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COMMISSIONING PLAN

I. Introduction

- A. The Department of Veterans Affairs (VA) is committed to commissioning new facilities and systems required for the reliable, safe, and secure operation of the cooling tower replacement and chiller addition in Pittsburgh, Pennsylvania. This process will verify that systems are complete and functioning properly upon project completion and that the facilities maintenance staff has appropriate system documentation and training.
- B. Commissioning consists of systematically documenting that specified components and systems have been installed and started up properly and then functionally tested to verify that systems are complete and functioning properly upon project completion and that the VAMC Facilities Management (FMD) staff has the appropriate system documentation and training. In addition, owner-personnel training will be verified and final project Operation & Maintenance (O&M) documents will be reviewed for completeness.
- C. This document is intended to be a roadmap for the parties involved in the Commissioning process. The document will explain the systems to be commissioned, the process activities, the procedures to follow throughout the commissioning process, and the roles and responsibilities for each party involved. The commissioning activities will begin during the design phase of the project and proceed through the warranty period.
- D. The team members for this project are committed to commissioning this facility and systems required for the reliable, safe, and secure operation of the Facility. This process is intended to verify that systems are properly installed, configured and operating in accordance with the requirements of the project and that operating personnel are adequately prepared to successfully operate the facility at project turnover.
- E. For this project, the Department of Veterans Affairs establishes AE Design contracts for Design Phase and Construction Period Services. The Department also establishes a construction contract with a Prime Contractor to provide construction services. Both contracts are administered by a VA Contracting Officer and his/her designated representative. During the Design Phase, this representative is the Project Manager; during the construction phase, it is the Resident Engineer. On every project, the authority to modify any contract is strictly limited to the Contracting Officer and his/her designated representative.



- F. In this structure, all communications on contractual issues are strictly limited to communications between the VA and these two prime contractors (AE Team and Prime Contractor). It is the practice of the VA to require that communication between other parties to the contracts (AE Sub-consultants, Subcontractors and Vendors) be routed through these two prime contractors and the VA.
- G. Whole Building Commissioning is a process that relies upon high levels of communications and collaboration between all parties to the construction process. By its nature, the levels of communication and cooperation between the Commissioning Authority and all other parties to the construction process (Architects, Engineers, Subcontractors, Vendors, third party testing agencies, etc) is essential to the success of the Commissioning effort. In the absence of the relationships, cooperation and support created by this communication, the Commissioning Process will likely fail to achieve its ends.
- H. With this fundamental conflict in mind, this Commissioning Plan has been developed to recognize that, in the execution of the Commissioning Process, the Commissioning Agent must develop effective methods to communicate with every member of the construction team involved in delivering commissioned systems while simultaneously respecting the exclusive contract authority of the Contracting Officer and his/her Designated Representative. Thus, all procedures outlined in this manual must be executed within the following limitations:
1. The Commissioning Agent may maintain a continuous open communication with the AE team, including sub-consultants, the Contractor and subcontractors and the Owner's team to facilitate a collaborative commissioning process subject to the specific limitations outlined below.
 2. All communications shall be copied to the VA Project Manager (Design Phase) and Resident Engineer (Construction Phase).
 3. All Communications shall include specific reference to these contract limitations (e.g., "All issues identified in this Commissioning Issues Log are subject to Paragraph 2.5: Contractual Relationships in the VA Commissioning Process Manual."
 4. All information from the Commissioning Agent to any party to the project must be transmitted with the following clear limitations:
 - a. No communications (verbal or written) will be deemed to constitute direction that modifies the terms of any contract between the Department of Veterans Affairs and any party to the construction project.
 - b. Commissioning Issues communicated in writing to the Contractor or AE Team and copied to the PM/RE are provided to all parties to the contract to expedite communication. All issues must be understood as the professional opinion of the



Commissioning Agent and suggestions for issue resolution only until expressly approved as direction by the Project Manager or Resident Engineer.

- c. In the event that any Commissioning Issues and suggested resolutions are deemed to require either an official interpretation of the construction documents or are determined to require a modification of the contract documents, Contracting Officer or designated COTR will issue an official directive to this effect.
- d. All parties to the Commissioning Process shall be individually responsible for alerting the COTR of any issues that they deem to constitute a potential contract change prior to acting on these issues.
- e. Authority for design and construction issues resolution rests solely with the Contracting Officer and his/her designated representative with appropriate technical guidance from the AE Team and/or Commissioning Agent.

I. Abbreviations

- 1. Operations and Maintenance (O&M)
- 2. VAMC Project Manager and/or Resident Engineer (PM/RE)
- 3. VAMC Facilities Management Department Staff (FMD)
- 4. Design Professionals (D)
- 5. Construction Manager (CPM)
- 6. Installation Contractors (CONTR)
- 7. Testing, Adjusting & Balancing Contractor (TAB)
- 8. Commissioning Authority (CxA)
- 9. Request for Information (RFI)
- 10. Architect's Supplemental Instructions (ASI)
- 11. Design Development Documents (DD)
- 12. Construction Documents (CD)
- 13. Commissioning (Cx)
- 14. Functional Performance Test (FPT)
- 15. Pre-Functional Checklist (PFC)
- 16. Corrective Action Notice (CAR)
- 17. Quality Control (QC)



II. Commissioning Goals

A. The Commissioning Authority has developed specific Commissioning Goals to emphasize the role commissioning will play in the design and construction processes:

- ❖ Meet or exceed VAMC Project Requirements
- ❖ Optimize Systems Operations
- ❖ System operation and performance verification
 - Performance Test results
 - Pre-Functional checklists
 - Equipment startup
- ❖ Documentation and Training for FMD Staff
 - Operating instructions and documentation
 - Operator equipment training
 - Operator systems training
- ❖ Integrate Testing Schedules into Construction Schedule
 - Coordination of trades
 - Coordination of DDC vendor tasks
 - Coordination of TAB vendor tasks
- ❖ Early identification and resolution of issues
- ❖ Clear and open communications

III. Project Description

The general scope of work for the Cooling Tower Replacement project at the VAMC Pittsburgh UD consists of adding a new chiller, associated pumps, cooling tower(s), piping, controls, electrical systems, and other ancillary devices. The scope of work also includes architectural and structural work to provide for a building addition between the Chiller Plant, Building 8, and the Animal Lab, Building 6. Demolition work is required to obtain the space for the new addition.



IV. Commissioning Scope

- A. H.F. Lenz Company will provide commissioning services to support the Cooling Tower Replacement project. Commissioning activities will include the tasks and deliverables outlined below.

Commissioning Scope			
Project Phase	Task	Description	Deliverable
Design	Review Owner's Project Requirements	Review VAMC Design Criteria and Owner's Project Requirement document prior to submission to LEED Facilitator.	Review comment log.
Design	Review Design Development design	Review Design Development design for familiarization, general conformance with Owner's Project Requirements, Basis of Design and VAMC Design Criteria.	Review comment log.
Design	Commissioning Specifications	Prepare Commissioning Specification "Section 01 91 13 – General Commissioning Requirements" to be included in project manual.	Commissioning Specification
		Prepare Commissioning Specification for Division 23 – HVAC, Division 26 – Electrical, to provide detailed commissioning, operations & maintenance and training requirements for individual technical specification sections.	Commissioning Specifications
Design	Design Phase Controls Meeting	Meet with Owner, Architect, Mechanical/Electrical Design Engineer, and Owner's Controls Vendor to review Building Control Systems and Sequences of Operations. The focus of the meeting will be to obtain understanding of the interactions between systems and the control system in various operating modes. It is anticipated this meeting will be held in conjunction with a scheduled Owner/Architect design-phase meeting.	Meeting notes.



Commissioning Scope			
Project Phase	Task	Description	Deliverable
Design	Preliminary Commissioning Plan	Prepare Preliminary Commissioning Plan that describes the Commissioning Process, Commissioning Team with specific Roles and Responsibilities. The Commissioning Plan will include description of systems to be commissioned.	Preliminary Commissioning Plan
Design	Focused Design Document Review	Perform a focused review of a Design Document SD-1, SD-2, DD-1, DD-2, CD, and Final submissions.	Commissioning Design Review Log
Design	Focused Construction Document Review	Perform a focused review of the final Construction Document submission. This review will include a back check of commissioning comments provided during previous reviews.	Commissioning Design Review Log
Design	Design Phase Meetings	Participate in selected Design Phase Owner/Architect/ meetings.	Meeting Notes.
Design	Focused Design Review Meetings	Attend selected meetings with Owner and Design Team to review the design and specific commissioning design review comments. It is assumed this meeting will be scheduled in conjunction with scheduled Owner/Architect meetings.	Meeting Notes.
Construction	Final Commissioning Plan	Based on the final construction documents, update the Preliminary Commissioning Plan to identify specific systems to be commissioned. The Final Commissioning Plan will also include specific individual roles and responsibilities and Preliminary Pre-Functional Checklists and Functional Test Plans for systems to be commissioned.	Final Commissioning Plan.



Commissioning Scope			
Project Phase	Task	Description	Deliverable
Construction	Construction Commissioning Kick Off meeting	Conduct an initial commissioning meeting with all contractors and commissioning team members. The purpose of the meeting will be to establish the purpose and proposed process for commissioning this facility in the construction, acceptance and warranties phases of the project. Review the individual roles and responsibilities of each participating commissioning team member as specified in the Construction Documents. Meeting will be scheduled for each construction package with a commissioning scope.	Meeting Notes
Construction	Duration Schedule for Commissioning Activities	Based on Final Commissioning Plan, prepare a duration schedule to show the duration, predecessors and successors for commissioning activities. This duration schedule will be provided to the Construction Manager to include commissioning activities in the project construction schedule. This will allow commissioning activities to be smoothly integrated into the overall construction process.	Duration schedule with commissioning activities, predecessors, successors and key milestones.
Construction	Submittal and Shop Drawing Review	Based on final construction documents, prepare a list of selected submittals and shop drawings for review by the Commissioning Authority.	Submittal Request Checklist.



Commissioning Scope			
Project Phase	Task	Description	Deliverable
Construction		Review selected submittals and shop drawings to support the commissioning process. Review will be for the purpose of developing appropriate Pre-Functional Checklists and Functional Test Plans. Reviews will focus on the ability to commission the systems, maintainability and general conformance to owner's requirements. Commissioning review of submittals and shop drawings does not replace the Design Team responsibility for approval.	Commissioning Submittal Review Log
Construction	Controls Meeting	<p>After receipt of the Controls Submittal, participate in or conduct a meeting with the Owner's representatives, Control Vendor, TAB contractor, Mechanical/Electrical Design team, mechanical sub-contractor and electrical sub-contractor to review the Controls Submittal and mechanical/electrical systems to be installed.</p> <p>Focus will be on how the selected sequences of operation interact with the mechanical/electrical systems and how well they meet the owner's requirements.</p>	<p>Meeting Notes</p> <p>Marked up Controls Submittal and Sequence of Operations.</p> <p>Commissioning Issues Log to track action items.</p>



Commissioning Scope			
Project Phase	Task	Description	Deliverable
Construction	Pre-Functional Checklists	<p>Prepare Pre-Functional Checklists for systems, components and/or equipment to be commissioned. These Pre-Functional Checklists will be used to document completion of system, component and/or equipment installation and to determine system readiness for functional testing.</p> <p>Pre-Functional Checklists should be completed by the installing contractors to document the installation process. Completed Pre-Functional Checklists are to be submitted to the commissioning authority a minimum of seven days prior to testing.</p> <p>Completed Systems Readiness Checklists will be spot checked by the commissioning authority to verify systems are ready for testing.</p>	<p>Draft Pre-Functional Checklists for owner and contractor review.</p> <p>Final Pre-Functional Checklists for use by contractors and/or CxA.</p>
Construction	Review Contractor Equipment Startup Checklists	<p>Commissioning authority will review selected equipment startup reports prepared by installing contractor.</p> <p>Commissioning authority will witness selected equipment startup procedures. Seven days prior notice is required to schedule commission authority witnessing the startup.</p>	<p>Contractor Equipment Startup Checklist (this checklist is part of the Submittal and Shop Drawing Review Checklist).</p> <p>Commissioning Issues Log</p>



Commissioning Scope			
Project Phase	Task	Description	Deliverable
Construction	Prepare Functional Test Plans	<p>Based on final construction documents (including applicable changes), and approved submittals, prepare Functional Test Plans for systems to be commissioned. Draft Functional Test Plans will be issued for review by owner, installing contractors and DDC Vendor.</p> <p>Final Functional Test Plans will be prepared incorporating review comments received from owner, contractors or DDC Vendor.</p>	<p>Draft Functional Test Plans for review by owner, installing contractors and DDC vendor.</p> <p>Final Functional Test Plans for use in systems testing.</p>
Construction	TAB Review	Review HVAC systems Test and Balance Plan prepared by the TAB vendor. Review will be to determine general conformance with owner's requirements.	Commissioning Review Log
		Review TAB Report prepared by TAB vendor following system air and water balancing. Review will be focused on TAB results that affect system performance and/or commissioning. Specific attention will be given to equipment installation and operational issues identified by the TAB vendor.	Commissioning Issues Log
Construction	Review O & M Manuals	Review Operations and Maintenance Manuals submitted by contractors for general conformance with specifications and owner's requirements.	Commissioning Review Log



Commissioning Scope			
Project Phase	Task	Description	Deliverable
Construction	Prepare Systems Manuals	Prepare detailed systems manuals for commissioned systems. The manuals will provide operating staff the information needed to understand and optimally operate the commissioned systems. The manuals will describe system design, components, capacity and sequences of operations. Manuals will include descriptions of interactions with other systems and common systems failure modes and responses.	Systems Manuals – 1 hardcopy plus 2 electronic copies on CD/DVD
Construction	Review Training Plans	Review contractor and manufacturer training plans and agendas for general conformance with specifications and owner's requirements. Observe selected training for quality of training and for general conformance with the training plan and agenda.	Commissioning Review Log
Construction	Warranty Review	Review contractor's and manufacturer's warranties for general conformance with specifications and owner's requirements.	Commissioning Review Log
Construction	Systems Functional Testing	<p>Direct functional testing for systems to be commissioned. Testing will be conducted as detailed on the specific Functional Test Plan for each system to be commissioned.</p> <p>Functional testing will require support from the owner, mechanical contractor, electrical contractor, DDC Vendor, TAB Vendor, and specialty-systems installing contractors. Installing contractors must be available to respond to issues and problems identified during testing.</p>	<p>Executed Functional Test Plans.</p> <p>Commissioning Issues Log</p>



Commissioning Scope			
Project Phase	Task	Description	Deliverable
Construction	Construction Observation	Conduct Construction Observation visits to the construction site to observe construction activities. Specific attention will be given to installation of mechanical, electrical, and plumbing systems for general conformance with specifications and manufacturer's installation requirements. Specific attention will also be given to installation of site utilities, site improvements and building envelope construction for general conformance with plans, specifications and manufacturer's installation requirements.	Field Observation Reports Commissioning Issues Log.
Construction	Final Commissioning Report	<p>Compile a comprehensive commissioning report documenting all commissioning activities, including but not limited to:</p> <ul style="list-style-type: none">• Commissioning scope• Test methods and results• Outstanding commissioning issues• Issues log• Commissioning plan• Status reports• Submittal and O&M manual reviews• Training record• Pre-Functional Checklists• Design Review Comments <p>Scope includes one submission of a preliminary report for owner review. Scope includes one submission of the Final Commissioning Report that incorporates owners review comments.</p>	<p>Preliminary Commissioning Report – 1 hardcopy for owner review.</p> <p>Final Commissioning Report – 1 hardcopy plus 2 electronic submissions on CD/DVD.</p>



Commissioning Scope			
Project Phase	Task	Description	Deliverable
Construction	Owner Architect and Construction Manager Meetings (Construction Phase)	Attend selected Owner/Architect/Contractor Meetings. H.F. Lenz Company will attend meetings to discuss commissioning issues, review the Commissioning Issues Log and to maintain awareness of general construction schedule and issues.	Meeting Notes (it is assumed the Construction Manager will provide the official minutes).
Construction	Commissioning Progress Meetings	Conduct Commissioning Progress Meetings to review system installation progress, system readiness, and preparation for functional systems testing. These meetings will also review status of unresolved commissioning issues and progress towards resolution of the issues. The Construction Manager, Construction Commissioning Manager, Construction Quality Control Manager, and commissioning representatives from the Mechanical/Electrical Design team, mechanical contractor, electrical contractor, DDC vendor, TAB vendor, and specialty systems installing contractors will attend these meetings.	Meeting minutes.
Construction	Status Reports	Provide periodic status reports detailing activities, significant unresolved issues, and upcoming commissioning activities. Prepare report outlining status of deliverables for the project. Status reports are submitted with invoices for professional services.	Monthly Narrative Status Report. Monthly Percent Complete Report.
Construction	Master Issues Log	Maintain a Commissioning Issues Log to document commissioning issues identified during construction and functional testing. The Commissioning Issues Log will include recommended responsible party and recommendations for resolution of the issue. The Commissioning Issues Log will also be used to document progress toward resolution and the final resolution	Commissioning Issues Log



Commissioning Scope			
Project Phase	Task	Description	Deliverable
Construction	Review Change Orders, ASI, and RFI	Review change orders, architect's supplemental instructions and requests for information (with design team response) for issues that affect commissioning. Review is for information only and does not constitute technical or contractual approval or disapproval.	Commissioning Requests for Information.
Warranty	Deferred and/or seasonal Testing	Direct testing that was deferred due to lack of system readiness or for seasonal requirements. Testing will be conducted in accordance with Functional Test Plans. Testing support will be required from the DDC Vendor and owner. We have assumed this testing will be performed during a two-day site visit approximately 10 months after substantial completion.	Executed Functional Test Plans. Commissioning Issues Log
Warranty	Post-Occupancy Warranty Checkup	Return to the project approximately 10 months into the 12 month warranty period to review the building operation with the facility staff and discuss outstanding issues related to commissioning and outstanding warranty issues. Provide suggestions for improvements. Assist facility staff in developing reports, documents and requests for service to remedy outstanding problems. We have assumed this will be performed during a (TBD)-day site visit approximately 10 months after substantial completion	Field Observation Report
Warranty	Final Commissioning Report Amendment	Amend Final Commissioning Report to document the Warranty Phase commissioning activities.	Amendment to Final Commissioning Report.

B. Design Phase Commissioning Services will be provided by the Johnstown office of H.F. Lenz Company.

C. Construction Phase Commissioning Services will be provided at the Construction Site in Pittsburgh.



V. Systems to Be Commissioned

- A. The systems and equipment to be commissioned are outlined in the table below. A more detailed list of specific systems and equipment is provided in Appendix A.

Systems To Be Commissioned					
System	Pre-Functional Checklists	Equipment Startup	Functional Testing	Sample Size	Remarks
Div 23 - HVAC					
Condenser Water Systems	Yes	Yes	Yes	100%	[list applicable bid packages or other remarks]
Chilled Water Systems	Yes	Yes	Yes	100%	[list applicable bid packages or other remarks]
Exhaust Fans	Yes	Yes	Yes	TBD	[list applicable bid packages or other remarks]
Direct Digital Control System	Yes	Yes	Yes	TBD	[list applicable bid packages or other remarks]



VI. Commissioning Team

- A. The Commissioning Team shall consist of representatives from the following parties involved in the design and construction of this facility. The time at which individual members join the team and the level of their participation during the different phases of the project will vary from member to member.

Commissioning Team			
Item	Team Member	Description	Contact Information
PM	VAMC- Project Manager	Program Management Representative responsible for contractual and technical aspects of the project.	Name Organization Address City, State Zip Phone: Email:
RE	VAMC-Resident Engineer	On-site technical representative of the Contracting Officer.	Name Organization Address City, State Zip Phone: Email:
FMD	VAMC-Facilities Management Department	Representative of the Facilities Management Department	Name Organization Address City, State Zip Phone: Email:
QA	VAMC-Quality Assurance Coordinator	FMD Quality Assurance coordinator for Commissioning activities	Name Organization Address City, State Zip Phone: Email:



Commissioning Team			
Item	Team Member	Description	Contact Information
A	Architectural Design Professional	Architect's Construction Administration Representative	Name Organization Address City, State Zip Phone: Email:
MEP	Mechanical, Electrical and Plumbing Design Professional	MEP Construction Administration Representative	Name H.F Lenz Company Address City, State Zip Phone: Email:
CxA	Commissioning Agent	Project Manager for Commissioning Agent	Paul E. Petrilli, P.E., CPMP H.F. Lenz Company 1407 Scalp Avenue Johnstown, PA 15904 (814) 269-9355 ppetrill@hflenz.com
CxTL	Commissioning Agent Technical Lead	Primary point of contact for Commissioning technical issues	Paul E. Petrilli, P.E., CPMP H.F. Lenz Company 1407 Scalp Avenue Johnstown, PA 15904 (814) 269-9355 ppetrill@hflenz.com
CPM	Construction Project Manager	Contractor's Project Manager responsible for construction and coordination of sub-contractors	Name Organization Address City, State Zip Phone: Email:



Commissioning Team			
Item	Team Member	Description	Contact Information
CQC	Quality Control Manager	Contractor's Quality Control Manager responsible for managing the construction quality program	Name Organization Address City, State Zip Phone: Email:
FP	Fire Protection Contractor	Commissioning Representative for the Sub-contractor responsible for installation of fire protection systems	Name Organization Address City, State Zip Phone: Email:
PLMG	Plumbing Contractor	Commissioning Representative for the Sub-contractor responsible for installation of plumbing systems	Name Organization Address City, State Zip Phone: Email:
HVAC	Mechanical Contractor	Commissioning Representative for the Sub-contractor responsible for installation of HVAC systems	Name Organization Address City, State Zip Phone: Email:
EC	Electrical Contractor	Commissioning Representative for the Sub-contractor responsible for installation of MV and LV electrical systems	Name Organization Address City, State Zip Phone: Email:



Commissioning Team			
Item	Team Member	Description	Contact Information
DDC	DDC Vendor	Commissioning Representative for the DDC vendor responsible for providing the control system(s)	Name Organization Address City, State Zip Phone: Email:
TAB	Testing and Balancing Vendor	Commissioning Representative for the TAB vendor responsible for certified air- and water-testing and balancing.	Name Organization Address City, State Zip Phone: Email:

- B. Roles and Responsibilities for the Commissioning Team members are described elsewhere in this Commissioning Plan.



VII. Commissioning Communications and Document Distribution

- A. The following table outlines the submittal and distribution requirements for various documents used in the commissioning process.

Communication Distribution Matrix				
Document	Prepared by:	Submitted to:	Copies to:	Comments
Owner's Project Requirements	PM	<ul style="list-style-type: none">Design Team	<ul style="list-style-type: none">QACxACPM	This document consists of VA Design Manual and meeting minutes.
OPR Comment Log	CxA	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QADesign TeamCPM	Not required on this project.
Basis of Design Document (Design Narrative)	Design Team	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QACxACPM	
Schematic Design Documents	Design Team	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QACxACPM	Design team submits direct to VAMC
Schematic Design Review Comment Log	CxA	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QADesign TeamCPM	VAMC Review comments submitted separately to Design Team
Design Development documents	Design Team	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QACxACPM	Design team submits direct to VAMC Building Department as separate submission
DD Review Comment Log	CxA	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QADesign TeamCPM	VAMC Review comments submitted separately to Design Team



Communication Distribution Matrix				
Document	Prepared by:	Submitted to:	Copies to:	Comments
General Commissioning Requirements Specification Section (01 91 00)	CxA	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QADesign Team	
Commissioning Specifications Coordination Matrix	CxA	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QADesign Team	
Design Phase Controls Meeting	Minutes by Design Team Notes by CxA	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QACxACPM	
Preliminary Commissioning Plan	CxA	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QACPMDesign TeamDDCTAB	
Progress CD Drawings and Specs	Design Team	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QACxADDC	
Progress Set Review Comments Log	CxA	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QADesign Team	
Final Construction Documents	Design Team	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QACxACPM	Design team submits direct to VAMC as separate submission
Final CD Review Comment Log	CxA	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QADesign TeamCPM	VAMC Review comments submitted separately to Design Team
Design Phase Meeting Minutes	Design Team	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QACxACPM	



Communication Distribution Matrix				
Document	Prepared by:	Submitted to:	Copies to:	Comments
Focused Design Review Meeting Minutes	Minutes by Design Team Notes by CxA	<ul style="list-style-type: none">PM	<ul style="list-style-type: none">QACxACPM	
Final Commissioning Plan	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QADesign TeamCPMDDCTAB	
Construction Kickoff Meeting Minutes	CPM	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACxADesign Team	
Duration Schedule for Commissioning Activities	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACPM	Initial submission included in Final Commissioning Plan Updates provided as necessary
Submittals and Shop Drawings	CPM	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">Design TeamCxAQA	Submittals and Shop Drawings are submitted to the Design Team as separate submission
Submittal and Shop Drawing Comment Log	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">CPMDesign TeamQA	Design team comments and/or approval provided separately to CPM and PM
Construction Phase Controls Meeting Minutes	CPM Notes by CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACxADesign TeamDDC	
Preliminary Pre-Functional Checklists	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACPMDDC	



Communication Distribution Matrix				
Document	Prepared by:	Submitted to:	Copies to:	Comments
System Pre-Functional Checklist Comments	CPM PM DDC	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">CxAQA	
Final Pre-Functional Checklists	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">CPMQA	
Executed Pre-Functional Checklists	CPM	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">CxAQA	
Contractor Startup Reports	CPM	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">CxAQADesign TeamDDC	
Contractor Startup Report Comment Log	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACPMDesign TeamDDC	
Preliminary Functional Test Procedures	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACPMDDC	
Preliminary Functional Test Procedure Comments	PM CPM DDC	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">CxAQADDC	
Final Functional Test Procedures	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACPMDDC	
Executed Functional Test Procedures	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACPMDDC	
TAB Plan	TAB	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACxADesign Team	



Communication Distribution Matrix				
Document	Prepared by:	Submitted to:	Copies to:	Comments
TAB Plan Review Comment Log	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QATABDesign Team	
TAB Daily Worksheets	TAB	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">CxAMEP	
TAB Final Report	TAB	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QADesign TeamCxA	
TAB Final Report Comment Log	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QATABDesign Team	
O&M Manuals	CPM	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QAFMDCxADesign Team	
O&M Manual Comment Log	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">CPMQAFMDDesign Team	
Systems Manuals	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QAFMDCPMDesign Team	
System Manual Review Comments	QA FMD CPM Design Team	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QAFMDCxACPMDesign Team	



Communication Distribution Matrix				
Document	Prepared by:	Submitted to:	Copies to:	Comments
Training Plans	CPM	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QAFMDCxADesign Team	
Training Plan Comment Log	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QAFMDCPMDesign Team	
Warranty and other Closeout Documents	CPM	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACxADesign Team	
Warranty and Closeout Comment Log	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACPMDesign Team	
System Functional Testing Field Reports	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACPMDDC	
Construction Observations Field Reports	CxA	<ul style="list-style-type: none">RE	<ul style="list-style-type: none">QACPMDDC	
Preliminary Commissioning Report	CxA	<ul style="list-style-type: none">QA	<ul style="list-style-type: none">PMCPMDDCTAB	
Commissioning Report Review Comments	QA	<ul style="list-style-type: none">CxA	<ul style="list-style-type: none">PMCPMDDCTAB	



Communication Distribution Matrix				
Document	Prepared by:	Submitted to:	Copies to:	Comments
Final Commissioning Report	CxA	<ul style="list-style-type: none">• QA	<ul style="list-style-type: none">• PM• CPM• DDC• TAB	
Construction O/A/C Meeting minutes	CPM	<ul style="list-style-type: none">• RE	<ul style="list-style-type: none">• QA• CxA• Design Team• DDC	
Commissioning Status Reports	CxA	<ul style="list-style-type: none">• QA	<ul style="list-style-type: none">• PM	
Master Issues Log	CxA	<ul style="list-style-type: none">• RE	<ul style="list-style-type: none">• QA• CPM• DDC	
Change Orders, ASI, RFI	Design Team CPM	<ul style="list-style-type: none">• RE	<ul style="list-style-type: none">• QA• CxA• CPM• Design Team	
Deferred / Seasonal Testing Field Report	CxA	<ul style="list-style-type: none">• RE	<ul style="list-style-type: none">• QA• CPM• DDC	
Deferred / Seasonal Executed Functional Test Procedures	CxA	<ul style="list-style-type: none">• RE	<ul style="list-style-type: none">• QA• CPM• DDC	
Warranty Checkup Field Report	CxA	<ul style="list-style-type: none">• RE	<ul style="list-style-type: none">• QA• CPM• DDC	
Master Issues Log	CxA	<ul style="list-style-type: none">• RE	<ul style="list-style-type: none">• QA• CPM• DDC	
Commissioning Report Amendment	CxA	<ul style="list-style-type: none">• QA	<ul style="list-style-type: none">• PM	



VIII. Design Phase Commissioning

- A. Design Development Phase: The goals of the commissioning tasks in the Design Development Phase of the project include the following:
1. The CxA, PM, and FMD representatives will review and provide written comments on the Design Development documents submitted by the Design Team. The focus of the CxA review will be on adherence to the Design Narrative as updated after the Schematic Design Phase. The review comments will be geared towards aligning the design and design narrative with the Design Narrative and/or updating the Design Narrative with decisions approved by VA during the Design Development Phase.
 2. The CxA will prepare the Preliminary Commissioning Plan to provide an initial framework for commissioning activities that will follow. This Preliminary Commissioning Plan will be aligned with the project scope and schedule. It will be reviewed by the PM, FMD, CPM and other interested parties.
 3. The CxA will also prepare preliminary commissioning specifications to be included in the project manual. The preliminary specifications will include Section 01 91 00 – GENERAL COMMISSIONING REQUIREMENTS as well as language to be included in other Division 7, Division 21, Division 22, Division 23, Division 26, Division 27, Division 28, and Division 31 specification sections. The Design Team will review the preliminary commissioning specifications and provide written comments to the CxA. The CxA will revise the Preliminary Commissioning Specification and re-submit to the Design Team.
 4. A review conference is held with the Design Team, PM, FMD, CxA and CPM to coordinate review comments and responses.
 5. The CxA, CPM, Design Team, PM, and FMD will hold a meeting to review mechanical, electrical and plumbing system selections and to develop the preliminary control system Sequences of Operations for the project. Based on the results of this meeting, the Design Team will use these concepts as the basis for designing the final control system specifications and Sequences of Operations to be included in the construction documents. The Design Team will notify and coordinate and changes with the other parties involved in the control system.
 6. The CxA will update the Commissioning Plan to incorporate any changes resulting from the Design Development submission and review comments.



7. The CxA will also prepare the Commissioning Specifications Coordination Matrix. This document is based on the outline specifications provided by the Design Team. It provides recommended wording to be included in the technical specifications sections to identify commissioning, O&M manual and training requirements for the CPM and the installing contractors.
 8. The Design Narrative will be updated by the CxA to incorporate decisions approved during the Design Development phase.
- B. Construction Document Phase: The goals of the commissioning tasks in the Construction Document Phase of the project include the following:
1. The Design Team will prepare final construction documents that will be used to construct the facility. A progress set of drawings and specifications will be issued for review at approximately the 50% CD stage. The CxA, PM, CPM, and FMD will review the progress set to verify that the design is proceeding in accordance with the Design Narrative.
 2. The CxA will prepare a final, detailed list of systems and equipment to be commissioned.
 3. The CxA will prepare preliminary Pre-Functional Checklists and Systems Functional Performance Test procedures for each type of system to be commissioned. These will be published in the Preliminary Commissioning Plan to be included as an informational appendix to Specification Section 01 91 00 – GENERAL COMMISSIONING REQUIREMENTS that will be issued for bid.
 4. A review conference will be conducted to coordinate review comments and provide direction for adjustments in the design prior to issuing the final construction documents.
 5. The CxA will update the Design Narrative to reflect changes approved during the review conference.
 6. The Design Team will issue final Construction Documents, including drawings, and specifications. These will be reviewed by the CxA, PM, VAMC User, and FMD. The CPM will also review the final construction documents and prepare the final estimates of construction costs.



IX. Construction and Acceptance Phase Commissioning

- A. The CxA will prepare the Construction Commissioning Plan that incorporates any changes due to the Final Construction Documents, Design Narrative. This Commissioning Plan outlines the commissioning activities during the Construction and Acceptance Phase of the project.
- B. A Commissioning Kickoff Meeting will be held at the start of construction to describe the commissioning process for the Construction Team which includes the CPM, installing sub-contractors (Mechanical, Electrical, Plumbing, Controls Electrical, DDC, TAB, and others). Preliminary Pre-Functional Checklists and Functional Test Plans will be included to describe the level of involvement required of all parties.
- C. The CxA will provide preliminary Commissioning Milestones, predecessors, successors, and durations to the CPM. The CPM will be able to use these data to integrate commissioning activities into the project construction schedule. The CxA will align commissioning activities with the construction schedule for each construction phase.
- D. The CxA will attend periodic Owner/Architect/Contractor (O/A/C) meetings to discuss commissioning activities, field reports, issues log and responses to commissioning issues noted during construction.
- E. Regular Commissioning Progress meetings will be held for each construction phase. These meetings are a forum to review progress and to discuss issues affecting installation, coordination, startup, and testing of the systems to be commissioned. Meeting attendees should include the Commissioning Agent, RE, CPM, mechanical, electrical, plumbing, controls and TAB subcontractors. Design team members, especially the MEP designers are also encouraged to attend.
- F. It is anticipated these meetings will be held monthly during the early stage of construction. As the mechanical, electrical and plumbing systems are being installed, it is likely the commissioning meetings will be held bi-weekly.
- G. The Commissioning Agent will witness selected equipment startups for mechanical, electrical and plumbing components. The purpose will be to observe any issues that may arise that would affect equipment or system operations.



- H. The Commissioning Agent will conduct periodic Field Observations to review construction progress, overall quality of workmanship, and to review maintenance access to equipment. The CxA will issue a Field Observation Report following each visit. The report will describe any specific observations that are found. The specific observations will be tracked on the Commissioning Master Issues Log.
- I. The RE, CPM, installing sub-contractors and the Design Team (as necessary) should review the Field Reports to determine the most appropriate resolution for the issue. The CxA will assist in determining the resolution as requested. The status of issue resolution will be a primary topic of discussion at the Commissioning Progress meetings and O/A/C meetings.
- J. The CxA will review selected submittals and shop drawings relative to the systems to be commissioned. The review will be to determine if sufficient information is provided to describe system installation, operation and the information necessary to commission the equipment and systems.
- K. The CxA will review the Operations & Maintenance data submitted by the installing contractor and the CPM. The Commissioning Specification provides specific requirements for O&M Manuals that are more detailed for those systems to be commissioned. The O&M Manuals will be review to determine compliance with these additional requirements.
- L. The Cx A will prepare systems narratives and other information to be added to the O&M data provided by the installing contractors and the CPM to become the Systems Operations and Maintenance Manual (SOMM). The SOMM will provide operations and maintenance staff with an overview of the system design parameters, intended operating conditions and sequences. It will also provide data necessary to maintain and troubleshoot the equipment and systems.
- M. The installing contractors and the CPM will prepare equipment training plans intended to provide basic equipment operating and maintenance procedures. The installing contractors and the CPM will prepare training plans that will outline the training to be provided and the intended outcome of the training. The CxA will review the training plans to determine that the training will meet the requirements of the specifications and the FMD staff.
- N. The Commissioning Agent will prepare Pre-Functional Checklists that the installing sub-contractors will complete to document equipment and systems are complete and ready for testing.



- O. The Commissioning Agent will also prepare detailed System Functional Performance Test plans that will provide detailed step-by-step procedures that will be used to verify system operations under all operating conditions. These test procedures will be issued to the RE, CPM, installing Contractors, DDC, TAB and FMD for review and comment. The reviews should focus on the ability to implement the steps, especially the control systems adjustments, necessary to perform the test. The reviewers should also note any procedures that would damage the equipment or system.
- P. The installing sub-contractors are encouraged to use the System Functional Test Plans as a tool for pre-testing the equipment and systems prior to the “official” functional testing. This will allow early detection and resolution of problems.
- Q. The CxA will assist the CPM in scheduling equipment training. The CxA will review training plans prepared by the CPM and the installing sub-contractors.
- R. The CxA will conduct enhanced systems training for FMD staff. This training will focus on the system operation, design criteria, and troubleshooting of systems level issues. It is anticipated that the enhanced systems training will be conducted prior to functional testing to facilitate participation of the FMD staff in the testing activities.
- S. It is the expectation that System Functional Testing will demonstrate that the systems perform in accordance with design criteria, construction documents and VA requirements. Functional testing pre-requisites are that the system components and equipment are completely installed, all required power connections are complete, all required control connections and control functions are operational, and that required air and hydronic testing and balancing has been completed. When required by construction specifications, third-party testing must also be complete and required test reports have been submitted to the RE and CxA for review.
- T. Functional testing of each system to be commissioned will be conducted by the CxA. The CxA will witness and document the testing; the installing sub-contractors, DDC contractor, and TAB contractor will conduct the testing by operating the equipment, adjusting the control system and performing measurements in accordance with the System Functional Test Plan. The FMD staff is encouraged to assist in the testing as an additional training opportunity.



- U. Issues and/or failures detected during the Functional Performance Testing will be documented on the test plan, on Field Observation reports and on the Master Issues Log. Installing sub-contractors, DDC contractor, and/or TAB contractor will be responsible for correcting each issue as directed by the RE, and reporting the corrective action to the RE and CxA. The CxA will document the corrective action on the Master Issues Log. The need for re-testing will be determined by the RE in consultation with the CxA..
- V. Upon completion of all commissioning activities, including resolution of all issues on the Commissioning Master Issues Log, the CxA will prepare and issue the Final Commissioning Report. This report will include the final version of the Commissioning Plan, copies of all Commissioning Meeting Minutes, Commissioning Field Observation Reports, Pre-Functional Checklists, Functional Performance Test results, and the Commissioning Master Issues Log. The report will also include blank copies of the Functional Test Plans for use by FMD for future re-commissioning activities.

X. Warranty Phase Commissioning

- A. The CxA will review operational data from the VAMC DDC System to monitor system operations. Significant deviations from defined criteria will be noted and referred to FMD for further investigation.
- B. Conduct any deferred or seasonal functional testing that was not completed during the Construction and Acceptance Phase. Issues identified during the deferred or seasonal testing will be documented on the Commissioning Issues Log. The CPM will be notified of the issue and will be responsible for resolution. The CPM will document the resolution and the CxA and FMD will verify the resolution. The RE in consultation from the CxA, will determine the need for re-testing.
- C. Conduct a 10-month warranty review to identify any potential warranty issues prior to expiration of the warranty. The warranty review will include interviews with FMD staff and an on-site inspection of systems and equipment condition and operations.
- D. Warranty issues identified during the review will be documented on the Commissioning Issues Log. Written notice of potential warranty issues will be provided to the RE. Upon direction by the RE, the CPM will schedule appropriate sub-contractors to correct the issues within the balance of the warranty period. The CPM will provide written documentation that each warranty issue has been resolved. The CxA and FMD will spot-check selected issues to verify resolution.



- E. The CxA will prepare an amendment to the Final Commissioning Report to document the deferred or seasonal testing, any re-testing, and the results of the warranty review.

XI. Team Member Roles and Responsibilities

- A. The following is an outline of team member responsibilities in the Design, Construction and Acceptance, and Warranty phases of the commissioning process. These responsibilities are meant to be limited to those tasks related to the commissioning process and are not intended to be representative of each team member's contractual responsibilities for other aspects of this project.
- B. In the table that follows, the tasks identified for the "CxA" include the Commissioning Project Manager, Commissioning Technical Lead, or other Commissioning Specialists and sub-consultants as directed by the CxA.
- C. In the table that follows, the tasks identified for the "Design Team" include the Architect, MEP Engineer, Structural Engineer or other design consultants as directed by the RE and Architect.
- D. In the table that follows, the tasks identified for "Contractor" include the Construction Project Manager, as well as the commissioning representatives for the installing sub-contractors, as directed by the RE and the Construction Project Manager.
- E. In the table that follows, the tasks identified for "DDC" include the owner's DDC Vendor as directed by the RE and CPM.
- F. In the table that follows, the tasks identified for "TAB" include the owner's TAB Vendor as directed by the RE or CPM.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
Design	Review Owner's Project Requirements	Review VAMC Design Criteria and Owner's Project Requirement document prior to submission to LEED Facilitator.	VA PM	<ul style="list-style-type: none">Prepare and issue Owner's Project Requirements based on specific requirements, Ed Specs and District Design Criteria.
			CxA	<ul style="list-style-type: none">Review and comment on Owner's Project Requirements. Submit comments to the PM and QA.
			Design Team	<ul style="list-style-type: none">Review for understanding project requirements.
			CPM	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None
			TAB	<ul style="list-style-type: none">None
Design	Review Design Narrative	Review the Design Narrative Document	VA PM	<ul style="list-style-type: none">Receive and distribute Basis of Design documents to CPM, CxA, and other VAMC agencies as necessary.
			CxA	<ul style="list-style-type: none">Review Design Narrative document.Provide comment log to PM and Design Team.
			Design Team	<ul style="list-style-type: none">Prepare Phase 1 (Schematic Design) and Design Narrative to describe design approach.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
Design	Review Schematic design	Review Schematic Design for familiarization, general conformance with Owner's Project Requirements, Basis of Design and VAMC Design Criteria.	CPM	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None
			TAB	<ul style="list-style-type: none">None
			VA PM	<ul style="list-style-type: none">Receive and distribute Schematic Design package to Peer Reviewer, CxA, and other VAMC agencies as necessary.
			CxA	<ul style="list-style-type: none">Review Schematic DesignProvide comment log to PM and QA.
			Design Team	<ul style="list-style-type: none">Prepare Schematic Design.Provide responses to CxA review comments.Incorporate changes into design as directed by PM.
			CPM	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None
			TAB	<ul style="list-style-type: none">None



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
Design	Design Development design	Review Design Development design for familiarization, general conformance with Owner's Project Requirements, Design Narrative, and VA Design Criteria.	VA PM	<ul style="list-style-type: none">Receive and distribute Design Development package to Peer Reviewer, CxA, DDC and other VAMC agencies as necessary.
			CxA	<ul style="list-style-type: none">Review Design Development drawings and specs.Update Design NarrativeProvide comment log to PM and QA.
			Design Team	<ul style="list-style-type: none">Prepare Design Development drawings and specs.Provide responses to CxA review comments.Incorporate changes into design as directed by PM.
			CPM	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None.
			TAB	<ul style="list-style-type: none">None
Design	Commissioning Specifications	Prepare Commissioning Specification "Section 01 91 00 – General	VA PM	<ul style="list-style-type: none">Review, comment and approve Cx specifications as part of project manual review.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
		Commissioning Requirements” to be included in project manual. Prepare Commissioning Specification for Division 23 – HVAC, Division 26 – Electrical to provide detailed commissioning, operations & maintenance and training requirements for individual technical specification sections.	CxA	<ul style="list-style-type: none">• Prepare Cx Specification Section 01 91 13.• Prepare systems commissioning specifications.
			Design Team	<ul style="list-style-type: none">• Incorporate commissioning specifications into Project Manual.
			CPM	<ul style="list-style-type: none">• None.
			DDC	<ul style="list-style-type: none">• None.
			TAB	<ul style="list-style-type: none">• None.
Design	Design Phase Controls Meeting	Meet with Owner, Architect, and Mechanical/Electrical Design Engineer to review Building Control Systems and Sequences of Operations. The focus of the meeting will be to obtain understanding of the interactions between systems and the control system in various operating modes.	VA PM	<ul style="list-style-type: none">• Schedule, facilitate and attend meeting.
			CxA	<ul style="list-style-type: none">• Attend meeting to discuss control sequences and strategies.
			Design Team	<ul style="list-style-type: none">• Attend meeting to discuss control sequences and strategies.
			CPM	<ul style="list-style-type: none">• None
			DDC	<ul style="list-style-type: none">• None.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			TAB	<ul style="list-style-type: none">None
Design	Preliminary Commissioning Plan	Prepare Preliminary Commissioning Plan that describes the Commissioning Process, Commissioning Team with specific Roles and Responsibilities. The Commissioning Plan will include description of systems to be commissioned.	VA PM	<ul style="list-style-type: none">Review Cx PlanProvide comments to CxA.
			CxA	<ul style="list-style-type: none">Prepare Cx PlanSubmit to PM and QA
			Design Team	<ul style="list-style-type: none">Review Cx Plan relative to Design Team roles and responsibilities.
			CPM	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None.
			TAB	<ul style="list-style-type: none">None.
Design	Focused Construction Document Review (Progress Set)	Perform a focused review of a Construction Document progress submission (recommend review prior to the 50% CD stage).	VAMC PM	<ul style="list-style-type: none">Receive and distribute Progress Set drawings and specs to QA, CxA, DDC and other VAMC agencies as necessary.
			CxA	<ul style="list-style-type: none">Review Progress Set drawings and specs.Update Design NarrativeProvide comment log to PM and QA.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			Design Team	<ul style="list-style-type: none">• Prepare Progress Set drawings and specs.• Provide responses to CxA review comments.• Incorporate changes into design as directed by PM.
			CPM	<ul style="list-style-type: none">• None
			DDC	<ul style="list-style-type: none">• None.
			TAB	<ul style="list-style-type: none">• None
Design	Focused Construction Document Review	Perform a focused review of the final Construction Document submission. This review will include a back check of commissioning comments provided during previous reviews.	VA PM	<ul style="list-style-type: none">• Receive and distribute Construction Documents package to QA, CxA, DDC and other VAMC agencies as necessary.
			CxA	<ul style="list-style-type: none">• Review Construction Document drawings and specs.• Update Design Narrative• Provide comment log to PM and QA.
			Design Team	<ul style="list-style-type: none">• Prepare Construction Documents drawings and specs.• Provide responses to CxA review comments.
			CPM	<ul style="list-style-type: none">• None.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			DDC	<ul style="list-style-type: none">None
			TAB	<ul style="list-style-type: none">None.
Design	Design Phase Meetings	Participate in Design Phase meetings.	VA PM	<ul style="list-style-type: none">Schedule, facilitate and attend meetings
			CxA	<ul style="list-style-type: none">Attend approximately selected meetings to discuss Commissioning Issues.
			Design Team	<ul style="list-style-type: none">Conduct meetingsProvide meeting minutes to PM, CxA and others as directed by PM.
			CPM	<ul style="list-style-type: none">None
			DDC	<ul style="list-style-type: none">None.
			TAB	<ul style="list-style-type: none">None.
Design	Focused Design Review Meetings	Attend Design Review meetings with to review the design and specific commissioning design review comments.	VA PM	<ul style="list-style-type: none">Schedule, facilitate and attend meetings.
			CxA	<ul style="list-style-type: none">Attend meetings to discuss commissioning review comments.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			Design Team	<ul style="list-style-type: none">Attend meetings to discuss design and to respond to commissioning and DDC comments.
			CPM	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None.
			TAB	<ul style="list-style-type: none">None.
Construction	Final Commissioning Plan	Based on the final construction documents, update the Preliminary Commissioning Plan to identify specific systems to be commissioned. The Final Commissioning Plan will also include specific individual roles and responsibilities and preliminary Pre-Functional Checklists and Functional Test Plans for systems to be commissioned.	VAMC PM	<ul style="list-style-type: none">Review and approve Commissioning Plan.Provide comments to CxA and QA.
			CxA	<ul style="list-style-type: none">Prepare Final Commissioning Plan.Prepare preliminary Pre-Functional ChecklistsPrepare Preliminary Systems Functional Performance Test procedures.Issue to PM and QA.Incorporate comments into Cx Plan revisions as necessary.
			Design Team	<ul style="list-style-type: none">Review Cx Plan relative to Design Team roles and responsibilities.Provide comments to PM and CxA.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			CPM	<ul style="list-style-type: none">Review Cx Plan relative to CPM and installing sub-contractor's roles and responsibilities.Provide comments to PM and CxA.
			DDC	<ul style="list-style-type: none">Review Cx Plan relative to DDC roles and responsibilities.Provide comments to QA and CxA.
			TAB	<ul style="list-style-type: none">Review Cx Plan relative to TAB roles and responsibilities.Provide comments to QA and CxA.
Construction	Construction Commissioning Kick Off meeting	Conduct an initial commissioning meeting with all contractors and commissioning team members. The purpose of the meeting will be to establish the purpose and proposed process for commissioning this facility in the construction, acceptance and warranties phases of the project. Review the individual roles and responsibilities of each participating commissioning team member as specified in the Construction	VA RE	<ul style="list-style-type: none">Schedule, facilitate and attend meeting.
			CxA	<ul style="list-style-type: none">Conduct meeting.Prepare, present and discuss commissioning tasks, roles and responsibilities.Prepare meeting agenda and minutes.
			Design Team	<ul style="list-style-type: none">Attend meeting.
			CPM	<ul style="list-style-type: none">Attend meeting.
			DDC	<ul style="list-style-type: none">Attend meeting



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
		Documents.	TAB	<ul style="list-style-type: none"> Attend meeting.
Construction	Duration Schedule for Commissioning Activities	Based on Final Commissioning Plan, prepare a duration schedule to show the duration, predecessors and successors for commissioning activities. This duration schedule will be provided to the Construction Manager to include commissioning activities in the project construction schedule. This will allow commissioning activities to be smoothly integrated into the overall construction process.	VA RE	<ul style="list-style-type: none"> Review commissioning schedule data. Coordinate with CPM to incorporate commissioning activities into project schedule.
			CxA	<ul style="list-style-type: none"> Prepare and issue commissioning activities schedule, including durations and predecessors. Review project schedule prepared by CPM.
			Design Team	<ul style="list-style-type: none"> None.
			CPM	<ul style="list-style-type: none"> Incorporate commissioning activities into Master Construction Schedule.
			DDC	<ul style="list-style-type: none"> Review project schedule prepared by CPM.
			TAB	<ul style="list-style-type: none"> Review project schedule prepared by CPM.
Construction	Submittal and Shop Drawing Review List	Based on final construction documents, prepare a list of selected submittals and shop drawings for review by the Commissioning	VA RE	<ul style="list-style-type: none"> None.
			CxA	<ul style="list-style-type: none"> Prepare list of submittals and shop drawings to be provided to the CxA.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
		Authority.	Design Team	<ul style="list-style-type: none">None.
			CPM	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None.
			TAB	<ul style="list-style-type: none">None.
Construction	Submittal and Shop Drawing Review	Review selected submittals and shop drawings to support the commissioning process. Review will be for the purpose of developing appropriate Pre-Functional Checklists and Functional Test Plans. Reviews will focus on the ability to commission the systems, maintainability and general conformance to owner's requirements. Commissioning review of submittals and shop drawings does not replace the Design Team responsibility for approval.	VA RE	<ul style="list-style-type: none">Receive and distribute submittals and shop drawings.Distribute selected submittals and shop drawings to CxA.Review and approve submittals
			CxA	<ul style="list-style-type: none">Review selected submittals and shop drawings.Prepare issue comment log
			Design Team	<ul style="list-style-type: none">Review submittals and shop drawings.Provide comments and recommendations to VA RE.
			CPM	<ul style="list-style-type: none">Prepare and issue submittals and shop drawings.Incorporate RE comments into revised submittals and shop drawings.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			DDC	<ul style="list-style-type: none">• Prepare and issue DDC submittals and shop drawings.• Incorporate RE comments into revised submittals and shop drawings.
			TAB	<ul style="list-style-type: none">• None.
Construction	Controls Meeting	After receipt of the Controls Submittal, participate in or conduct a meeting with the Owner's representatives, Owner's Control Vendor, Owner's TAB contractor, Mechanical/Electrical Design team, mechanical sub-contractor and electrical sub-contractor to review the Controls Submittal and mechanical/electrical systems to be installed. Focus will be on how the selected sequences of operation interact with the mechanical/electrical systems and how well they meet the owner's requirements.	VA RE	<ul style="list-style-type: none">• Schedule, facilitate and attend meeting.
			CxA	<ul style="list-style-type: none">• Conduct Meeting• Prepare meeting agenda and minutes.
			Design Team	<ul style="list-style-type: none">• Attend meeting
			CPM	<ul style="list-style-type: none">• Coordinate and schedule Mechanical, Electrical and Controls Electrical sub-contractors to attend meeting.• Attend meeting.
			DDC	<ul style="list-style-type: none">• Attend meeting
			TAB	<ul style="list-style-type: none">• None.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
Construction	Pre-Functional Checklists	Prepare Pre-Functional Checklists for systems, components and/or equipment to be commissioned. These Pre-Functional Checklists will be used to document completion of system, component and/or equipment installation and to determine system readiness for functional testing.	VA RE	<ul style="list-style-type: none">Review checklistsProvide comments to CxA
			CxA	<ul style="list-style-type: none">Prepare preliminary checklists.Issue to RE and CPM for reviewIncorporate changes into final checklists as necessary.
			Design Team	<ul style="list-style-type: none">None.
		Pre-Functional Checklists should be completed by the installing contractors to document the installation process. Completed Pre-Functional Checklists are to be submitted to the commissioning authority a minimum of seven days prior to testing.	CPM	<ul style="list-style-type: none">Provide copies of sub-contractor QC installation checklists to CxA for review.Review checklists prepared by CxAProvide comments to CxA
			DDC	<ul style="list-style-type: none">Review checklists prepared by CxAProvide comments to CxA
			TAB	<ul style="list-style-type: none">Review checklists prepared by CxAProvide comments to CxA
Construction	Review Contractor Equipment	Commissioning authority will review selected equipment	VA RE	<ul style="list-style-type: none">Receive and distribute Contractor Startup Reports



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
	Startup Reports	startup reports prepared by installing contractor. Commissioning Agent will witness selected equipment startup procedures. Seven days prior notice is required to schedule commission authority witnessing the startup.	CxA	<ul style="list-style-type: none">• Witness selected contractor equipment startups.• Review selected Contractor Startup Reports.• Provide comment log to RE and QA.
			Design Team	<ul style="list-style-type: none">• Review Contractor Startup Reports.
			CPM	<ul style="list-style-type: none">• Complete Contractor Startup Reports• Issue to RE and CxA.
			DDC	<ul style="list-style-type: none">• Review selected Contractor Startup Reports.
			TAB	<ul style="list-style-type: none">• Review selected Contractor Startup Reports.
Construction	Prepare Functional Test Procedures	Based on final construction documents (including applicable changes), and approved submittals, prepare Functional Test Procedures for systems to be commissioned. Draft Functional Test Procedures will be issued for review by owner, installing contractors and DDC Vendor. Final Functional Test	VA RE	<ul style="list-style-type: none">• Review preliminary Functional Test Procedures.• Provide comments to CxA
			CxA	<ul style="list-style-type: none">• Prepare preliminary Functional Test Procedures.• Issue to RE, CPM and DDC.• Incorporate comments into final Functional Test Procedures as necessary.
			Design Team	<ul style="list-style-type: none">• None.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
		Procedures will be prepared incorporating review comments received from owner, contractors or DDC Vendor.	CPM	<ul style="list-style-type: none">Distribute preliminary Functional Test Procedures to MC, EC and other installing sub-contractors.Review preliminary Functional Test ProceduresProvide comments to CxA
			DDC	<ul style="list-style-type: none">Review preliminary Functional Test ProceduresProvide comments to CxA
			TAB	<ul style="list-style-type: none">Review preliminary Functional Test ProceduresProvide comments to CxA
Construction	TAB Plan Review	Review HVAC systems Test and Balance Plan prepared by the TAB vendor. Review will be to determine general conformance with owner's requirements.	VA RE	<ul style="list-style-type: none">Distribute TAB Plan to CxA, QA, CPM and Design Team.
			CxA	<ul style="list-style-type: none">Review TAB PlanProvide comment log to PM and QA
			Design Team	<ul style="list-style-type: none">Review and approve TAB Plan.
			CPM	<ul style="list-style-type: none">Review TAB PlanProvide comments to PM
			DDC	<ul style="list-style-type: none">Review TAB PlanProvide comments to QA, CxA and PM



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			TAB	<ul style="list-style-type: none">Prepare preliminary TAB PlanIssue to PM and QA.Incorporate comments into Final TAB Plan as necessary.
Construction	TAB Report Review	Review TAB Report prepared by TAB vendor following system air and water balancing. Review will be focused on TAB results that affect system performance and/or commissioning. Specific attention will be given to equipment installation and operational issues identified by the TAB vendor.	VA RE	<ul style="list-style-type: none">Distribute TAB report to Design Team, and CxA.Approve TAB Report in consultation with Design Team and CxA.
			CxA	<ul style="list-style-type: none">Review TAB report.Provide comments to RE and Design Team.
			Design Team	<ul style="list-style-type: none">Review and provide recommendations to RE.
			CPM	<ul style="list-style-type: none">Review and submit TAB Report.
			DDC	<ul style="list-style-type: none">None
			TAB	<ul style="list-style-type: none">Provide preliminary TAB data (daily worksheets) to CxA for preliminary review.Prepare TAB ReportIssue TAB report to RE.
Construction	Review O & M Manuals	Review Operations and Maintenance Manuals submitted by contractors. Manuals will be reviewed for	VA RE	<ul style="list-style-type: none">Distribute O&M Manuals to CxA and Design Team.Review and approve O&M Manuals.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
		clarity, organization, usability and general conformance with specifications and owner's requirements.	CxA	<ul style="list-style-type: none">Review O&M Manuals.Provide comment log to RE and QA.
			Design Team	<ul style="list-style-type: none">Review O&M Manuals.
			CPM	<ul style="list-style-type: none">Prepare and issue O&M Manuals to PM.
			DDC	<ul style="list-style-type: none">Prepare and issue DDC O&M Manuals to PM.
			TAB	<ul style="list-style-type: none">None.
Construction	Prepare Systems Manuals for commissioned systems	Prepare detailed systems manuals for commissioned systems. The manuals will provide operating staff the information needed to understand and optimally operate the commissioned systems. The manuals will describe system design, components, capacity and sequences of operations. Manuals will include descriptions of interactions with other systems and common systems failure modes and responses.	VA RE	<ul style="list-style-type: none">Review and approve Systems Manuals.Distribute Systems Manuals to FMD.
			CxA	<ul style="list-style-type: none">Using O&M Manuals, Basis of Design, and Construction Documents, prepare Systems Manual.
			Design Team	<ul style="list-style-type: none">None.
			CPM	<ul style="list-style-type: none">None>
			DDC	<ul style="list-style-type: none">None.
			TAB	<ul style="list-style-type: none">None.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
Construction	Review Training Plans	Review contractor and manufacturer training plans and agendas for general conformance with specifications and owner's requirements. Observe selected training for quality of training and for general conformance with the training plan and agenda.	VA RE	<ul style="list-style-type: none">Schedule and facilitate training sessions.FMD staff attends training sessions.
			CxA	<ul style="list-style-type: none">Review Training Plans.Provide comment logWitness selected training sessions.
			Design Team	<ul style="list-style-type: none">None.
			CPM	<ul style="list-style-type: none">In conjunction with installing sub-contractors and/or manufacturers' representatives, conduct training sessions.
			DDC	<ul style="list-style-type: none">Conduct DDC training sessions.
			TAB	<ul style="list-style-type: none">None.
Construction	Warranty Review	Review contractor's and manufacturer's warranties for general conformance with specifications and owner's requirements.	VA RE	<ul style="list-style-type: none">Distribute warranty documents to FMD and CxAReview and approve warranty documents
			CxA	<ul style="list-style-type: none">Review warranty documents.Provide comment log
			Design Team	<ul style="list-style-type: none">Review warranty documents and provide comments.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			CPM	<ul style="list-style-type: none">Prepare and issue warranty documentsIncorporate comments into final warranty documents.
			DDC	<ul style="list-style-type: none">Prepare and issue warranty documents for DDC.Incorporate comments into final warranty documents.
			TAB	<ul style="list-style-type: none">None
Construction	Systems Functional Testing	Witness and document functional testing for systems to be commissioned. Testing will be conducted as detailed on the specific Functional Test Plan for each system to be commissioned. Functional testing will require support from the CPM, MC, EC, DDC and TAB Vendor. Installing contractors should be available to respond to issues and problems identified during testing.	VA RE	<ul style="list-style-type: none">Schedule, facilitate and witness systems functional testing.FMD staff should assist in functional testing as additional systems training opportunity.
			CxA	<ul style="list-style-type: none">Witness systems functional testing using previously prepared Functional Test Procedures.Document systems testing on Functional Test Procedures.Issue Field Reports to document deficiencies.Update Master Commissioning Issues Log to document and track deficiencies.
			Design Team	<ul style="list-style-type: none">Review test documentation



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			CPM	<ul style="list-style-type: none">• CPM, MC and EC to conduct functional testing by operating systems in accordance with functional test procedures.• Make corrections, repairs or adjustments to systems during testing as directed by the RE.• Correct outstanding deficiencies after testing as directed by the RE.• Report corrective actions to RE and CxA upon completion.
			DDC	<ul style="list-style-type: none">• Conduct functional testing by operating DDC in accordance with CxA directions and functional test procedures.• Assist in troubleshooting and corrective action as necessary
			TAB	<ul style="list-style-type: none">• Assist functional testing as directed by the RE and functional test procedures.• Verify selected DDC data by spot measurements of air and/or water balancing data.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
Construction	Systems Functional Retesting	Retest systems with deficiencies as recommended by the CxA and directed by the PM (Note: Retesting is not included in the scope of commissioning services and is provided as an additional service. The costs associated with retesting may be recovered from the Construction Manager in accordance with appropriate contract provisions.)	VA RE	<ul style="list-style-type: none">• Approve retesting as recommended by CxA.• Schedule and coordinate retesting.
			CxA	<ul style="list-style-type: none">• Make recommendations for necessary retesting.• Coordinate with RE to schedule retesting after deficiencies are corrected.
			Design Team	<ul style="list-style-type: none">• None
			CPM	<ul style="list-style-type: none">• Make necessary system repairs, adjustments and/or corrections prior to retesting.• Coordinate retesting as directed and approved by the RE.• Conduct systems retesting by operating systems as directed by RE and functional test procedures.
			DDC	<ul style="list-style-type: none">• Assist in systems retesting by operating DDC as directed by RE and functional test procedures.
			TAB	<ul style="list-style-type: none">• None.
Construction	Construction Observation	Conduct visits to the construction site to observe construction	VA RE	<ul style="list-style-type: none">• None.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
		activities. Specific attention will be given to installation of mechanical, electrical, and plumbing systems for general conformance with specifications and manufacturer's installation requirements. Specific attention will also be given to installation of site utilities, site improvements and building envelope construction for general conformance with plans, specifications and manufacturer's installation requirements.	CxA	<ul style="list-style-type: none">• Conduct Construction Observation visits to observe construction progress, systems/equipment installation and general quality of construction.• Prepare Field Report to document general and specific observations and issues.• Update Master Issues Log to document and track specific issues reported on Field Report.• Monitor and verify corrective actions.• Update Master Issues Log to document corrective action progress and completion.
			Design Team	<ul style="list-style-type: none">• Review Master Issues Log
			CPM	<ul style="list-style-type: none">• Review Field Reports• Review Master Issues Log• Provide corrective actions as directed by the RE to resolve outstanding issues.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			DDC	<ul style="list-style-type: none">Review Field Reports relative to DDC issues.Review Master Issues Log relative to DDC issues.Report progress of corrective actions relative to DDC issues.
			TAB	<ul style="list-style-type: none">Review Field Reports relative to issues affecting TAB.Review Master Issues Log relative to issues affecting TAB.Report corrective actions relative to issues affecting TAB.
Construction	Final Commissioning Report	Compile a comprehensive commissioning report documenting all commissioning activities, including but not limited to: <ul style="list-style-type: none">Commissioning scopeTest methods and resultsOutstanding commissioning issuesIssues logCommissioning plan	VA RE	<ul style="list-style-type: none">Review preliminary Commissioning Report.Provide comments to CxA.Review and approve Final Commissioning Report
			CxA	<ul style="list-style-type: none">Prepare preliminary Commissioning Report.Incorporate VA comments into final report.Issue Final Commissioning Report.
			Design Team	<ul style="list-style-type: none">Review Final Commissioning Report



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
		<ul style="list-style-type: none">• Status reports• Submittal and O&M manual reviews• Training record• Pre-Functional Checklists• Design Review Comments	CPM	<ul style="list-style-type: none">• Review Final Commissioning report• Report on progress and completion of corrective actions.
			DDC	<ul style="list-style-type: none">• Review Final Commissioning Report.• Report on progress and completion of corrective actions relative to DDC.
			TAB	<ul style="list-style-type: none">• Review Final Commissioning Report.• Report on progress and completion of corrective actions relative to TAB.
Construction	Owner Architect and Construction Manager Meetings (Construction Phase)	Attend selected Owner/Architect/Contractor Meetings to discuss commissioning issues, review the Commissioning Issues Log, and to maintain awareness of general construction schedule and issues.	VA RE	<ul style="list-style-type: none">• Schedule, facilitate and attend meetings.
			CxA	<ul style="list-style-type: none">• Attend selected meetings to review commissioning issues.
			Design Team	<ul style="list-style-type: none">• Attend meetings.
			CPM	<ul style="list-style-type: none">• Conduct meetings.• Prepare and issue Meeting Minutes.
			DDC	<ul style="list-style-type: none">• Attend selected meetings to review DDC issues.
			TAB	<ul style="list-style-type: none">• Attend selected meetings to review TAB issues.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
Construction	Status Reports	Provide monthly status reports detailing activities, significant unresolved issues, and upcoming commissioning activities. Prepare report outlining status of deliverables for the project. Status reports are submitted with invoices for professional services.	VA RE	<ul style="list-style-type: none">Review and approve status reports.
			CxA	<ul style="list-style-type: none">Prepare Status Reports to summarize commissioning activities, significant unresolved issues and provide a two-month look-ahead of commissioning activities.
			Design Team	<ul style="list-style-type: none">None.
			CPM	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None.
			TAB	<ul style="list-style-type: none">None.
Construction	Master Issues Log	Maintain a Commissioning Issues Log to document commissioning issues identified during construction and	VA RE	<ul style="list-style-type: none">Review Master Issues LogCoordinate and direct corrective actions to resolve commissioning issues.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
		functional testing. The Commissioning Issues Log will include recommended responsible party and recommendations for resolution of the issue. The Commissioning Issues Log will also be used to document progress toward resolution and the final resolution	CxA	<ul style="list-style-type: none">• Provide monthly updates to Master Commissioning Log.• Provide updated Master Commissioning Log after each Construction Visit to document specific issues observed during the visit.• Update Master Issues Log to document progress on corrective actions.• Update Master Issues Log to document completion of corrective actions.
			Design Team	<ul style="list-style-type: none">• None.
			CPM	<ul style="list-style-type: none">• Review Master Issues Log.• Provide status of corrective actions.• Provide notification of corrective action completion.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			DDC	<ul style="list-style-type: none">Review Master Issues Log.Provide documentation of punch list or other issues noted by DDC vendor.Provide status of corrective actions relative to DDC issues.Provide notification of corrective action completion relative to DDC issues.
			TAB	<ul style="list-style-type: none">Review Master Issues Log.Provide documentation of punch list or other issues noted by TAB vendor.Provide status of corrective actions relative to TAB issues.Provide notification of corrective action completion relative to TAB issues.
Construction	Review Change Orders, ASI, and RFI	Review change orders, architect's supplemental instructions and requests for	VA RE	<ul style="list-style-type: none">Issue change orders, ASI and/or RFI.Provide copies of change orders, ASI and RFI to CxA



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
		information (with design team response) for issues that affect commissioning. Review is for information only and does not constitute technical or contractual approval or disapproval.	CxA	<ul style="list-style-type: none">Review change orders, ASI, and RFI for changes that affect system/equipment design or installation.Incorporate changes into revised Functional Test Procedures or Pre-Functional Checklists.
			Design Team	<ul style="list-style-type: none">Respond to RFIs.Prepare change orders and/or ASI.Update construction documents as necessary.
			CPM	<ul style="list-style-type: none">Issue RFI.Request change orders and ASI as needed.
			DDC	<ul style="list-style-type: none">Monitor system changes for impact on DDC installation and/or sequences of operations.Update DDC programming or sequences of operations to implement approved changes.
			TAB	<ul style="list-style-type: none">Monitor system changes for impact on TAB.Update TAB Plan as necessary to implement approved changes.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
Warranty	Monitor Systems Operation	Monitor system operation using trend data from DDC.	VA RE	<ul style="list-style-type: none">Coordinate corrective actions with CPM as necessary
			CxA	<ul style="list-style-type: none">Periodically monitor systems operation using DDC trend data.Prepare and issue brief narrative reports documenting issues noted during systems monitoring.Update Master Commissioning Log with issues noted during systems monitoring.
			Design Team	<ul style="list-style-type: none">None.
			CPM	<ul style="list-style-type: none">Provide corrective actions as directed by RE.
			DDC	<ul style="list-style-type: none">Provide corrective actions as directed by RE.
			TAB	<ul style="list-style-type: none">None.
Warranty	Deferred and/or seasonal Testing	Direct testing that was deferred due to lack of system readiness or for seasonal requirements. Testing will be conducted in accordance with Functional Test Plans.	VA RE	<ul style="list-style-type: none">Schedule, facilitate and witness deferred/seasonal testing.FMD staff should assist in deferred/seasonal as additional systems training opportunity.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
		Testing support will be required from the DDC Vendor and FMD.	CxA	<ul style="list-style-type: none">• Witness deferred/seasonal testing using previously prepared Functional Test Procedures.• Document deferred/seasonal testing on Functional Test Procedures.• Issue Field Reports to document deficiencies.• Update Master Commissioning Issues Log to document and track deficiencies.
			Design Team	<ul style="list-style-type: none">• None.
			CPM	<ul style="list-style-type: none">• CPM, MC and EC will conduct seasonal/deferred testing by operating systems in accordance with RE directions and functional test procedures.• Make corrections, repairs or adjustments to systems during testing as directed by the RE.• Correct outstanding deficiencies after testing as directed by the RE.• Report corrective actions to RE and CxA upon completion.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
			DDC	<ul style="list-style-type: none">Conduct deferred/seasonal testing by operating DDC in accordance with CxA directions and functional test procedures.Assist in troubleshooting and corrective action as necessary
			TAB	<ul style="list-style-type: none">Assist deferred/seasonal testing as directed by the CxA and functional test procedures.Verify selected DDC data by spot measurements of air and/or water balancing data.
Warranty	Post-Occupancy Warranty Checkup	Return to the project approximately 10 months into the 12 month warranty period to review the building operation with the facility staff and	VA RE	<ul style="list-style-type: none">Schedule and facilitate Warranty Checkup Visit.Direct CPM and/or DDC to provide corrective action for Warranty claims.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
		discuss outstanding issues related to commissioning and outstanding warranty issues. Provide suggestions for improvements. Assist facility staff in developing reports, documents and requests for service to remedy outstanding problems.	CxA	<ul style="list-style-type: none">• Conduct Warranty Checkup Visit.• Interview facility users and/or FMD staff to identify specific operational concerns.• Review FMD Work Order logs for potential warranty claim issues.• Verify corrective action on outstanding unresolved issues shown on Master Issues Log.• Document other deficiencies noted during Warranty Checkup Visit.• Prepare report of potential Warranty Claims noted during Warranty Checkup Visit.
			Design Team	<ul style="list-style-type: none">• None.
			CPM	<ul style="list-style-type: none">• Implement corrective actions on Warranty Claims as directed by RE.
			DDC	<ul style="list-style-type: none">• Implement corrective actions on Warranty Claims as directed by RE.
			TAB	<ul style="list-style-type: none">• None.



Commissioning Team Roles and Responsibilities				
Project Phase	Cx Task	Description	Team Member	Responsibility
Warranty	Final Commissioning Report Amendment	Amend Final Commissioning Report to document the Warranty Phase commissioning activities.	VA RE	<ul style="list-style-type: none">Review and approve Commissioning Report Amendment.
			CxA	<ul style="list-style-type: none">Prepare Final Report Amendment to document Warranty phase commissioning activities.
			Design Team	<ul style="list-style-type: none">None
			CPM	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None.
			TAB	<ul style="list-style-type: none">None.

XII. Commissioning Schedule

- A. The following is a general outline of the Commissioning Schedule for the commissioning tasks that will be performed on the project site or at H.F. Lenz Company's Offices:

Commissioning Schedule				
Project Phase	Task	Duration	Schedule	Predecessors
Design	Review Owner's Project Requirements	3 weeks	Comments submitted concurrent with design review comments	Receive Owner's Project Requirement document



Commissioning Schedule				
Project Phase	Task	Duration	Schedule	Predecessors
Design	Review Design Narrative	3 weeks	Comments submitted concurrent with design review comments	Receive Design Narrative
Design	Review 50% Design	3 weeks	Comment log issued 3 weeks after receipt of 50% design Attend 50% Design Review meeting	Receive 50% design drawings and specifications
Design	Commissioning Specifications	3 weeks	Specifications issued concurrent with Phase 2 comment log	Receive 50% drawings and specifications
Design	Design Phase Controls Meeting	1 day	Schedule after Cx 50% Design Review	50% comment log issued
Design	Preliminary Commissioning Plan	3 weeks	Preliminary Cx Plan issued concurrent with 50% comment log	Receive 50% drawings and specifications
Design	Review 75% Design	3 weeks	Comment log issued 3 weeks after receipt of 75% design Attend 75% Design Review Meeting	Receive DD-2 drawings and specifications
Design	Update Design Narrative	3 weeks	Updated Design Narrative issued 3 weeks after 75% Design Review Meeting	75% Design Review meeting. Receive 75% Design review comments from peer reviewer.
Design	Focused CD-1 Review (Progress Set)	3 weeks	Comment log with back check update issued 3 weeks after receipt of progress set. Attend CD-1 Design Review meeting	Receive CD-1 drawings and specifications
Design	Update Design Narrative	3 weeks	Updated Design Narrative issued 3 weeks after CD-1 Design Review Meeting	CD-1 Design Review meeting. Receive CD-1 Design review comments from peer reviewer.



Commissioning Schedule				
Project Phase	Task	Duration	Schedule	Predecessors
Design	Focused Final Construction Document Review	3 weeks	Comment log issued 3 weeks after receipt of final CDs	Receive Final Construction Document drawings and specifications
Design	Update Design Narrative	3 weeks	Updated Design Narrative issued 3 weeks after Final CD Design Review Meeting	Final CD Design Review meeting. Receive Final CD Design review comments from peer reviewer.
Design	Design Phase Meetings	1 day each	Scheduled by PM and Design Team	None
Construction	Preliminary Commissioning Plan	3 weeks	Concurrent with Final CD Design review	Receive Final CD drawings and specifications.
Construction	Construction Commissioning Kick Off meeting	1 day	Scheduled by RE and CPM	Contracting Officer's and RE Initial Construction Meeting
Construction	Final Commissioning Team	3 weeks	Issue 3 weeks after Construction Commissioning Kickoff Meeting	Commissioning Kickoff Meeting
Construction	Duration Schedule for Commissioning Activities	None	Issued as part of Final Commissioning Plan	Preliminary construction schedule
Construction	Submittal and Shop Drawing Request List	None	Issued as part of Final Commissioning Plan	Final Construction Document plans and specifications
Construction	Submittal and Shop Drawing Review	2 weeks	Comment log issued 2 week after receipt of shop drawings and submittals	Receipt of submittal or shop drawings. Comment log will be updated after receipt of each requested submittal



Commissioning Schedule				
Project Phase	Task	Duration	Schedule	Predecessors
Construction	Controls Meeting	1 day	Scheduled by RE and CPM Meeting notes issued 1 week after meeting.	Receive major HVAC equipment submittals. Receive DDC submittal with sequences of operations.
Construction	Pre-Functional Checklists	TBD	Preliminary checklists issued approximately 4 months prior to substantial completion Final checklists issued approximately 3 months prior to substantial completion	Receive equipment submittals Receive installing contractor's QC checklists
Construction	Witness selected Contractor Equipment Startup	1 day	Scheduled by CPM	1 week written notice of scheduled startup
Construction	Review Contractor Equipment Startup Checklists	1 week	Comment log issued 1 week after receipt of completed checklist	Receive Startup Checklist completed by installing sub-contractor.
Construction	Prepare Functional Test Procedures	TBD	Preliminary Functional Test Procedures issues approximately 4 months prior to substantial completion. Final Functional Test Procedures issues approximately 3 months prior to substantial completion	Receive all requested equipment submittals and shop drawings. Receive DDC submittal and final sequences of operations.
Construction	TAB Plan Review	1 week	Comment log issued 1 week after receiving TAB Plan	Receive TAB Plan
Construction	TAB Report Review	1 week	Comment log issued 1 week after receiving TAB Report	Receive TAB Report



Commissioning Schedule				
Project Phase	Task	Duration	Schedule	Predecessors
Construction	Review O & M Manuals	1 week	Comment log issued 1 week after receiving O&M Manuals	Receive O&M Manuals
Construction	Prepare Systems Manuals	4 weeks	Systems Manuals issued 4 weeks after receiving O&M Manuals	Receive O&M Manuals
Construction	Review Training Plans	1 weeks	Comment log issued 1 week after receiving Training Plans	Receive Training Plans
Construction	Warranty Review	1 weeks	Comment log issued 1 week after receiving Warranty documents	Receive Warranty documents
Construction	Systems Functional Testing	TBD	Functional testing to begin coordinated with construction schedule and systems completion	See separate table.
Construction	Systems Functional Retesting	TBD	TBD	Corrective actions complete



Commissioning Schedule				
Project Phase	Task	Duration	Schedule	Predecessors
Construction	Construction Observation	1 day	<p>Construction observations scheduled concurrent with progress meetings – approximately 1 visit per month.</p> <p>More frequent visits may be scheduled during the 3 months preceding substantial completion</p> <p>Cx Specialist will provide a verbal out-brief of significant issues to the CPM prior to leaving the construction site.</p> <p>Field Report will be issued 1 week following visit.</p>	None
Construction	Final Commissioning Report	4 weeks	Preliminary Commissioning Report issued approximately 4 weeks after completing Functional Testing	Functional Testing completed.
Construction	Owner Architect and Construction Manager Meetings (Construction Phase)	1 day	Scheduled by PM and CPM. CxA will attend approximately 1 meeting per month. More frequent attendance may be warranted during the 3 months prior to substantial completion.	None



Commissioning Schedule				
Project Phase	Task	Duration	Schedule	Predecessors
Construction	Status Reports	1 day	Status Reports will be issued monthly in conjunction with invoices for professional services	None
Construction	Master Issues Log	1 day	Master Issues Log will be updated and issued following each progress meeting and/or Construction Observation visit	Construction Observation visit and/or progress meeting.
Construction	Review Change Orders, ASI, and RFI	TBD	Ongoing throughout construction	Receive Change Order, ASI or RFI
Warranty	Deferred and/or seasonal Testing	TBD	Seasonal testing scheduled approximately 6 months after completing Functional Testing Deferred testing schedule to be determined	Seasonal changeover (i.e. summer-to-winter or winter-to-summer) Completion of system installation or corrective action completed
Warranty	Post-Occupancy Warranty Checkup	TBD	Scheduled approximately 10 months after substantial completion	Initial Functional Testing is complete. Seasonal/deferred testing is complete. Receive FMD work order log for HVAC equipment.
Warranty	Final Commissioning Report Amendment	2 weeks	Final Commissioning Report Amendment issued approximately 2 weeks following Warranty Checkup	Warrant Checkup visit complete



- B. The following is a general outline of the Commissioning Schedule for the Functional Testing activities that will be performed at the construction site. This information is provided to assist the General Contractor in incorporating the commissioning activities into the overall construction schedule:

Functional Testing Activities				
System	Test Duration	Schedule	Predecessors	Notes
<i>Mechanical Systems</i>				
Hydronic Pumps	4 hours per system	Functional Testing TBD	<ul style="list-style-type: none">• Pre-Functional Checklist• Equipment startup• Controls & DDC Interface Operational• TAB water balance	<ul style="list-style-type: none">• Functional testing of pump systems
Centrifugal Water Chiller Systems	1 day per system	1 week prior notice of startup by CPM Functional Testing TBD	<ul style="list-style-type: none">• Pre-Functional Checklist• Equipment startup• Controls & DDC Interface Operational• TAB water balance	<ul style="list-style-type: none">• Witness equipment startup• Functional testing of all chillers
Cooling Towers	1 day per system	1 week prior notice of startup by CPM Functional Testing TBD	<ul style="list-style-type: none">• Pre-Functional Checklist• Equipment startup• DDC Controls Operational• TAB water balance	<ul style="list-style-type: none">• Witness equipment startup• Functional testing of all cooling towers



Functional Testing Activities				
System	Test Duration	Schedule	Predecessors	Notes
Variable Frequency Motor Controls	Included in other testing	1 week prior notice of startup by CPM	<ul style="list-style-type: none">Pre-Functional ChecklistEquipment startupControls & DDC Interface Operational	<ul style="list-style-type: none">Witness selected equipment startup.Functional testing in conjunction with testing the motor and system controlled
HVAC Power Ventilators	1 – 2 hours per system	1 week prior notice of startup by CPM	<ul style="list-style-type: none">Pre-Functional ChecklistEquipment startupControls & DDC Interface OperationalTAB air balance	<ul style="list-style-type: none">Witness selected equipment startup.Functional testing of a representative sampling of equipment in conjunction with testing air handling units or other systems
Ductwork	1 day	1 week prior notice by CPM	<ul style="list-style-type: none">Ductwork complete	<ul style="list-style-type: none">Witness selected duct pressure testing
DDC System	1 day for head-end testing	1 week prior notice of startup by CPM Functional Testing TBD	<ul style="list-style-type: none">Pre-Functional ChecklistEquipment startupControls & DDC Interface OperationalTAB air & water balance	<ul style="list-style-type: none">Review DDC sequences of operation.Witness selected equipment startup.Functional testing of DDC in conjunction with air handler units, chillers, and other systems controlled.Review of DDC graphics and other human-interface equipment.Review of trend data to support functional testing and verify proper operation of systems controlled
Tests HVAC Piping Systems	1 day	1 week prior notice by CPM	<ul style="list-style-type: none">Piping system complete	<ul style="list-style-type: none">Witness selected HVAC piping tests



Functional Testing Activities				
System	Test Duration	Schedule	Predecessors	Notes
Electrical Systems				
Motor Controls	Included in other testing	TBD		<ul style="list-style-type: none">Functional testing in conjunction with system testing of equipment controlled
Integrated Systems Testing				
Loss of Utility Power Test	1 day	TBD	All functional systems testing complete with no significant deficiencies	<ul style="list-style-type: none">Tests response by all systems to loss of utility powerTests response by all systems to restoration of utility power



XIII. Appendix A – Preliminary Pre-Functional Checklists

- A. Preliminary Pre-Functional Checklists: The attached preliminary Pre-Functional Checklists are representative of the systems to be commissioned and the data to be provided on the Pre-Functional Checklists. The preliminary checklists are not all-inclusive, but have been coordinated with the specific requirements of this project. Final Pre-Functional Checklists will be developed following receipt of the equipment submittals and any updated construction documents, and specifications.

XIV. Appendix B – Functional Performance Test Procedures

- A. Preliminary and Final Systems Functional Test Procedures: Preliminary and Final System Functional Performance Test procedures shall be developed and issued for use by the Contractor and Commissioning Agent to perform functional tests. The test plans shall be coordinated with the specific requirements of this project. Final Systems Functional Test Procedures will be developed following receipt of the equipment submittals, and any updated construction documents, and specifications.