SECTION 01 91 02

**COMMISSIONING PROCESS**

**BASED ON DFD MASTER SPECIFICATION DATED 03/01/14**

***This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, exchange items between Level 1 commissioning and Level 2 or modify what is currently written. The Division of Facilities Development expects changes and comments from you.***

***This section describes Level 2 commissioning lead by either the A/E’s CxP or an independent 3rd party CxP.***

**P A R T 1 ‑ G E N E R A L**

**SCOPE**

This section includes specifications for the implementation, tracking and verification of the commissioning process. Included are the following topics:

PART 1 - GENERAL

Scope

Commissioned Systems

Reference

Definitions

Submittals

PART 2 - PRODUCTS

Equipment

PART 3 - EXECUTION

Meetings

Scheduling

Issues List

CxP Site Visits

Construction Verification

Functional Performance Testing

Operation and Maintenance Data

Agency Training

Substantial Completion Review Meeting

Commissioning Report

**COMMISSIONED SYSTEMS**

***Edit the following to reflect Divisions of work to be commissioned.***

Division 03 - Concrete

Division 04 - Masonry

Division 07 - Thermal and Moisture Protection

Division 08 - Exterior Building Envelope

Division 11 - Equipment

Division 13 - Special Construction

Division 14 - Conveying Systems

Division 21 - Fire Suppression

Division 22 - Plumbing

Division 23 - HVAC

Division 26 - Electrical

Division 27 -Communications

Division 28 - Electronic Safety and Security

Division 33 - Utilities

**REFERENCE**

Applicable provisions of Division 01 govern work under this section. Note in particular:

 General Conditions, Article 15 – Quality Control & Inspection

 General Requirements, Article 33 – Operating and Maintenance Manuals and Instructions

**DEFINITIONS**

Commissioning (Cx): The process of ensuring that systems are designed, installed, functionally tested and performing in conformity with the Owner’s Project Requirements and that the building operator has received complete equipment and systems documentation and training.

Commissioning Provider (CxP): The entity identified by the DFD Project Manager to lead, monitor, coordinate and report on project commissioning activities. The commissioning provider may be the project A/E (most common), an independent third party or DFD.

Commissioning Plan: A detailed plan of the organization, schedule, allocation of resources, procedures and documentation requirements of the commissioning process.

Construction Verification: A quality control verification process performed by the installer as building assemblies, components, equipment and systems are being installed which documents that the materials, installation procedures, interfaces with other trades, start-up, testing and operation are correct, complete, in compliance with contract documents and manufacturer’s recommendations and are ready for functional performance testing.

Functional Performance Tests (FPT): Contractor testing of installed building assemblies, components, equipment, systems and interfaces which confirms correct performance through all operating modes and compliance with contract documents and manufacturer’s recommendations.

Commissioning Report: A document that records the activities and results of the commissioning process.

**SUBMITTALS**

Reference the General Conditions of the Contract for submittal requirements.

**P A R T 2 – P RO D U C T S**

**EQUIPMENT**

Provide equipment required to perform startup, checkout and testing. Equipment to be calibrated within the past year and in accordance with the manufacturer’s recommendations.

**P A R T 3 – E X E C U T I O N**

**MEETINGS**

Each contractor is required to attend meetings related to commissioning (pre-construction, construction progress, commissioning meetings, etc.) and have personnel requested by CxP in attendance to facilitate quality control and coordinate commissioning efforts.

The CxP will present an overview of the project’s commissioning process at the pre-construction meeting. The commissioning team members will be identified and their responsibilities reviewed.

At subsequent meetings, contractors are to provide a review of project progress, a report on the status of issues, commissioning tasks and scheduling for future commissioning tasks.

**SCHEDULING**

Reference General Conditions Article 13 for Contractor responsibilities for scheduling. Each contractor shall provide the Contractor a detailed schedule and regular updates of commissioning tasks for incorporation into the project schedule.

**ISSUES LIST**

Each contractor is responsible for completing action items in a timely manner that are noted in the Issues List as their responsibility. Timely response and successful completion are a requirement to avoid withholding of payment.

**CxP SITE VISITS**

Commissioning is a team effort requiring the cooperation of all parties. Contractors are to proactively carry out their commissioning responsibilities and are to assist the CxP during site visits in performing commissioning tasks. This includes providing access to and demonstrating the installation, operation, and testing of commissioned systems; responding to CxP requests for information; carrying out proactive and corrective actions; and accurate reporting on system status and conditions.

**CONSTRUCTION VERIFICATION**

***Edit the individual construction verification checklists found in each Division’s Commissioning Section and provide additional checklists as needed to reflect the verification requirements of assemblies, components, equipment and systems to be commissioned on this project.***

***Construction verification checklists should not be submitted with the preliminary review documents but should be submitted with the final review documents.***

The construction verification checklists are a formalized means to provide individual workers the criteria for a successful installation, adherence to the construction documents and to easily track construction progress.

Each assembly, component, equipment, system and interface to be commissioned shall be verified by the installer at the site while work is underway and documented on the construction verification checklists. The contractor is responsible for successfully completing installations, documenting this on the construction verification checklist forms and correcting all deficiencies.

Contractor shall periodically review the construction verification schedule with the CxP allowing advance notice of activities of 5 business days so that the CxP may witness as deemed necessary. If CxP identifies more than a 10% discrepancy rate during confirmation of construction verification, the contractor shall correct all deficiencies and revalidate all items covered by that checklist and resubmit new checklists. The cost of reconfirmation of construction verification due to equipment or construction deficiencies is the responsibility of the contractor and subject to deductive change order at DFD’s discretion. Correction of deficiencies and revalidation are the responsibility of the contractor and are not subject to time extensions or delay claims.

Complete the construction verification checklists in each Division’s Commissioning Section for this project and submit to the CxP for review and comment. Contractor should make multiple copies of the blank test forms as needed for duplicate items. The “Checklist Tracking ID” on the form is only applicable where a checklist tracking ID system is being used by the CxP.

**FUNCTIONAL PERFORMANCE TESTING**

***The AE may handle the functional performance test forms either of two ways.***

***The first option is to include unedited copies of the master functional performance test forms in the bidding documents in order to give bidders the scope of what they will need to provide for functional performance testing. At the time of shop drawing submittal review, the AE must edit and provide a unique form to be used for the actual functional performance test for each specific item being tested. The edited functional performance test forms are to accompany shop drawings submittals returned to the contractor prior to functional performance testing. This option is preferred for medium and large projects where there are many functional performance tests to be done. Include a water mark indicating “SAMPLE” on each of the test forms before inserting into the bidding documents.***

***The second option is to edit the functional test forms and include them in the bidding documents. This is appropriate for smaller sized projects where there are very few functional performance tests. Do not include the watermark on the test forms if final editing is done prior to issuing bid documents.***

***The AE should provide additional test forms as needed to reflect the testing requirements of assemblies, components, equipment and systems to be commissioned on this project.***

***Insert test forms in each Division’s Commissioning Section after the Construction Verification Checklists.***

***Test forms should not be submitted with the preliminary review documents but should be submitted with the final review documents.***

Complete the functional performance test procedures included on the functional performance test forms in each Division’s Commissioning Section on this project. Coordinate with DFD, A/E and CxP so they may witness and document test results. If the forms include a “SAMPLE” water mark then the AE will edit the forms prior to the start of testing. If forms do not include a “SAMPLE” water mark, then they are the forms that will be used for the testing.

Contractors are responsible for completion and coordination of their work with all trades prior to testing, preplanning testing procedures, performing preliminary functional performance testing using test forms, insuring necessary staff and resources are on hand and expediting testing. This includes completion of testing and balancing by the HVAC contractor required for successful functional performance testing. Failure to complete or coordinate work, preplan or have staff and resources available to carry out testing will result in retesting. Submit completed preliminary functional performance test forms to CxP for review prior to scheduling testing for witnessing.

Contractor shall coordinate functional performance testing with DFD, the A/E, CxP and Agency and notify them 5 business days prior to testing so that they may witness and document the test results. All contractors involved with specific assemblies, components, equipment, systems and interfaces shall have qualified installers and technicians present at the same time working together to perform testing and demonstrate correct performance through all operating and failure modes and compliance with contract documents and manufacturer’s recommendations.

CxP shall establish sampling protocol and at the time of testing select sample test locations for identical pieces of equipment. Where simulation of conditions or altering of setpoints or values is required to achieve an operating or failure mode for testing, the contractor must receive CxP approval.

With DFD’s oversight, the CxP is responsible for witnessing functional performance testing and recording the results and deficiencies. Correct minor deficiencies during testing. Deficiencies that cannot be corrected during testing will be documented and subject to retest. Retesting will continue until no deficiencies remain.

Retesting is required when testing cannot be successfully completed. Deficiencies requiring retesting include:

* Incomplete work and/or coordination with others
* Inadequate preparation of systems for testing
* Inadequate preplanning
* Inadequate staff, equipment, tools or resources for testing
* Material, equipment or construction deficiencies
* Incomplete or failed test due to reasons under the Contractor’s responsibility

The cost of retesting is the responsibility of the contractor and subject to deductive change order at DFD’s discretion. Correction of deficiencies and retesting are the responsibility of the contractor and are not subject to time extensions or delay claims.

**OPERATION AND MAINTENANCE (O&M) DATA**

Reference Division 01 General Requirements.

**AGENCY TRAINING**

Provide agency training using final O&M data. The Contractor is responsible for developing a cohesive training plan for all Divisions and Sections of work where training is specified. The plan should include the agenda including topics and objectives to be covered for each section, the instructor’s name and contact information, and the anticipated duration and schedule for each session, a formal training record listing attendees and a training evaluation form. Develop the training schedule including number of hours for each component or system in coordination with the Agency, CxP and DFD that complies with the Agency’s and CxP’s personnel availability. See technical sections for specified minimum training hours. Submit a preliminary training plan to the Agency, DFD and CxP for review and finalize the plan to incorporate comments received.

Training sessions to include classroom and site presentations as appropriate. Demonstrate operation of systems and equipment. Review setpoints and operating parameters. Demonstrate preventive and routine maintenance procedures as well as common repairs. Videotape training sessions providing reasonable video/audio quality and provide final record in labeled DVD format to agency along with a sign off sheet demonstrating receipt by the agency.

The CxP shall provide each trainee with a Training Evaluation Form and at completion of training collect forms for review. Based on evaluations and CxP training review, contractor shall repeat training sessions which CxP determines were inadequate or incomplete.

**SUBSTANTIAL COMPLETION REVIEW MEETING**

Within 10 months of substantial completion and prior to completion of warranty period, CxP shall coordinate and facilitate a substantial completion review meeting. The intent of the meeting will be to review the project design, construction, turnover, operation and warranty issues. Contractor is required to have key project personnel in attendance and participating in the review for the purpose of making future project delivery improvements.

**COMMISSIONING REPORT**

CxP shall provide Contractor, DFD, and Agency a draft commissioning report for the project upon substantial completion and a final commissioning report after the substantial completion meeting. This report shall include contact information for key members of the commissioning team; description of commissioned systems, commissioning activities, sampling protocol and results; and findings and recommendations from substantial completion meeting. The report to also include the Owner’s Project Requirements, Basis of Design/Design Concept and Functional Performance Test forms.

**END OF SECTION**