

# ***Commissioning Services for Renovate Research North***

***Project Number: 541-13-104***

02/12/2016

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### **1.0 SCOPE OF WORK**

1. The Commissioning Agent (CxA) shall perform all Design Phase, Pre-Bid Phase, Construction Phase, Acceptance Phase and Warranty Phase commissioning services as an independent Commissioning Agent of the Veterans Affairs, for VA Project No. 541-13-104, “Renovate Research North” at the Wade Park Campus of the Louis Stokes Cleveland VAMC, Cleveland, Ohio.
2. The CxA shall perform these services in FULL ACCORDANCE WITH the Department of Veterans Affairs “Whole Building Commissioning Process Manual” and TIL - Master Construction Specifications (PG-18-1), Section 01 91 00 – General Commissioning Requirements. Commissioning Services may include, (but may not be limited to) the services outlined below. Refer to the “Whole Building Commissioning Process Manual” for a complete description of the Commissioning Services to be provided. The manual is available at: <http://www.cfm.va.gov/til/Cx-RCx/CxManual.PDF>
3. The major scope items for this design-bid-build construction project includes:

<b>Systems To Be Commissioned</b>	
<b>System</b>	<b>Description</b>
<b>Specialties</b>	
Laboratory Medical Gases	Medical gas certification and cross check, electrical connections
<b>Equipment</b>	
Laboratory Fume Hoods	Fume Hood Certification
Biological Safety Cabinets	Cabinet Certification
<b>Fire Suppression</b>	
Fire Sprinkler Systems	Wet pipe system, dry pipe system, pre-action system, special agent systems
<b>Plumbing</b>	
Domestic Water Distribution	Booster pumps, backflow preventers, water softeners, potable water storage tanks

<b>Systems To Be Commissioned</b>	
<b>System</b>	<b>Description</b>
Domestic Hot Water Systems	Water heaters**, heat exchangers, circulation pumps, point-of-use water heaters*
General Service Air Systems	Packaged compressor systems, air dryers, filtration
Medical Air Systems	Packaged medical air compressor units. Outlet certification, cross-connection verification
Medical Vacuum Systems	Packaged medical vacuum units, outlet certification, cross-connection verification
Acid Waste Systems	Package Acid Waste Systems
Water Deionizing Systems	Package Water Deionizing Systems
Medical Gas Systems (other than Medical Air Systems)	Medical gas (oxygen, nitrogen, nitrous oxide, etc.) tank/manifold systems, outlet certification, cross-connection verification
<b>HVAC</b>	
Noise and Vibration Control	[Noise and vibration levels for critical equipment such as Air Handlers, Chillers, Cooling Towers, 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 (centrifugal, rotary screw, air-cooled), pumps (primary, secondary, variable primary), VFDs associated with chilled water system components, DDC Control Panels (including integration with Building Control System)
Condenser Water System**	Cooling Towers, Fluid Coolers, heat exchangers/economizers, pumps, VFDs associated with condenser water system components, DDC control panels.
Steam/Heating Hot Water System**	Boilers, boiler feed water system, economizers/heat recovery equipment, condensate recovery, water treatment, boiler fuel system, controls, interface with facility DDC 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
Humidity Control Systems	Humidifiers, de-humidifiers, controls, interface with facility DDC
Hydronic Distribution Systems	Pumps, DDC control panels, heat exchangers,

Systems To Be Commissioned	
System	Description
<b>Electrical</b>	
Medium-Voltage Electrical Distribution Systems	Medium-Voltage Switchgear, Medium-Voltage Switches, Underground ductbank and distribution, Pad-Mount Transformers, Medium-Voltage Load Interrupter Switches,
Grounding & Bonding Systems	Witness 3 <sup>rd</sup> 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
Secondary Unit Substations	Medium-voltage components, transformers, low-voltage distribution, verify breaker testing results (injection current, etc)
Low-Voltage Distribution System	Normal 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)
Lighting & Lighting Control** Systems	Emergency lighting, occupancy sensors, lighting control systems, architectural dimming systems, theatrical dimming systems, exterior lighting and controls
Cathodic Protection Systems	Review 3 <sup>rd</sup> party testing results.
Lightning Protection System	Witness 3 <sup>rd</sup> party testing, review reports
<b>Communications</b>	
Grounding & Bonding System	Witness 3 <sup>rd</sup> party testing, review reports
Structured Cabling System	Witness 3 <sup>rd</sup> party testing, review reports
Public Address & Mass Notification Systems	Witness 3 <sup>rd</sup> party testing, review reports
Intercom & Program Systems	Witness 3 <sup>rd</sup> party testing, review reports
Nurse Call & Code Blue Systems	Witness 3 <sup>rd</sup> party testing, review reports
Security Emergency Call Systems	Witness 3 <sup>rd</sup> party testing, review reports
Duress Alarm Systems	Witness 3 <sup>rd</sup> party testing, review reports
<b>Electronic Safety and Security</b>	
Grounding & Bonding	Witness 3 <sup>rd</sup> party testing, review reports
Physical Access Control Systems	Witness 3 <sup>rd</sup> party testing, review reports
Access Control Systems	Witness 3 <sup>rd</sup> party testing, review reports
Security Access Detection Systems	Witness 3 <sup>rd</sup> party testing, review reports

Systems To Be Commissioned	
System	Description
Video Surveillance System	Witness 3 <sup>rd</sup> party testing, review reports
Electronic Personal Protection System	Witness 3 <sup>rd</sup> 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.
<b>Integrated Systems Tests</b>	
Loss of Power Response	Loss of power to building, loss of power to campus, restoration of power to building, restoration of power to campus.
Fire Alarm Response	Integrated System Response to Fire Alarm Condition and Return to Normal
<b>Table Notes</b>	
** Denotes systems that LEED requires to be commissioned to comply with the Fundamental Commissioning pre-requisite.	

## 2.0 GENERAL

1. Commissioning is a systematic process of verifying that the building systems perform interactively according to the construction documents and the VA's operational needs. The commissioning process shall encompass and coordinate the system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction, and post-occupancy phases is intended to achieve the following specific objectives according to the contract documents:
  - a. Verify that the applicable equipment and systems are installed in accordance with the contract documents and according to the manufacturer's recommendations.
  - b. Verify and document proper integrated performance of equipment and systems.
  - c. Verify that Operations & Maintenance documentation is complete.
  - d. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
  - e. Verify that the VA's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
  - f. Document the successful achievement of the commissioning objectives listed above.
2. The commissioning process does not take away from or reduce the responsibility of the Design A/E, or construction Contractor(s) to provide a finished and fully functioning product.

### 3. COMMISSIONING AGENT'S RESPONSIBILITIES

<b>Commissioning Agent Task/Deliverables Description</b>		
<b>Design Phase</b>		
<b>Project Phase/ Cx Task</b>	<b>Commissioning Task Description</b>	<b>Commissioning Deliverables</b>
<b>65% Submission (DD2)</b>		
Design Submission Review	<p>Complete a thorough commissioning review of the submittal documents and submitted criteria to establish the systems to be designed and installed in compliance with the OPR.</p> <p>Documents provided to the Commissioning Agent should include: Design Narrative, calculations, equipment schedules, system and control schematic diagrams and appropriate schematics and other submittal documents required by PG 18-15, as well as other pertinent documents.</p>	<p>Design Phase Commissioning Issues Log</p> <p>(Incorporate review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report)</p>
Design Narrative	<p>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.</p> <p>Submit the Design Narrative to the AE team for review and comment. Incorporate review comments into the Design Narrative as necessary.</p>	Design Phase Commissioning Issues Log
Commissioning Plan	<p>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.</p> <p>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.</p> <p>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</p>	Updated Project Design Phase Commissioning Plan

Commissioning Agent Task/Deliverables Description Design Phase		
Project Phase/ Cx Task	Commissioning Task Description	Commissioning Deliverables
Commissioning Specifications	<p>Provide Preliminary Commissioning Specifications Sections utilizing the VA Master Construction Specification. Specifications shall be submitted in accordance with the requirements of PG 18-15.</p> <p>Review individual equipment and technical sections to ensure commissioning-related language has been included as provided in the Commissioning Specification Coordination Matrix.</p>	<p>Preliminary Commissioning Specifications</p> <p>Marked up equipment and technical specification sections showing any revisions to commissioning-related language.</p> <p>Specification Coordination Matrix for Commissioning Agent/A/E coordination.</p>
Duration Schedule for Commissioning Activities	<p>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.</p> <p>Based on the Project Construction Phase Commissioning Plan and the 65% 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.</p>	<p>Design Phase Commissioning Duration Schedule – Incorporate into Design Phase Commissioning Plan</p> <p>Construction Phase Commissioning Duration Schedule – Incorporate into Construction Phase Commissioning Plan</p>
Develop Preliminary Pre-Functional Checklists (PFC's)	<p>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.</p> <p>Preliminary Pre-Functional Checklists shall be included in the Construction Phase Commissioning Plan and the Commissioning Specifications.</p>	Preliminary Pre Functional Checklists (PFC's)

<b>Commissioning Agent Task/Deliverables Description</b> <b>Design Phase</b>		
<b>Project Phase/ Cx Task</b>	<b>Commissioning Task Description</b>	<b>Commissioning Deliverables</b>
Develop Preliminary Systems Functional Performance Test (FPT's) Procedures	Based on the systems to be commissioned and the systems shown in the 65% 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 VAMC to update HVAC and other system control strategies, sequences of operation, trending, and alarms.  The Commissioning Agent acts as an advocate for the VAMC 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 65% 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)

Commissioning Agent Task/Deliverables Description		
Design Phase		
Project Phase/ Cx Task	Commissioning Task Description	Commissioning Deliverables
<b>90% Submission (CD1)</b>		
Design Submission Review	Complete a thorough commissioning review of the 90% 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, 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.	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



<b>Commissioning Agent Task/Deliverables Description</b> <b>Design Phase</b>		
<b>Project Phase/ Cx Task</b>	<b>Commissioning Task Description</b>	<b>Commissioning Deliverables</b>
Duration Schedule for Commissioning Activities	<p>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.</p> <p>Based on the Project Construction Phase Commissioning Plan and the 90% 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.</p>	<p>Design Phase Commissioning Duration Schedule – Incorporate into Design Phase Commissioning Plan</p> <p>Update Construction Phase Duration Schedule – Incorporate into Construction Phase Commissioning Plan</p>
Commissioning Specifications	<p>Provide Final Commissioning Specifications Sections utilizing the VA Master Construction Specification. Specifications shall be submitted in accordance with the requirements of PG 18-15.</p> <p>Review individual equipment and technical sections to ensure commissioning-related language has been included as provided in the Commissioning Specification Coordination Matrix.</p>	<p>Final Project Commissioning Specifications</p> <p>Marked up equipment and technical specification sections to identify any changes to commissioning-related language.</p>
Develop Draft Pre-Functional Checklists (PFC's)	<p>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.</p> <p>Draft Pre-Functional Checklists shall be included in the Construction Phase Commissioning Plan and the Commissioning Specifications.</p>	Draft Pre Functional Checklists (PFC's)
Develop Preliminary Systems Functional Performance Test (FPT's) Procedures	<p>Based on the systems to be commissioned and the systems shown in the 90% submittal, the Commissioning Agent will update the Preliminary Systems Functional Performance Test Procedures (FPT's) to become Draft Systems Functional Performance Test Procedures. .</p> <p>Draft FPTs shall be included in the Construction Phase Commissioning Plan and the Commissioning Specifications.</p>	Draft Systems Functional Performance Test Procedures (FPT's)

Commissioning Agent Task/Deliverables Description		
Design Phase		
Project Phase/ Cx Task	Commissioning Task Description	Commissioning Deliverables
Design Phase Controls Meeting	<p>Meet with the Design Team and VAMC to update HVAC and other system control strategies, sequences of operation, trending, and alarms.</p> <p>The Commissioning Agent acts as an advocate for the VAMC 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.</p>	Meeting Notes
Design Review Meeting	<p>Attend and participate in 90% 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.</p>	<p>Revised Design Phase Commissioning Issue Log.</p> <p>(Incorporate review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report)</p> <p>(Note that resolution of some issues may be deferred to later design stages.)</p>
Design Phase Issue Log Resolution	Update the Commissioning Issues Log by recording resolutions to identified Commissioning Issues.	Revised Design Phase Commissioning Issue Log
<b>100% Submission (FINAL)</b>		
Design Final Design Submission Review	Review 100% Design Submission for resolution of Outstanding Commissioning Issues	<p>Design Phase Commissioning Issues Log</p> <p>(Incorporate review comments into Dr. Checks for Project Tracking – Retain for Design Phase Cx Report)</p>
Design Narrative	<p>Commissioning Agent to provide a Final Design Narrative to Include all modifications and/or deviations from 90% 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.</p>	Revised Design Narrative

Commissioning Agent Task/Deliverables Description Design Phase		
Project Phase/ Cx Task	Commissioning Task Description	Commissioning Deliverables
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.	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

<b>Commissioning Team Task/Deliverables Description</b> <b>Construction Phase</b>		
<b>Project Phase/ Cx Task</b>	<b>Commissioning Task Description</b>	<b>Commissioning Deliverables</b>
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, VA 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.)

Commissioning Team Task/Deliverables Description Construction Phase		
Project Phase/ Cx Task	Commissioning Task Description	Commissioning Deliverables
Submittal & Shop Drawing Review	<p>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 &amp; Shop drawings shall be reviewed for commissionability, maintainability and for compliance to the Construction Documents.</p> <p>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.</p> <p>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.</p> <p><b>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.</b></p>	<p>Shop Drawing Cx Review List</p> <p>Shop Drawing Review Comments</p>
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 Team Task/Deliverables Description Construction Phase		
Project Phase/ Cx Task	Commissioning Task Description	Commissioning Deliverables
Commissioning Construction Observations	<p>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.</p> <p>In addition, site observations visits will be scheduled to include</p> <ul style="list-style-type: none"> <li>• Witnessing factory testing and/or contractor equipment/system start up activities;</li> <li>• Verification of Completed Pre Functional Checklists</li> <li>• Verification that the Contractor and his subcontractors are completing and documenting Pre-Test procedures required by the specifications.</li> <li>• Clarification and technical support for understanding and resolving Commissioning Issues.</li> </ul>	<p>Site Observation Reports</p> <p>Updated Commissioning Issues Log</p>
Commissioning Team Meetings	<p>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.</p> <p>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 VA-RE.</p> <p>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.</p>	<p>Commissioning Meeting Agenda and Minutes</p> <p>Updated Commissioning Issues Log</p>

<b>Commissioning Team Task/Deliverables Description</b> <b>Construction Phase</b>		
<b>Project Phase/ Cx Task</b>	<b>Commissioning Task Description</b>	<b>Commissioning Deliverables</b>
Develop Final Pre-Functional Checklists (PFC's)	<p>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.</p> <p>An executed PFC submitted by the Prime Contractor indicates the system and its related equipment is ready for Systems Functional Performance Testing.</p> <p>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.</p>	Pre Functional Checklists (PFC's)
Final Systems Functional Performance Test (FPT's) Procedures	<p>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.</p> <p>Completed Final FPT's will be distributed to all appropriate members of the Commissioning Team for review and comment.</p> <p>Final FPT's will be issued once comments are reviewed and incorporated into final documents as appropriate.</p>	Pre-Final and Final Systems Functional Performance Test Procedures (FPT's)
Review Operations & Maintenance Manuals	<p>The Commissioning Agent shall review Operations and Maintenance Manuals submitted by contractors for general conformance with specifications and VA's requirements, including:</p> <p>If provided with the manuals, Review Preventive Maintenance Schedules provided as part of the O&amp;M Manuals for completeness. Verify that data is provided in a manner consistent with VA process for managing Preventive Maintenance tasks.</p> <p>Review of O&amp;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.</p> <p>Review of O&amp;M Manuals shall be completed in accordance with the Submittal Review schedule requirements.</p>	Updated Commissioning Issues Log

Commissioning Team Task/Deliverables Description Construction Phase		
Project Phase/ Cx Task	Commissioning Task Description	Commissioning Deliverables
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



Commissioning Team Task/Deliverables Description Construction Phase		
Project Phase/ Cx Task	Commissioning Task Description	Commissioning Deliverables
TAB Verification	<p>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:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>	<p>TAB Agenda Review Comments</p> <p>TAB Agenda Review Meeting Minutes</p> <p>Field Observation Reports of TAB Inspections</p> <p>Summary Report of TAB Verification Readings</p>

<b>Commissioning Team Task/Deliverables Description</b> <b>Acceptance and Testing Phase</b>		
<b>Project Phase/ Cx Task</b>	<b>Commissioning Task Description</b>	<b>Commissioning Deliverables</b>
Systems Functional Performance Testing	<p>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.</p> <p>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</p>	<p>Executed Functional Performance Tests and support documentation.</p> <p>Long Term Trend Data and Analysis</p>
Prepare Systems Manuals	<p>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.</p> <p>Systems Manual will include sections for each major system included in the commissioning process.</p>	Project Systems Manual

<b>Commissioning Team Task/Deliverables Description</b> <b>Acceptance and Testing Phase</b>		
<b>Project Phase/ Cx Task</b>	<b>Commissioning Task Description</b>	<b>Commissioning Deliverables</b>
Training Plan Review	<p>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.</p> <p>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.</p>	<p>Compiled Training Plan</p> <p>Individual Training Agendas</p> <p>Training Attendance Sign In Sheets</p>
Systems Training	<p>The Commissioning Agent will conduct training sessions to provide systems-level training for O&amp;M personnel. Training will include:</p> <ul style="list-style-type: none"> <li>● Review of system design, capacity, and equipment selection</li> <li>● Review of system operating sequences</li> <li>● Review of interconnection with other systems</li> <li>● Review of Emergency operating procedures</li> <li>● Review of the Project Systems Manual and its Use</li> <li>● Student Evaluation forms</li> </ul> <p>The number, duration and scope of the Systems Training sessions shall be determined by the specific requirements of the project.</p> <p>The training provided by the CxA does not in any way relieve the Contractor from any specified training obligations.</p>	<p>Systems Training Presentations (electronic)</p>

<b>Commissioning Team Task/Deliverables Description</b> <b>Acceptance and Testing Phase</b>		
<b>Project Phase/ Cx Task</b>	<b>Commissioning Task Description</b>	<b>Commissioning Deliverables</b>
Final Commissioning Report	<p>The Commissioning Agent shall compile a comprehensive commissioning report documenting all commissioning activities, including but not limited to the following:</p> <ul style="list-style-type: none"> <li>• Executive Summary</li> <li>• Commissioning Scope of Work</li> <li>• Test methods and results</li> <li>• Outstanding commissioning issues</li> <li>• Comprehensive Commissioning Issues Log, including resolved items and a description of their resolution,</li> <li>• Commissioning plan,</li> <li>• Field Observation Reports, Status reports and other field activity documentation,</li> <li>• Submittal and O&amp;M manual reviews</li> <li>• Training record</li> <li>• Completed Pre Functional Checklists</li> <li>• Completed Functional Performance Test protocols and support documentation</li> <li>• Other support documentation developed as part of the execution of the project Construction Phase Commissioning Process</li> </ul>	Final Commissioning Report

<b>Commissioning Team Task/Deliverables Description</b> <b>Warranty Phase</b>		
<b>Project Phase/ Cx Task</b>	<b>Commissioning Task Description</b>	<b>Commissioning Deliverables</b>
Deferred and/or Seasonal Testing	<p>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.</p> <p>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.</p>	<p>Executed Functional Performance Test and Support Documents</p> <p>Commissioning Issues Log</p>
Warranty Period Site Visits	<p>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.</p>	<p>Warranty Site Visit Reports</p>

<b>Commissioning Team Task/Deliverables Description</b> <b>Warranty Phase</b>		
<b>Project Phase/ Cx Task</b>	<b>Commissioning Task Description</b>	<b>Commissioning Deliverables</b>
Post-Occupancy Inspection	<p>Return to the project approximately 10 months after substantial completion to review the building operation with the facility occupants and O&amp;M staff, and to discuss outstanding issues related to commissioning. Provide suggestions for improvements to systems operation including,</p> <ul style="list-style-type: none"> <li>• Measurement &amp; Verification Issues,</li> <li>• Re-Commissioning Tasks, and</li> <li>• Improvements in Preventive Maintenance or Operational Strategies</li> </ul> <p>Assist facility staff in developing warranty issues, documents and requests for service to remedy outstanding problems.</p> <p>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.</p>	<p>Post Occupancy Field Visit Report</p> <p>Commissioning Issues Log</p> <p>Warranty Issues Report</p> <p>Systems Energy Review Report</p>
Final Commissioning Report Amendment	Amend Final Commissioning Report to document the Warranty Phase commissioning activities.	Final Report Amendment

#### 4. COMMISSIONING AGENT QUALIFICATIONS

- a. The CxA shall either be certified by the NEBB or the TABB, or be a member of ACG, or shall provide and utilize the services of a Commissioning Authority that meets the above qualifications as a sub-consultant to the CxA for performance of all commissioning services for the VA under this project. The certification shall be maintained for the entire duration of duties specified herein. If, for any reason, the firm loses subject certification during this period, immediately notify the Contracting Officer and submit another Commissioning Firm for approval. Any firm that has been the subject of disciplinary action by the ACG, the NEBB, or the TABB within the five years preceding Contract Award is not eligible to perform any duties related to the HVAC systems, including Commissioning. All work specified in Statement of Work to be performed by the CxA shall be considered invalid if the CxA or sub-consulting Firm loses its certification prior to Contract completion and must be performed by an approved successor. These Commissioning services are to assist the VA in performing the quality oversight for which it is responsible. The Commissioning or sub-consulting Firm shall be an agent acting of and for the VA and shall be financially and corporately independent of all other sub-contractors.

- b. The CxA shall be working through, and reporting to the VA COTR. The CxA will be paid by the VA.

5. TRADE ASSOCIATION DEFINITIONS

- a. AABC: Associated Air Balance Council
- b. ACG: Associated Air Balance Council Commissioning Group
- c. NEBB: National Environmental Balancing Bureau
- d. SMACNA: Sheet Metal and Air-Conditioning Contractors' National Association
- e. TABB: Testing, Adjusting, and Balancing Bureau

6. COMMISSIONING TEAM

Commissioning Team Roles and Responsibilities Design Phase					
Phase	Project Phase/Cx Task (ref Table above for description)	Commissioning Team Member Responsibilities			
		VA PM	VAMC	A/E Team	Commissioning Agent
65% (DD2)	Design Submission Review	<p>Facilitate delivery of Design Submission Documents to Commissioning Agent</p> <p>Review Commissioning Agent Issues Log &amp; Provide Feedback as appropriate</p> <p>Facilitate Resolution of Comments by A/E Team</p>	Review Commissioning Agent Issues Log & Provide Feedback as appropriate	<p>Deliver Documents to Commissioning Agent for review.</p> <p>Review Commissioning Agent Issues Log</p> <p>Provide Written Responses to Issues</p>	<p>Review and comment on Design Review Log.</p> <p>Provide clarifications as required.</p> <p>Record resolution for each issues based on A/E Response</p>



Commissioning Team Roles and Responsibilities Design Phase					
Phase	Project Phase/Cx Task (ref Table above for description)	Commissioning Team Member Responsibilities			
		VA PM	VAMC	A/E Team	Commissioning Agent
65% (DD2)	Design Narrative	Review Design Narrative & Comment	Review Design Narrative & Provide Feedback as appropriate	Update Design Narrative to Include OPR and Basis of Design response to OPR.	<p>Review Design Narrative for compliance with VA Standards and other stated VA Objectives.</p> <p>CxA to update, review and reconcile the Project Design Narrative. Narrative should reflect the evolution of the project design and note all significant deviations from prior versions.</p> <p>Narrative should describe designer's response to the project requirements.</p> <p>Where appropriate, provide documentation of approval of deviations from VA Design Criteria and reasoning for same.</p> <p>Provide support for developing measurable performance criteria for installed systems.</p>

Commissioning Team Roles and Responsibilities Design Phase					
Phase	Project Phase/Cx Task (ref Table above for description)	Commissioning Team Member Responsibilities			
		VA PM	VAMC	A/E Team	Commissioning Agent
65% (DD2)	Preliminary Pre-Functional Checklists and Preliminary System Functional Performance Test Procedures	Distribute to Cx Team.  Review and comment	Review and Comment	Review and Comment	Prepare Preliminary PFC and FPT.  Incorporate review comments into the Draft PFCs and FPTs as appropriate.
65% (DD2)	Design Phase Controls Meeting	Facilitate and schedule meeting. Participate in meeting	Attend and participate in meeting	Chair meeting Attend and participate in meeting	Attend and participate in meeting
65% (DD2)	Commissioning Plan	Distribute Updated Design Phase Cx Plan Review Cx Plan & Comment	Review Cx Plan & Comment	Review Cx Plan & Comment	Update & Submit Project Commissioning Plan
65% (DD2)	Commissioning Specification	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.

Commissioning Team Roles and Responsibilities Design Phase					
Phase	Project Phase/Cx Task  (ref Table above for description)	Commissioning Team Member Responsibilities			
		VA PM	VAMC	A/E Team	Commissioning Agent
65% (DD2)	Duration Schedule for Commissioning Activities	Distribute schedule 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
65% (DD2)	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.  Provide responses to and clarifications of identified Commissioning Issues.	Attend Design Review Meeting. Provide clarification and facilitate resolution to Commissioning Issues Identified
65% (DD2)	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	Record resolutions to Cx Issues on the Design Phase Commissioning Issues Log.

Commissioning Team Roles and Responsibilities Design Phase					
Phase	Project Phase/Cx Task  (ref Table above for description)	Commissioning Team Member Responsibilities			
		VA PM	VAMC	A/E Team	Commissioning Agent
90% (CD1)	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	Deliver Documents to Commissioning Agent for review.  Review Commissioning Agent Issues Log  Provide Written Responses to Issues	Review and comment on Design Review Log.  Provide clarifications as required.  Record resolution for each issues based on A/E Response

Commissioning Team Roles and Responsibilities Design Phase					
Phase	Project Phase/Cx Task  (ref Table above for description)	Commissioning Team Member Responsibilities			
		VA PM	VAMC	A/E Team	Commissioning Agent
90% (CD1)	Design Narrative	Review Design Narrative & Comment	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.

Commissioning Team Roles and Responsibilities Design Phase					
Phase	Project Phase/Cx Task (ref Table above for description)	Commissioning Team Member Responsibilities			
		VA PM	VAMC	A/E Team	Commissioning Agent
90% (CD1)	Draft Pre-Functional Checklists and Functional Performance Test procedures	Distribute to team Review and comment	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.
90% (CD1)	Design Phase Controls Meeting	Facilitate and schedule meeting. Participate in meeting	Attend and participate in meeting	Chair meeting Attend and participated in meeting	Attend and participate in meeting
90% (CD1)	Commissioning Plan	Distribute Updated Design Phase Cx Plan Review Cx Plan & Comment	Review Cx Plan & Comment	Review Cx Plan & Comment	Update & Submit Project Commissioning Plan
90% (CD1)	Duration Schedule for Commissioning Activities	Distribute schedule 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

Commissioning Team Roles and Responsibilities Design Phase					
Phase	Project Phase/Cx Task (ref Table above for description)	Commissioning Team Member Responsibilities			
		VA PM	VAMC	A/E Team	Commissioning Agent
90% (CD1)	Commissioning Specification	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.
90% (CD1)	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. Provide responses to and clarifications of identified Commissioning Issues.	Attend Design Review Meeting. Provide clarification and facilitate resolution to Commissioning Issues Identified
90% (CD1)	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	Record resolutions to Cx Issues on the Design Phase Commissioning Issues Log.
100% (FINAL)	Design Final Design Submission Review	Facilitate delivery of Design Submission Documents to Commissioning Agent  Facilitate Resolution of Comments by A/E Team	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

Commissioning Team Roles and Responsibilities Design Phase					
Phase	Project Phase/Cx Task (ref Table above for description)	Commissioning Team Member Responsibilities			
		VA PM	VAMC	A/E Team	Commissioning Agent
100% (FINAL)	Design Narrative	Review & Approve Final Design Narrative	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.
100% (FINAL)	Commissioning Plan	Distribute Updated Design Phase Cx Plan Review Cx Plan & Comment	Review Cx Plan & Comment	Review Cx Plan & Comment	Update & Submit Project Commissioning Plan



Commissioning Team Roles and Responsibilities Design Phase					
Phase	Project Phase/Cx Task (ref Table above for description)	Commissioning Team Member Responsibilities			
		VA PM	VAMC	A/E Team	Commissioning Agent
100% (FINAL)	Draft Pre-Functional Checklists and Functional Performance Test procedures	Distribute Review and back-check	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.
100% (FINAL)	Duration Schedule for Commissioning Activities	Distribute schedule 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
100% (FINAL)	Commissioning Specification	Review Cx Updated Specs & Approve	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.
100% (FINAL)	Design Phase Issue Log Resolution	Review & Comment on Revised Design Phase Commissioning Issues Log	N one	None	Record resolutions to Cx Issues on the Design Phase Commissioning Issues Log.

Commissioning Team Roles and Responsibilities Design Phase					
Phase	Project Phase/Cx Task  (ref Table above for description)	Commissioning Team Member Responsibilities			
		VA PM	VAMC	A/E Team	Commissioning Agent
100% (FINAL)	Design Phase Commissioning Report	Review, comment and approve	Review and Comment and approve	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			
		VA-CFM	VAMC	A/E Team	Commissioning Agent
Pre- Bid	Pre Bid Meeting	None	Organize, schedule and conduct meeting	Attend meeting, respond to questions	Attend meeting, respond to questions
Pre- Const.	Pre-Construction Meeting	None	Organize, schedule and conduct meeting	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			
	Commissioning Agent	VAMC	A/E Team	Contractor
Commissioning Kick Off Meeting	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	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 VAMC 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	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?

Commissioning Team Roles and Responsibilities Construction Phase				
Project Phase/ Cx Task	Commissioning Team Member Responsibilities			
	Commissioning Agent	VAMC	A/E Team	Contractor
Review RFI'S ASI'S and other Contract Documents	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	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	Visit the Project Site on a regular scheduled basis as agreed upon with the VA 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 Roles and Responsibilities Construction Phase				
Project Phase/ Cx Task	Commissioning Team Member Responsibilities			
	Commissioning Agent	VAMC	A/E Team	Contractor
Commissioning Team Meetings	Prepare and disseminate Agenda for regular periodic Cx Team Meetings Lead Cx Team Meetings Produce Meeting Minutes and Incorporate Comments	VAMC 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)	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	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.

Commissioning Team Roles and Responsibilities Construction Phase				
Project Phase/ Cx Task	Commissioning Team Member Responsibilities			
	Commissioning Agent	VAMC	A/E Team	Contractor
Review Contractor Equipment Startup Checklists, TAB Reports and PFC's	Review & Comment on results 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 VA 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.  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			
	Commissioning Agent	VAMC	A/E Team	Contractor
Systems Functional Performance Testing	<p>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.</p> <p>Retest systems as appropriate to demonstrate compliance with the Contract Documents and the Commissioning Plan.</p>	<p>Participate with the Commissioning Agent as agreed upon to support the commissioning process and facilitate training of the Operations Team.</p> <p>Review &amp; Comment on Commissioning Issues Log as appropriate.</p>	<p>Review &amp; Comment on the Commissioning Issues Log as appropriate.</p>	<p>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.</p> <p>Provide documentation of test results from installed systems as required by the FPT's.</p> <p>Correct issues and deficiencies identified on the Commissioning Issues Log and report methods and results of corrective actions to the Commissioning Agent.</p>

Commissioning Team Roles and Responsibilities Acceptance and Testing Phase				
Project Phase/ Cx Task	Commissioning Team Member Responsibilities			
	Commissioning Agent	VAMC	A/E Team	Contractor
Prepare Systems Manuals	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. Collaborate with CM/GC/SC and VAMC 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.



Commissioning Team Roles and Responsibilities Acceptance and Testing Phase				
Project Phase/ Cx Task	Commissioning Team Member Responsibilities			
	Commissioning Agent	VAMC	A/E Team	Contractor
Systems Training	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 VAMC 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	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	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			
	Commissioning Agent	VAMC	A/E Team	Contractor
Deferred and/or Seasonal Testing	<p>Schedule &amp; Execute Seasonal Testing in Accordance with Functional Performance Testing Protocols.</p> <p>Maintain &amp; Distribute Warranty Phase Commissioning Issues Logs.</p> <p>Facilitate and record resolution to identified Issues and Deficiencies recorded on Commissioning Issues Log.</p>	<p>Provide O&amp;M Personnel to support seasonal testing in accordance with the Commissioning Plan.</p> <p>Review Commissioning Agent Issues Log &amp; Comment</p> <p>Operations Team will operate systems under the deferred season testing protocols.</p>	<p>Review &amp; Comment on Seasonal Testing.</p> <p>Provide and report resolution of any issue identified as a Design Issue.</p>	<p>Contractor will be invited to participate in the execution of seasonal testing and assist in resolution of issues and deficiencies identified.</p> <p>Record resolution for each issues based on A/E Response</p>

<b>Commissioning Team Roles and Responsibilities</b> <b>Warranty Phase</b>				
<b>Project Phase/ Cx Task</b>	<b>Commissioning Team Member Responsibilities</b>			
	<b>Commissioning Agent</b>	<b>VAMC</b>	<b>A/E Team</b>	<b>Contractor</b>
Post-Occupancy Warranty Checkup	Meet with the VAMC 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.  Review and approve Final Commissioning Report Amendment.	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.  Facilitate Post Occupancy Warranty Check Up Meetings.	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	Create and submit Final Commissioning Report Amendment in accordance with the Commissioning Plan and other contract requirements.	Review & Approve Final Commissioning Report Amendment.	Review & Comment on Final Commissioning Report	None

### 3.0 REFERENCES

1. Department of Veterans Affairs, Whole Building Commissioning Process Manual. This document can be found at <http://www.cfm.va.gov/til/spclRqmts.asp#Cx>
2. TIL - Master Construction Specifications (PG-18-1), Section 01 91 00 – General Commissioning Requirements. This document can be found at <http://www.cfm.va.gov/til/spec.asp#01>
3. Construction Project Specifications: To be developed in the design phase.
4. Construction Project Drawings: To be developed in the design phase.

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