# Appendix B – Sample Commissioning Agent Scope of Work

The pages that follow are a summary of the systems to be commissioned, the Commissioning Agent scope of work tasks and deliverables, and the Roles and Responsibilities of the Commissioning Team members. This is a compilation of the information included in the main body of this Whole Building Commissioning Process Manual. The compilation provides a summary of the commissioning tasks in a single location as a handy review guide. Please refer to the main body of this manual for more detailed descriptions of the tasks and deliverables.

These tables can be used as starting point when developing the Commissioning Agent scope of work for a specific project. The edited tables can be used to replace the comparable tables in the Sample Request for Proposals provided in Appendix C.

SYSTEMS TO BE COMMISSIONED

The following systems shall be included in the Commissioning Scope of Work.

[Editor’s Note: The following table provides a list of typical systems used in NCA facilities that should be commissioned. The list is intended for guidance only and is not considered comprehensive. Definition of the specific list of systems to be commissioned is the responsibility of the NCA project team in consultation with the operator of the facility, the designers and the commissioning agent.

Edit the Systems to be Commissioned table below to conform to the scope of the project to be commissioned and the budget allocated for Commissioning Activities. Remember that it is the intention of the Department of Veterans Affairs to provide Building Commissioning on every project. Commissioning agent bid should be based on the full design, construction and warranty periods.

The list of commissioned systems must be tailored to the systems to be installed on each project.]

Systems To Be Commissioned

| System | Description |
| --- | --- |
| **Precast Burial Crypts** | |
| Crypts | Precast burial crypts |
| **Building Exterior Closure** | |
| Foundations (excluding structural) | Standard, special, slab-on-grade, vapor barriers, air barriers |
| Exterior Closure | Exterior walls, exterior windows, exterior doors, louvers, grilles and sunscreens, |
| Roofing | Roof system (including parapet), roof openings (skylights, pipe chases, ducts, equipment curbs, etc.) |
| Note: | The emphasis on commissioning the above building envelope systems is on control of air flow, heat flow, noise, infrared, ultraviolet, rain penetration, moisture, durability, security, reliability, constructability, maintainability, and sustainability. |
| **Equipment** | |
| Global Positioning System (GPS) | Base station, remote GPS receivers, antenna, reference monuments |
| Geographic Information System (GIS) | Software user interface |
| **Fire Suppression** | |
| Fire Pump | Fire Pump, jockey pump, fire pump controller/ATS |
| Fire Sprinkler Systems | Wet pipe system, dry pipe system, pre-action system, special agent systems |
| **Plumbing** | |
| Domestic Water Distribution | Booster pumps, backflow preventers, water softeners, potable water storage tanks |
| Domestic Hot Water Systems | Water heaters\*\*, heat exchangers, circulation pumps, point-of-use water heaters\* |
| Sewerage Pump Systems | Sewage ejectors |
| Wastewater Pump Systems | Sump pumps |
| Sanitary Waste Interceptors | Grease interceptors, acid neutralizers |
| General Service Air Systems | Packaged compressor systems, air dryers, filtration |
| Water Treatment Systems | Water treatment systems |
| **HVAC** | |
| Noise and Vibration Control | [Noise and vibration levels for critical equipment such as Air Handlers, Chillers, Boilers, Generators, etc. will be commissioned as part of the system commissioning] |
| Direct Digital Control System\*\* | Operator Interface Computer, Operator Work Station (including graphics, point mapping, trends, alarms), Network Communications Modules and Wiring, Integration Panels. [DDC Control panels will be commissioned with the systems controlled by the panel] |
| Chilled Water System\*\* | Chillers (air-cooled), pumps (primary, secondary, variable primary), VFDs associated with chilled water system components, DDC Control Panels (including integration with Building Control System) |
| HVAC Air Handling Systems\*\* | Air handling Units, packaged rooftop AHU, Outdoor Air conditioning units, humidifiers, DDC control panels |
| HVAC Ventilation/Exhaust Systems | General exhaust, toilet exhaust, laboratory exhaust, isolation exhaust, room pressurization control systems |
| HVAC Energy Recovery Systems\*\* | Heat Wheels, Heat Recovery Loops, AHU Integrated Heat Recovery |
| HVAC Terminal Unit Systems\*\* | VAV Terminal Units, CAV terminal units, fan coil units, fin-tube radiation, unit heaters |
| Decentralized Unitary HVAC Systems\* | Split-system HVAC systems, controls, interface with facility DDC |
| Unitary Heat Pump Systems\*\* | Water-source heat pumps, controls, interface with facility DDC |
| Hydronic Distribution Systems | Pumps, DDC control panels, heat exchangers, |
| Facility Fuel Systems | Boiler fuel system, generator fuel system |
| Geothermal Energy Heating (water and direct exchange) \*\* | Geothermal well, ground heat exchanger, geothermal pumps, heat exchanger, valves, instrumentation |
| Solar Energy Heating Systems \*\* | Solar collectors, heat exchangers, storage tanks, solar-boosted domestic hot water heater, pumps, valves, instrumentation |
| Facility Fuel Gas Systems | Witness Natural gas piping pressure testing, natural gas compressors and storage, propane storage |
| **Electrical** | |
| Grounding & Bonding Systems | Witness 3rd party testing, review reports |
| Electric Power Monitoring Systems | Metering, sub-metering, power monitoring systems, PLC control systems |
| Electrical System Protective Device Study | Review reports, verify field settings consistent with Study |
| Low-Voltage Distribution System | Power distribution system, Life-safety power distribution system, critical power distribution system, equipment power distribution system, switchboards, distribution panels, panelboards, verify breaker testing results (injection current, etc) |
| Emergency Power Generation Systems | Generators, Generator paralleling switchgear, automatic transfer switches, PLC, Uninterruptible Power Supplies and other control systems |
| Lighting & Lighting Control\*\* Systems | Emergency lighting, occupancy sensors, lighting control systems, architectural dimming systems, theatrical dimming systems, exterior lighting and controls |
| Lightning Protection System | Witness 3rd party testing, review reports |
| **Communications** | |
| Grounding & Bonding System | Witness 3rd party testing, review reports |
| Structured Cabling System | Witness 3rd party testing, review reports |
| Security Emergency Call Systems | Witness 3rd party testing, review reports |
| **Electronic Safety and Security** | |
| Grounding & Bonding | Witness 3rd party testing, review reports |
| Physical Access Control Systems | Witness 3rd party testing, review reports |
| Access Control Systems | Witness 3rd party testing, review reports |
| Security Access Detection Systems | Witness 3rd party testing, review reports |
| Video Surveillance System | Witness 3rd party testing, review reports |
| Electronic Personal Protection System | Witness 3rd party testing, review reports |
| Fire Detection and Alarm System | 100% device acceptance testing, battery draw-down test, verify system monitoring, verify interface with other systems. |
| **Site Utilities** | |
| Water Utilities | City Water Service Entrance, Backflow Prevention, Pressure Control, Booster Pumps,Lawn Irrigation Systems, Drinking Well Water Systems |
| Sanitary Sewerage Utilities | City Sanitary Connection, Waste Water Treatment Systems |
| Storm Water Drainage Utilities | City Storm Water Connection, Site Storm Water Distribution and Storage |
| **Renewable Energy Sources** | |
| Solar Energy Electrical Power Generation Systems \*\* | Solar collector modules, DC-AC inverter, storage batteries, combiners, Switchgear, instrumentation, monitoring and control systems |
| Wind Energy Electrical Power Generation Systems \*\* | Wind Turbines, DC-AC inverter, storage batteries, combiners, switchgear, instrumentation, monitoring and control systems |
| **Integrated Systems Tests** | |
| Fire Alarm Response | Integrated System Response to Fire Alarm Condition and Return to Normal |
| **Table Notes** | |
| \*\* Denotes systems that LEED requires to be commissioned to comply with the Fundamental Commissioning pre-requisite. | |

SCOPE OF WORK

The Commissioning Agent shall include all tasks and provide all deliverables to complete the scope of work outlined below:

[Editor’s Note: Edit the table below to conform to the scope of the project to be commissioned and the budget allocated for Commissioning Activities. Remember that it is the intention of the Department of Veterans Affairs to provide Whole Building Commissioning on every project. The list of task should be tailored to the project execution method and schedule for your specific project

Also note that these tables are not intended to be included in the RFQ for Commissioning Agent Services. The RFQ should be edited to show only the tasks identified in Column 1. The tables below can be used by the RFQ Evaluation Team as a basis of how well the commissioning firm understands the scope of each task.]

Commissioning Agent Task/Deliverables Description

**Pre-Design Phase**

| Project Phase/ Cx Task | Commissioning Task Description | | Commissioning Deliverables | |
| --- | --- | --- | --- | --- |
| **PRE-DESIGN PHASE** | |  | |  |
| Pre-Design Commissioning Kickoff Meeting | Conduct Pre-Design Commissioning Kickoff Meeting with the VA and the Design Team.  Establish or review Owner’s Project Requirements (OPR), goals, objectives, and preliminary schedule.  Establish commissioning goals and objectives.  Establish the purpose and proposed process for commissioning the project.  Establish the individual roles of each participating commissioning team member.  Establish systems to be commissioned and preliminary acceptance criteria. | | Draft Commissioning Plan  Meeting Minutes  Preliminary Owner’s Project Requirements | |

Commissioning Agent Task/Deliverables Description

**Design Phase**

| Project Phase/ Cx Task | Commissioning Task Description | Commissioning Deliverables |
| --- | --- | --- |
| **SD1 PHASE** | | |
| Design Submission Review | Complete a thorough commissioning review of the SD1 submittal documents and submitted criteria to establish the systems to be designed and installed in compliance with the Owner’s Project Requirements (OPR). Review is conducted in conjunction with the IDIQ-AE Peer Review.  Documents provided to the Commissioning Agent should include, SD1 Design Narrative and other submittal documents required by PG 18-15, Volume D as well as other pertinent documents. | Design Phase Commissioning Issues Log  (Incorporate Commissioning Agent review comments into Dr Checks for Project Tracking – Retain for Design Phase Cx Report) |
| Basis of Design Report | Review and Reconcile the Project Design Narrative. Narrative should incorporate OPR requirements from VA Standards and other Project Documents. Design Narrative should describe designer’s approach to the project requirements.  Basis of Design (BOD) should include the Owner’s Project Requirements (OPR), Design Narrative and sustainability goals. Likewise separate documents can be developed and retained in the project record. | Basis of Design Report  Design Phase Commissioning Issues Log  (Incorporate commissioning review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report) |
| Commissioning Plan | Develop the Project Design Phase Commissioning Plan that outlines preliminary scope, process requirements, deliverables, roles, design concerns, responsibilities, schedule and milestones.  Provide a copy of the Commissioning Plan to the A/E. The A/E will incorporate the Commissioning Plan into the Design Narrative as described in PG 18-15, Volume D. | Project Design Phase Commissioning Plan |
| Duration Schedule for Commissioning Activities | Based on the Project Design Phase Commissioning Plan, prepare a duration schedule for the design phase commissioning activities required by the commissioning plan. This duration schedule should include Design Phase Activities. The Duration Schedule should provide sufficient detail to comply with the AE Team CPM scheduling requirements as outlined in PG 18-15, Volume D. | Design Phase Commissioning Duration Schedule – Incorporate into Commissioning Plan |
| Design Review Meeting | Attend and participate in SD1 Design Review Meeting. Provide clarifications for identified Commissioning Issues as appropriate. Incorporate other comments or issues identified at Review Meeting that impact project commissioning into Commissioning Issues Log. | Revised Design Phase Commissioning Issue Log.  (Note that resolution of some issues may be deferred to later design stages.) |
| **SD2 PHASE** | | |
| Design Submission Review | Complete a thorough commissioning review of the SD2 submittal documents and submitted criteria to establish the systems to be designed and installed in compliance with the OPR.  Documents provided to the Commissioning Agent should include, SD2 Design Narrative, calculations, room locations and preliminary layouts and other submittal documents required by PGA 18-15, Volume D, as well as other pertinent documents. | Design Phase Commissioning Issues Log  (Incorporate commissioning review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report) |
| Design Narrative | Review the updated Project Design Narrative. The Design Narrative should incorporate OPR requirements from VA Standards and other Project Documents. Design Narrative should describe designer’s approach to the project requirements. | Design Phase Commissioning Issues Log  (Incorporate review comments into Dr Checks for Project Tracking – Retain for Design Phase Cx Report) |
| Commissioning Plan | Update the Project Design Phase Commissioning Plan.  Provide a copy of the Commissioning Plan to the A/E. The A/E will incorporate the Commissioning Plan into the Design Narrative as described in PG 18-15, Volume D. | Updated Project Design Phase Commissioning Plan |
| Duration Schedule for Commissioning Activities | Based on the Project Design Phase Commissioning Plan, prepare a duration schedule for the Design Phase commissioning activities required by the commissioning plan. This duration schedule should include Design Phase Activities. The Duration Schedule should provide sufficient detail to comply with the AE Team CPM scheduling requirements as outlined in PG 18-15, Volume D. | Design Phase Commissioning Duration Schedule – Incorporate into Commissioning Plan |
| Commissioning Specifications | Provide List of Commissioning Specifications Sections utilizing the VA Master Construction Specification. Specifications shall be submitted in accordance with the requirements of PG 18-15, Volume D. | List of Required Commissioning Specifications  Specification Coordination Matrix for Commissioning Agent/A/E coordination. |
| Design Review Meeting | Attend and participate in SD2 Design Review Meeting. Provide clarifications for identified Commissioning Issues as appropriate. Incorporate other comments or issues identified at Review Meeting that impact project commissioning into Commissioning Issues Log. | Revised Design Phase Commissioning Issue Log  Note that resolution of some issues may be deferred to later design stages. |
| Design Phase Issue Log Resolution | Update the Commissioning Issues Log by recording resolutions to identified Commissioning Issues. | Revised Design Phase Commissioning Issue Log |
| **DD1 PHASE** | | |
| Design Submission Review | Complete a thorough commissioning review of the DD1 submittal documents and submitted criteria to establish the systems to be designed and installed in compliance with the OPR.  Documents provided to the Commissioning Agent should include: DD1 Updated Design Narrative, calculations, equipment schedules, system and control schematic diagrams and appropriate schematics and other submittal documents required by PG 18-15, Volume D, as well as other pertinent documents. | Design Phase Commissioning Issues Log  (Incorporate review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report) |
| Design Narrative | Update Project Design Narrative. The Design Narrative should be updated to reflect the evolution of the project design and note all significant deviations from prior version for ease of review and reconciliation. Design Narrative should describe designer’s approach to the project requirements. | Design Phase Commissioning Issues Log  (Incorporate review comments into Dr Checks for Project Tracking – Retain for Design Phase Cx Report) |
| Design Phase Controls Meeting | Meet with the Design Team and NCA to develop HVAC and other system control strategies, sequences of operation, trending, and alarms.  The Commissioning Agent acts as a advocate for the NCA and the facilities operations staff to assist the Design Team in developing realistic operating strategies and sequences of operations that will enable the facilities operations staff to operate the building systems to sustain the operational, energy and other systems parameters throughout the project life cycle. | Meeting Notes |
| Commissioning Plan | Update the Project Design Phase Commissioning Plan, including any revisions to Commissioning Team Members, Schedules and other modifications required by the progress of the project.  Prepare a Draft Construction Phase Commissioning Plan, including systems to be commissioned, an outline of construction phase roles and responsibilities, and an outline of required system documentation requirements.  Provide a copy of the updated Design Phase Commissioning Plan to the A/E. The A/E will incorporate the Commissioning Plan into the Design Narrative as described in PG 18-15, Volume D. | Updated Project Design Phase Commissioning Plan  Draft Construction Phase Commissioning Plan |
| Duration Schedule for Commissioning Activities | Based on the Project Design Phase Commissioning Plan, prepare a duration schedule for the commissioning activities required by the commissioning plan. This duration schedule should include Design Phase Activities. The Duration Schedule should provide sufficient detail to comply with the AE Team CPM scheduling requirements as outlined in PG 18-15, Volume D.  Based on the Draft Construction Phase Commissioning Plan, prepare a preliminary duration schedule for Construction Phase Commissioning Activities. Incorporate the draft duration schedule into the Draft Construction Phase Commissioning Plan. | Commissioning Duration Schedule – Incorporate into Commissioning Plan  Draft Construction Phase Commissioning Duration Schedule – Incorporate into the Draft Construction Phase Commissioning Plan. |
| Commissioning Specifications | Provide Draft Commissioning Specifications Sections utilizing the VA Master Construction Specification. Specifications shall be submitted in accordance with the requirements of PG 18-15, Volume D.  Provide a Specification Coordination Matrix that outlines the commissioning-related language that needs to be included in the individual equipment and technical specifications. | Draft Commissioning Specifications  Specification Coordination Matrix for Commissioning Agent/A/E coordination. |
| Design Review Meeting | Attend and participate in DD1 Design Review Meeting. Provide clarifications for identified Commissioning Issues as appropriate. Incorporate other comments or issues identified at Review Meeting that impact project commissioning into Commissioning Issues Log. | Revised Design Phase Commissioning Issue Log.  (Incorporate review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report)  (Note that resolution of some issues may be deferred to later design stages.) |
| Design Phase Issue Log Resolution | Update the Commissioning Issues Log by recording resolutions to identified Commissioning Issues. | Revised Design Phase Commissioning Issue Log  (Incorporate review comments into Dr Checks for Project Tracking – Retain for Design Phase Cx Report) |
| **DD2 PHASE** | | |
| Design Submission Review | Complete a thorough review of the DD2 submittal documents and submitted criteria to establish the systems to be designed and installed in compliance with the OPR.  Documents provided to the Commissioning Agent should include: DD2 Updated Design Narrative, calculations, equipment schedules, system and control schematic diagrams, floor plans and appropriate schematics and other submittal documents required by PG 18-15, Volume D as well as other pertinent documents. | Design Phase Commissioning Issues Log  (Incorporate review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report) |
| Design Narrative | Commissioning Agent to update, review and reconcile the Project Design Narrative. The Design Narrative should reflect the evolution of the project design and note all significant deviations from prior version for ease of review and reconciliation. Design Narrative should describe designer’s response to the project requirements.  Submit the updated Design Narrative to the AE team for review and comment. Incorporate review comments into the updated Design Narrative as necessary. | Design Phase Commissioning Issues Log |
| Commissioning Plan | Update the Project Design Phase Commissioning Plan, including any revisions to Commissioning Team Members, Schedules and other modifications required by the progress of the project.  Update the Construction Phase Commissioning Plan, including systems to be commissioned, an outline of construction phase roles and responsibilities, and an outline of required system documentation requirements.  Include the updated Commissioning Plan in the revised Design Narrative | Updated Project Commissioning Plan |
| Commissioning Specifications | Provide Preliminary Commissioning Specifications Sections utilizing the VA Master Construction Specification. Specifications shall be submitted in accordance with the requirements of PG 18-15, Volume D.  Review individual equipment and technical sections to ensure commissioning-related language has been included as provided in the Commissioning Specification Coordination Matrix. | Preliminary Commissioning Specifications  Marked up equipment and technical specification sections showing any revisions to commissioning-related language.  Specification Coordination Matrix for Commissioning Agent/A/E coordination. |
| Duration Schedule for Commissioning Activities | Based on the Project Design Phase Commissioning Plan, prepare an updated duration schedule for the design phase commissioning activities required by the commissioning plan. This duration schedule should include Design Phase Activities. The Duration Schedule should provide sufficient detail to comply with the AE Team CPM scheduling requirements as outlined in PG 18-15, Volume D.  Based on the Project Construction Phase Commissioning Plan and the DD2 Phase design submission, update the draft Construction Phase Commissioning Duration Schedule. Incorporate the revised Construction Phase Duration Schedule into the Draft Commissioning Phase Commissioning Plan. | Design Phase Commissioning Duration Schedule – Incorporate into Design Phase Commissioning Plan  Construction Phase Commissioning Duration Schedule – Incorporate into Construction Phase Commissioning Plan |
| Develop Preliminary Pre-Functional Checklists (PFC’s) | The Commissioning Agent will prepare Preliminary Pre Functional Checklists (PFC) for type of system to be commissioned and distribute to all Cx Team members for review and comment. A completed PFC indicates the system and its related equipment is ready for Systems Functional Performance Testing.  Preliminary Pre-Functional Checklists shall be included in the Construction Phase Commissioning Plan and the Commissioning Specifications. | Preliminary Pre Functional Checklists (PFC’s) |
| Develop Preliminary Systems Functional Performance Test (FPT’s) Procedures | Based on the systems to be commissioned and the systems shown in the DD2 submittal, the Commissioning Agent will prepare Preliminary Systems Functional Performance Test Procedures (FPT’s).  Preliminary FPTs shall be included in the Construction Phase Commissioning Plan and the Commissioning Specifications. | Preliminary Systems Functional Performance Test Procedures (FPT’s) |
| Design Phase Controls Meeting | Meet with the Design Team and NCA to update HVAC and other system control strategies, sequences of operation, trending, and alarms.  The Commissioning Agent acts as an advocate for the NCA and the facilities operations staff to assist the Design Team in developing realistic operating strategies and sequences of operations that will enable the facilities operations staff to operate the building systems to sustain the operational, energy and other systems parameters throughout the project life cycle. | Meeting Notes |
| Design Review Meeting | Attend and participate in DD2 Design Review Meeting. Provide clarifications for identified Commissioning Issues as appropriate. Incorporate other comments or issues identified at Review Meeting that impact project commissioning into Commissioning Issues Log. | Revised Design Phase Commissioning Issue Log.  (Incorporate review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report)  (Note that resolution of some issues may be deferred to later design stages.) |
| Design Phase Issue Log Resolution | Update the Commissioning Issues Log by recording resolutions to identified Commissioning Issues. | Revised Design Phase Commissioning Issue Log  (Incorporate review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report) |
| **CD1 PHASE** | | |
| Design Submission Review | Complete a thorough commissioning review of the CD1 submittal documents and submitted criteria to establish the systems to be designed and installed in compliance with the OPR.  Documents provided to the Commissioning Agent should include: calculations, equipment schedules, system and control schematic diagrams, floor plans and appropriate schematics and other submittal documents required by PG 18-15, Volume D, as well as other pertinent documents. | Design Phase Commissioning Issues Log  (Incorporate review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report) |
| Design Narrative | Commissioning Agent to update, review and reconcile the Project Design Narrative. The Design Narrative should be updated to reflect the evolution of the project design and note all significant deviations from prior version for ease of review and reconciliation. Design Narrative should describe designer’s response to the project requirements.  Submit the updated Design Narrative to the AE team for review and comment. Incorporate review comments into the updated Design Narrative as necessary. Include O&M Manual, training and demonstration requirements. | Revised Design Narrative |
| Commissioning Plan | Update the Project Design Phase Commissioning Plan, including any revisions to Commissioning Team Members, Schedules and other modifications required by the progress of the project.  Update the Construction Phase Commissioning Plan, including systems to be commissioned, an outline of construction phase roles and responsibilities, and an outline of required system documentation requirements.  Include the updated Commissioning Plan in the revised Design Narrative | Updated Design Phase Project Commissioning Plan  Updated Construction Phase Project Commissioning Plan |
| Duration Schedule for Commissioning Activities | Based on the Project Design Phase Commissioning Plan, prepare a duration schedule for the commissioning activities required by the commissioning plan. This duration schedule should include Design Phase Activities. The Duration Schedule should provide sufficient detail to comply with the AE Team CPM scheduling requirements as outlined in PG 18-15, Volume D.  Based on the Project Construction Phase Commissioning Plan and the DD2 Phase design submission, update the draft Construction Phase Commissioning Duration Schedule. Incorporate the revised Construction Phase Duration Schedule into the Draft Commissioning Phase Commissioning Plan. | Design Phase Commissioning Duration Schedule – Incorporate into Design Phase Commissioning Plan  Update Construction Phase Duration Schedule – Incorporate into Construction Phase Commissioning Plan |
| Commissioning Specifications | Provide Final Commissioning Specifications Sections utilizing the VA Master Construction Specification. Specifications shall be submitted in accordance with the requirements of PG 18-15, Volume D.  Review individual equipment and technical sections to ensure commissioning-related language has been included as provided in the Commissioning Specification Coordination Matrix. | Final Project Commissioning Specifications  Marked up equipment and technical specification sections to identify any changes to commissioning-related language. |
| Develop Draft Pre-Functional Checklists (PFC’s) | The Commissioning Agent will update the Preliminary Pre Functional Checklists (PFC) to Draft Pre-Functional Checklists for each type of system to be commissioned and distribute to all Cx Team members for review and comment.  Draft Pre-Functional Checklists shall be included in the Construction Phase Commissioning Plan and the Commissioning Specifications. | Draft Pre Functional Checklists (PFC’s) |
| Develop Draft Systems Functional Performance Test (FPT’s) Procedures | Based on the systems to be commissioned and the systems shown in the CD1 submittal, the Commissioning Agent will update the Preliminary Systems Functional Performance Test Procedures (FPT’s) to become Draft Systems Functional Performance Test Procedures. .  Draft FPTs shall be included in the Construction Phase Commissioning Plan and the Commissioning Specifications. | Draft Systems Functional Performance Test Procedures (FPT’s) |
| Design Phase Controls Meeting | Meet with the Design Team and NCA to update HVAC and other system control strategies, sequences of operation, trending, and alarms.  The Commissioning Agent acts as an advocate for the NCA and the facilities operations staff to assist the Design Team in developing realistic operating strategies and sequences of operations that will enable the facilities operations staff to operate the building systems to sustain the operational, energy and other systems parameters throughout the project life cycle. | Meeting Notes |
| Design Review Meeting | Attend and participate in CD1 Design Review Meeting. Provide clarifications for identified Commissioning Issues as appropriate. Incorporate other comments or issues identified at Review Meeting that impact project commissioning into Commissioning Issues Log. | Revised Design Phase Commissioning Issue Log.  (Incorporate review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report)  (Note that resolution of some issues may be deferred to later design stages.) |
| Design Phase Issue Log Resolution | Update the Commissioning Issues Log by recording resolutions to identified Commissioning Issues. | Revised Design Phase Commissioning Issue Log |
| **BID PHASE** | | |
| Design Final Design Submission Review | Review Final Design Submission for resolution of Outstanding Commissioning Issues | Design Phase Commissioning Issues Log  (Incorporate review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report) |
| Design Narrative | Commissioning Agent to provide a Final Design Narrative to Include all modifications and/or deviations from CD1 Design Narrative. The Design Narrative should be updated to reflect the evolution of the project design and note all significant deviations from prior version for ease of review and reconciliation. Design Narrative should describe designer’s response to the project requirements. Where appropriate, provide documentation of approved deviations from design standards and reasoning for same. | Revised Design Narrative |
| Commissioning Plan | Update & Submit Project Construction Phase Commissioning Plan  Include the updated Commissioning Plan in the revised Design Narrative | Project Construction Phase Commissioning Plan |
| Duration Schedule for Commissioning Activities | Based on the Project Construction Phase Commissioning Plan, prepare a duration schedule for the commissioning activities required by the commissioning plan. This duration schedule should include Construction Phase Activities. The Duration Schedule should provide sufficient detail to allow the Prime Contractor to incorporate commissioning activities into the Master Project Schedule. | Construction Phase Commissioning Duration Schedule – Incorporate into Commissioning Plan |
| Commissioning Specification | Provide updated Final Cx Specifications. Specifications shall be submitted in accordance with the requirements of PG 18-15, Volume D. | Updated Project Commissioning Specifications |
| Design Phase Issue Log Resolution | Record resolutions to Cx Issues on the Design Phase Commissioning Issues Log. | Revised Design Phase Commissioning Issue Log  (Incorporate review comments into Dr Checks for Project Tracking – Retain for Design Phase Cx Report) |
| Design Phase Commissioning Report | Prepare Design Phase Commissioning Report to document the Design Phase commissioning process and results | Design Phase Commissioning Report |

Commissioning Team Task/Deliverables Description

**Bid and Pre Construction Phase**

| Project Phase/ Cx Task | Commissioning Task Description | Commissioning Deliverables |
| --- | --- | --- |
| Pre Bid Meeting | Attend Pre Bid Meeting; provide overall description of Commissioning Process, provide clarifications for Commissioning Issues. | Meeting Notes for PM/RE  Clarifications for Addendum if required |
| Pre-Construction Meeting | Attend Pre Construction Meeting and be prepared to clarify the Commissioning Process for this project (e.g., discuss commissioning representative selection). | None |

Commissioning Team Task/Deliverables Description

**Construction Phase**

| Project Phase/ Cx Task | Commissioning Task Description | Commissioning Deliverables |
| --- | --- | --- |
| Commissioning Kick Off Meeting  (Construction Phase)  [The kickoff meeting should occur within 60 days of Notice to Proceed.] | Conduct a “Commissioning Kickoff Meeting” with the Construction Team  Establish the purpose and process for commissioning the project.  Establish the individual roles of each participating commissioning team member.  Review the Construction Phase Commissioning Plan and Commissioning Specifications.  Review the Commissioning Documents  Review the Project Schedule and discuss how commissioning activities will be incorporated into the master schedule.  Review Draft PFC and FPT; identify pre-requisites for functional testing.  ATTENDEES:  Commissioning Agent, A/E Design Team Representatives, Contractor’s Commissioning Representative, Subcontractor’s Commissioning Representatives, RE. | Meeting Minutes  Revised Project Commissioning Plan (Include Names/Contact Information for selected Commissioning Team Members) |
| Duration Schedule for Commissioning Activities | Based on the Construction Phase Commissioning Plan, prepare a duration schedule for the commissioning activities required by the commissioning plan. This duration schedule should be incorporated into the contractor’s project schedule to track all commissioning activities of the commissioning team. | Commissioning Duration Schedule  (Schedule shall be periodically updated to reflect changes in the project schedule and/or scope.) |
| Submittal & Shop Drawing Review | Review all pertinent project shop drawings necessary to support the Commissioning Process. Review of the shop drawings is for the purpose of developing appropriate Pre Functional Checklists and Systems Functional Performance Test Procedures. Submittals & Shop drawings shall be reviewed for commissionability, maintainability and for compliance to the Construction Documents.  Note any issues identified in the Shop Drawing Review that might compromise the final commissioned system on the ‘Commissioning Review Log’ and submit comment to the Design Team and the RE contemporaneously with the A/E review for resolution.  Comments shall be submitted in accordance with the contractual submittal review time. Comments shall be provided to the Design Team no less than 7 days prior to the Submittal Review Due Date provided that the Cx Agent has no less than 7 days to review the submittals.  **ANY ISSUES IDENTIFIED IN THE SUBMITTAL REVIEW THAT MIGHT REQUIRE A CONTRACT CHANGE BUT IS NECESSARY TO MEET DESIGN INTENT SHOULD BE SPECIFICALLY REFERRED TO THE RE.** | Shop Drawing Cx Review List    Shop Drawing Review Comments |
| Construction Phase Commissioning Plan | Based on the work completed in the items above, the Construction Phase Commissioning Plan for the project shall be periodically reviewed with the Commissioning Team and updated to reflect changes in project equipment, sequences of operations, scope or schedule and with project personnel. | Revised Project Commissioning Plan |
| Commissioning Construction Observations | During the course of construction, the Commissioning Agent will visit the site to observe the progress of construction with respect to the systems being commissioned. The focus of the observations will to verify that systems being installed comply with the Construction Documents and can be successfully configured, operated and maintained.  In addition, site observations visits will be scheduled to include  • Witnessing factory testing and/or contractor equipment/system start up activities  • Verification of Completed Pre Functional Checklists  • Verification that the Contractor and his subcontractors are completing and documenting Pre-Test procedures required by the specifications.  • Clarification and technical support for understanding and resolving Commissioning Issues. | Site Observation Reports  Updated Commissioning Issues Log |
| Commissioning Team Meetings | The Commissioning Agent will hold regular commissioning team meetings to review progress of the commissioning effort and reinforce individual responsibilities. The team will review schedule, construction sequence, and completed work (PFC, PFT and FPT’s) and outstanding issues on the Commissioning Issues Log.  Commissioning Team Meetings may be held at the jobsite or by teleconference depending upon the status of construction. While it is imperative that many of the Commissioning Team Meetings be held in person, during early construction phases, some meetings may be more cost effectively conducted remotely. Scheduling and location of meetings shall occur by consultation between the Commissioning Agent and the RE.  The Prime Contractor’s scheduler should attend approximately every other Commissioning Team Meeting to review the master schedule and any changes that will affect commissioning activities. | Commissioning Meeting Agenda and Minutes  Updated Commissioning Issues Log |
| Develop Final Pre-Functional Checklists (PFC’s) | The Commissioning Agent will prepare Pre-Final Pre Functional Checklists (PFC) for the project and distribute to all Cx Team members for review and comment. The Commissioning Agent will incorporate review comments and prepare Final PFCs.  An executed PFC submitted by the Prime Contractor indicates the system and its related equipment is ready for Systems Functional Performance Testing.  The requirements for Pre Functional Checklists shall be coordinated with the startup requirements specified for each commissioned system. The PFC’s shall be constructed to leverage the specified contractor and vendor start activities to avoid unnecessary duplication. | Pre Functional Checklists (PFC’s) |
| Final Systems Functional Performance Test (FPT’s) Procedures | Based on construction documents and approved submittals, the Commissioning Agent will prepare Pre-Final Systems Functional Performance Test Procedures (FPT’s) for systems to be commissioned.  Completed Final FPT’s will be distributed to all appropriate members of the Commissioning Team for review and comment.  Final FPT’s will be issued once comments are reviewed and incorporated into final documents as appropriate. | Pre-Final and Final Systems Functional Performance Test Procedures (FPT’s) |
| Review Operations & Maintenance Manuals | The Commissioning Agent shall review Operations and Maintenance Manuals submitted by contractors for general conformance with specifications and VA’s requirements, including:  If provided with the manuals, Review Preventive Maintenance Schedules provided as part of the O&M Manuals for completeness. Verify that data is provided in a manner consistent with VA process for managing Preventive Maintenance tasks.  Review of O&M Manuals will include a review of system and component warranties to confirm conformance with contract requirements and adequate documentation of warranty contact information and VA obligations.  Review of O&M Manuals shall be completed in accordance with the Submittal Review schedule requirements. | Updated Commissioning Issues Log |
| Review Contractor Equipment Startup Checklists, TAB Reports and PFC’s | The Commissioning Agent will review all contractor prepared Equipment Startup Checklists, TAB Reports (including “pencil” daily test results) and PFC’s to confirm that the systems are have been subject to appropriate Quality Control and Start Up procedures prior to initiation of Functional Performance Testing. Incomplete work, inadequate preparation and deficiencies will note noted and tracked on the Commissioning Issues Log. | Commissioning Issues Log |
| TAB Verification | The Commissioning Agent shall work with the TAB Contractor to verify that all Testing and Balancing work is conducted in strict accordance with the specified Procedural Standards for Testing, Adjusting and Balancing by either NEBB or AABC. The Commissioning Agent shall execute the following tasks:  • Review the TAB Agenda provided by the TAB Contractor to verify that it is complete, thorough and in compliance with the specification and Procedural Standards requirements.  • On the project site, the CxA shall review the calibration certificates for the instrumentation being used by the TAB • Contractor during the execution of TAB activities to confirm that the instrumentation meets the requirements of the spec and the appropriate Procedural Standard.  • The CxA shall periodically visit the project site and review the TAB documentation for method, reasonable values, and compliance with the specification, Procedural Standard and TAB Agenda.  • Upon completion of the TAB activities, the CxA shall visit the project site with the TAB Contractor and the RE. The TAB Contractor shall demonstrate readings selected by the CxA that demonstrate that the system performance is consistent with the submitted values on the TAB report. Readings shall include Air Handling Unit total flows, static pressure control values, select outlet flows, building, and space pressures selected by the CxA as critical system operating values. | TAB Agenda Review Comments  TAB Agenda Review Meeting Minutes  Field Observation Reports of TAB Inspections  Summary Report of TAB Verification Readings |

Commissioning Team Task/Deliverables Description

**Acceptance and Testing Phase**

| Project Phase/ Cx Task | Commissioning Task Description | Commissioning Deliverables |
| --- | --- | --- |
| Systems Functional Performance Testing | The Commissioning Agent will oversee, facilitate, and document all FPT testing. Execution of FPT’s shall be executed in accordance with the Functional Testing Procedures published by the Commissioning Agent. All systems tested in accordance with the FPT’s shall be operated by the contractors in accordance with the approved FPT. Contractors shall retain responsibility for the installed systems during and after functional testing until substantial completion or final acceptance as determined by the VA.  The Commissioning Agent, in collaboration with the control contractor shall include long term trends (greater than 7 days) of integrated system performance once all systems have been commissioned. The Commissioning Agent shall provide analysis of these trends to confirm that the installed systems are stable and reliable | Executed Functional Performance Tests and support documentation.  Long Term Trend Data and Analysis |
| Prepare Systems Manuals | The Commissioning Agent shall work with the design team, contractor and VA to develop Systems Manuals. Manuals will contain system design, operations and sequence information that describes the design intent, operational features and appropriate operational practices necessary to sustain the system operation in accordance with the Design Narrative and the VA’s overall objectives for the facility.  Systems Manual will include sections for each major system included in the commissioning process. | Project Systems Manual |
| Training Plan Review | The Commissioning Agent shall collaborate with the Prime Contractor and installing subcontractors to develop effective contractor and manufacturer training plans and agendas for general conformance with specifications and VA’s requirements. Observe training for quality of training and for general conformance with the training plan and agenda.  The CxA shall observe contractor and vendor training for critical systems. The Contractor shall provide and the CxA shall maintain all attendance records and associated agendas and presentations for all training sessions. Attendance records shall be written original sign in sheets for each training session. | Compiled Training Plan  Individual Training Agendas  Training Attendance Sign In Sheets |
| Systems Training | The Commissioning Agent will conduct training sessions to provide systems-level training for O&M personnel. Training will include:  • Review of system design, capacity, and equipment selection  • Review of system operating sequences  • Review of interconnection with other systems  • Review of Emergency operating procedures  • Review of the Project Systems Manual and its Use  • Student Evaluation forms  The number, duration and scope of the Systems Training sessions shall be determined by the specific requirements of the project.  The training provided by the CxA does not in any way relieve the Contractor from any specified training obligations. | Systems Training Presentations (electronic) |
| Final Commissioning Report | The Commissioning Agent shall compile a comprehensive commissioning report documenting all commissioning activities, including but not limited to the following:  • Executive Summary  • Commissioning Scope of Work  • Test methods and results  • Outstanding commissioning issues  • Comprehensive Commissioning Issues Log, including resolved items and a description of their resolution,  • Commissioning plan,  • Field Observation Reports, Status reports and other field activity documentation,  • Submittal and O&M manual reviews  • Training record  • Completed Pre Functional Checklists  • Completed Functional Performance Test protocols and support documentation  • Other support documentation developed as part of the execution of the project Construction Phase Commissioning Process | Final Commissioning Report |

Commissioning Team Task/Deliverables Description

**Warranty Phase**

| Project Phase/ Cx Task | Commissioning Task Description | Commissioning Deliverables |
| --- | --- | --- |
| Deferred and/or Seasonal Testing | The Commissioning Agent shall witness and document Systems Functional Performance Testing that was deferred to allow systems to be tested in appropriate seasonal conditions. Testing will be conducted in accordance with Systems Functional Performance Test Procedures. Testing support will be required from the installing contractors, EMCS Vendor and VA. Requirement for seasonal testing will be incorporated into the project specifications.  As part of the Seasonal Testing Effort, the Commissioning Agent shall review systems operations with the onsite operations team and reinforce training and best operating practices of the operations team. | Executed Functional Performance Test and Support Documents  Commissioning Issues Log |
| Warranty Period Site Visits | The Commissioning Agent shall make quarterly visits to the project site to reinforce training, evaluate performance of the installed systems and provide technical support to the operating team to sustain commissioned performance of the systems. | Warranty Site Visit Reports |
| Post-Occupancy Inspection | Return to the project approximately 10 months after substantial completion to review the building operation with the facility occupants and O&M staff, and to discuss outstanding issues related to commissioning. Provide suggestions for improvements to systems operation including,  • Measurement & Verification Issues,  • Re-Commissioning Tasks, and  • Improvements in Preventive Maintenance or Operational Strategies  Assist facility staff in developing warranty issues, documents and requests for service to remedy outstanding problems.  As part of the Post Occupancy Inspection, the Commissioning Agent shall analyze the energy consumption records from the project site (both utility and system generated reports) and provide the team with an analysis of actual system energy performance versus predicted performance. To the extent possible, deficiencies in performance shall be analyzed to provide an understanding of the systems, components or operating strategies that may be operating outside predicted parameters. | Post Occupancy Field Visit Report  Commissioning Issues Log  Warranty Issues Report  Systems Energy Review Report |
| Final Commissioning Report Amendment | Amend Final Commissioning Report to document the Warranty Phase commissioning activities. | Final Report Amendment |

Commissioning Team Roles and Responsibilities

**Design Phase**

| Phase | Project Phase/Cx Task  (ref Table above for description**)** | Commissioning Team Member Responsibilities | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| PM | CFM | NCA | A/E Team | Commissioning Agent | |
| Pre-Design | Commissioning Kick Off Meeting | Facilitate the Kick Off Meeting  Participate in Kick Off Meeting  Provide VA Schedule Requirements and Milestones  Review Meeting Minutes & Comment | Identify Cx Team Members  Participate in Kick Off Meeting  Review Meeting Minutes & Comment | Identify Cx Team Members  Participate in Kick Off Meeting  Review Meeting Minutes & Comment | Identify Cx Team Members  Discuss Design Schedule and Critical Milestones  Participate in Kick Off Meeting  Review Meeting Minutes & Comment | Prepare and disseminate Agenda  Lead Kick Off Meeting  Produce Meeting Minutes and Incorporate Comments  Prepare Draft Commissioning Plan | |
|  | | | | | | |
| SD-1 | Design Submission Review | Facilitate delivery of Design Submission Documents to Commissioning Agent  Review Commissioning Agent Issues Log & provide feedback as appropriate  Facilitate resolution of comments by A/E Team | Review Commissioning Agent Issues Log & Provide Feedback as appropriate | Review Commissioning Agent Issues Log & Provide Feedback as appropriate | Deliver Documents to Commissioning Agent for review.  Review Dr. Checks comments.  Review Commissioning Agent Issues Log  Provide Written Responses to Issues | Perform commissioning review and comment on SD1 Design Review submission.  Record review comments on Commissioning Issues Log.  Incorporate review comments into Dr. Checks.  .  Record resolution for each issues based on A/E Response; record in Commissioning Issues Log and on Dr. Check. | |
| SD-1 | Design Narrative | Review Design Narrative & Comment | Review Design Narrative & Comment | Review Design Narrative & Comment | Develop Design Narrative to Include OPR and Basis of Design response to OPR. | Review Design Narrative for compliance with VA Standards and other stated VA Objectives for project.  Provide support for developing measurable performance criteria for installed systems. | |
| SD-1 | Commissioning Plan | Distribute Design Phase Cx Plan  Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Develop & Submit Project Design Phase Commissioning Plan | |
| SD-1 | Duration Schedule for Commissioning Activities | Distribute schedule  Review and comment | Review and comment | Review and comment | Review schedule and incorporate into project design schedule | Prepare Duration Schedule for Design Phase Commissioning Activities | |
| SD-1 | Design Review Meeting | Facilitate Design Review Meeting.  Facilitate Resolution of Cx Issues | Attend Design Review Meeting as req’d by other VA requirements. | Attend Design Review Meeting | Attend Design Review Meeting.  Provide responses to and clarifications of identified Commissioning Issues. | Attend Design Review Meeting. Provide clarification and facilitate resolution to Commissioning Issues Identified | |
|  | | | | | | |
| SD-2 | Design Submission Review | Facilitate delivery of Design Submission Documents to Commissioning Agent  Review Commissioning Agent Issues Log & Provide Feedback as appropriate  Facilitate Resolution of Comments by A/E Team | Review Commissioning Agent Issues Log & Provide Feedback as appropriate | Review Commissioning Agent Issues Log & Provide Feedback as appropriate | Deliver Documents to Commissioning Agent for review.  Review Commissioning Agent Issues Log  Provide Written Responses to Issues | Review and comment on SD2 Design Review Log.  Provide clarifications as required.  Record resolution for each issues based on A/E Response | |
| SD-2 | Design Narrative | Review Design Narrative & Comment | Review Design Narrative & Provide Feedback as appropriate | Review Design Narrative & Provide Feedback as appropriate | Update Design Narrative to Include OPR and Basis of Design response to OPR. | Review Design Narrative for compliance with VA Standards and other stated VA Objectives for project.  Provide support for developing measurable performance criteria for installed systems. | |
| SD-2 | Commissioning Plan | Distribute Updated Design Phase Cx Plan  Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Update & Submit Project Commissioning Plan | |
| SD-2 | Duration Schedule for Commissioning Activities | Distribute schedule  Review and comment | Review and comment | Review and comment | Review schedule and incorporate into project design schedule | Update Duration Schedule for Design Phase Commissioning Activities | |
| SD-2 | Commissioning Specifications | Review specification list and comment | Review specification list and comment | Review specification list and comment | Include list of commissioning specifications in submission to NCA. | Provide list of required commissioning specifications to A/E Team. | |
| SD-2 | Design Review Meeting | Facilitate Design Review Meeting.  Facilitate Resolution of Cx Issues. | Attend Design Review Meeting as required by other NCA requirements.  Participate in Issue Resolution as appropriate. | Attend Design Review Meeting as required by other NCA requirements.  Participate in Issue Resolution as appropriate. | Attend Design Review Meeting.  Provide responses to and clarifications of identified Commissioning Issues. | Attend Design Review Meeting. Provide clarification and facilitate resolution to Commissioning Issues Identified | |
| SD-2 | Design Phase Issue Log Resolution | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Record resolutions to Cx Issues on the Design Phase Commissioning Issues Log. | |
|  | | | | | | | |
| DD-1 | Design Submission Review | Facilitate delivery of Design Submission Documents to Commissioning Agent  Review Commissioning Agent Issues Log & Provide Feedback as appropriate  Facilitate Resolution of Comments by A/E Team | Review Commissioning Agent Issues Log & Provide Feedback as appropriate | Review Commissioning Agent Issues Log & Provide Feedback as appropriate | Deliver Documents to Commissioning Agent for review.  Review Commissioning Agent Issues Log  Provide Written Responses to Issues | Review and comment on DD1 Design Review Log.  Provide clarifications as required.  Record resolution for each issues based on A/E Response | |
| DD-1 | Design Narrative | Review Design Narrative & Comment | Review Design Narrative & Provide Feedback as appropriate | Review Design Narrative & Provide Feedback as appropriate | Update Design Narrative to Include OPR and Basis of Design response to OPR. | Review Design Narrative for compliance with VA Standards and other stated VA Objectives for project.  Provide support for developing measurable performance criteria for installed systems. | |
| DD-1 | Design Phase Controls Meeting | Facilitate and schedule meeting.  Participate in meeting | Attend and participate in meeting | Attend and participate in meeting | Chair meeting  Attend and participate in meeting | Attend and participate in meeting | |
| DD-1 | Commissioning Plan | Distribute Updated Design Phase Cx Plan  Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Update & Project Commissioning Plan | |
| DD-1 | Duration Schedule for Commissioning Activities | Distribute schedule  Review and comment | Review and comment | Review and comment | Review schedule and incorporate into project design schedule | Update Duration Schedule for Design Phase Commissioning Activities  Prepare draft duration schedule for Construction Phase Commissioning Activities | |
| DD-1 | Commissioning Specification | Review Cx Draft Specs & Comment | Review Cx Draft Specs & Comment | Review Cx Draft Specs & Comment | Incorporate Draft Cx Specifications into Project Specification Submittal.  Review Cx Draft Specs & Comment | Develop Draft Cx Specifications & Cx Coordination Matrix. Deliver to A/E Team for incorporation into Specification Submittal. | |
| DD-1 | Design Review Meeting | Facilitate Design Review Meeting.  Facilitate Resolution of Cx Issues. | Attend Design Review Meeting as required by other NCA requirements.  Participate in Issue Resolution as appropriate. | Attend Design Review Meeting as required by other NCA requirements.  Participate in Issue Resolution as appropriate. | Attend Design Review Meeting.  Provide responses to and clarifications of identified Commissioning Issues. | Attend Design Review Meeting. Provide clarification and facilitate resolution to Commissioning Issues Identified | |
| DD-1 | Design Phase Issue Log Resolution | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Record resolutions to Cx Issues on the Design Phase Commissioning Issues Log. | |
|  | | | | | | | |
| DD-2 | Design Submission Review | Facilitate delivery of Design Submission Documents to Commissioning Agent  Review Commissioning Agent Issues Log & Provide Feedback as appropriate  Facilitate Resolution of Comments by A/E Team | Review Commissioning Agent Issues Log & Provide Feedback as appropriate | Review Commissioning Agent Issues Log & Provide Feedback as appropriate | Deliver Documents to Commissioning Agent for review.  Review Commissioning Agent Issues Log  Provide Written Responses to Issues | Review and comment on DD2 Design Review Log.  Provide clarifications as required.  Record resolution for each issues based on A/E Response | |
| DD-2 | Design Narrative | Review Design Narrative & Comment | Review Design Narrative & Provide Feedback as appropriate | Review Design Narrative & Provide Feedback as appropriate | Review Updated Design Narrative to Include OPR and Basis of Design response to OPR. | Commissioning Agent to update, review and reconcile the Project Design Narrative. The Design Narrative should reflect the evolution of the project design and note all significant deviations from prior version for ease of review and reconciliation.  Design Narrative should describe designer’s response to the project requirements.  Where appropriate, provide documentation of approval of deviations from VA Design Criteria and reasoning for same.  Provide support for developing measurable performance criteria for installed systems. | |
| DD-2 | Preliminary Pre-Functional Checklists and Preliminary System Functional Performance Test Procedures | Distribute to Cx Team.  Review and comment | None | Review and Comment | Review and Comment | Prepare Preliminary PFC and FPT.  Incorporate review comments into the Draft PFCs and FPTs as appropriate. | |
| DD-2 | Design Phase Controls Meeting | Facilitate and schedule meeting.  Participate in meeting | Attend and participate in meeting | Attend and participate in meeting | Chair meeting  Attend and participated in meeting | Attend and participate in meeting | |
| DD-2 | Commissioning Plan | Distribute Updated Design Phase Cx Plan  Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Update & Submit Project Commissioning Plan | |
| DD-2 | Commissioning Specification | Review Cx Preliminary Specs & Comment | Review Cx Draft Preliminary & Comment | Review Cx Draft Preliminary & Comment | Incorporate Preliminary Cx Specifications into Project Specification Submittal.  Review Cx Draft Specs & Comment | Develop Preliminary Cx Specifications & Cx Coordination Matrix. Deliver to A/E Team for incorporation into Specification Submittal. | |
| DD-2 | Duration Schedule for Commissioning Activities | Distribute schedule  Review and comment | Review and comment | Review and comment | Review schedule and incorporate into project design schedule | Update Duration Schedule for Design Phase Commissioning Activities  Update draft duration schedule for Construction Phase Commissioning Activities | |
| DD-2 | Design Review Meeting | Facilitate Design Review Meeting.  Facilitate Resolution of Cx Issues. | Attend Design Review Meeting as required by other VA requirements.  Participate in Issue Resolution as appropriate. | Attend Design Review Meeting as required by other VA requirements.  Participate in Issue Resolution as appropriate. | Attend Design Review Meeting.  Provide responses to and clarifications of identified Commissioning Issues. | Attend Design Review Meeting. Provide clarification and facilitate resolution to Commissioning Issues Identified | |
| DD-2 | Design Phase Issue Log Resolution | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Record resolutions to Cx Issues on the Design Phase Commissioning Issues Log. | |
|  | | | | | | | |
| CD-1 | Design Submission Review | Facilitate delivery of Design Submission Documents to Commissioning Agent  Review Commissioning Agent Issues Log & Provide Feedback as appropriate  Facilitate Resolution of Comments by A/E Team | Review Commissioning Agent Issues Log & Provide Feedback as appropriate | Review Commissioning Agent Issues Log & Provide Feedback as appropriate | Deliver Documents to Commissioning Agent for review.  Review Commissioning Agent Issues Log  Provide Written Responses to Issues | Review and comment on CD1 Design Review Log.  Provide clarifications as required.  Record resolution for each issues based on A/E Response | |
| CD-1 | Design Narrative | Review Design Narrative & Comment | Review Design Narrative & Provide Feedback as appropriate | Review Design Narrative & Provide Feedback as appropriate | Review Design Narrative for conformance with current project status. Verify recorded decisions are consistent with Design Team intent and contracts with the VA. | Commissioning Agent to update, review and reconcile the Project Design Narrative. The Design Narrative should reflect the evolution of the project design and note all significant deviations from prior version for ease of review and reconciliation.  Design Narrative should describe designer’s response to the project requirements.  Where appropriate, provide documentation of approval of deviations from VA Design Criteria and reasoning for same. | |
| CD-1 | Draft Pre-Functional Checklists and Functional Performance Test procedures | Distribute to team  Review and comment | None | Review and Comment | Review and comment | Starting from the Preliminary PFCs and FPTs and review comments, develop Draft PFCx and FPTs.  Incorporate into the Construction Phase Commissioning Plan and Commissioning Specifications. | |
| CD-1 | Design Phase Controls Meeting | Facilitate and schedule meeting.  Participate in meeting | Attend and participate in meeting | Attend and participate in meeting | Chair meeting  Attend and participated in meeting | Attend and participate in meeting | |
| CD-1 | Commissioning Plan | Distribute Updated Design Phase Cx Plan  Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Update & Submit Project Commissioning Plan | |
| CD-1 | Duration Schedule for Commissioning Activities | Distribute schedule  Review and comment | Review and comment | Review and comment | Review schedule and incorporate into project design schedule | Update Duration Schedule for Design Phase Commissioning Activities  Update draft duration schedule for Construction Phase Commissioning Activities | |
| CD-1 | Commissioning Specification | Review Cx Final Specs & Comment | Review Cx Final Specs & Comment | Review Cx Final Specs & Comment | Incorporate Final Cx Specifications into Project Specification Submittal.  Review Cx Final Specs & Comment | Develop Final Cx Specifications & Cx Coordination Matrix. Deliver to A/E Team for incorporation into Specification Submittal. | |
| CD-1 | Design Review Meeting | Facilitate Design Review Meeting.  Facilitate Resolution of Cx Issues. | Attend Design Review Meeting as required by other VA requirements.  Participate in Issue Resolution as appropriate. | Attend Design Review Meeting as required by other VA requirements.  Participate in Issue Resolution as appropriate. | Attend Design Review Meeting.  Provide responses to and clarifications of identified Commissioning Issues. | Attend Design Review Meeting. Provide clarification and facilitate resolution to Commissioning Issues Identified | |
| CD-1 | Design Phase Issue Log Resolution | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Review & Comment on Revised Design Phase Commissioning Issues Log | Record resolutions to Cx Issues on the Design Phase Commissioning Issues Log. | |
|  | | | | | | | |
| Final | Design Final Design Submission Review | Facilitate delivery of Design Submission Documents to Commissioning Agent  Facilitate Resolution of Comments by A/E Team | None | None | Deliver Documents to Commissioning Agent for review.  Review Commissioning Agent Issues Log  Provide Written Responses to all Outstanding Issues | Review Final Design Submission for resolution of Outstanding Commissioning Issues | |
| Final | Design Narrative | Review & Approve Final Design Narrative | None | None | Review Design Narrative for conformance with current project status. Verify recorded decisions are consistent with Design Team intent and contracts with the VA. | Commissioning Agent to provide Final Project Design Narrative. The Design Narrative should reflect the evolution of the project design and note all significant deviations from prior version for ease of review and reconciliation.  Design Narrative should describe designer’s response to the project requirements.  Where appropriate, provide documentation of approval of deviations from VA Design Criteria and reasoning for same. | |
| Final | Commissioning Plan | Distribute Updated Design Phase Cx Plan  Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment | Update & Submit Project Commissioning Plan | |
| Final | Draft Pre-Functional Checklists and Functional Performance Test procedures | Distribute  Review and back-check | None | Review and back-check | Review and back-check | Incorporate back-check comments into the Draft PFCs and FPTs; incorporate into the Commissioning Plan and Final Commissioning Specifications. | |
| Final | Duration Schedule for Commissioning Activities | Distribute schedule  Review and comment | Review and comment | Review and comment | Review schedule and incorporate into project design schedule | Update Duration Schedule for Design Phase Commissioning Activities  Update draft duration schedule for Construction Phase Commissioning Activities | |
| Final | Commissioning Specification | Review Cx Updated Specs & Approve | Review Cx Updated Specs & Comment | Review Cx Updated Specs & Comment | Incorporate Updated Cx Specifications into Project Specification Submittal. | Provide updated Final Cx Specifications & Cx Coordination Matrix. Deliver to A/E Team for incorporation into Specification Submittal. | |
| Final | Design Phase Issue Log Resolution | Review & Comment on Revised Design Phase Commissioning Issues Log | None | N one | None | Record resolutions to Cx Issues on the Design Phase Commissioning Issues Log. | |
| Final | Design Phase Commissioning Report | Review, comment and approve | Review and Comment | Review and Comment | Review and Comment | Prepare and submit Design Phase Commissioning Report. | |

Commissioning Team Roles and Responsibilities

**Bid and Pre-Construction Phase**

| Phase | Project Phase/Cx Task  (ref Table above for description**)** | Commissioning Team Member Responsibilities | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| PM/RE | CFM | NCA | A/E Team | Commissioning Agent |
| Pre-Bid | Pre Bid Meeting | Organize, schedule and conduct meeting | None | Attend meeting, respond to questions | Attend meeting, respond to questions | Attend meeting, respond to questions |
| Pre-Const. | Pre-Construction Meeting | Organize, schedule and conduct meeting | None | Attend meeting, respond to questions | Attend meeting, respond to questions | Attend meeting, respond to questions |

Commissioning Team Roles and Responsibilities

**Construction Phase**

| Project Phase/  Cx Task | Commissioning Team Member Responsibilities | | | | |
| --- | --- | --- | --- | --- | --- |
| RE | Commissioning Agent | NCA | A/E Team | Contractor |
| Commissioning Kick Off Meeting | Facilitate the Kick Off Meeting  Provide VA Schedule Requirements and Milestones  Review Meeting Minutes & Comment | Prepare and disseminate Agenda  Lead Kick Off Meeting  Produce Meeting Minutes and Incorporate Comments | Identify Cx Team Members  Review Meeting Minutes & Comment | Identify Cx Team Members  Review Meeting Minutes & Comment | Identify Cx Team Members (including SC, TAB, DDCC, SpC)  Review Meeting Minutes & Comment |
| Duration Schedule for Commissioning Activities | Review Commissioning Agent Duration Schedule and Comment as Appropriate | Refine Commissioning Duration Schedule provided with the specification to include Commissioning Activities, Estimated Duration for each Activity and Conditions Required for Activity Execution | Review Commissioning Agent Duration Schedule and Comment as Appropriate  Schedule NCA Personnel to support Commissioning Process as appropriate | Review Commissioning Agent Duration Schedule and Comment as Appropriate | Review Commissioning Agent Duration Schedule and Comment as Appropriate  Incorporate Commissioning Activities into Project CPM Schedule.  Confirm with Commissioning Agent |
| Submittal & Shop Drawing Review | Facilitate Delivery of Shop Drawings to Commissioning Agent  Review and approve submittals and shop drawings after review by A/E and Commissioning Agent | Provide a list of Required Shop Drawings to CM/GC  Review required Shop Drawings in parallel with A/E Team.  Deliver Comments to A/E Team as part of Submittal Review Process | None | Review Commissioning Agent Comments  Incorporate into A/E Comments as Appropriate  Communicate with Commissioning Agent where Cx comments are deemed inappropriate. | Deliver appropriate Shop Drawings to Commissioning Agent when provided to A/E Team.  Submittal deliverable must be in contract  -Agent address /Section 01340  -in specs? |
| Review RFI’S ASI’S and other Contract Documents | Distribute to CxA | Review documents to identify impacts on Commissioning Process. Review to identify any conflicts with the project OPR. | None | In addition to other contract responsibilities, review and respond to CxA comments. | In addition to other contract responsibilities, review and respond to CxA comments. |
| Project Commissioning Plan | Distribute Design Phase Cx Plan  Review Cx Plan & Comment/Approve | Update Project Commissioning Plan to include specific individuals and team members.  Update as required for changes in project schedule or work scope as appropriate. | Review Cx Plan & Comment | Review Cx Plan & Comment | Review Cx Plan & Comment  Support Construction Team adherence to Cx Plan |
| Site Observations | Review Site Visit Reports and Commissioning Issues Logs and Comment as appropriate.  Forward Site Visits Report to Contractor and A/E  Facilitate resolution of Commissioning Issues Log Items as expeditiously as possible. | Visit the Project Site on a regular scheduled basis as agreed upon with the RE.  Submit Site Visit Report to RE.  Update and deliver Commissioning Issues Log | Review Site Visit Report & Comment as Appropriate | Review Site Visit Report & Comment as Appropriate  Assist the Commissioning Agent in resolving all Design related Commissioning Issues. | Forward Site Visit Report to all Subcontractors, Commissioning Representatives and other appropriate construction team personnel.  Review Site Visit Report & Comment as Appropriate  Assist the Commissioning Agent in resolving all commissioning Issues. |
| Commissioning Team Meetings | Review Meeting Minutes & Comment | Prepare and disseminate Agenda for regular periodic Cx Team Meetings  Lead Cx Team Meetings  Produce Meeting Minutes and Incorporate Comments | NCA Cx Team Members Attend  Review Meeting Minutes & Comment | A/E Cx Team Members Attend  Review Meeting Minutes & Comment | Cx Team Members (including SC, TAB, DDC, SpC) Attend  Review Meeting Minutes & Comment |
| Develop Pre Functional Checklists (PFC’s) | Review & Comment as appropriate | Develop Pre Functional Checklists. (PFC’s)  Provide to Contractor for comment.  Disseminate final PFC’s for use by Construction Team. | Review & Comment as appropriate | Review & Comment as appropriate | Review & Comment – All Cx Team Members.  Incorporate PFC requirements into start up schedules and processes. |
| Develop Functional Performance Test (FPT’s) Procedures | Review & Comment as appropriate | Develop Functional Performance Tests (FPT’s).  Provide to Contractor team for comment.  Disseminate final FPT’s for use by Construction Team. | Review & Comment as appropriate | Review & Comment as appropriate | Review & Comment – All Cx Team Members.  Incorporate FPT requirements into project and personnel schedules. |
| Review Contractor Equipment Startup Checklists, TAB Reports and PFC’s | Review & Comment as appropriate | Review & Comment on result s of Start Up testing, TAB results and PFC documentation.  Field Verify a sampling of PFC’s to confirm compliance with PFC requirements. Evaluate readiness for Functional Performance Testing | Review & Comment as appropriate | Review & Comment as appropriate | Provide Factory and Contractor Start Up documentation in accordance with Specifications and PFC’s to PM/RE, Commissioning Agent and A/E Team for review & comment.  Correct any deficiencies or deviations noted on the Commissioning Issues Log and report corrective action. |
| Review Operations & Maintenance Manuals | Review & Comment on Operations and Maintenance Manuals. | Review & Comment on Operations and Maintenance Manuals.  Incorporate into Systems Training as appropriate. | Review & Comment on Operations and Maintenance Manuals. | Review & Comment on Operations and Maintenance Manuals. | Complete & Submit Operations and Maintenance Manuals prior to equipment start up and execution of Pre Functional Checklists.  Correct issues identified with O&M Manuals identified on the Commissioning Issues Log. |

Commissioning Team Roles and Responsibilities

**Acceptance and Testing Phase**

| Project Phase/  Cx Task | Commissioning Team Member Responsibilities | | | | |
| --- | --- | --- | --- | --- | --- |
| RE | Commissioning Agent | NCA | A/E Team | Contractor |
| Systems Functional Performance Testing | Facilitate execution of the Functional Performance Testing as required.  Review Commissioning Agent Issues Log & Provide Feedback as appropriate  Facilitate Resolution of Commissioning Issues Log and reporting requirements between the Commissioning Agent and the Construction team. | In collaboration with the Contractor Commissioning Team, direct the execution of the Functional Performance Testing.  Identify issues and deficiencies in system operation and performance on the Commissioning Issues Log.  Retest systems as appropriate to demonstrate compliance with the Contract Documents and the Commissioning Plan. | Participate with the Commissioning Agent as agreed upon to support the commissioning process and facilitate training of the Operations Team.  Review & Comment on Commissioning Issues Log as appropriate. | Review & Comment on the Commissioning Issues Log as appropriate. | Provide Qualified Technicians and Professionals to operate the installed systems and components as required by the Functional Performance Testing and any retesting required by the Commissioning Agent.  Provide documentation of test results from installed systems as required by the FPT’s.  Correct issues and deficiencies identified on the Commissioning Issues Log and report methods and results of corrective actions to the Commissioning Agent. |
| Prepare Systems Manuals | Review Systems Manual & Approve | Utilizing the accumulated information and data, prepare a Systems Manual for the Operations Team.  Review submitted data and note any issues or deficiencies on the Commissioning Issues Log.  Deliver Systems Manual to the Cx Team for Review and Comment. | Review Systems Manual & Comment | Provide systems diagrams and other appropriate data to the Commissioning Agent in electronic format for development of Systems Manual.  Review Systems Manual & Comment | Provide data, including record drawings and submittal data for all commissioned systems.  Correct any deficiencies and issues identified with the submitted data.  Review Systems Manual & Comment |
| Training Plan Review | Facilitate Development of Training Agendas and Training Schedules.  Review Training Plan & Comment | Facilitate development of Training Agendas.  Collaborate with CM/GC/SC and NCA teams to schedule training activities.  Review and Approve all CM/GC/SC training agendas. Note any issues or deficiencies in Agendas on the Commissioning Issues Log. | Review Training Plan & Comment  Schedule Appropriate Operations Personnel in accordance with the training schedule. | Review Training Plan & Comment | Develop training agendas in accordance with Project Specifications and submit to Commissioning Agent for review.  Coordinate training schedule with Commissioning Agent and other Cx Team members.  Schedule and execute training in accordance with training schedule and agendas. |
| Systems Training | Review & Approve Systems Training Agenda  Facilitate Systems Training in accordance with the Agenda and Schedule | Develop Systems Training Sessions in accordance with the Commissioning Plan. Sessions shall include the use of the Operations and Maintenance Manual and a ‘Systems Manual’ developed for the NCA operations Team.  Deliver Systems Training in accordance with the approved Systems Training Agenda. | Schedule key O&M Personnel to attend Systems Training Sessions. | Review & Comment on Systems Training Agenda. | Review & Comment on Systems Training Agenda. |
| Final Commissioning Report | Review & Approve Final Commissioning Plan. | Create and submit Final Commissioning Report in accordance with the Commissioning Plan and other contract requirements. | Review & Comment on Final Commissioning Plan | Review & Comment on Final Commissioning Report | None |
| Lessons Learned Review Meeting | Facilitate Lessons Learned Meeting  Review & Comment on Meeting Minutes | Distribute the Agenda for the Lessons Learned Meeting.  Lead the Lessons Learned Meeting.  Complete and distribute Meeting Minutes. Incorporate comments as appropriate. | Attend & Contribute to Meeting.  Review & Comment on Meeting Minutes | Attend & Contribute to Meeting.  Review & Comment on Meeting Minutes | Attend & Contribute to Meeting.  Review & Comment on Meeting Minutes |

Commissioning Team Roles and Responsibilities

**Warranty Phase**

| Project Phase/  Cx Task | Commissioning Team Member Responsibilities | | | | |
| --- | --- | --- | --- | --- | --- |
| RE | Commissioning Agent | NCA | A/E Team | Contractor |
| Deferred and/or Seasonal Testing | Facilitate Seasonal Testing with all appropriate parties.  Review Commissioning Agent Issues Log & facilitate issues resolution.  Facilitate Resolution of identified Commissioning Issues. | Schedule & Execute Seasonal Testing in Accordance with Functional Performance Testing Protocols.  Maintain & Distribute Warranty Phase Commissioning Issues Logs.  Facilitate and record resolution to identified Issues and Deficiencies recorded on Commissioning Issues Log. | Provide O&M Personnel to support seasonal testing in accordance with the Commissioning Plan.  Review Commissioning Agent Issues Log & Comment  Operations Team will operate systems under the deferred season testing protocols. | Review & Comment on Seasonal Testing.  Provide and report resolution of any issue identified as a Design Issue. | Contractor will be invited to participate in the execution of seasonal testing and assist in resolution of issues and deficiencies identified.  Record resolution for each issues based on A/E Response |
| Post-Occupancy Warranty Checkup | Facilitate Post Occupancy Warranty Check Up Meetings.  Review and approve Final Commissioning Report Amendment. | Meet with the NCA Operations Team. Interview team members to evaluate system performance and identify any issues with operation of the commissioned systems.  Evaluate system performance through a review of operating performance data and warranty phase (re-commissioning) tests as identified in the Commissioning Plan and Systems Manual.  Develop a Warranty Report identifying any outstanding warranty issues for VAMC use in resolving warranty issues on the project. | Provide O&M personnel to participate with the Commissioning Agent in the Post Occupancy Warranty Checkup.  Identify any outstanding or persistent warranty issues to the Commissioning Agent. | A/E Team will be invited to participate at their discretion.  Review & Comment on Seasonal Testing.  Provide and report resolution of any issue identified as a Design Issue. | Contractor will be invited to participate at his discretion. Assist in resolution of issues and deficiencies identified. Assist in facilitating execution of all warranty obligations identified. |
| Final Commissioning Report Amendment | Review & Approve Final Commissioning Report Amendment. | Create and submit Final Commissioning Report Amendment in accordance with the Commissioning Plan and other contract requirements. | Review & Comment on Final Commissioning Report Amendment | Review & Comment on Final Commissioning Report | None |