

SCOPE OF SERVICES FOR BUILDING COMMISSIONING

COMMISSIONING SCOPE OF SERVICES

- Conduct a second review of the 85% CD documents and 100% CD Documents.
- Include commissioning requirements in the construction documents
- Develop and utilize a commissioning plan that includes pre-functional and functional tests forms/reports
- Conduct a review of the contractor's submittals of commissioned equipment and exterior envelope systems
- Visit the jobsite and provide commissioning reports
- Verify pre-functional test
- Functional testing
- Maintain commissioning issues log
- Participate in the training of facility staff
- Review operation and maintenance manuals, and report and deficiencies.
- Complete and distribute a commissioning report
- Conduct a 10 month warranty review

SCOPE DETAILS

- *Conduct a focused review of the 85% Construction Documents and 100% Construction Documents:* These reviews should be conducted prior to issuing the construction documents for bid and captured in the commissioning report. The review should answer these questions:
 - Does the design meet the owners design intent which is outlined in the Basis of Design or Owner's Project Requirements (OPR)?
 - Does the design allow for proper maintenance access?
 - Do the construction documents clearly detail the construction requirements?
 - Do the construction documents clearly define the commissioning requirements?
- *Include commissioning requirements in the construction documents:* All commissioning requirements must be integrated into the construction documents to clearly specify the responsibilities and tasks to be performed. Of particular importance are the delineation of the contractors' responsibilities regarding documentation, functional performance testing, occupant and operator training, and the creation of the operations and maintenance manuals.

SCOPE OF SERVICES FOR BUILDING COMMISSIONING

- *Develop commissioning plan:* The commissioning plan includes a list of all equipment and systems to be commissioned, delineation of roles for each of the primary commissioning participants, and details on the scope, timeline, and deliverables throughout the commissioning process.
- *Conduct a review of the contractor submittals and shop drawings related to the commissioned systems:* Contractor submittals for the systems included in the commissioning scope shall be reviewed by the CxA in conjunction with the designer's review. The review shall focus on the ability of the submitted product to meet the owner's requirements and review comments shall be provided to the owner and the design team.
- *Visit the jobsite to observe progress:* Make site visits to observe installation of commissioned systems. Provide commissioning reports reflecting the observations made during the site visits. The commissioning progress reports shall be distributed to the owner, the designer and DOE.
- *Observe system start-ups:* The CxA shall observe, at minimum, the startup procedures for each piece of primary equipment (such as heating and chiller water generation and distribution systems, packaged air handling systems, heat pumps, packaged kitchen hood systems, etc.) unless there are multiple units, (in which case a sampling strategy may be used.) Extent of CxA observation of system start-up will be at the discretion of the CxA.
- *Verify Pre-Functional Testing:* The CxA shall provide the Contractor with the pre-functional checklists (PFC) that include a list of items to inspect and elementary component tests to conduct to verify proper installation of equipment. PFCs are primarily static inspections and procedures to prepare the equipment or system for initial operation. Completed PFC's, provided by the Contractor, are separate from and in addition to the manufacturers' installation and start-up forms and shall be reviewed by the CxA and included in the Commissioning Report. Contractor shall certify that installation, prestart, and startup activities have been completed prior to commencing functional testing. Certification shall include completed PFC's, manufacturer installation and startup checklists, and the final TAB report approved by the A/E.

SCOPE OF SERVICES FOR BUILDING COMMISSIONING

- *Functional Testing:* The CxA shall develop the functional testing procedures in a sequential written form, coordinate, oversee and document the actual testing. Functional performance tests (FPT) are performed after pre-functional testing and startup are completed and test the dynamic function, including all inputs and outputs, and operation of equipment and systems using manual (direct observation) or monitoring methods. Systems shall be tested under various modes and run through all the control system's sequences of operation while components are verified to be responding as the sequences state. Functional test forms will be completed during the testing process, deficiencies will be added to the Commissioning Issues Log and each included in the Commissioning Report. The CxA shall coordinate the completion of all outstanding issues.
- *Maintain commissioning issues log:* The CxA shall be maintain an issues log reflecting issues found during the commissioning process. The CxA shall identify the issues and help ensure all items are addressed and resolved.
- *Participate in training of facility staff in accordance with the training plan:* The CxA shall be charged with reviewing the training plan, developed by the General Contractor, for adequacy, and participating in the training.
- *Review Operations & Maintenance manual:* The Contractor compiles the O&M Manuals prior to commencement of training and the CxA reviews them for completeness, organization, and readability. The CxA shall review the O&M Manuals for the following items:
 - As-built sequences of operations for all equipment as provided by the design professionals and contractors, including time-of-day schedules and schedule frequency, and detailed point listings with ranges and initial setpoints.
 - Ongoing operating instructions for all energy and water-saving features and strategies.
 - Seasonal operation guidelines.
 - Recommendations for recalibration frequency of sensors and actuators by type and use.
 - Guidelines for continuous maintenance of the owner's project requirements (operational requirements) and basis of design (basis of operation.)
- *Complete a commissioning report:*

SCOPE OF SERVICES FOR BUILDING COMMISSIONING

- The report must show that the building's systems have met the design intent and specifications, have been properly installed, and performing as expected, and that proper O&M documentation and training have been provided. The report should include a compilation of all commissioning documentation described in this criterion, including complete functional testing results and forms and should note any items that have not been resolved at the time the report is issued.
- Commissioning report shall be distributed to the owner, the designer and DOE.
- *Ten month warranty, post occupancy review:* The commissioning contract shall contain provisions for a 10-month warranty and post-occupancy review. The review is intended to bring the design, construction, commissioning, and facility staff together to solicit the facility staff's comments, suggestions, and areas of concern regarding the systems in the first year of operation. Warranties on any commissioned systems should be reviewed and deficient equipment should be identified and a plan for resolution developed.

SYSTEMS TO BE COMMISSIONED

- Mechanical Systems:
 - HVAC systems
 - hot water heating systems
 - chilled water cooling systems
 - geothermal water systems
 - central air systems
 - exhaust systems
 - kitchen hoods
 - ductless split cooling
 - Automatic Temperature Controls
 - Energy management systems
- Plumbing Systems:
 - Domestic hot water systems
 - Confirm hot water generation and temperature
 - Confirm domestic water piping distribution and valve locations
 - Confirm hot water recirculation operation
 - Verify supply and return temperatures
 - Thermostatic mixing devices

SCOPE OF SERVICES FOR BUILDING COMMISSIONING

- Pumping systems
 - Verify booster pump discharge pressure
 - Confirm elevator pump operation
- Emergency Safety Stations
 - Verify temperature output
- Compressed Air
 - Confirm piping system distribution and valve locations
 - Confirm air outlet locations
 - Confirm delivery pressure
- Natural Gas system
 - Confirm piping system distribution and valve locations
 - Confirm gas outlet locations
- Electrical Systems:
 - Lighting controls
 - daylight harvesting
 - occupancy sensors
 - timing switches
 - Emergency generator
 - automatic transfer
 - sequencing of equipment at start-up
 - UPS / Emergency Lighting
 - Owner metering systems
 - Access Control
 - Lock-down system
- Building Envelope
 - Review of mock-up assembly
 - Air infiltration and water barrier systems
 - Window system installations and flashings
 - Fenestration field testing
 - Thermal imaging
 - Roofing systems