

**Directive: 1B-6 Commissioning****Responsible Office: Design & Construction****Last Revised Date: June 2022**

SUMMARY

This Directive provides the consultants with the commissioning requirements of the State University Construction Fund (SUCF) for SUNY projects. The requirements detailed within are to be implemented into the project's specifications and/or drawings. The intent is not for the specifications or drawings to reference back to this document for compliance nor is it intended to override or amend the applicable laws or codes where either is more stringent.



TABLE OF CONTENTS

Contents

Section 1 – APPLICABILITY.....	3
A. SUCF.....	3
B. LEED	4
C. NYSERDA or other incentive programs.....	4
Section 2 –COMMISSIONING AUTHORITY (CxA).....	4
A. CxA Qualifications.....	4
B. CxA Responsibilities	4
C. Details on CxA Deliverables	6
Section 3 – DESIGN TEAM	9
A. Design Team Responsibilities and Deliverables.....	9

Section 1 – APPLICABILITY

A. SUCF

1. Commissioning shall be performed on all New Construction, Additions, and Alterations projects which contain any new or modified mechanical, electrical, plumbing, envelope, renewable energy systems and components.
2. Commissioning shall comply with the requirements of ASHRAE 90.1-16, the New York State Energy Conservation Code (NYSECC) section C408, and the NYStretch Energy Code 2020.
3. The following systems and/or their components shall be commissioned: building envelope, building mechanical systems, service water heating systems, electrical power systems, lighting systems and control systems.
 - a. Commissioning shall be performed on 100% of all main/central equipment and systems. Sampling strategies are allowed during Functional testing only on terminal equipment. (i.e., fan coils or non-laboratory VAV boxes.) Sampling shall incorporate 20% of terminal equipment or 10 units minimum. If functional issues are discovered an additional 10% shall be added until the terminal units pass functional testing and are functioning according to the design documents.
4. Examples of equipment/components which at a minimum shall be commissioned
 - a. Chiller, air conditioner, heat exchangers, campus chilled water, condensers, cooling systems
 - b. Boiler, furnace, heat exchangers, steam, HTHW, MTHW, heating systems
 - c. Domestic and service water heater, domestic water heating systems
 - d. Cooling tower (fan, valves)
 - e. Air Handling Unit (coils, valves, fans, humidification, dampers)
 - f. HVAC terminal units (fan coil units, heat pumps, VAV, etc.)
 - g. Ventilation, exhaust, and miscellaneous fans
 - h. Ducts and dampers
 - i. Piping and valves
 - j. Duct and piping insulation
 - k. Controls for system, building and central plant.
 - l. Energy recovery (components, systems and units).
 - m. Air or water economizers
 - n. Renewable energy systems
 - o. Thermal storage
 - p. HVAC pumps
 - q. Refrigerant leak detection systems
 - r. Fume hood and other special exhaust systems
 - s. Electrical systems and lighting systems including daylight/occupancy sensor and dimming controls
 - t. Any other system as requested by the design team and/or Campus, **approved by SUCF.**
 - u. Building Envelope
 - 1) New Buildings with areas between 25,000 ft² and 50,000 ft² with a height of no more than 75 ft shall require whole-building pressurization testing in accordance with ASHRAE 90.1-16 and the NYStretch Energy Code 2020.

- 2) For all other projects which have envelope alterations whole-building pressurization testing is not required. Air leakage verification shall be achieved through an air barrier design and installation verification program as detailed in ASHRAE 90.1-16 and the NYStretch Energy Code 2020.

B. LEED

1. Perform commissioning as required to achieve LEED credits, if any, including documentation. See Directive 1B-7 – Sustainability and LEED Policies for applicability of LEED.

C. NYSERDA or other incentive programs

1. Commissioning as required to meet the requirements of applicable NYSERDA programs or any other incentive programs

Section 2 –COMMISSIONING AUTHORITY (CxA)

A. CxA Qualifications

1. CxA firm and assigned staff must have documented commissioning project experience on at three (3) contracts similar in size, scope, and complexity to this contract. The experience must extend from early design phase through at least 10 months of occupancy.
2. CxA may be an independent consultant or a disinterested subcontractor of the design team, subject to the **Funds approval**.

B. CxA Responsibilities

1. General
 - a. Work collaboratively as the leader of the commissioning team.
 - 1) During the design phase the commissioning team includes the architects and engineers of record, the Campus, and Fund.
 - 2) During construction additional team members will include the Fund's site representative or construction manager, as applicable, the contractor and subcontractors.
 - b. Provide timely reporting and distribution of the findings with clearly communicated action items, as required to minimize the volume of submissions submitted for commissioning team information and review. Provide frequent updates to the status of activities and facilitate commissioning team review of progress and status reports such as through electronic or online access to forms, with changes flagged by date.
2. Design Phase Commissioning Activities
 - a. Participate in an orientation/onboarding meeting, project design review meetings, and telephone conference calls with the commissioning team, as required to effectively provide commissioning services.
 - b. Develop, submit, and implement Design Phase commissioning plan.
 - c. Develop, and submit Construction Phase commissioning plan.
 - d. Review the Owners Project Requirements (OPR) to ensure it reflects the Basis of Design (BOD)
 - e. Review the project design documents at the Design Manual, Construction Document and Bid phases.
 - 1) Review the design documents to ensure they reflect the OPR and BOD.

- 2) Review the design documents to ensure that adequate devices are included in the design to properly document the performance of the commissioned systems and equipment.
- 3) Review the design documents to ensure that the contractor provides pre-installation meetings, mock-ups, testing, and other quality assurance requirements required to verify initial, ongoing, and final installation of commissioned systems.
- 4) Review the design documents for their impact on the commissioning process and the final performance of commissioned systems.
- 5) Review sequence of operations.
- 6) Review equipment/system training requirements.
- f. Develop and incorporate into the Bid documents
 - 1) Commissioning specifications
 - 2) System Manual requirements
3. Construction Phase Commissioning Activities
 - a. Develop and implement ongoing Construction Phase commissioning plan
 - b. Review contractor submittals of commissioned systems/equipment
 - c. Develop installation verification and pre-functional checklists.
 - d. Verify Installation and Completion of Pre-functional Checklists
 - 1) With the assistance of the contractor, verify and document the installation of systems, equipment, and components. The CxA shall obtain completed and signed pre-functional checklists from the contractor. The CxA shall also be responsible to maintain an up-to-date commissioning report at the site. Any differences between original construction documents and final installation must be documented in the report. Documentation shall also be provided for other building systems or components that may be compromising the efficiency of the systems or features being commissioned.
 - e. Develop functional performance testing procedures and functional checklists.
 - f. Supervise Functional Testing and Completion of Functional Checklists
 - 1) Oversee functional testing performed by the contractor, fill out the functional performance checklists for insertion in the commissioning report.
 - 2) Before Testing Adjusting and Balancing (TAB) of systems occurs, confirm sufficient functional testing of the control system and the equipment has occurred to approve its use for TAB.
 - g. Witness:
 - 1) HVAC piping tests and flushing procedures
 - 2) HVAC duct tests and cleaning procedures
 - h. Visit and inspect the construction site, participate in project construction meetings, and telephone conference calls with the commissioning team, as required to effectively provide commissioning services during the progress of the work.
 - i. Early in the construction process meet with the contractor, consultant, and construction manager (if applicable) to incorporate commissioning activities into the construction schedule.
 - j. Conduct construction commissioning kickoff meeting, with all commissioning team members in attendance. Review the process and requirements for all commissioning activities required for Substantial Completion of the construction work and any activities deferred until or after occupancy.

- k. Conduct regular commissioning meetings with commissioning team throughout construction. Once a month at beginning of project, progressing to once a week as the project moves into the functional testing phase. Provide written meeting minutes.
- l. Maintain a master log of deficiencies and resolutions related to commissioning.
- m. Maintain a testing log related to commissioning.
- n. Review TAB plan.
- o. Develop Commissioning Report and complete it as required to achieve Substantial Completion of the construction work.
- p. Develop and finalize the Systems Manual
- q. Review Operations and Maintenance Manuals
- r. When Operations and Maintenance Manuals are adequate for training purposes, oversee and approve the training of the campus personnel.
- s. Create a list identifying where Construction Phase Commissioning Activities, or portions of activities, must be deferred due to seasonal or other factors
- 4. Occupancy and Operations Phase Commissioning Activities
 - a. Work with the commissioning team to implement and complete deferred Construction Phase Commissioning Activities.
 - b. Return to the site 10 months after the building occupancy to review building operation, the adequacy of the Systems Manual, and the original commissioning with the owner. Update the Systems Manual to address any campus comments received from the meeting.
 - c. If applicable, return to the site after the 10-month building operation review to complete seasonally or deferred commissioning. Update Systems Manual as necessary.

C. Details on CxA Deliverables

- 1. Commissioning Plan
 - a. Commissioning plan must be written around using a single prime contractor. Terms such as “Mechanical Contractor”, “Plumbing Contractor”, “Electrical Contractor” and “Controls Contractor”, etc. shall not be used.
 - b. Commissioning should be done in two separate but related parts. Commissioning Plan–Design Phase and Commissioning Plan–Construction Phase/Occupancy and Operations Phase. Each plan must include, but is not limited to:
 - 1) Overview of tasks to be executed.
 - 2) List of all systems and features to be commissioned.
 - 3) Simulation of various operational conditions and scenarios that could be anticipated to occur in each space.
 - 4) List of all reference documents, i.e., specifications, drawings, and submittals.
 - 5) List of participants and their responsibilities.
 - 6) A plan for management, communication, and documentation.
 - 7) Outline of the scope of the commissioning process including seasonally deferred testing.
 - 8) All checklists and descriptions of tests to be performed for pre-start and start-up.
 - 9) A list of all functional performance tests.
 - 10) Description of the installation verification program(s) and the process used to document the completion of the program(s).
 - 11) Description of the content of the training to be provided to the campus personnel.
 - 12) A commissioning activity schedule by system.

- 13) Method to document changes and incorporating changes in as-built record
2. Commissioning Specification
 - a. Commissioning specification must be written around using a single prime contractor. Terms such as "Mechanical Contractor", "Plumbing Contractor", "Electrical Contractor" and "Controls Contractor", etc. shall not be used.
 - b. Must be included in the Construction Documents, and must include:
 - 1) Scope and details of the process.
 - 2) Roles and responsibilities of all parties involved in commissioning process.
 - 3) Systems, equipment, and components to be commissioned.
 - 4) Pre-functional checklist and start-up requirements.
 - 5) Functional performance testing requirements, including test conditions and acceptance criteria.
 - 6) Installation verification program activities, including quality assurance activities and acceptance criteria.
 - 7) Procedures for resolving deficiencies.
 - 8) Reporting and documentation requirements.
 - 9) Training requirements.
 - 10) Requirements for Operations Instructions and Manuals not covered by the projects General Requirement section.
 - 11) Proposed schedule of commissioning activities.
 - 12) Definition of the minimum requirements for the Contractor's coordination and management plan (the need for a single person employed by Contractor to coordinate commissioning work of trades, staff qualifications, etc.).
3. Commissioning Report
 - a. Preliminary & Final Report must be project specific and completed after all commissioning except seasonally deferred testing. Report must include:
 - 1) Executive Summary.
 - 2) List of all commissioning participants and their roles.
 - 3) Brief building description.
 - 4) Overview of commissioning scope, testing and verification methods.
 - 5) List of commissioned systems.
 - 6) Description of adequacy of training, installation, functional performance, efficiency, equipment documentation, and O & M manuals.
 - 7) List of outstanding commissioning issues and statement as to why item is outstanding. (i.e., installation deficiency, seasonally deferred testing, etc.) Each outstanding commissioning item shall be referenced to where deficiency is documented in the commissioning plan and shall lay out the path/schedule as to when commissioning will take place.
 - 8) Appendices with commissioning plans, installation checklists, pre-functional tests, functional tests, individual commissioning reports or reviews, sequence documentation, logs, meeting minutes, progress reports, deficiency logs, site visit reports, photos, findings, unresolved issues, communications, and other relevant project information.
 - 9) A list of as-built components, equipment, systems, controls, and sequences of operation that is different than required in the original construction documents.

- 10) CxA shall issue an addendum to the commissioning report (if necessary) to complete the commissioning report for seasonally deferred testing or deficiency resolution to commissioned systems.
- b. Training documentation as detailed below.
4. Training
 - a. Prior to contractor training the CxA shall meet with design team, contractor, and Campus personnel to be trained to review all commissioning deliverables.
 - b. The CxA must document that training (both instructional and demonstration) of operations and maintenance personnel was conducted for all commissioned systems. The CxA shall oversee and approve the content and adequacy of the training for commissioned systems.
 - c. The campus will identify the personnel to be trained. Unless otherwise agreed to by the campus, personnel shall be trained during their regularly scheduled working hours.
 - d. Training must be performed prior to Substantial Completion of the construction work and within three (3) months of the date commissioning is completed on the system.
 - e. The Systems Manual and the Operating Instructions and Manual information must be available and used for the training.
 - f. The instructional portion of the training must cover, at a minimum:
 - 1) General description of systems, theory of operation, control modes, and sequences of operation.
 - 2) Use of the System Manuals and the Operating Instructions and Manual information
 - 3) Review of control diagrams and drawings.
 - 4) Use of building controls system, including startup, shutdown, seasonal changeover, alarms, troubleshooting, set-up, and data logging/trending.
 - 5) Service and operations of each system.
 - 6) Specific training on building systems which effect energy consumption, indoor air quality and occupant comfort.
 - g. The demonstration portion of the training must include hands-on operation of systems and/or equipment for which instructional training will be given. Start-up, shut-down procedures, operation under all sequence of operations and emergency conditions.
5. Systems Manual
 - a. Must be project specific and must contain at a minimum:
 - 1) Executive Summary.
 - 2) A narrative of the BOD and OPR (modified to reflect the as-constructed installations) which shall include a brief description of the systems.
 - 3) Construction Record Drawings and specifications.
 - 4) Final Commissioning plan and the Final Commissioning report.
 - 5) Operations and Maintenance Manuals for Commissioned System/Equipment.
 - 6) A detailed description of energy saving features and options as well as a description of their special maintenance requirements.
 - 7) Recommendations and methodology for accounting of building energy usage.
 - 8) Recommendations for frequency of sensor and actuator recalibration.
 - 9) Recommendations for frequency of recommissioning of specific systems (i.e., CO₂ controlled outdoor air system).
 - 10) List and description of user adjustable set points and schedules with recommendations for adjustments.

- 11) List of system diagnostic tools (i.e., trend logs) to be used by operators in optimizing building energy efficiency.

Section 3 – DESIGN TEAM

A. Design Team Responsibilities and Deliverables

1. Owners Project Requirements document
 - a. Develop the OPR document, it shall establish the campus' goals and the building's intended function and operation. The content shall be organized into an Introduction, Key Owner's Project Requirements, General Project Description, Objectives, Functional Uses, Occupancy Requirements, Budget Consideration and Limitations, Performance Criteria and Version History. The Performance Criteria section shall be broken down into General, Economic, User Requirements, Construction Process, Operations, Systems, Assemblies sections. It shall include but not be limited to the following: Service water heating criteria, lighting systems design, space temperature and humidity criteria, thermal zoning criteria, level of occupant control over HVAC systems, ventilation and IAQ criteria, performance related to energy efficiency, and commissioning criteria.
 - b. Submit the OPR at the Concept Design Phase with updates as necessary in the Schematic Design, Design Manual and Construction Document phases.
2. Basis of Design document
 - a. Develop the Basis of Design (BOD) document, it shall provide clear technical guidance on how to achieve the OPR. The BOD must include all systems to be commissioned. It shall include but not be limited to: Occupancy, space climate requirements, applicable codes and standards, primary load and design assumptions, LEED elements, lighting levels and controls, energy performance, ventilation strategies and methods, control systems complete with sequence of operations, fire and life safety criteria, emergency power control and function, and additional information that will aid in the commissioning process or future building operation.
 - b. Submit the BOD at the Schematic Design Phase with updates as necessary in the Design Manual and Construction Document Phase.
3. Cooperate and coordinate with the Commissioning Team.