and handover final Retrocommissioning Report and Systems Manual.

Systems and Assemblies to be Retrocommissioned

RCxP shall work with campus to determine the applicable systems to be commissioned.

HVAC Systems and Equipment Controls

- Chilled water system (chiller, cooling tower, piping, pumps)
- Heating water system (boilers, piping, pumps)
- Under floor air distribution system
- Air handlers (including minimum outside air control,
- CO2 monitoring, heat recovery, humidification)
- Hydronic piping (including air separators and expansion tanks)
- Thermal comfort, temperature and humidity control
- Variable speed drives
- Outside air valves
- Perimeter heaters
- Unit heaters
- Air terminal boxes
- Variable refrigerant flow (VRF) system
- Computer room air conditioning units
- Fan coil units
- Restroom exhaust system
- Misc. exhaust fans
- Garage exhaust fans
- Building automation and control system (BAS)
- Data acquisition system
- Atrium smoke control system
- Radiant floor heating

- HVAC and envelope differential pressure relationships

Electrical Systems

- Scheduled lighting controls
- Exterior lighting controls
- Daylight dimming controls
- Lighting occupancy sensors
- Wire and cable
- Medium voltage shielded cable
- Wiring devices (switches and outlets)
- Switchgear
- Motor control centers
- Transformers
- Variable frequency drives
- Ground fault
- Secondary grounding
- Low voltage metal-enclosed switchgear
- Bus duct
- Emergency power generator system and ATS
- Whole building power outage integrated test
- Photovoltaics
- Battery Energy Storage Systems

Fire Life Safety

- Fire alarm system
- Fire protection
- Stair pressurization system
- Fire smoke dampers

Plumbing

- Domestic water system (booster pumps)
- Domestic water heating system (heaters, circulation pumps, mixing valves)
- Sump and ejector pumps
- Irrigation systems and controls
- Automatic fixture control
- Grey/rainwater system
- Solar hot water

Laboratory and Clean Room

- General lab exhaust systems
- Lab and room pressurization control
- Air terminal units (supply and exhaust valves)
- Room differential pressure controls and equipment
- (exhaust and makeup fans and terminals)
- Fume hood functionality (not including ASHRAE 110 tests or other certifications)
- Hood and process exhaust systems
- Exhaust scrubbers
- Biological safety cabinets
- Cold rooms

- Bio-waste sterilization
- Lab vacuum pumps
- Lab air compressor
- Cleanroom fan filter units
- Cleanroom makeup air units
- Cleanroom certification
- Pure water systems
- Process gas systems
- Process coolers
- Safety cabinets

Special Systems Projection screens

- Automatic window shades
- Elevators
- Electric coiling doors and grills
- Loading dock lift Service Duration

The term of the service authorization shall begin at the planning phase and conclude with the hand-off phase.

Fee

- a) Commissioning fee for each project shall be provided on an hourly rate in accordance with the Billing Rate Table agreed and attached hereto as Exhibit C with a maximum ‘not to exceed’ amount identified, as calculated by Exhibit E. Invoicing for services shall be provided monthly.
- b) The work effort shall generally align to the percentage’s ranges below. Advise the trustees at the earliest opportunity if it is anticipated that the required effort will vary materially from these ranges.

Percentage of fee	Phase/Milestone
10%	Planning Phase / Retrocommissioning Plan
40%	Investigation Phase / Lists of Findings and Improvements
40%	Implementation Phase/ Implementation Summary Report
10%	Handoff Phase / Final Report & Close-out Meeting

Deliverables

- a) Provide deliverables as specified in the applicable scope of retrocommissioning work above in the format specified:
- b) Provide electronic copies of reports to Campus. Deliver via email or FTP, Dropbox, etc.
- c) Provide print report copies to campus as requested.

Scope Summary

This scope is modified as follows:

- No modifications
- As listed below:

Attached (campus to determine/provide):

- 1.
- 2.
- 3.

All correspondence regarding commissioning shall be sent to **NAME, TITLE**, with a copy to **NAME, TITLE**.

End of Attachment 2

THE CALIFORNIA STATE UNIVERSITY
Attachment 3 - Monitoring-Based Commissioning (MBCx) Scope of Work
Kilowatt Engineering, Inc.

(Sample Only – Campus to update or provide actual scope)

The objective of the CSU Monitoring Based Commissioning process is to utilize permanent data trending from a campus' energy management systems controlling electrical and mechanical systems to detect and diagnose faults within the systems. The MBCx process is also intended to make adjustments to bring building systems and components to bring the original design functionality, or to meet new functional requirements as they may change from original design using current best practices to provide the intended functionality in the most efficient manner and meet CSU's operational and project requirements.. The preferred software is SkySpark® analytics software, although similar software products may be considered if proposed. This includes monitoring of zone level sensor data such as space temperatures, set points, valve positions, airflow, commands, and similar data that can be analyzed to detect faults.

The Service Provider engaged for this work is hereby designated as the Monitoring Based Commissioning Provider (MBCxP) for the project. In this role the MBCxP acts as a consultant and vendor to the campus to test, document, review and make adjustments to the building systems to accomplish the scope of work. The MBCxP serves as the Engineer of Record for this monitoring based commissioning project. The MBCxP shall perform to the selected scope of work using the most current CSU Commissioning Guidelines (available through the CSU CPDC [Resource Library](#)) as a reference.

The MBCxP shall seek direction from the campus where guideline or scope requirements relative to the specific project are not applicable.

Monitoring-Based Commissioning (MBCx) Objectives

The goal of an MBCx process is to maintain existing improvements and implement further improvements to building performance over time. Monitoring-based commissioning is defined as the implementation of an ongoing commissioning process with focus on monitoring and analyzing large amounts of data on a continuous basis.

The existing building MBCx scope of work will involve the MBCxP through three phases of the project.

1. During the planning phase, the MBCxP shall work with the campus project team to establish the technical plan and define the scope of how MBCx will

be implemented using the energy management system (EMS) and/or energy information system (EIS).

2. During the EMS/EIS configuration phase, the role of the MBCxP is to configure and calibrate necessary data points (e.g. fault detection, energy savings), user interfaces, and sensors for the accurate tracking of data over the course of the project.
3. During the implementation phase, the MBCxP shall identify issues and opportunities for corrective action and work with the campus project team to implement these measures, and update facility documentation accordingly, as well as deliver a final report and necessary training.

Scopes of Work

1. Phase 1: Planning
 - a) Deliverables
 - i. Monitoring Action Plan (MAP)
 - ii. Training Plan
 - iii. Kick-off meeting
 - b) Activities
 - i. Hold project kick-off meeting
 - ii. Collect building documentation and create/update current facility requirements. Work with campus and building personnel to identify normal operating ranges for monitored systems. Requirement will be used inform the monitoring action plan. Requirements for the following shall be included as applicable: Indoor temperature and humidity, occupied and unoccupied mode, building operational hours, special use areas, other key operational
 - iii. Define high priority systems for performance monitoring. Work with campus and facility personnel to identify the critical facility systems to be monitored. Focus should be given to previously implemented commissioning efforts and other key energy saving features as defined by the campus. Building systems to be monitored may include the following systems: Chillers and cooling towers, boilers, air handlers, terminal units, packaged HVAC, lighting, commercial refrigeration, whole building meters, energy submeters, others as defined by campus.
 - iv. Create a Monitoring Action Plan. The Monitoring Action Plan (MAP) will serve as the key document for the MBCx project. The MAP should define the metrics, views, and analytics to be used through the project. A template MAP is included as Appendix 1 to this document.
 - v. Specify enhancements for EMIS. During the creation of the MAP, MBCx Agent should identify any necessary or suggested enhancements to the EMIS that will allow for a more successful project.

- vi. Create a training plan. A training plan that identifies areas of necessary training and personnel requiring training should be created using the facilities requirements, priority systems, and MAP as guidelines.
2. Phase 2: EMS and EIS Configuration
 - a) Deliverables
 - i. Calibration Plan
 - ii. EMS/EIS User Guide and Configuration Summary
 - iii. Summary of planned energy savings and anomaly tracking periods
 - b) Activities
 - i. Define data configuration requirements. **Appendix 2 (Data Configuration Requirements, campus specific)** outlines the data types that will be monitored using the EMIS to support the MBCx program. In addition to configuring an ongoing data stream, there will be certain meters for which historical data will also be imported (for example, to provide a historical energy baseline). Data point naming/tagging will follow consistent, transparent naming conventions.
 - ii. Develop calibration plan and calibrate critical sensors. Wherever possible, meters/sensors will be calibrated, and values derived from interval meters and submeters will be cross-checked against monthly billing data or other documents of record to ensure consistency. The most critical points for calibration are: Outside air temperature, air handler supply/return/mixed air temperatures, chilled water supply/return temperatures, hot water supply/return temperatures.
 - iii. Perform EMIS data quality checks. Ensure that data reported to the EMIS meets quality needs for the MBCx project. Issues that should be identified and remedied include data values falling outside the range of an installed meter or sensor, meters installed incorrectly, insufficient data capture (e.g., memory, value, sample rates, or gaps in timeseries errors), data reporting errors, misleading labels, insufficient sampling rates.
 - iv. Create an EMS or EIS user interface. As allowable Cx agent shall design and implement dashboards and drill-down views will be configured for the MBCx program, to support the MAP and other general reporting needs. Cx agent shall work with the campus and facilities personnel to identify requirements and capabilities.
 - v. Configure fault detection diagnostics (FDD).
 - vi. Configure diagnostics, energy savings and anomaly tracking. Savings tracking will be configured using appropriate modeling techniques in accordance with CalTRACK 1.0 (<https://www.caltrack.org/>).

3. Phase 3: Implementation

a) Deliverables

- i. Implementation report
 - ii. Updated facility documentation
 - iii. Building operator training
- b) Activities
- i. Identify issues and opportunities using EMS/EIS and the Monitoring Action Plan. Using the previously crated project deliverables identify issues using either automated methods or manual review and compile into an issues log
 - ii. Investigate root cause for prioritized issues.
 - iii. Identify and implement corrective actions.
 - iv. Verify performance improvement
 - v. Tracking of Improvements/Repairs. All recommendations shall be tracked for progress and each item’s status and history shall be recorded on the Findings Log. Any item that was detected through data analytics shall be verified as completed once noted as such, by review of the relevant data to ensure the issue was resolved.
 - vi. Report Findings – Recommendations shall be presented to the Campus at regular intervals (specify interval) during the duration of the commissioning project, culminating in a final report. The final MBCx report shall include a description of the facility, HVAC equipment, controls, operating schedules, operational deficiencies and energy efficiency opportunities (commonly referred to as a Findings Log), changes in project scope, an analysis of baseline and post-MBCx energy use and the resulting energy savings along with a verbal and visual description of the analysis approach, and any other issues encountered which are relevant to a comprehensive understanding of the project. The Final Report should also describe the staff training program which will be offered and when it will take place.
 - vii. Update Systems Manual. The systems manual will include
 - o MBCx Final Report
 - o Alarm set points
 - o Available monitoring points and active trending capabilities
 - o Control graphics or diagrams
 - o O&M plan
 - o Ongoing diagnostics
 - o M&V Plan
 - o General building or plant info & Design intent (current facility requirements)
 - o System diagram and descriptions
 - o Equipment schedules & control sequences (this includes setpoints)
 - o Available monitoring points and recommended trend groups
 - o ECM persistence recommendations
 - o Updated findings log and action plan
 - o Updated benchmarking and baseline data

- Operator training plans and records
- Plans for Recommissioning to maintain persistence (15 years).
- Summary of available as-built records & documentation
- Conduct 8-hour hands-on training with Campus facilities/physical plant/plant operations/operations & maintenance staff and operators. Review systems commissioned, actions taken, and trends set up for future monitoring.

Systems and Assemblies to be Commissioned

MBCxP shall work with campus to determine the applicable systems to be commissioned.

HVAC Systems and Equipment Controls

- Chilled water system (chiller, cooling tower, piping, pumps)
- Heating water system (boilers, piping, pumps)
- Under floor air distribution system
- Air handlers (including minimum outside air control,
- CO2 monitoring, heat recovery, humidification)
- Hydronic piping (including air separators and expansion tanks)
- Ductwork
- Thermal comfort, temperature and humidity control
- Variable speed drives
- Outside air valves
- Perimeter heaters
- Unit heaters
- Air terminal boxes
- Variable refrigerant flow (VRF) system
- Computer room air conditioning units
- Fan coil units
- Restroom exhaust system
- Misc. exhaust fans
- Garage exhaust fans
- Building automation and control system (BAS)
- Data acquisition system
- Atrium smoke control system
- Radiant floor heating
- TAB work
- HVAC and envelope differential pressure relationships

Electrical Systems

If electrical equipment other than lighting controls and emergency generators are to be tested by the MBCxP rather than the contractor's certified testing company, then additional detail should be provided in scope such as which tests and inspections will be required for each piece of equipment. Refer to InterNational Electrical Testing Association (NETA) testing standards and specifications online.

- Scheduled lighting controls
- Exterior lighting controls

- Daylight dimming controls
- Lighting occupancy sensors
- Wire and cable
- Medium voltage shielded cable
- Wiring devices (switches and outlets)
- Switchgear
- Motor control centers
- Transformers
- Variable frequency drives
- Ground fault
- Secondary grounding
- Low voltage metal-enclosed switchgear
- Bus duct
- Emergency power generator system and ATS
- Whole building power outage integrated test
- Photovoltaics
- Battery Energy Storage Systems

Plumbing

- Domestic water system (booster pumps)
- Domestic water heating system (heaters, circulation pumps, mixing valves)
- Sump and ejector pumps
- Irrigation systems and controls
- Automatic fixture control
- Grey/rainwater system
- Solar hot water

Laboratory and Clean Room

- General lab exhaust systems
- Lab and room pressurization control
- Air terminal units (supply and exhaust valves)
- Room differential pressure controls and equipment (exhaust and makeup fans and terminals)
- Fume hood functionality (not including ASHRAE 110 tests or other certifications)
- Hood and process exhaust systems
- Exhaust scrubbers
- Biological safety cabinets
- Safety cabinets
- Cold rooms
- Bio-waste sterilization
- Lab vacuum pumps
- Lab air compressor
- Cleanroom fan filter units
- Cleanroom makeup air units
- Cleanroom certification
- Pure water systems
- Process gas systems
- Process coolers

Special Systems

- Automatic window shades

Service Duration

The term of the service authorization shall begin at the planning phase and conclude with the hand-off phase.

Fee

Commissioning fee for each project shall be provided on an hourly rate in accordance with the Billing Rate Table agreed and attached hereto as Exhibit C with a maximum ‘not to exceed’ amount identified, as calculated by Exhibit E. Invoicing for services shall be provided monthly. The work effort shall generally align to the percentage’s ranges below. Advise the trustees at the earliest opportunity if it is anticipated that the required effort will vary materially from these ranges.

Percentage of fee	Phase
20%	Planning
40%	EMS/EIS Configuration
40%	Implementation

Deliverables

Provide deliverables as specified in the applicable scope of monitoring based commissioning work above in the format specified:
Provide electronic copies of reports to Campus. Deliver via email or FTP, Dropbox, etc.
Provide print report copies to campus as requested.

Scope Summary

This scope is modified as follows:

- No modifications
- As listed below:

Attached (campus to determine/provide):

1. Monitoring Action Plan (LBNL Template)
2. Data Configuration Requirements (Campus specific)
- 3.

All correspondence regarding commissioning shall be sent to NAME, TITLE, with a copy to NAME, TITLE.

End of Attachment 3

THE CALIFORNIA STATE UNIVERSITY
Exhibit "B"- Service Order and Authorization to Proceed,
Kilowatt Engineering, Inc.

[Date]

Mr. John Doe, President
John Doe, LLC
555 Marin Street; Suite 230
Thousand Oaks, CA 91360

Dear Mr. Doe

[Project Name], [Project Number]
[Campus]
Service Order and Authorization to Proceed Number [insert]

In accordance with the provisions of the Systemwide Master Enabling Agreement Number XXXX you are hereby authorized to provide [insert as appropriate].

The Service Provider shall not perform services in excess of this Service Order without prior written authorization to proceed from the University.

Service Provider shall coordinate services with:

[CSU Campus Name]
[Campus Department]
[Executive Dean or Designated Campus Project Manager]
[Campus Address]
[Campus Project Manager's Phone Number]

The total amount to be expended under this Service Order shall not exceed [written and numerical dollar value] inclusive of reimbursables, regardless of Service Provider's cost in performing these services. Service Provider shall submit all invoices with the Agreement and Service Order and Authorization to Proceed number on each invoice to the project manager named above.

Questions regarding this authorization shall be directed to the above-named project manager.

Approved:

Fund Certified:

[Name]
[Department Head]
[Department]

[Name]
[Accounting/Fiscal Officer]
[Department]

cc:

End of Exhibit "B"

CALIFORNIA STATE UNIVERSITY
Exhibit "C" – Service Provider Rate Schedule
Kilowatt Engineering, Inc.

Discipline	Maximum Rate
Principal	\$305
Director	\$273
Engineering Manager	\$252
Sr Engineer II	\$239
Data Analyst II	\$239
Sr Engineer	\$229
Project Engineer	\$218
Cx Agent	\$229
Engineer	\$208
Technician	\$158
Intern	\$121
Admin	\$89

End of Exhibit "B"

THE CALIFORNIA STATE UNIVERSITY
Exhibit "D" - New Building Energy Usage Intensity Report
Report of Building First Year Post-Occupancy Energy Consumption
Kilowatt Engineering, Inc.

Building Name:
 Building Functions:
 Campus:
 Building GSF:
 Commissioning Provider Name:
 Commissioning Provider Company:
 Commissioning Provider Contact Email:
 Campus Contact Name:
 Campus Contact Email:

Description of Building Energy Meters

(Provide a brief description of meters installed, whether they have been installed per manufacturer's recommendations, and how they were calibrated. Describe if meter readings are automatically or manually read and how the data is compiled)

Building Meter Data

Month-Yr	Electricity (kwh)	Natural Gas (Therms)	Chilled Water (Ton-Hrs)	HHW (or Steam) (Therms)	Energy Usage Intensity (kBTU/SF)
Totals					

End of Exhibit "D"



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

8/25/2023

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an **ADDITIONAL INSURED**, the policy(ies) must have **ADDITIONAL INSURED** provisions or be endorsed. If **SUBROGATION IS WAIVED**, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER AssuredPartners Design Professionals Insurance Services, LLC 3697 Mt. Diablo Blvd Suite 230 Lafayette CA 94549	CONTACT NAME: Doris A. Chambers PHONE (A/C. No. Ext): (510) 272-1499 FAX (A/C. No): E-MAIL ADDRESS: Doris.Chambers@AssuredPartners.com	
	INSURER(S) AFFORDING COVERAGE	
License#: 6003745 KILOWENGI	INSURER A: US Specialty Insurance Company INSURER B: HARTFORD INSURANCE COMPANY INSURER C: Sentinel Insurance Company INSURER D: INSURER E: INSURER F:	NAIC # 29599 38288 11000


COVERAGES **CERTIFICATE NUMBER:** 360597906 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
C	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:	Y	Y	57SBWBM4497	4/2/2023	4/2/2024	EACH OCCURRENCE \$2,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$1,000,000 MED EXP (Any one person) \$10,000 PERSONAL & ADV INJURY \$2,000,000 GENERAL AGGREGATE \$4,000,000 PRODUCTS - COMP/OP AGG \$4,000,000 \$
C	<input type="checkbox"/> AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input checked="" type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY	Y	Y	57SBWBM4497	4/2/2023	4/2/2024	COMBINED SINGLE LIMIT (Ea accident) \$2,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
C	<input checked="" type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$	Y	Y	57SBWBM4497	4/2/2023	4/2/2024	EACH OCCURRENCE \$3,000,000 AGGREGATE \$3,000,000 \$
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N N	N/A	57WEGRT1031	4/2/2023	4/2/2024	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$1,000,000 E.L. DISEASE - EA EMPLOYEE \$1,000,000 E.L. DISEASE - POLICY LIMIT \$1,000,000
A	Professional Liability		Y	USS2333706	4/2/2023	4/2/2024	\$2,000,000 Per Claim \$2,000,000 Annl Aggr

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
 The Excess-Umbrella Liability is Following Form to the General Liability, Automobile Liability and Employers' Liability policies. Insured owns no company vehicles; therefore, hired/non-owned auto is the maximum coverage that applies.
 REF: ALL OPERATIONS OF THE NAMED INSURED - GENERAL LIABILITY/AUTOMOBILE LIABILITY ADDITIONAL INSURED: That the State of California, the Trustees of the California State University, the CSU, and the employees, officers, and agents of each of them, are included as additional insured, but only insofar as the operations under this contract are concerned are named as Additional Insured as respects General Liability and Auto Liability as required per written contract or agreement. General Liability is Primary/Non-Contributory per policy form wording. Waiver of Subrogation applies to Commercial General Liability, Automobile Liability and Workers Compensation. Notice of Cancellation: It is understood and agreed that in the event of cancellation of the policy for any reason other than nonpayment of premium, 30 days written notice will be sent to the certificate holder by mail. In the event the policy is cancelled for non payment of premium, 10 days written notice will be sent to the above.

CERTIFICATE HOLDER **CANCELLATION** 30 Days Notice of Cancellation.

California State University 401 Golden Shore Long Beach CA 90802	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE 
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THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED PROVISIONS - CALIFORNIA

This endorsement modifies insurance provided under the following:

BUSINESS LIABILITY COVERAGE FORM

A. It is agreed that paragraph (2) of subsections 6.d. and 6.f. of Section C. - **WHO IS AN INSURED** is replaced by the following:

(2) The insurance afforded by paragraph (1) above does not apply if your acts or omissions, or the acts or omissions of those acting on your behalf, that are alleged to have caused the "bodily injury", "property damage" or "personal and advertising injury", involve professional architectural, engineering or surveying services, including but not limited to:

- (a) The preparing, approving, editing of or failure to prepare or approve, shop drawings, maps, opinions, reports, surveys, change orders, field orders, designs, drawings, specifications, warnings, recommendations, permit applications payment requests, manuals or instructions;
- (b) Supervisory, inspection, quality control, architectural, engineering or surveying activities or services;
- (c) Maintenance of job site safety, construction administration, construction contracting, construction management, computer consulting or design software development or programming service, or selection of a contractor or programming service;
- (d) Monitoring, sampling, or testing service necessary to perform any of the services included in a. b. or c. above;
- (e) Supervision, hiring, employment, training or monitoring of others who are performing any of the services included in a., b. or c. above.

The insurance afforded to such additional insured:

- (a) Only applies to the extent permitted by law; and
- (b) Will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. It is agreed that the following paragraphs are added to the end of subsections 1. and 8. of Section F -

OPTIONAL ADDITIONAL INSURED COVERAGES; and it is agreed the following paragraphs replace section b. of subsection 9. of Section F. - **OPTIONAL ADDITIONAL INSURED COVERAGES.** These paragraphs do not attach or amend the language of any of the other subsections of **Section F - OPTIONAL ADDITIONAL INSURED COVERAGES:**

The insurance afforded by this subsection does not apply if your acts or omissions, or the acts or omissions of those acting on your behalf, that are alleged to have caused the "bodily injury", "property damage" or "personal and advertising injury", involve professional architectural, engineering or surveying services, including but not limited to:

- (a) The preparing, approving, editing of or failure to prepare or approve, shop drawings, maps, opinions, reports, surveys, change orders, field orders, designs, drawings, specifications, warnings, recommendations, permit applications payment requests, manuals or instructions;
- (b) Supervisory, inspection, quality control, architectural, engineering or surveying activities or services;
- (c) Maintenance of job site safety, construction administration, construction contracting, construction management, computer consulting or design software development or programming service, or selection of a contractor or programming service;
- (d) Monitoring, sampling, or testing service necessary to perform any of the services included in a. b. or c. above;
- (e) Supervision, hiring, employment, training or monitoring of others who are performing any of the services included in a., b. or c. above.

The insurance afforded to such additional insured:

- (a) Only applies to the extent permitted by law; and
- (b) Will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

(b) Rented to, in the care, custody or control of, or over which physical control is being exercised for any purpose by you, any of your "employees", "volunteer workers", any partner or member (if you are a partnership or joint venture), or any member (if you are a limited liability company).

b. Real Estate Manager

Any person (other than your "employee" or "volunteer worker"), or any organization while acting as your real estate manager.

c. Temporary Custodians Of Your Property

Any person or organization having proper temporary custody of your property if you die, but only:

- (1) With respect to liability arising out of the maintenance or use of that property; and
- (2) Until your legal representative has been appointed.

d. Legal Representative If You Die

Your legal representative if you die, but only with respect to duties as such. That representative will have all your rights and duties under this insurance.

e. Unnamed Subsidiary

Any subsidiary and subsidiary thereof, of yours which is a legally incorporated entity of which you own a financial interest of more than 50% of the voting stock on the effective date of this Coverage Part.

The insurance afforded herein for any subsidiary not shown in the Declarations as a named insured does not apply to injury or damage with respect to which an insured under this insurance is also an insured under another policy or would be an insured under such policy but for its termination or upon the exhaustion of its limits of insurance.

3. Newly Acquired Or Formed Organization

Any organization you newly acquire or form, other than a partnership, joint venture or limited liability company, and over which you maintain financial interest of more than 50% of the voting stock, will qualify as a Named Insured if there is no other similar insurance available to that organization. However:

- a. Coverage under this provision is afforded only until the 180th day after you acquire or form the organization or the end of the policy period, whichever is earlier; and

b. Coverage under this provision does not apply to:

- (1) "Bodily injury" or "property damage" that occurred; or
- (2) "Personal and advertising injury" arising out of an offense committed before you acquired or formed the organization.

4. Operator Of Mobile Equipment

With respect to "mobile equipment" registered in your name under any motor vehicle registration law, any person is an insured while driving such equipment along a public highway with your permission. Any other person or organization responsible for the conduct of such person is also an insured, but only with respect to liability arising out of the operation of the equipment, and only if no other insurance of any kind is available to that person or organization for this liability. However, no person or organization is an insured with respect to:

- a. "Bodily injury" to a co-"employee" of the person driving the equipment; or
- b. "Property damage" to property owned by, rented to, in the charge of or occupied by you or the employer of any person who is an insured under this provision.

5. Operator of Nonowned Watercraft

With respect to watercraft you do not own that is less than 51 feet long and is not being used to carry persons for a charge, any person is an insured while operating such watercraft with your permission. Any other person or organization responsible for the conduct of such person is also an insured, but only with respect to liability arising out of the operation of the watercraft, and only if no other insurance of any kind is available to that person or organization for this liability.

However, no person or organization is an insured with respect to:

- a. "Bodily injury" to a co-"employee" of the person operating the watercraft; or
- b. "Property damage" to property owned by, rented to, in the charge of or occupied by you or the employer of any person who is an insured under this provision.

→ **6. Additional Insureds When Required By Written Contract, Written Agreement Or Permit**

The person(s) or organization(s) identified in Paragraphs a. through f. below are additional insureds when you have agreed, in a written

contract, written agreement or because of a permit issued by a state or political subdivision, that such person or organization be added as an additional insured on your policy, provided the injury or damage occurs subsequent to the execution of the contract or agreement, or the issuance of the permit.

A person or organization is an additional insured under this provision only for that period of time required by the contract, agreement or permit.

However, no such person or organization is an additional insured under this provision if such person or organization is included as an additional insured by an endorsement issued by us and made a part of this Coverage Part, including all persons or organizations added as additional insureds under the specific additional insured coverage grants in Section F. – Optional Additional Insured Coverages.

a. Vendors

Any person(s) or organization(s) (referred to below as vendor), but only with respect to "bodily injury" or "property damage" arising out of "your products" which are distributed or sold in the regular course of the vendor's business and only if this Coverage Part provides coverage for "bodily injury" or "property damage" included within the "products-completed operations hazard".

- (1) The insurance afforded to the vendor is subject to the following additional exclusions:

This insurance does not apply to:

- (a) "Bodily injury" or "property damage" for which the vendor is obligated to pay damages by reason of the assumption of liability in a contract or agreement. This exclusion does not apply to liability for damages that the vendor would have in the absence of the contract or agreement;
- (b) Any express warranty unauthorized by you;
- (c) Any physical or chemical change in the product made intentionally by the vendor;
- (d) Repackaging, except when unpacked solely for the purpose of inspection, demonstration, testing, or the substitution of parts under instructions from the manufacturer, and then repackaged in the original container;

- (e) Any failure to make such inspections, adjustments, tests or servicing as the vendor has agreed to make or normally undertakes to make in the usual course of business, in connection with the distribution or sale of the products;

- (f) Demonstration, installation, servicing or repair operations, except such operations performed at the vendor's premises in connection with the sale of the product;

- (g) Products which, after distribution or sale by you, have been labeled or relabeled or used as a container, part or ingredient of any other thing or substance by or for the vendor; or

- (h) "Bodily injury" or "property damage" arising out of the sole negligence of the vendor for its own acts or omissions or those of its employees or anyone else acting on its behalf. However, this exclusion does not apply to:

- (i) The exceptions contained in Subparagraphs (d) or (f); or

- (ii) Such inspections, adjustments, tests or servicing as the vendor has agreed to make or normally undertakes to make in the usual course of business, in connection with the distribution or sale of the products.

- (2) This insurance does not apply to any insured person or organization from whom you have acquired such products, or any ingredient, part or container, entering into, accompanying or containing such products.

b. Lessors Of Equipment

- (1) Any person or organization from whom you lease equipment; but only with respect to their liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by your maintenance, operation or use of equipment leased to you by such person or organization.

- (2) With respect to the insurance afforded to these additional insureds, this insurance does not apply to any "occurrence" which takes place after you cease to lease that equipment.

c. Lessors Of Land Or Premises

- (1) Any person or organization from whom you lease land or premises, but only with respect to liability arising out of the ownership, maintenance or use of that part of the land or premises leased to you.
- (2) With respect to the insurance afforded to these additional insureds, this insurance does not apply to:
- (a) Any "occurrence" which takes place after you cease to lease that land or be a tenant in that premises; or
- (b) Structural alterations, new construction or demolition operations performed by or on behalf of such person or organization.

d. Architects, Engineers Or Surveyors

- (1) Any architect, engineer, or surveyor, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by your acts or omissions or the acts or omissions of those acting on your behalf:
- (a) In connection with your premises; or
- (b) In the performance of your ongoing operations performed by you or on your behalf.
- (2) With respect to the insurance afforded to these additional insureds, the following additional exclusion applies:
- This insurance does not apply to "bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering of or the failure to render any professional services by or for you, including:
- (a) The preparing, approving, or failure to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders, designs or drawings and specifications; or
- (b) Supervisory, inspection, architectural or engineering activities.

e. Permits Issued By State Or Political Subdivisions

- (1) Any state or political subdivision, but only with respect to operations performed by you or on your behalf for which the state or political subdivision has issued a permit.
- (2) With respect to the insurance afforded to these additional insureds, this insurance does not apply to:
- (a) "Bodily injury", "property damage" or "personal and advertising injury" arising out of operations performed for the state or municipality; or
- (b) "Bodily injury" or "property damage" included within the "products-completed operations hazard".

 **f. Any Other Party**

- (1) Any other person or organization who is not an insured under Paragraphs **a.** through **e.** above, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by your acts or omissions or the acts or omissions of those acting on your behalf:
- (a) In the performance of your ongoing operations;
- (b) In connection with your premises owned by or rented to you; or
- (c) In connection with "your work" and included within the "products-completed operations hazard", but only if
- (i) The written contract or written agreement requires you to provide such coverage to such additional insured; and
- (ii) This Coverage Part provides coverage for "bodily injury" or "property damage" included within the "products-completed operations hazard".
- (2) With respect to the insurance afforded to these additional insureds, this insurance does not apply to:
- "Bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering of, or the failure to render, any professional architectural, engineering or surveying services, including:

- (a) The preparing, approving, or failure to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders, designs or drawings and specifications; or
- (b) Supervisory, inspection, architectural or engineering activities.

The limits of insurance that apply to additional insureds are described in Section **D. – Limits Of Insurance.**

How this insurance applies when other insurance is available to an additional insured is described in the Other Insurance Condition in Section **E. – Liability And Medical Expenses General Conditions.**

No person or organization is an insured with respect to the conduct of any current or past partnership, joint venture or limited liability company that is not shown as a Named Insured in the Declarations.

D. LIABILITY AND MEDICAL EXPENSES LIMITS OF INSURANCE

1. The Most We Will Pay

The Limits of Insurance shown in the Declarations and the rules below fix the most we will pay regardless of the number of:

- a. Insureds;
- b. Claims made or "suits" brought; or
- c. Persons or organizations making claims or bringing "suits".

2. Aggregate Limits

The most we will pay for:

- a. Damages because of "bodily injury" and "property damage" included in the "products-completed operations hazard" is the Products-Completed Operations Aggregate Limit shown in the Declarations.
- b. Damages because of all other "bodily injury", "property damage" or "personal and advertising injury", including medical expenses, is the General Aggregate Limit shown in the Declarations.

This General Aggregate Limit applies separately to each of your "locations" owned by or rented to you.

"Location" means premises involving the same or connecting lots, or premises whose connection is interrupted only by a street, roadway or right-of-way of a railroad.

This General Aggregate limit does not apply to "property damage" to premises while rented to you or temporarily occupied by you with permission of the owner, arising out of fire, lightning or explosion.

3. Each Occurrence Limit

Subject to **2.a.** or **2.b.** above, whichever applies, the most we will pay for the sum of all damages because of all "bodily injury", "property damage" and medical expenses arising out of any one "occurrence" is the Liability and Medical Expenses Limit shown in the Declarations.

The most we will pay for all medical expenses because of "bodily injury" sustained by any one person is the Medical Expenses Limit shown in the Declarations.

4. Personal And Advertising Injury Limit

Subject to **2.b.** above, the most we will pay for the sum of all damages because of all "personal and advertising injury" sustained by any one person or organization is the Personal and Advertising Injury Limit shown in the Declarations.

5. Damage To Premises Rented To You Limit

The Damage To Premises Rented To You Limit is the most we will pay under Business Liability Coverage for damages because of "property damage" to any one premises, while rented to you, or in the case of damage by fire, lightning or explosion, while rented to you or temporarily occupied by you with permission of the owner.

In the case of damage by fire, lightning or explosion, the Damage to Premises Rented To You Limit applies to all damage proximately caused by the same event, whether such damage results from fire, lightning or explosion or any combination of these.

→ **6. How Limits Apply To Additional Insureds**

The most we will pay on behalf of a person or organization who is an additional insured under this Coverage Part is the lesser of:

- a. The limits of insurance specified in a written contract, written agreement or permit issued by a state or political subdivision; or
- b. The Limits of Insurance shown in the Declarations.

Such amount shall be a part of and not in addition to the Limits of Insurance shown in the Declarations and described in this Section.

If more than one limit of insurance under this policy and any endorsements attached thereto applies to any claim or "suit", the most we will pay under this policy and the endorsements is the single highest limit of liability of all coverages applicable to such claim or "suit". However, this paragraph does not apply to the Medical Expenses limit set forth in Paragraph 3. above.

The Limits of Insurance of this Coverage Part apply separately to each consecutive annual period and to any remaining period of less than 12 months, starting with the beginning of the policy period shown in the Declarations, unless the policy period is extended after issuance for an additional period of less than 12 months. In that case, the additional period will be deemed part of the last preceding period for purposes of determining the Limits of Insurance.

E. LIABILITY AND MEDICAL EXPENSES GENERAL CONDITIONS

1. Bankruptcy

Bankruptcy or insolvency of the insured or of the insured's estate will not relieve us of our obligations under this Coverage Part.

2. Duties In The Event Of Occurrence, Offense, Claim Or Suit

a. Notice Of Occurrence Or Offense

You or any additional insured must see to it that we are notified as soon as practicable of an "occurrence" or an offense which may result in a claim. To the extent possible, notice should include:

- (1) How, when and where the "occurrence" or offense took place;
- (2) The names and addresses of any injured persons and witnesses; and
- (3) The nature and location of any injury or damage arising out of the "occurrence" or offense.

b. Notice Of Claim

If a claim is made or "suit" is brought against any insured, you or any additional insured must:

- (1) Immediately record the specifics of the claim or "suit" and the date received; and
- (2) Notify us as soon as practicable.

You or any additional insured must see to it that we receive a written notice of the claim or "suit" as soon as practicable.

c. Assistance And Cooperation Of The Insured

You and any other involved insured must:

- (1) Immediately send us copies of any demands, notices, summonses or legal papers received in connection with the claim or "suit";
- (2) Authorize us to obtain records and other information;
- (3) Cooperate with us in the investigation, settlement of the claim or defense against the "suit"; and
- (4) Assist us, upon our request, in the enforcement of any right against any person or organization that may be liable to the insured because of injury or damage to which this insurance may also apply.

d. Obligations At The Insured's Own Cost

No insured will, except at that insured's own cost, voluntarily make a payment, assume any obligation, or incur any expense, other than for first aid, without our consent.

e. Additional Insured's Other Insurance

If we cover a claim or "suit" under this Coverage Part that may also be covered by other insurance available to an additional insured, such additional insured must submit such claim or "suit" to the other insurer for defense and indemnity.

However, this provision does not apply to the extent that you have agreed in a written contract, written agreement or permit that this insurance is primary and non-contributory with the additional insured's own insurance.

f. Knowledge Of An Occurrence, Offense, Claim Or Suit

Paragraphs **a.** and **b.** apply to you or to any additional insured only when such "occurrence", offense, claim or "suit" is known to:

- (1) You or any additional insured that is an individual;
- (2) Any partner, if you or an additional insured is a partnership;
- (3) Any manager, if you or an additional insured is a limited liability company;
- (4) Any "executive officer" or insurance manager, if you or an additional insured is a corporation;
- (5) Any trustee, if you or an additional insured is a trust; or
- (6) Any elected or appointed official, if you or an additional insured is a political subdivision or public entity.

This Paragraph f. applies separately to you and any additional insured.

3. Financial Responsibility Laws

- a. When this policy is certified as proof of financial responsibility for the future under the provisions of any motor vehicle financial responsibility law, the insurance provided by the policy for "bodily injury" liability and "property damage" liability will comply with the provisions of the law to the extent of the coverage and limits of insurance required by that law.
- b. With respect to "mobile equipment" to which this insurance applies, we will provide any liability, uninsured motorists, underinsured motorists, no-fault or other coverage required by any motor vehicle law. We will provide the required limits for those coverages.

4. Legal Action Against Us

No person or organization has a right under this Coverage Form:

- a. To join us as a party or otherwise bring us into a "suit" asking for damages from an insured; or
- b. To sue us on this Coverage Form unless all of its terms have been fully complied with.

A person or organization may sue us to recover on an agreed settlement or on a final judgment against an insured; but we will not be liable for damages that are not payable under the terms of this insurance or that are in excess of the applicable limit of insurance. An agreed settlement means a settlement and release of liability signed by us, the insured and the claimant or the claimant's legal representative.

5. Separation Of Insureds

Except with respect to the Limits of Insurance, and any rights or duties specifically assigned in this policy to the first Named Insured, this insurance applies:

- a. As if each Named Insured were the only Named Insured; and
- b. Separately to each insured against whom a claim is made or "suit" is brought.

6. Representations

a. When You Accept This Policy

By accepting this policy, you agree:

- (1) The statements in the Declarations are accurate and complete;
- (2) Those statements are based upon representations you made to us; and

- (3) We have issued this policy in reliance upon your representations.

b. Unintentional Failure To Disclose Hazards

If unintentionally you should fail to disclose all hazards relating to the conduct of your business at the inception date of this Coverage Part, we shall not deny any coverage under this Coverage Part because of such failure.

7. Other Insurance

If other valid and collectible insurance is available for a loss we cover under this Coverage Part, our obligations are limited as follows:

a. Primary Insurance

This insurance is primary except when b. below applies. If other insurance is also primary, we will share with all that other insurance by the method described in c. below.

b. Excess Insurance

This insurance is excess over any of the other insurance, whether primary, excess, contingent or on any other basis:

(1) Your Work

That is Fire, Extended Coverage, Builder's Risk, Installation Risk or similar coverage for "your work";

(2) Premises Rented To You

That is fire, lightning or explosion insurance for premises rented to you or temporarily occupied by you with permission of the owner;

(3) Tenant Liability

That is insurance purchased by you to cover your liability as a tenant for "property damage" to premises rented to you or temporarily occupied by you with permission of the owner;

(4) Aircraft, Auto Or Watercraft


If the loss arises out of the maintenance or use of aircraft, "autos" or watercraft to the extent not subject to Exclusion g. of Section A. – Coverages.

(5) Property Damage To Borrowed Equipment Or Use Of Elevators

If the loss arises out of "property damage" to borrowed equipment or the use of elevators to the extent not subject to Exclusion k. of Section A. – Coverages.

(6) When You Are Added As An Additional Insured To Other Insurance

That is other insurance available to you covering liability for damages arising out of the premises or operations, or products and completed operations, for which you have been added as an additional insured by that insurance; or

 **(7) When You Add Others As An Additional Insured To This Insurance**

That is other insurance available to an additional insured.

However, the following provisions apply to other insurance available to any person or organization who is an additional insured under this Coverage Part:

(a) Primary Insurance When Required By Contract

This insurance is primary if you have agreed in a written contract, written agreement or permit that this insurance be primary. If other insurance is also primary, we will share with all that other insurance by the method described in c. below.

(b) Primary And Non-Contributory To Other Insurance When Required By Contract

If you have agreed in a written contract, written agreement or permit that this insurance is primary and non-contributory with the additional insured's own insurance, this insurance is primary and we will not seek contribution from that other insurance.

Paragraphs (a) and (b) do not apply to other insurance to which the additional insured has been added as an additional insured.

When this insurance is excess, we will have no duty under this Coverage Part to defend the insured against any "suit" if any other insurer has a duty to defend the insured against that "suit". If no other insurer defends, we will undertake to do so, but we will be entitled to the insured's rights against all those other insurers.

When this insurance is excess over other insurance, we will pay only our share of the amount of the loss, if any, that exceeds the sum of:

- (1) The total amount that all such other insurance would pay for the loss in the absence of this insurance; and
- (2) The total of all deductible and self-insured amounts under all that other insurance.

We will share the remaining loss, if any, with any other insurance that is not described in this Excess Insurance provision and was not bought specifically to apply in excess of the Limits of Insurance shown in the Declarations of this Coverage Part.


c. Method Of Sharing

If all the other insurance permits contribution by equal shares, we will follow this method also. Under this approach, each insurer contributes equal amounts until it has paid its applicable limit of insurance or none of the loss remains, whichever comes first.

If any of the other insurance does not permit contribution by equal shares, we will contribute by limits. Under this method, each insurer's share is based on the ratio of its applicable limit of insurance to the total applicable limits of insurance of all insurers.

8. Transfer Of Rights Of Recovery Against Others To Us**a. Transfer Of Rights Of Recovery**

If the insured has rights to recover all or part of any payment, including Supplementary Payments, we have made under this Coverage Part, those rights are transferred to us. The insured must do nothing after loss to impair them. At our request, the insured will bring "suit" or transfer those rights to us and help us enforce them. This condition does not apply to Medical Expenses Coverage.

 **b. Waiver Of Rights Of Recovery (Waiver Of Subrogation)**

If the insured has waived any rights of recovery against any person or organization for all or part of any payment, including Supplementary Payments, we have made under this Coverage Part, we also waive that right, provided the insured waived their rights of recovery against such person or organization in a contract, agreement or permit that was executed prior to the injury or damage.



THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

HIRED AUTO AND NON-OWNED AUTO

This endorsement modifies insurance provided under the following:

BUSINESS LIABILITY COVERAGE FORM

This coverage is subject to all provisions in the **BUSINESS LIABILITY COVERAGE FORM** not expressly modified herein:

A. Amended Coverage:

Coverage is extended to "bodily injury" and "property damage" arising out of the use of a "hired auto" and "non-owned auto".

B. Paragraph B. EXCLUSIONS is amended as follows:

1. Exclusion **g. Aircraft, Auto or Watercraft** does not apply to a "hired auto" or a "non-owned auto".
2. Exclusion **e. Employers Liability** does not apply to "bodily injury" to domestic "employees" not entitled to workers' compensation benefits or to liability assumed by the "insured" under an "insured contract".
3. Exclusion **f. Pollution** is replaced by the following:

"Bodily injury" or "property damage" arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release or escape of "pollutants":

- a. That are, or that are contained in any property that is:
 - (1) Being transported or towed by, handled, or handled for movement into, onto or from, the covered "auto";
 - (2) Otherwise in the course of transit by or on behalf of the "insured"; or
 - (3) Being stored, disposed of, treated or processed in or upon the covered "auto".
- b. Before the "pollutants" or any property in which the "pollutants" are contained are

moved from the place where they are accepted by the "insured" for movement into or onto the covered "auto"; or

- c. After the "pollutants" or any property in which the "pollutants" are contained are moved from the covered "auto" to the place where they are finally delivered, disposed of or abandoned by the "insured".

Paragraph **a.** above does not apply to fuels, lubricants, fluids, exhaust gases or other similar "pollutants" that are needed for or result from the normal electrical, hydraulic or mechanical functioning of the covered "auto" or its parts, if:

- (1) The "pollutants" escape, seep, migrate, or are discharged or released directly from an "auto" part designed by its manufacturer to hold, store, receive, or dispose of such "pollutants"; and
- (2) The "bodily injury" and "property damage" does not arise out of the operation of any equipment listed in paragraphs **15.b.** and **15.c.** of the definition of "mobile equipment".

Paragraphs **b.** and **c.** above do not apply to "accidents" that occur away from premises owned by or rented to an "insured" with respect to "pollutants" not in or upon a covered "auto" if:

- (1) The "pollutants" or any property in which the "pollutants" are contained are upset, overturned or damaged as a result of the maintenance or use of a covered "auto"; and

- (2) The discharge, dispersal, seepage, migration, release or escape of the "pollutants" is caused directly by such upset, overturn or damage as a result of the maintenance or use of a covered "auto".
- 4. With respect to this coverage, the following additional exclusions apply:
 - a. **Fellow employee**

Coverage does not apply to "bodily injury" to any fellow "employee" of the "insured" arising out of the operation of an "auto" owned by the "insured" in the course of the fellow "employee's" employment.
 - b. **Care, custody or control**

Coverage does not apply to "property damage" involving property owned or transported by the "insured" or in the "insured's" care, custody or control.
- C. With respect to "hired auto" and "non-owned auto" coverage, Paragraph C. **WHO IS AN INSURED** is deleted and replaced by the following:

The following are "insureds":

 - a. You.
 - b. Your "employee" while using with your permission:
 - (1) An "auto" you hire or borrow; or
 - (2) An "auto" you don't own, hire or borrow in your business or personal affairs; or
 - (3) An "auto" hired or rented by your "employee" on your behalf and at your direction.
 - c. Anyone else while using a "hired auto" or "non-owned auto" with your permission except:
 - (1) The owner or anyone else from whom you hire or borrow an "auto".
 - (2) Someone using an auto while he or she is working in a business of selling, servicing, repairing, parking or storing "autos" unless that business is yours.
 - (3) Anyone other than your "employees", partners (if you are a partnership), members (if you are a limited liability company), or a lessee or borrower or any of their "employees", while moving property to or from an "auto".
 - (4) A partner (if you are a partnership), or a member (if you are a limited liability company) for an "auto" owned by him or her or a member of his or her household.
- d. Anyone liable for the conduct of an "insured" described above but only to the extent of that liability.
- D. With respect to the operation of a "hired auto" and "non-owned auto", the following additional conditions apply:
 - 1. **OTHER INSURANCE**
 - a. Except for any liability assumed under an "insured contract" the insurance provided by this Coverage Form is excess over any other collectible insurance.

However, if your business is the selling, servicing, repairing, parking or storage of "autos", the insurance provided by this endorsement is primary when covered "bodily injury" or "property damage" arises out of the operation of a customer's "auto" by you or your "employee".
 - b. When this Coverage Form and any other Coverage Form or policy covers on the same basis, either excess or primary, we will pay only our share. Our share is the proportion that the Limit of Insurance of our Coverage Form bears to the total of the limits of all the Coverage Forms and policies covering on the same basis.
 - 2. **TWO OR MORE COVERAGE FORMS OR POLICIES ISSUED BY US**

If the Coverage Form and any other Coverage Form or policy issued to you by us or any company affiliated with us apply to the same "accident", the aggregate maximum Limit of Insurance under all the Coverage Forms or policies shall not exceed the highest applicable Limit of Insurance under any one Coverage Form or policy. This condition does not apply to any Coverage Form or policy issued by us or an affiliated company specifically to apply as excess insurance over this Coverage Form.
- E. The following definitions are added:
 - G. **LIABILITY AND MEDICAL EXPENSES DEFINITIONS:**
 - 1. "Hired auto" means any "auto" you lease, hire, rent or borrow. This does not include any auto you lease, hire, rent or borrow from any of your "employees", your partners (if you are a partnership), members (if you are a partnership), members (if you are a limited liability company),

or your "executive officers" or members of their households.

This does not include a long-term leased "auto" that you insure as an owned "auto" under any other auto liability insurance policy or a temporary substitute for an "auto" you own that is out of service because of its breakdown, repair, servicing or destruction.

2. "Non-owned auto " means any "auto" you do not own, lease, hire, rent or borrow which is used in connection with your business. This includes:
 - a. "Autos" owned by your "employees" your partners (if you are a partnership), members (if you are a limited liability company), or your "executive officers", or members of their households, but only while used in your business or your personal affairs.
 - b. Customer's "auto" that is in your care, custody or control for service.



THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**WAIVER OF OUR RIGHT TO RECOVER FROM
OTHERS ENDORSEMENT - CALIFORNIA**

Policy Number: 57WEGRT1031

Endorsement Number:

Effective Date: 04/02/2023

Effective hour is the same as stated on the Information Page of the policy.

Named Insured and Address: Kilowatt Engineering, Inc.
dba: kW Engineering, Inc.
287 17th Street, Suite 300
Oakland, CA 94612

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule. (This agreement applies only to the extent that you perform work under a written contract that requires you to obtain this agreement from us.)

You must maintain payroll records accurately segregating the remuneration of your employees while engaged in the work described in the Schedule.

The additional premium for this endorsement shall be 2 % of the California workers' compensation premium otherwise due on such remuneration.

SCHEDULE

Person or Organization

Job Description

Any person or organization from whom you are required by written contract or agreement to obtain this waiver of rights from us

Countersigned by

Authorized Representative