

## **STATEMENT OF WORK - IDIQ**



**PROJECT TITLE:** VISN 10 - IDIQ for Commissioning (Cx) Services

**PROJECT LOCATION:** VISN 10 (Ohio Region)

**PROJECT NO.** Varies

**DATE:** October 29, 2014

**PROJECT SUMMARY:** Varies

**ESTIMATED TIMELINE:** Varies

**PURPOSE** – Required by VA and is specifically a 3<sup>rd</sup> party contract to hold A/E and Construction firms accountable

## TABLE OF CONTENTS

1.0 BACKGROUND.....	3
1.1 Project Summary .....	3
1.2 Performance Requirements .....	4
2.0 SCOPE OF WORK.....	6
3.0 Commissioning Authority Responsibilities.....	7
3.1 Pre-Design Phase.....	7
3.2 Design Phase.....	7
3.3 Pre-Bid Phase.....	8
3.4 Construction Phase.....	8
4.0 Commissioning Agent qualifications.....	10
5.0 Trade Associations definitions.....	10
6.0 Compliance to VA and Federal Standards for Building Commissioning .....	10
7.0 Deliverables.....	23
8.0 Abbreviations .....	27
9.0 Exhibits.....	28
9.1 Exhibit 1 LEED 2009 for Healthcare .....	28
9.2 Exhibit 2 Checklist.....	28
10.0 Security Considerations .....	47

## 1.0 BACKGROUND

### 1.1 Project Summary

The VISN 10 offices of the Department of Veterans Affairs is seeking the services of a qualified commissioning authority/firm for all design and construction activity of the facilities it manages.

The VA Healthcare System of Ohio (VISN 10) is an integrated health care system consisting of the following facilities. (Medical Centers – Chillicothe OH, Cleveland OH, Dayton OH, Cincinnati OH & Ft. Thomas KY) and one (1) Ambulatory Care Clinic (ACC) located in Columbus OH, **thirty-one (31)** Community Based Outpatient Clinics (CBOC) located primarily in the State of Ohio, but also portions of Indiana and Kentucky.)

Please note the Cincinnati Facility includes a two-division campus (Cincinnati OH (Main) and also the Ft. Thomas KY facilities) under one administration within two states.

#### Owned Space

Admin	Station	Facility/ City
1	538	Chillicothe, OH
2	539	Cincinnati, OH
	539A	Ft Thomas (Kentucky)
3	541	Cleveland, OH
4	757	Columbus, OH
5	552	Dayton, OH

#### VISN 10 Capital Asset Inventory (CAI): August 2012

(Inventory listed does not include Brecksville VAMC as this facility has been vacated)

- Buildings – 185
- Owned GSF – 5,200,667
- Historic – 109
- Land Owned Acres = 587.4
- # of Leases – 68
- Leased GSF – 729,177

The management structure of each construction project for VISN 10 is the traditional design-bid-build approach where the full design documents and specifications are developed by an architectural/engineering (A/E) firm. The construction documents will then be let out to bid and a general contractor (GC) will be hired to complete the construction. The Owner's primary construction representative on-site will be provided by the Owner. The commissioning agent or commissioning authority (CxA) will report to the Owner.

The Owner (VA) is committed to commissioning of its facilities to ensure that all systems are complete and functioning properly upon occupancy and that facility staff has adequate system documentation and training. Commissioning consists of systematically documenting that specified components and systems have been designed, installed and started up properly, and then functionally tested to verify and document proper operation through all modes and conditions. In addition, owner-personnel training will be verified and final project operations and operations and maintenance (OM) documents will be reviewed for completeness.

## **1.2 Performance Requirements**

The VA is required under Executive Order 13423 and numerous other regulations to reduce energy and water consumption in federal facilities. Such mandates require building commissioning, which is defined as a systematic approach to improving system performance, operation and maintenance, indoor air quality and thermal comfort, and energy efficiency, as well as improving occupant comfort, health and welfare, and productivity. The VA is committed to commissioning its facilities to ensure that all systems are complete and functioning properly upon occupancy. The VA's overarching commissioning principles that are to be met are as follows:

- A. Establish measureable project performance requirements
- B. Plan and execute the commissioning process
- C. Verify and document compliance with requirements
- D. Effectively transfer knowledge to the building operations team

In general, Commissioning is a systematic process of verifying that the building systems perform interactively according to the design and construction documents and the VA's operational needs. The commissioning process shall encompass and coordinate the system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction phase and post-occupancy phases is intended to achieve the following specific objectives according to the contract documents:

- a. Verify that the applicable equipment and systems are installed in accordance with the contract documents, VA Master Specifications, and according to the manufacturer's recommendations.
- b. Verify and document proper and energy efficient integrated performance of equipment and systems.
- c. Verify that Operations & Maintenance documentation is complete.
- d. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
- e. Verify that the VA's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.

- f. Document the successful achievement of the commissioning objectives listed above.
- 2. The commissioning process does not take away from or reduce the responsibility of the Design A/E, or construction Contractor(s) to provide a finished and fully functioning product.

## **2.0 SCOPE OF WORK**

1. The A/E shall perform all Design Phase, Pre-Bid Phase, Construction Phase, Acceptance Phase and Warranty Phase commissioning services as an independent Commissioning Agent of the Veterans Affairs, for VA – VISN 10 Projects.
2. The A/E shall perform these services in FULL ACCORDANCE WITH the Department of Veterans Affairs “Whole Building Commissioning Process Manual” and TIL - Master Construction Specifications (PG-18-1), Section 01 91 00 – General Commissioning Requirements. Commissioning Services may include, (but may not be limited to) the services outlined below. Refer to the “Whole Building Commissioning Process Manual” for a complete description of the Commissioning Services to be provided. The manual is available at: <http://www.cfm.va.gov/til/commissioning/CxManual.PDF>

(See Attachment A – for detailed listing of systems)

3. The major scope items for each VA traditional design-bid-build construction project includes: Commissioning services during both the design and construction phases of the projects. This varies by Project and should be discussed with the COR and CO) (Contracting Officers Representative and Contracting Officer)

## **3.0 COMMISSIONING AGENT’S RESPONSIBILITIES**

### **3.1 Pre-Design Phase**

- a. Participate in a Pre-Design Meeting with the VA Project Manager, A/E Design Team, and Peer Review Team
- b. Conduct a Pre-Design Commissioning Kick-off Meeting with the VA and the Design Team
- c. Review Owner’s Project Requirements and VA Design Requirements

### **3.2 Design Phase**

- a. Conduct Commissioning Design Review of Schematic Design (SD1).
- b. Participate in SD1 Design Review Conference.
- c. Review SD2 Design Narrative and SD2 Design Submission.
- d. Participate in SD2 Design Review Conference.
- e. Prepare Outline Commissioning Specifications.
- f. Prepare Outline Commissioning Plan that outlines process requirements, deliverables, roles & responsibilities of commissioning team members, schedules, and milestones for both Design and Construction Phases.
- g. Review DD1 Design Narrative and DD1 Design Submission.
- h. Participate in DD1 Design Review Conference.
- i. Prepare Draft Commissioning Plan.
- j. Prepare Draft Commissioning Specifications.
- k. Review DD2 Design Narrative and DD2 Design Submission.
- l. Participate in DD2 Design Review Conference.

- m. Update Design Narrative based on DD2 Design.
- n. Prepare Preliminary Commissioning Plan.
- o. Prepare Preliminary Commissioning Specifications.
- p. Participate in a Design Phase Controls Meeting to discuss control strategies and system sequences of operations.
- q. Prepare Draft System Readiness Checklists.
- r. Prepare Draft System Functional Performance Test Protocols.
- s. Review CD1 Design Submission.
- t. Participate in CD1 Design Review Conference.
- u. Update Design Narrative based on CD1 Design.
- v. Review Final Construction Documents to Back check Commissioning Design Review Comments.
- w. Update Design Narrative based on Final Construction Documents.

### 3.3 Pre-Bid Phase

- a. Support the VA and the A/E team during the bidding period.
- b. Attend and present brief overview of commissioning process at Pre-Bid Conference, conducted during the formal solicitation period.
- c. Develop clarifications with regard to the commissioning process as required in response to written questions or requests for information (RFIs) that arise during the bidding period.

### 3.4 Construction Phase

- a. Organize and lead the commissioning team.
- b. Attend Pre-Construction meeting and provide a brief overview of the commission process
- c. Prepare the duration schedule of commissioning activities for inclusion into the commissioning plan and coordination with the contractor's construction progress schedule.
- d. Prepare the commissioning plan. See Paragraph 1.11-A of TIL - Master Construction Specifications (PG-18-1), Section 01 91 00 – General Commissioning Requirements, for further information.
- e. Review and comment on selected project submittals provided by the VA COTR, for general conformance with the Construction Documents. Review and provide comments to the VA COTR on the ability to test and operate the system and/or equipment, including providing gages, controls and other components required to operate, maintain, and test the system. Review and provide comments to the VA COTR on performance expectations of systems and equipment and interfaces between systems relating to the Construction Documents.
- f. At the beginning of the construction phase, conduct an initial construction phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; Pre-Functional Checklists, Systems Functional Performance Testing; and project completion.

- g. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss status of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The Commissioning Agent shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.
- h. Observe construction and report progress, observations and issues. Observe systems and equipment installation for adequate accessibility for maintenance and component replacement or repair, and for general conformance with the Construction Documents.
- i. Prepare Project specific Pre-Functional Checklists and Systems Functional Performance Test procedures.
- j. Participate in construction phase controls conference with A/E, controls designers and contractors, MEP contractors, and TAB contractors.
- k. Coordinate with TAB Contractor, perform TAB agenda review, and perform TAB verification
- l. Coordinate Systems Functional Performance Testing schedule with the Contractor.
- m. Witness selected systems startups.
- n. Verify selected Pre-Functional Checklists completed and submitted by the Contractor.
- o. Witness and document Systems Functional Performance Testing.
- p. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.
- q. Review and comment on operation and maintenance (O&M) documentation and systems manual outline for compliance with the Contract Documents.
- r. Develop and prepare Systems Manuals for all commissioned systems.
- s. Review operation and maintenance training program developed by the Contractor. Verify training plans provide qualified instructors to conduct operation and maintenance training.
- t. Prepare and deliver systems training to VA O&M technicians.
- u. Prepare commissioning Field Observation Reports and Commissioning Issues Log and maintain updated Issues Log as construction and commissioning progresses.
- v. Prepare the Final Commissioning Report.
- w. Schedule, witness and document deferred and/or seasonal Systems Functional Performance Testing.
- x. Perform warranty period quarterly site visits.
- y. Return to the site at 10 months into the 12 month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal Systems Functional Performance Testing. Also interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M



manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.

- z. Assemble the final commissioning documentation, including the Final Commissioning Report and Addendum to the Final Commissioning Report.

#### **4.0 COMMISSIONING AGENT QUALIFICATIONS**

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

#### **5.0 TRADE ASSOCIATION DEFINITIONS**

- 5.1 AABC: Associated Air Balance Council
- 5.2 ACG: Associated Air Balance Council Commissioning Group
- 5.3 NEBB: National Environmental Balancing Bureau
- 5.4 SMACNA: Sheet Metal and Air-Conditioning Contractors' National Association
- 5.5 TABB: Testing, Adjusting, and Balancing Bureau

#### **6.0 Compliance to VA and Federal Standards for Building Commissioning**

The Commissioning Agent (CxA) shall comply with VA standards for commissioning, which is stated under the "Whole Building Commissioning Process Manual" (Aug 18, 2010), (or the latest version). The web link for this document is:

<http://www.cfm.va.gov/til/commissioning/CxManual.PDF>.

The following is a summary of the commissioning systems that the VA intends to implement with each project. The offeror is free to suggest changes and improvements to this list. However, for this proposal the following systems shall be assumed.

The level of commissioning will vary depending of the project:

Parking lot projects will generally not have commissioning requirements, however, VA Minor Construction, new Building additions, will require commissioning of each entity listed below.

#### ***6.1.1 Outline of Systems To Be Commissioned (Reference Attachment A)***

The following systems, including all components and controls, will be commissioned:

- A. Exterior walls, roofing, windows, doors, and other exterior penetrations.
- B. Operating Room, Recovery Rooms, Medical Procedural Rooms, Clinical Workrooms, Equipment Rooms, etc.
- C. Central building automation systems, including linkages to remote monitoring and control sites (this excludes any security-related control systems or interlocks).
- D. All equipment of the heating, ventilating and air conditioning systems both mechanical and plumbing, and direct digital controls. As included in this project, the following subsystems:
  - a. Chilled Water System, including chillers, pumps, cooling towers, condensers, piping, valves, etc.
  - b. Hot Water System, including boilers, hot water pumps, valves, piping, etc.
  - c. Steam Distribution System (boilers, piping, hot well, steam traps, condensate pumps)
  - d. Air handling units (supply fans, return fans, coils, valves, variable frequency drives (VFD), ducts, dampers, filters)
  - e. Packaged air conditioning or heat pump units (supply fans, return fans, coils, valves, VFD, ducts, dampers, filters, compressors, condensers)
  - f. Terminal Units
  - g. Unit Heaters
  - h. Heat recovery coils and pumps
  - i. Domestic Water Systems, including steam water heaters, backflow preventers, recirculating pumps, and booster pumps
  - j. Building Automation System (controls - pneumatic, electric, and digital controls)
  - k. Testing and balancing
- E. Air supply and exhaust systems and controls (including pressurization controls).
- F. Central plant systems (boilers, chillers, pumps, etc.) used by the project.
- G. Life safety systems (smoke and fire alarm, fire suppression, fire/smoke dampers).
- H. Domestic water distribution, process water pumping systems, steam/hot water system, chilled water system.
- I. Emergency power systems.

- J. All electrical and lighting systems, including but not limited to electrical distribution system, normal power, emergency power, grounding/bonding, electrical monitoring, substations, lighting controls (light sweep, occupancy sensors and daylight dimming)
- K. Public address system.
- L. Medical air, gas, and vacuum systems; all other systems installed in the OR and support areas.
- M. Data and Communication, including television/cable system, ground/bonding, security, access control system, video surveillance, etc.
- N. All installed lab equipment, including, but not limited to laboratory storage cabinets, biological safety cabinets, sterilizers, washers, etc.

The following sections are a detailed summary of the commissioning process through various stages of construction that shall be implemented by the CxA with each project. The offeror is free to suggest changes and improvements to this process. However, for this proposal the following process shall be assumed.

#### ***6.1.2 Commissioning Process during Preconstruction***

A summary of the commissioning process during design is:

- A. Assemble a commissioning team, hold a strategy meeting and identify responsibilities during Construction Administration. The design team comprises VA/AE/CxA representatives.
- B. Develop the commissioning plan, based on the commissioning goals and objectives and appropriate commissioning process activities, which include roles and responsibilities
- C. The CxA performs a focused review of design documents to meet design intent, VA's requirements, and commission ability.
- D. The CxA develops commissioning specifications for the construction documents, with review by the design team, for inclusion in their construction specifications. The VA Master Specification Section 01 91 00 shall be used as a template. The CxA shall edit, as necessary, to meet the commissioning requirements of this project.  
<http://www.cfm.va.gov/TIL/spec/019100.doc>
- E. The CxA develops a commissioning plan for the construction phase based on Final Design documents and provides design improvement recommendations.
- F. The CxA will perform all tasks and provide documentation necessary to satisfy LEED Fundamental Commissioning prerequisite.
- G. The CxA will perform all tasks and provide documentation necessary to satisfy LEED Enhanced Commissioning Credit 3 if applicable.
- H. The CxA completes a commissioning report at the end of the Final Design phase.

#### ***6.1.3 Commissioning Process During Construction and Warranty***

A summary of the commissioning process during construction is:

- A. A scoping meeting is conducted by the CxA in conjunction with the VA COR where the commissioning process is reviewed with the general contractor, the commissioning team members, and subcontractors (at minimum electrical, mechanical and plumbing).

- B. Additional meetings will be required throughout construction, scheduled by the CxA with necessary parties attending, to plan, scope, coordinate, schedule and review future activities and resolve problems.
- C. CxA reviews submittals pertaining to equipment designated for commissioning to ensure all equipment meets VA's project requirements.
- D. Additional equipment documentation is submitted to the CxA including detailed start-up procedures and operation, maintenance, and installation manuals.
- E. The CxA works with the Subcontractors (Subs) in developing start-up plans and start-up documentation formats, including providing to the Subs prefunctional checklists to be completed during the startup process.
- F. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels with prefunctional checklists being completed before functional testing.
- G. The Subs, under their own direction, execute and document the prefunctional checklists and perform startup and initial checkout. The CxA documents that the checklists and startup were completed according to the approved plans. This may include the CxA witnessing startup of selected equipment.
- H. The CxA develops specific equipment and system functional performance test procedures. The Subs review the procedures.
- I. The performance test procedures are executed by the Subs, under the direction of and documented by the CA.
- J. Items of non-compliance are corrected at the Subs' expense and the system retested.
- K. The CxA submits construction progress reports prior to the progress milestones defined in the Schedule of Values.
- L. The CxA reviews the OM documentation for completeness.
- M. The CxA reviews, pre-approves and coordinates the training provided by the Subs and verifies that it was completed.
- N. The CxA prepares and issues the Pre-Functional Checklist.
- O. The CxA completes a commissioning report upon the completion of construction that complies with the content requirements outlined in the VA's Whole Building Commissioning Process Manual.
- P. Deferred and seasonal testing and performance evaluation is conducted, as specified or required.
- Q. The CxA shall develop a re-commissioning manual per LEED requirement for Enhanced Commissioning Credit 3, when applicable else the CxA will provide a Systems Manual as defined in the VA's Whole Building Commissioning Process Manual.
- R. The CxA will perform all tasks and provide documentation necessary to satisfy LEED Fundamental Commissioning prerequisite.
- S. The CxA will perform all tasks and provide documentation necessary to satisfy LEED Enhanced Commissioning Credit 3 when applicable.
- T. The CxA completes a commissioning report at the close of the one-year warranty period that complies with the content requirements outlined in the VA's Whole Building Commissioning Process Manual.

## **6.2 Commissioning Authority Responsibilities**

The offeror is free to suggest changes and improvements to following task list. However, for costing each proposal the following tasks will be assumed.

### **6.2.1 General Responsibilities**

The commissioning authority/firm (CA) will have the following general responsibilities:

- A. The primary role of the CxA is to develop and coordinate the execution of a pre-construction review of the design and testing plan, and to observe and document performance—that is determine whether systems are functioning in accordance with the documented design intent and in accordance with the contract documents.
- B. The CxA will provide regular construction progress reporting that coincides with the milestones defined in the Schedule of Values used by the CO and GC.
- C. The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management.
- D. The CxA may assist with problem-solving or resolving non-conformance or deficiencies, but ultimately that responsibility resides with the GC and the A/E.
- E. The Contractors will provide all tools or the use of tools to start, check-out and functionally test equipment and systems, except for specified testing with portable data-loggers, which shall be supplied and installed by the CA.
- F. Facilitate the integration of the commissioning process into the overall construction schedule.

The following specific responsibilities will be completed by the CxA within, but not limited to, each of the following phases of the project:

### **6.2.2 Commissioning Authority Responsibilities**

The offeror is free to suggest changes and improvements to following task list. However, for costing this proposal the following tasks will be assumed. The CxA will have the following responsibilities:

- A. The primary role of the CxA is to develop and manage an overall commissioning plan and process, including the execution of a pre-construction review and testing plan, and to observe and document performance—that is determine whether systems are functioning in accordance with the documented design intent and in accordance with the contract documents.
- B. The CxA may assist with problem-solving or resolving non-conformance or deficiencies, but ultimately that responsibility resides with the VA.
- C. The GC and his subcontractors will provide all tools or the use of tools to start, check-out and functionally test equipment and systems, except for specified testing with portable data-loggers, which shall be supplied and installed by the CA.
- D. The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management.

### **6.2.3 Pre-construction Phase**

- A. Perform a focused review of the drawings and specifications at 100% construction document design stage.

- B. Conduct coordination meeting with the design team to resolve issues identified during design review.
- C. Assist, review and approve the development of the design intent and operating parameters documentation by all design team members.
- D. Develop a project-specific commissioning plan for the construction phase. The commissioning plan shall identify the following items for each test:
  - a. Function to be tested (e.g., calibration, economizer control, etc.);
  - b. Condition under which the test shall be performed (e.g., winter design conditions, full outside air, etc.);
  - c. Measurable criteria for acceptable results.
- E. The commissioning provider shall submit the Commissioning Plan to the VA representative(s) for review and approval by the design professional and VA representative(s) within 30 calendar days of notice to proceed. The Commissioning Plan shall include a detailed description and schedule of all commissioning activities.
- F. Develop full commissioning specifications for all building systems, and commissioned equipment listed below. The commissioning specification will include:
  - a. Detailed description of the responsibilities of all parties included in the commissioning process;
    - i. Details of the commissioning process;
    - ii. Reporting and documentation requirements, including formats;
    - iii. Deficiency resolution;
    - iv. Pre-functional checklist and startup requirements;
    - v. Functional testing process; and
    - vi. Specific functional test requirements, including testing conditions; and
  - b. Acceptance criteria for each piece of equipment being commissioned.
  - c. Edit as applicable VA master specs for commissioning and forward to the AE for their input/inclusion in the construction specifications.
  - d. Develop and maintain a master deficiency and resolution log.
  - e. Complete a commissioning report at the end of Final Design.
- G. Submit a Commissioning Schedule (e.g., scheduling of meetings, document due dates, and testing dates) to the VA representative(s) for review and approval by the design professional and VA representative(s) within 30 calendar days of the Commissioning Plan approval by the VA representative(s).
- H. Submit a Start-up Plan to the VA representative(s) that establishes Equipment/Systems formal start-up criteria and procedures. For Equipment/Systems identified for which formal start-up is required, coordinate start-up with the GC and its subcontractors. Submit a Start-Up Plan for VA representative(s)'s approval. The Start-Up Plan should include a list of firms and individuals required to participate, and detailed start-up data forms as set forth in the VA's Whole Building Commissioning Process Manual for complete documentation of the process.

#### **6.2.4 Bid Phase**

Attend pre-bid meeting to answer commissioning related questions and provide written input for possible use in any Bid Phase amendments.

### ***6.2.5 Construction and Acceptance Phase***

- A. Coordinate and direct the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.
- B. Coordinate the commissioning work and, with the GC and construction manager (if part of project management team), ensure that commissioning activities are being scheduled into the master schedule.
- C. Revise, as necessary, the current draft of the construction phase commissioning plan developed during Final Design.
- D. Plan and conduct a commissioning scoping meeting. Schedule and attend the initial commissioning meeting with the VA representative(s), GC and subcontractors to describe commissioning and to discuss the purpose, duties, and responsibilities of all participants. In addition, schedule and attend regular commissioning progress meetings with all participants.
- E. Request and review additional information required to perform commissioning tasks, including OM materials, contractor start-up and checkout procedures.
- F. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
- G. Review and approve normal Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the AE reviews.
- H. Write and distribute pre-functional tests and checklists.
- I. Provide the services of a qualified Test Engineer, who shall at a minimum:
  - a. Develop test procedures and forms for documentation as contemplated in the Building Commissioning Handbook to demonstrate that all Equipment/Systems tests and Functional Performance Testing (FTP) are performed completely and accurately and that the Equipment/Systems are operating correctly. FTP shall demonstrate the correct installation and operation of each equipment device, system and system-to-system inter-tie relations in accordance with approved plans and specifications. Test procedures shall be in accordance with the Equipment/Systems manufacturer's recommendations, where applicable. Test procedures shall fully describe Equipment/Systems configuration and steps required for each test; appropriately documented so that another party can repeat the tests with virtually identical results.
  - b. In coordination with the construction contractors and the construction schedule, develop schedules for all testing and coordinate all testing with the construction schedule.
  - c. With the assistance of the construction contractors and subcontractors, perform all performance tests. Fully document tests for all Equipment/Systems.
  - d. Submit test procedure schedule, procedures, forms, and other documentation to the Contracting Agency for approval within 30 days after approval of the Commissioning Plan or at least 30 days prior to starting any testing required.
- J. Develop an enhanced start-up and initial systems checkout plan with Subcontractors. Monitor the start-up of all Equipment/Systems.

- K. Perform site visits, to observe component and system installations. Attend planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
- L. Perform the commissioning procedures detailed in the VA's Whole Building Commissioning Process Manual.
- M. Witness all or part of the HVAC piping test and flushing procedure, sufficient to be confident that proper procedures were followed. Document this testing and include documentation in OM manuals. Notify VA of any deficiencies in results or procedures.
- N. Witness all or part of any ductwork testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Document this testing and include documentation in OM manuals. Notify VA of any deficiencies in results or procedures.
- O. Approve prefunctional tests and checklist completion by reviewing prefunctional checklist reports or by direct site observation.
- P. Approve systems startup by reviewing start-up reports and by selected site observation.
- Q. Review testing, adjusting and balancing (TAB) execution plan.
- R. Oversee sufficient functional testing of the control system and approve it to be used for TAB, before TAB is executed.
- S. Approve air and water systems balancing by spot testing and by reviewing completed reports and by selected site observation.
- T. With necessary assistance and review from installing contractors, write the functional performance test procedures for equipment and systems. This may include energy management control system trending, stand-alone data-logger monitoring or manual functional testing. Submit to VA and CM for review, and approval if required.
- U. Analyze any functional performance trend logs and monitoring data to verify performance.
- V. Coordinate, witness, and approve manual functional performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved.
- W. Continually maintain master deficiency and resolution log and develop a separate testing record. Provide to the VA and CM written progress reports and test results with recommended actions.
- X. Witness performance testing of smoke control systems by others and all other VA contracted tests or tests by manufacturer's personnel over which the CxA may not have direct control. Document and include in Commissioning Record in OM manuals.
- Y. Provide, if contracted, any and all Testing and Balancing services identified in the construction bid documents.
  - a. Equipment/Systems identified in the construction bid documents shall be tested in all operating modes to include the full range of potential operating conditions up to and including maximum load.
  - b. Provide air system balancing, including but not limited to Variable Air Volume (VAV) Boxes, air handling units, Lab Airflow Control System components and controls, exhaust fans, complete grille and register reports, and duct traverse reports for each main duct system riser.



- c. Provide hydronic balancing for the heating water system, chilled water system, and heat recovery systems, including functional performance testing reports for coils and pumps that are within those Equipment/Systems.
  - d. Testing and Balancing shall be substantially complete prior to Functional Performance Testing, contemplated under the above, especially where unbalanced conditions would affect the results of the Functional Performance Tests.
- Z. Review equipment warranties to ensure that the VA's responsibilities are clearly defined.
- AA. Oversee and approve the training of the VA's operating personnel.
- BB. Compile and maintain a commissioning record and building systems book(s) OR a recommissioning manual per LEED requirement for the Enhanced Commissioning Credit 3, if applicable.
- CC. Review and confirm as-built drawings of the constructed project have been completed and accurately represent the final constructed project. The CxA will report discrepancies to the GC and VA and note compliance within the issues log. Verify as-built drawings and the OM manual has been provided to the VA representative(s). The CA's review will include but is not limited to confirmation of:
  - a. Positive correlation between installed equipment labeling and as-built drawing schedules (i.e. equipment tags, equipment descriptions, electrical panel labels and schedules, pipe and valve labels, valve tags and valve schedules)
  - b. Lock out tag out documents for all powered equipment included in OM Manual.
  - c. Arc flash protective labeling
- DD. Review and approve the preparation of the final, submitted OM manuals and as-built construction drawings.
- EE. Provide a final commissioning report per the content listed in the VA's Whole Building Commissioning Process Manual.

#### **6.2.6 Warranty Period**

- A. Coordinate and supervise required seasonal or deferred testing and deficiency corrections and provide the final testing documentation for the commissioning record and OM manuals.
- B. Return to the site at 10 months into the 12 month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning. Also interview facility staff and identify problems or concerns they have with operating the building as originally intended. Make suggestions for improvements and for recording these changes in the OM manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports and documents and requests for services to remedy outstanding problems.
- C. Assist in the development of a preventative maintenance plan, a detailed operating plan or an energy and resource management plan.
- D. Update master deficiency and resolution log.
- E. Verify that training specified in the construction bid documents has been provided to the VA representative(s).
- F. Verify construction phase corrections to as-built drawings and the OM manual have been completed and provided to the VA representative(s). Verification will include but is not limited to confirmation of:

- a. Correlation between equipment labeling and as-built drawing schedules (i.e. equipment tags, equipment descriptions, electrical panel labels and schedules, pipe and valve labels, valve tags and valve schedules)
  - b. Lock out tag out documents for all powered equipment included in OM Manual.
  - c. Arc flash protective labeling
- G. Verify that operations and maintenance materials specified in the construction bid documents are complete and delivered to the VA representative (s).
- H. Provide final end-of-warranty commissioning report. Document all commissioning procedures completed and submit to VA representative(s) a final comprehensive report detailing all commissioning services provided upon completion of all commissioning services.

### **6.3 Assumptions**

It is assumed that the A/E will provide adequate written design intent, basis of design and full sequences of operation for all equipment and systems for the OM manuals and for the commissioning authority to use in writing functional tests. It is also assumed that the contractors will execute the functional testing of equipment, coordinated and documented by the commissioning authority, using forms provided by the commissioning authority.

#### ***6.3.1 Expected Depth And Breadth Of Cx Service***

The following outlines the level of effort expected for each commissioned system:

The functional testing shall include operating the system and components through each of the written sequences of operation and other significant modes and sequences, including startup, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment. Sensors and actuators shall be calibrated during prefunctional checklist testing by the installing contractors and spot-checked by the commissioning authority during functional testing.

Tests on respective HVAC equipment shall be executed during both the heating and cooling season. However, some overwriting of control values to simulate conditions may be allowed, if used judiciously. The installed HVAC equipment shall have be energy efficiency bench-marked for later use by operations staff. Functional testing shall be done using conventional manual methods, control system trend logs and read-outs or stand-alone data loggers, to provide a high level of confidence in proper system function, as deemed appropriate by the commissioning authority and the Owner.

The functional testing process and equipment shall be coordinated with the building's energy management control system and long-term monitoring objectives. Long-term continuous measurement and verification of performance shall be based on the *International Performance Measurement and Verification Protocol*

*Option B Methods by Technology* for the following:

- A. Lighting systems and controls
- B. Constant and variable motor loads
- C. Variable frequency drive (VFD) operation
- D. Chiller efficiency at variable loads (kW/ton) for existing chiller serving space
- E. Cooling load
- F. Air and water economizer and heat recovery cycles

- G. Air distribution static pressures and ventilation air volumes
- H. Boiler efficiencies
- I. Laboratory-specific process energy efficiency systems and equipment

### ***6.3.2 Expected Effort Of Cx Services***

The following outlines the level of effort expected for each commissioned system:

- A. The functional testing shall include operating the system and components through each of the written sequences of operation and other significant modes and sequences, including startup, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment. Sensors and actuators shall be calibrated during prefunctional checklist testing by the installing contractors and spot-checked by the CxA during functional testing.
- B. Tests on respective HVAC equipment shall be executed during both the heating and cooling season. However, some overwriting of control values to simulate conditions may be allowed, if used judiciously. The central plant shall have its efficiency bench-marked for later use by operations staff.
- C. Functional testing shall be done using conventional manual methods, control system trend logs and read-outs or stand-alone data loggers, to provide a high level of confidence in proper system function, as deemed appropriate by the CxA and the VA.
- D. The functional testing process and equipment shall be coordinated with the building's energy management control system and long-term monitoring objectives. Long-term continuous measurement and verification of performance shall be based on the International Performance Measurement and Verification.

### ***6.3.3 Firm and Individual Qualifications***

The firm and the designated CxA shall have a minimum of five (5) years' experience in providing Total Building Commissioning Services and shall be regularly employed as a Commissioning Provider.

- A. The CxA is an objective, independent advocate for the CO. The CxA shall have current engineering knowledge and extensive hands-on field experience regarding building systems; the physical principles of building systems performance; building systems start-ups, balancing, functional testing, and troubleshooting; operation and maintenance procedures; and the building design and construction process.
- B. The Commissioning firm and the designated CxA shall have successful commissioning experience for projects that are similar to the project. The Firm and designated CxA shall have been the principal commissioning authority on a least three comparable projects that have been completed within the previous five years.
- C. The CxA shall have experience in the quality process.
- D. The CxA shall be knowledgeable in building operation and maintenance, including training of operations and maintenance personnel.

- E. The CxA shall have excellent verbal and written communications skills, be highly organized, and able to work with all levels of management, technical, and trades personnel.
- F. The CxA firm shall have staffing levels of personnel sufficient to sustain loss of assigned personnel without compromising quality and timeliness of performance. The CxA will pay all costs and fees related to hiring and retaining personnel necessary to complete the services described in this contract.
- G. The CxA shall be an independent contractor and not an employee of the Architect/Engineer, Design-Build Contractor, Prime Contractor or GC on this project.
- H. Firm and Individual Certifications shall include:
  - a. The proposed commissioning firm should be certified by at least one of the following agencies:
    - i. National Environmental Balancing Bureau (NEBB)
    - ii. AABC Commissioning Group (AGC)
    - iii. Building Commissioning Association (BCxA)
  - b. The proposed Commissioning Agent(s) shall be certified by one of the following organizations to supervise execution of the commissioning process:
    - i. National Environmental Balancing Bureau (NEBB)
    - ii. AABC Commissioning Group (AGC)
    - iii. Building Commissioning Association (BCxA)
- H. The Fire Protection Commissioning Specialist should be a registered Fire Protection Engineer in at least one state. He/she should have a minimum of five years' experience with design, installation, inspection, or testing of fire protection systems, and/or smoke control systems.
- I. The Building Envelope Commissioning Specialist should be a Registered Architect in at least one state. He/she should also have a minimum of five years' experience with design, installation, or inspection of building envelope components.
- J. The Controls Commissioning Specialist should have a minimum of 5 years' experience in design, installation, programming, inspection, or testing of direct digital control systems for HVAC systems.
- K. Key members of the CxA's commissioning team shall possess a valid bachelor's degree in one of the following disciplines: Mechanical, Electrical, or Architectural engineering. The team that will be on site shall have at least one team member with over five years verifiable field experience in: building systems operations, maintenance, and troubleshooting, HVAC system installation, maintenance, and troubleshooting, HVAC Direct Digital Control system installation, programming, maintenance, and troubleshooting, electrical system installation, maintenance, and troubleshooting, other applicable trade contracting experience may be deemed equivalent experience for the bachelor's degree. A Professional Engineer license and a Certified Energy Manager certificate are desired.

#### **6.4 Other Information**

The AE will provide adequate written design intent, basis of design and the equipment and systems operational information for the OM manuals and for the CxA to use in writing

functional tests. The construction contractors will execute the functional testing of equipment, coordinated and documented by the CxA, using forms provided by the CxA.

## **6.5 VA Project Staff**

CxA will work with the following VA personnel managing this project:

### ***6.5.1 Contracting Officer (CO)***

The CO shall be responsible for all contractual administration of this Project. All transactions of a legal nature, including contractual agreements, amendments, change orders, etc. shall be approved and processed through the CO.

### ***6.5.2 Contracting Officer's Representative (COR)***

The COR shall be responsible for the project management on behalf of the VA and will manage the Project on a day-to-day basis to ensure that the Project requirements are met from the design phase through construction according to this Scope of Work and the final construction documents.

## **7.0 DELIVERABLES**

### **7.1 Preliminary Design/Preconstruction Phase**

#### ***7.1.1 Pre-construction/post-design Phase Pre-construction Phase Commissioning Plan***

Due: As detailed on the construction schedule approved by the VA (prior to the beginning of construction and scoping meeting with the GC)

This Construction Phase Commissioning Plan shall include the following based on the 100% Final Design construction documents and specifications:

- A. The report shall include an executive summary, list of participants and roles, building description, overview of commissioning scope, and a general description of design verification methods. For each commissioned feature, the report should contain the disposition of the CxA regarding the adequacy of the design in meeting the design intent, owner's requirements and contract documents based on reviewing the 100% Final Design submittal.
- B. A detailed overview of the commissioning process
- C. A list of all proposed commissioned features, systems, elements and equipment
- D. Identification of primary commissioning participants and their responsibilities
- E. A description of the management, communication, and reporting for the commissioning plan
- F. A description of the commissioning process scope including submittal review, observation, start-up, testing, training, OM documentation, and warranty period activities
- G. A description of the expected written work products
- H. An activity schedule
- I. A description of the rigor and scope of testing
- J. This plan shall also include a dedicated section detailing the commissioning requirements that the CxA recommends be included in the GC bid documents.

### **7.2 Construction Phase**

#### ***7.2.1 Construction Phase Commissioning Plan – Updated***

Due: As detailed on the construction schedule approved by the VA (no later than 2 months after execution of this contract phase)

- A. This updated version of the Construction Phase Commissioning Plan shall include the following based on the 100% Final Design construction documents and specifications as well as identification of the GC and selected subcontractors:
  - a. A detailed overview of the commissioning process
  - b. A list of all proposed commissioned features, systems, elements and equipment
  - c. Identification of all commissioning participants and their responsibilities
  - d. A detailed description of the management, communication, and reporting for the commissioning plan

- e. A detailed description of the commissioning process scope including submittal review, observation, start-up, testing, training, OM documentation, and warranty period activities
- f. A detailed description of the expected written work products
- g. A detailed activity schedule
- h. A detailed description of the rigor and scope of testing

### ***7.2.2 Construction Progress Reports***

Due: As detailed on the construction schedule approved by the VA (no later and less than the first Monday of each quarter, estimated 8 occurrences).

Each construction progress report will coincide with the progress milestones defined in the CO's approved Schedule of Values. The report will be submitted to the VA representative 2 business days prior to the milestone completion dates defined within the Schedule of Values. Each construction progress report shall include the following elements:

- a. A brief overview and status of the construction phase commissioning process
- b. A description of the overall project construction progress to date, issue log items identified status of issue log items. Field observations will be reported.
- c. Overview of the primary commissioning participants and their responsibilities
- d. Activities that occurred during the previous reporting period
- e. Planned activities for the upcoming construction period
- f. Any outstanding non-compliance items for the period shall be specifically listed.
- g. Recommendations for issue resolutions, improvement, future actions, commissioning process changes, etc. shall also be listed.

### ***7.2.3 Final Commissioning Report***

Due: As detailed on the construction schedule approved by the VA (upon final acceptance of the building).

- A. The report shall include an executive summary, list of participants and roles, building description, overview of commissioning and testing scope and a general description of testing and verification methods. For each piece of commissioned equipment, the report should contain the disposition of the CxA regarding the adequacy of the equipment, documentation and training meeting the contract documents in the following areas:
  - a. Equipment meeting the specifications,
  - b. Equipment installation,
  - c. Functional performance and efficiency,
  - d. Equipment documentation and design intent, and
  - e. Operator training.
- B. All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented. The functional performance and efficiency section for each piece of equipment shall include a brief

description of the verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from the testing.

- C. Appendices shall contain acquired sequence documentation, logs, meeting minutes, progress reports, deficiency lists, site visit reports, findings, unresolved issues, communications, etc. Prefunctional checklists and functional tests (along with blanks for the operators) and monitoring data and analysis will be provided in a separate labeled binder.

## **7.3 Warranty Phase**

### ***7.3.1 Warranty Phase Commissioning Plan***

Due: As detailed on the construction schedule approved by the VA (no later than 1 month after execution of this contract phase)

- A. The Warranty Phase Commissioning Plan shall include the following elements:
- An overview of the warranty phase commissioning process
  - A list of features, systems, and performance to commission during the first year of occupancy
  - Identification of primary warranty phase commissioning participants and their responsibilities
  - A description of the management, communication, and reporting for the warranty phase commissioning plan
  - A detailed activity schedule
  - A detailed description of the rigor and scope of testing and any outstanding training needs

### ***7.3.2 Intermediate Warranty Period Commissioning Report***

Due: As detailed on the construction schedule approved by the VA (no later than 6 months after execution of this contract phase)

- A. The Intermediate Warranty Period Commissioning Report shall include the following elements:
- A brief overview and status of the warranty phase commissioning process
  - Overview of the primary commissioning participants and their responsibilities
  - Commissioning activities that occurred since final acceptance
  - Planned activities until the end of the warranty
  - Any outstanding non-compliance items for the period shall be specifically listed. Recommendations for improvement, future actions, commissioning process changes, etc. shall also be listed.

### ***7.3.3 Post-warranty Commissioning Report***

Due: As detailed on the construction schedule approved by the VA (no later than 1 year after execution of this contract phase)

- A. The report shall include an executive summary, list of participants and roles, building description, overview of commissioning and testing scope and a general description of



testing and verification methods applied during the warranty period. For each piece of commissioned equipment, the report should contain the disposition of the CxA regarding the adequacy of the equipment, documentation and training meeting the contract documents in the following areas:

- a. Equipment meeting the specifications,
  - b. Equipment installation,
  - c. Functional performance and efficiency,
  - d. Equipment documentation and design intent, and
  - e. Operator training.
- B. All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, recommissioning, etc. shall also be listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented. The functional performance and efficiency section for each piece of equipment shall include a brief description of the verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from the testing.
- C. Appendices shall contain acquired sequence documentation, logs, meeting minutes, progress reports, deficiency lists, site visit reports, findings, unresolved issues, communications, etc. Functional tests and monitoring data and analysis will be provided in a separate labeled binder.

## 8.0 Abbreviations

AE	Architect & Engineering Firm
CA	Commissioning Authority
CM	Construction Manager
CO	Contracting Officer
CxA	Commissioning Agent
Cx	Commissioning
COTR	Contracting Officer's Technical Representative
GC	General Contractor
LEED	Leadership in Energy and Environmental Design. This specifically is referring to the LEED 2009 for Healthcare standard
OM	Operations and Maintenance documents
SOW	Statement of Work
TAB	Testing, Adjusting, and Balancing
VA	Veterans Affairs
VAMC	Veterans Affairs Medical Center

## 9.1 Exhibit 1 – LEED 2009 for Healthcare Checklist



NC2009 checklist.xls



New Construction -  
LEED.pdf

## 9.2 Exhibit 2 – Commissioning Agent Task/Deliverables Description

The following tables describe the typical construction phase commissioning services and deliverables to be provided by the CxA:

Project Phase	Commissioning Task Description	Deliverable(s)
<b>FINAL DESIGN DOCUMENTS</b>		
Design Final Design Submission Review	Review Final Design Submission for resolution of Outstanding Commissioning Issues	Design Phase Commissioning Issues Log
Design Narrative	Commissioning Agent to provide a Final Design Narrative to Include all modifications and/or deviations from CD1 Design Narrative. The Design Narrative should be updated to reflect the evolution of the project design and note all significant deviations from prior version for ease of review and reconciliation. Design Narrative should describe designer's response to the project requirements. Where appropriate, provide documentation of approved deviations from design standards and reasoning for same.	Revised Design Narrative
Commissioning Plan	Update & Submit Project Construction Phase Commissioning Plan Include the updated Commissioning Plan in the revised Design Narrative	Project Construction Phase Commissioning Plan
Duration Schedule for Commissioning Activities	Based on the Project Construction Phase Commissioning Plan, prepare a duration schedule for the commissioning activities required by the commissioning plan. This duration schedule should include Construction Phase Activities. The Duration Schedule should provide sufficient detail to allow the Prime Contractor to incorporate commissioning activities into the Master Project Schedule.	Construction Phase Commissioning Duration Schedule – Incorporate into Commissioning Plan
Commissioning Specification	Provide updated Final Cx Specifications. Specifications shall be submitted in accordance with the requirements of PG 18-15.	Updated Project Commissioning Specifications

Design Phase Issue Resolution	Record resolutions to Cx Issues on the Design Phase Commissioning Issues Log.	Revised Design Phase Commissioning Issue Log
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<b>Project Phase</b>	<b>Commissioning Task Description</b>	<b>Deliverable(s)</b>
Pre Bid Meeting	Attend Pre Bid Meeting; provide overall description of Commissioning Process, provide clarifications for Commissioning Issues.	Meeting Notes for PM/RE  Clarifications for Addendum if required
Pre-Construction Meeting	Attend Pre Construction Meeting and be prepared to clarify the Commissioning Process for this project (e.g., discuss commissioning representative selection).	None
Commissioning Kick Off Meeting (Construction Phase) (The kickoff meeting should occur within 60 days of Notice to Proceed.)	<p>Conduct a “Commissioning Kickoff Meeting” with the Construction Team</p> <p>Establish the purpose and process for commissioning the project.</p> <p>Establish the individual roles of each participating commissioning team member.</p> <p>Review the Construction Phase Commissioning Plan and Commissioning Specifications.</p> <p>Review the Commissioning Documents</p> <p>Review the Project Schedule and discuss how commissioning activities will be incorporated into the master schedule.</p> <p>Review Draft PFC and FPT; identify pre-requisites for functional testing.</p> <p>ATTENDEES:</p> <p>Commissioning Agent, A/E Design Team Representatives, Contractor’s Commissioning Representative, Subcontractor’s Commissioning Representatives, VA RE.</p>	<p>Meeting Minutes</p> <p>Revised Project Commissioning Plan (Include Names/Contact Information for selected Commissioning Team Members)</p>
Duration Schedule for Commissioning Activities	Based on the Construction Phase Commissioning Plan, prepare a duration schedule for the commissioning activities required by the commissioning plan. This duration schedule should be incorporated into the contractor’s project schedule to track all commissioning activities of the commissioning team.	<p>Commissioning Duration Schedule</p> <p>(Schedule shall be periodically updated to reflect changes in the project schedule and/or scope.)</p>

Project Phase	Commissioning Task Description	Deliverable(s)
Submittal & Shop Drawing Review	<p>Review all pertinent project shop drawings necessary to support the Commissioning Process. Review of the shop drawings is for the purpose of developing appropriate Pre Functional Checklists and Systems Functional Performance Test Procedures. Submittals &amp; Shop drawings shall be reviewed for commissionability, maintainability and for compliance to the Construction Documents.</p> <p>Note any issues identified in the Shop Drawing Review that might compromise the final commissioned system on the 'Commissioning Review Log' and submit comment to the Design Team and the RE contemporaneously with the A/E review for resolution.</p> <p>Comments shall be submitted in accordance with the contractual submittal review time. Comments shall be provided to the Design Team no less than 7 days prior to the Submittal Review Due Date provided that the Cx Agent has no less than 7 days to review the submittals.</p> <p><b>ANY ISSUES IDENTIFIED IN THE SUBMITTAL REVIEW THAT MIGHT REQUIRE A CONTRACT CHANGE BUT IS NECESSARY TO MEET DESIGN INTENT SHOULD BE SPECIFICALLY REFERRED TO THE RE.</b></p>	<p>Shop Drawing Cx Review List</p> <p>Shop Drawing Review Comments</p>
Construction Phase Commissioning Plan	<p>Based on the work completed in the items above, the Construction Phase Commissioning Plan for the project shall be periodically reviewed with the Commissioning Team and updated to reflect changes in project equipment, sequences of operations, scope or schedule and with project personnel.</p>	<p>Revised Project Commissioning Plan</p>

Project Phase	Commissioning Task Description	Deliverable(s)
Commissioning Construction Observations	<p>During the course of construction, the Commissioning Agent will visit the site to observe the progress of construction with respect to the systems being commissioned. The focus of the observations will to verify that systems being installed comply with the Construction Documents and can be successfully configured, operated and maintained.</p> <p>In addition, site observations visits will be scheduled to include</p> <ul style="list-style-type: none"> <li>• Witnessing factory testing and/or contractor equipment/system start up activities;</li> <li>• Verification of Completed Pre Functional Checklists</li> <li>• Verification that the Contractor and his subcontractors are completing and documenting Pre-Test procedures required by the specifications.</li> <li>• Clarification and technical support for understanding and resolving Commissioning Issues.</li> </ul>	<p>Site Observation Reports</p> <p>Updated Commissioning Issues Log</p>



<p>Commissioning Team Meetings</p>	<p>The Commissioning Agent will hold regular commissioning team meetings to review progress of the commissioning effort and reinforce individual responsibilities. The team will review schedule, construction sequence, and completed work (PFC, PFT and FPT's) and outstanding issues on the Commissioning Issues Log.</p> <p>Commissioning Team Meetings may be held at the jobsite or by teleconference depending upon the status of construction. While it is imperative that many of the Commissioning Team Meetings be held in person, during early construction phases, some meetings may be more cost effectively conducted remotely. Scheduling and location of meetings shall occur by consultation between the Commissioning Agent and the VA-RE.</p> <p>The Prime Contractor's scheduler should attend approximately every other Commissioning Team Meeting to review the master schedule and any changes that will affect commissioning activities.</p>	<p>Commissioning Meeting Agenda and Minutes</p> <p>Updated Commissioning Issues Log</p>
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<b>Project Phase</b>	<b>Commissioning Task Description</b>	<b>Deliverable(s)</b>
Develop Final Pre-Functional Checklists (PFC's)	<p>The Commissioning Agent will prepare Pre-Final Pre Functional Checklists (PFC) for the project and distribute to all Cx Team members for review and comment. The Commissioning Agent will incorporate review comments and prepare Final PFCs.</p> <p>An executed PFC submitted by the Prime Contractor indicates the system and its related equipment is ready for Systems Functional Performance Testing.</p> <p>The requirements for Pre Functional Checklists shall be coordinated with the startup requirements specified for each commissioned system. The PFC's shall be constructed to leverage the specified contractor and vendor start activities to avoid unnecessary duplication.</p>	Pre Functional Checklists (PFC's)
Final Systems Functional Performance Test (FPT's) Procedures	<p>Based on construction documents and approved submittals, the Commissioning Agent will prepare Pre-Final Systems Functional Performance Test Procedures (FPT's) for systems to be commissioned.</p> <p>Completed Final FPT's will be distributed to all appropriate members of the Commissioning Team for review and comment.</p> <p>Final FPT's will be issued once comments are reviewed and incorporated into final documents as appropriate.</p>	Pre-Final and Final Systems Functional Performance Test Procedures (FPT's)

Review Operations & Maintenance Manuals	<p>The Commissioning Agent shall review Operations and Maintenance Manuals submitted by contractors for general conformance with specifications and VA's requirements, including:</p> <p>If provided with the manuals, Review Preventive Maintenance Schedules provided as part of the O&amp;M Manuals for completeness. Verify that data is provided in a manner consistent with VA process for managing Preventive Maintenance tasks.</p> <p>Review of O&amp;M Manuals will include a review of system and component warranties to confirm conformance with contract requirements and adequate documentation of warranty contact information and VA obligations.</p> <p>Review of O&amp;M Manuals shall be completed in accordance with the Submittal Review schedule requirements.</p>	Updated Commissioning Issues Log
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Project Phase	Commissioning Task Description	Deliverable(s)
Review Contractor Equipment Startup Checklists, TAB Reports and PFC's	<p>The Commissioning Agent will review all contractor prepared Equipment Startup Checklists, TAB Reports (including "pencil" daily test results) and PFC's to confirm that the systems are have been subject to appropriate Quality Control and Start Up procedures prior to initiation of Functional Performance Testing.</p> <p>Incomplete work, inadequate preparation and deficiencies will note noted and tracked on the Commissioning Issues Log.</p>	Commissioning Issues Log

<p>TAB Verification</p>	<p>The Commissioning Agent shall work with the TAB Contractor to verify that all Testing and Balancing work is conducted in strict accordance with the specified Procedural Standards for Testing, Adjusting and Balancing by either NEBB or AABC. The Commissioning Agent shall execute the following tasks:</p> <ul style="list-style-type: none"> <li>• Review the TAB Agenda provided by the TAB Contractor to verify that it is complete, thorough and in compliance with the specification and Procedural Standards requirements.</li> <li>• On the project site, the CxA shall review the calibration certificates for the instrumentation being used by the TAB Contractor during the execution of TAB activities to confirm that the instrumentation meets the requirements of the spec and the appropriate Procedural Standard.</li> <li>• The CxA shall periodically visit the project site and review the TAB documentation for method, reasonable values, and compliance with the specification, Procedural Standard and TAB Agenda.</li> <li>• Upon completion of the TAB activities, the CxA shall visit the project site with the TAB Contractor and the RE. The TAB Contractor shall demonstrate readings selected by the CxA that demonstrate that the system performance is consistent with the submitted values on the TAB report. Readings shall include Air Handling Unit total flows, static pressure control values, select outlet flows, building, and space pressures selected by the CxA as critical system operating values.</li> </ul>	<p>TAB Agenda Review Comments</p> <p>TAB Agenda Review Meeting Minutes</p> <p>Field Observation Reports of TAB Inspections</p> <p>Summary Report of TAB Verification Readings</p>
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Project Phase	Commissioning Task Description	Deliverable(s)
Systems Functional Performance Testing	<p>The Commissioning Agent will oversee, facilitate, and document all FPT testing. Execution of FPT's shall be executed in accordance with the Functional Testing Procedures published by the Commissioning Agent. All systems tested in accordance with the FPT's shall be operated by the contractors in accordance with the approved FPT. Contractors shall retain responsibility for the installed systems during and after functional testing until substantial completion or final acceptance as determined by the VA.</p> <p>The Commissioning Agent, in collaboration with the control contractor shall include long term trends (greater than 7 days) of integrated system performance once all systems have been commissioned. The Commissioning Agent shall provide analysis of these trends to confirm that the installed systems are stable and reliable</p>	<p>Executed Functional Performance Tests and support documentation.</p> <p>Long Term Trend Data and Analysis</p>
Prepare Systems Manuals	<p>The Commissioning Agent shall work with the design team, contractor and VA to develop Systems Manuals. Manuals will contain system design, operations and sequence information that describes the design intent, operational features and appropriate operational practices necessary to sustain the system operation in accordance with the Design Narrative and the VA's overall objectives for the facility. Systems Manual will include sections for each major system included in the commissioning process.</p>	Project Systems Manual

<p>Training Plan Review</p>	<p>The Commissioning Agent shall collaborate with the Prime Contractor and installing subcontractors to develop effective contractor and manufacturer training plans and agendas for general conformance with specifications and VA's requirements. Observe training for quality of training and for general conformance with the training plan and agenda.</p> <p>The CxA shall observe contractor and vendor training for critical systems. The Contractor shall provide and the CxA shall maintain all attendance records and associated agendas and presentations for all training sessions. Attendance records shall be written original sign in sheets for each training session.</p>	<p>Compiled Training Plan</p> <p>Individual Training Agendas Training Attendance Sign In Sheets</p>
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Project Phase	Commissioning Task Description	Deliverable(s)
Systems Training	<p>The Commissioning Agent will conduct training sessions to provide systems-level training for O&amp;M personnel. Training will include:</p> <ul style="list-style-type: none"> <li>• Review of system design, capacity, and equipment selection</li> <li>• Review of system operating sequences</li> <li>• Review of interconnection with other systems</li> <li>• Review of Emergency operating procedures</li> <li>• Review of the Project Systems Manual and its Use</li> <li>• Student Evaluation forms</li> </ul> <p>The number, duration and scope of the Systems Training sessions shall be determined by the specific requirements of the project.</p> <p>The training provided by the CxA does not in any way relieve the Contractor from any specified training obligations.</p>	Systems Training Presentations (electronic)

Final Commissioning Report	<p>The Commissioning Agent shall compile a comprehensive commissioning report documenting all commissioning activities, including but not limited to the following:</p> <ul style="list-style-type: none"> <li>• Executive Summary</li> <li>• Commissioning Scope of Work</li> <li>• Test methods and results</li> <li>• Outstanding commissioning issues</li> <li>• Comprehensive Commissioning Issues Log, including resolved items and a description of their resolution,</li> <li>• Commissioning plan,</li> <li>• Field Observation Reports, Status reports and other field activity documentation,</li> <li>• Submittal and O&amp;M manual reviews</li> <li>• Training record</li> <li>• Completed Pre Functional Checklists</li> <li>• Completed Functional Performance Test protocols and support documentation</li> <li>• Other support documentation developed as part of the execution of the project Construction Phase Commissioning Process</li> </ul>	Final Commissioning Report
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Project Phase	Commissioning Task Description	Deliverable(s)
Deferred and/or Seasonal Testing	<p>The Commissioning Agent shall witness and document Systems Functional Performance Testing that was deferred to allow systems to be tested in appropriate seasonal conditions. Testing will be conducted in accordance with Systems Functional Performance Test Procedures. Testing support will be required from the installing contractors, EMCS Vendor and VA. Requirement for seasonal testing will be incorporated into the project specifications.</p> <p>As part of the Seasonal Testing Effort, the Commissioning Agent shall review systems operations with the onsite operations team and reinforce training and best operating practices of the operations team.</p>	<p>Executed Functional Performance Test and Support Documents</p> <p>Commissioning Issues Log</p>
Warranty Period Site Visits	<p>The Commissioning Agent shall make quarterly visits to the project site to reinforce training, evaluate performance of the installed systems and provide technical support to the operating team to sustain commissioned performance of the systems.</p>	Warranty Site Visit Reports

Post-Occupancy Inspection	<p>Return to the project approximately 10 months after substantial completion to review the building operation with the facility occupants and O&amp;M staff, and to discuss outstanding issues related to commissioning. Provide suggestions for improvements to systems operation including,</p> <ul style="list-style-type: none"> <li>• Measurement &amp; Verification Issues,</li> <li>• Re-Commissioning Tasks, and</li> <li>• Improvements in Preventive Maintenance or Operational Strategies</li> </ul> <p>Assist facility staff in developing warranty issues, documents and requests for service to remedy outstanding problems.</p> <p>As part of the Post Occupancy Inspection, the Commissioning Agent shall analyze the energy consumption records from the project site (both utility and system generated reports) and provide the team with an analysis of actual system energy performance versus predicted performance. To the extent possible, deficiencies in performance shall be analyzed to provide an understanding of the systems, components or operating strategies that may be operating outside predicted parameters.</p>	<p>Post Occupancy Field Visit Report</p> <p>Commissioning Issues Log</p> <p>Warranty Issues Report</p> <p>Systems Energy Review Report</p>
Final Commissioning Report Amendment	Amend Final Commissioning Report to document the Warranty Phase commissioning activities.	Final Report Amendment

Project Phase	Commissioning Task Description	Deliverable(s)
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<p>Post-Occupancy Inspection</p>	<p>Return to the project approximately 10 months after substantial completion to review the building operation with the facility occupants and O&amp;M staff, and to discuss outstanding issues related to commissioning. Provide suggestions for improvements to systems operation including,</p> <ul style="list-style-type: none"> <li>• Measurement &amp; Verification Issues,</li> <li>• Re-Commissioning Tasks, and</li> <li>• Improvements in Preventive Maintenance or Operational Strategies</li> </ul> <p>Assist facility staff in developing warranty issues, documents and requests for service to remedy outstanding problems.</p> <p>As part of the Post Occupancy Inspection, the Commissioning Agent shall analyze the energy consumption records from the project site (both utility and system generated reports) and provide the team with an analysis of actual system energy performance versus predicted performance. To the extent possible, deficiencies in performance shall be analyzed to provide an understanding of the systems, components or operating strategies that may be operating outside predicted parameters.</p>	<p>Post Occupancy Field Visit Report</p> <p>Commissioning Issues Log</p> <p>Warranty Issues Report</p> <p>Systems Energy Review Report</p>
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## **10.0 Security Considerations**

VA Privacy and Information Security Awareness and Rules of Behavior Course (text version) must be completed by all contractors and subcontractor employees assigned to VA accounts prior to delivery of service and annually thereafter as long as the contract is in place.

The contractor shall provide to the VA COTR a copy of the completed training certificate(s).

Certification and accreditation requirements do not apply, and a Security Accreditation Package is not required. At no time will the vendor be in contact or have access to VA sensitive information. VA sensitive information procedures will be followed per VA Handbook 6500.6.