

GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF GENERAL SERVICES



Addendum No. 5

To

Request for Proposal (“RFP”) No. DCAM-22-CS-RFP-0026

Construction Services for Major Renovations of PSCC Building

Issued: January 9, 2023

This Addendum No. 5 is issued on January 9, 2023. Except as modified herein, the RFP remains unchanged.

Item No. 1. The Questions and Answers spreadsheet is hereby attached as **Exhibit A.**

Item No. 2. Revised Section (018100) of the Specifications is hereby attached as **Exhibit B.**

Item No. 3. Sample Construction Waste management form, for reference only, is hereby attached as **Exhibit C.**

By: James H. Marshall
James H. Marshall
Contracting Officer

Date: 1/9/2023

--End of Addendum No. 5--

**GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF GENERAL SERVICES**



EXHIBIT A

[EXHIBIT WILL APPEAR ON THE FOLLOWING PAGE]

**GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF GENERAL SERVICES**



Request for Proposals (“RFP”) No. DCAM-22-CS-RFP-0026

Construction Services for Major Renovations of PSCC Building

Offerors Questions on RFP with DGS Responses

No.	Question	DGS Response
1	<p>The commissioning requirements (018100 3.1B) state the following systems will be commissioned as part of this project:</p> <p>12.) Audio Visual Systems 13.) Security Systems 14.) Communication Systems</p> <p>Will a complete set of plans/specifications for the AV, security, and communications systems be issued as an Addendum at a later date? Or, should contract propose these systems per DGS standards (PSD security standards, DC-Net/OCTO network standards, etc.)?</p>	<p>District will be engaging an independent commissioning agent (CxA) for this project. Revised Specification Section (018100) attached in this addendum No. 5 provides the requirements.</p>
2	<p>Could you please provide an unstamped copy of the specification manual? The permit stamp makes the right side of the specifications difficult to read.</p>	<p>Unstamped specifications shall be provided for reference only. The DCRA stamped specifications shall take precedent over any discrepancies from the unstamped specifications.</p>
3	<p>Please clarify if any low voltage work is to be completed by others.</p>	<p>Low voltage (<50 Volts) for this project is installing cables throughout the project. Termination of cables will be completed by other DGS/OUC subcontractors.</p>
4	<p>Please provide the HVAC controls contractor required, if any.</p>	<p>There is not a required HVAC controls contractor.</p>
5	<p>Please provide the fire alarm controls contractor, if any.</p>	<p>There is not a required Fire Alarm controls contractor.</p>

6	Please confirm all demolition and installation responsibilities of the 3 rd party vendor for console furniture.	Confirmed. The 3rd party vendor will be required to coordinate the demolition and installation with the awarded vendor of this contract.
7	Please clarify if we will be required to adhere to the specified phase.	Yes. See Sections 1.4, 2.1 A, 2.2, 2.3, 2.5 of the RFP.
8	Please confirm local parking lot limitations and restrictions.	Please see Section 2.7.2 of the RFP.
9	Please provide the vendor information for the vending machines.	Monumental Vending
10	The specifications state that the Equipment and Furnishings divisions are not used. Please confirm that the GC is not responsible for furnishing any furniture or equipment.	Please refer to FFE Schedule on A-801, A-802, A-803, A-804 and A-805 and relevant drawings in the contract documents.
11	Please clarify what the highlighting on sheet A804 means.	Highlights have no meaning.
12	Please confirm if the pay phone in 1 st floor vestibule is to remain or be removed.	Yes, the pay phone is to be removed.
13	Please clarify the extent in which green codes must be acknowledge in renovations.	Green codes shall be adhered to per the contract documents and the Energy Verification Sheet (EVS) G-003. Construction work shall comply with 2013 DC Green Construction Code. Contractor shall fill out the Construction Waste management form per IgCC 503 (see sample sheet attached for reference only). The Construction Waste Management form only needs to be submitted once, before the final inspection.
14	The link in addendum No. 1 provides two PDFs for drawings and specifications that appear to be the same document. Please confirm these the specification manual and drawings are duplicated in the folder.	An updated, corrected link was provided in Addendum No. 3.
15	Please confirm that the drawings and specifications are not being reissued due to a revision to the drawings and specification but to provide unstamped specifications per the RFIs.	Confirmed. Unstamped specifications are provided for reference only. The DCRA stamped specifications shall take precedent over any discrepancies from the unstamped specifications.

**GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF GENERAL SERVICES**



EXHIBIT B

[EXHIBIT WILL APPEAR ON THE FOLLOWING PAGE]

SECTION 018100 - COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Commissioning is a systematic process of ensuring all building systems perform interactively according to design intent and Government's operational needs. Commissioning will encompass and coordinate traditionally separate functions of system documentation, installation checkout, equipment start-up, control system calibration and point-to-point checkout, testing and balancing, and functional performance testing. Commissioning is intended to achieve the following specific objectives according to the Contract Documents.:
1. Verify and document proper installation and performance of equipment and systems.
 2. Ensure O&M and commissioning documentation requirements are complete.
 3. Provide Government with functional buildings and/or systems with minimal operation problems at time of occupancy.
 4. Verify the completeness of operation and maintenance materials.
 5. Confirm that the Government's operating personnel are adequately trained on the operation and maintenance of building equipment.
- B. This Section in no way diminishes the responsibility to perform work and testing as outlined in other parts of the Contract Documents. Any requirements outlined in this Section are in addition to the requirements outlined in the Contract Documents.

1.2 DEFINITIONS

- A. Acceptance Phase: Phase of construction after start-up and initial checkout when Functional Performance Tests, O&M documentation review and training occur.
- B. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in tested modes according to the Contract Documents.
- C. Commissioning Agent or Authority (CA): CA directs and coordinates day-to-day commissioning activities. CA reports directly to Government.
- D. Commissioning Plan (Cx Plan): Overall plan developed after bidding that provides structure, schedule and coordination planning for commissioning process.
- E. Control Systems: System and components associated with automation system.
- F. Deferred Functional Tests: Functional tests performed after Substantial Completion due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow test from being performed.
- G. Deficiency: Condition of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with design intent).

- H. Functional Performance Test Procedures: Commissioning protocols and detailed test procedures and instructions that fully describe system configuration and steps required to determine if the system is performing and functionally properly.
- I. Functional Performance Test (FPT): Test of dynamic function and operation of equipment and systems. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, life safety conditions, power failure, etc. Systems are run through all specified sequences of operation. Components are verified to be responding in accordance with Contract Documents. Functional Performance Tests are executed after pre-functional checklists and start-ups are complete.
- J. Monitoring: Recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or trending capabilities of control system.
- K. Overridden Value: Writing over a sensor value in a control system to see response of system (e.g., changing outside air temperature value from 52 deg.F to 72 deg.F to verify economizer operation). See also “Simulated Signal”.
- L. Pre-Functional Checklist (PC): A list of static inspections and elementary component tests that verify proper installation of equipment (e.g., belt tension, oil levels, labels affixed, gauges in place, sensors calibrated, etc.).
- M. Seasonal Performance Tests: Functional Performance Tests deferred until system(s) ambient conditions are closer to design conditions.
- N. Simulated Condition: Conditions created for testing component or system (e.g., applying heat to space temperature sensor to monitor response of VAV box).
- O. Simulation Signal: Disconnecting sensor and using signal generator to send amperage, resistance or pressure transducer and/or DDC system to simulate value to Building Automation System.
- P. Start-up: The activities where systems or equipment are initially tested and operated. Start-up is completed prior to functional testing.
- Q. Test Procedures: Step-by-step process which must be executed to full test requirements.
- R. Trending: Monitoring using building control system.
- S. Warranty Period: Warranty period for entire project and system, including equipment components.

1.3 RELATED WORK

- A. Specific commissioning requirements are given in the following Sections of the specifications. The following sections apply to:
 - 1. Basic Mechanical Requirements: Refer to Division 23.
 - 2. Basic Electrical Requirements: Refer to Division 26.
 - 3. Section 019113 General Commissioning Requirements

1.4 COORDINATION

- A. Commissioning Team: Member of the Commissioning Team (CT) may consist of:
1. Commissioning Agent (CA)
 2. Government's Representative(s) (OR)
 3. Construction Manager (CM)
 4. Architect and Engineers (AE)
 5. Mechanical Contractor (MC)
 6. Electrical Contractor (EC)
 7. Test and Balance Agency (TAB Agency)
 8. Controls Contractors (CC)
 9. Equipment Suppliers and Vendors
- B. Management: Government shall be responsible for acquiring the services of a qualified and approved Commissioning Agent (CA). The CA shall lead, review, and oversee all commissioning activities and report to the OR. All members of the Commissioning Team shall cooperate to fulfill contracted responsibilities and objectives of the Contract Documents.
1. Qualifications:
 - a. The CA can either be a registered design professional meeting the following requirements;
 - 1) Must be independent of the work of design and construction of this project (though may be an employee of the project design firm).
 - 2) Must not be an employee of, or contracted through, a contractor or construction manager holding construction contracts of this project.
 - 3) Must have prior experience commissioning a minimum of two (2) projects of similar scope.
 - 4) May be an employee or consultant of the owner of this project meeting the above requirements.
 - b. Or the CA must meet the following credentials:
 - 1) Must be a Certified Commissioning Professional certified by one of the following commissioning provider certification agencies:
 - a) Building Commissioning Certification Board (CCP).
 - b) ASHRAE (CPMP).
 - c) NEEB (BSC-CP).
 - d) AEE (CPCP).
 - 2) Must be independent of the work of design and construction of this project (though may be an employee of the project design firm).
 - 3) Must not be an employee of, or contracted through, a contractor or construction manager holding construction contracts of this project.
 - 4) May be an employee or consultant of the owner of this project meeting the above requirements.
- C. Kick-off Meeting: Within 90 days of commencement of construction, CA will plan, schedule and conduct a commissioning kick-off meeting. Membership and responsibilities of the Commissioning Team will be clarified at this meeting. CA will distribute meeting minutes to all parties.
- D. Scheduling:

1. CA will work with commissioning team to establish required commissioning activities to incorporate in preliminary commissioning schedule. The Contractor will integrate commissioning activities into master construction schedule. Representatives of the commissioning team will address scheduling problems. Necessary notifications are to be made in a timely manner in order to expedite commissioning.
2. The CA will provide initial schedule of primary commissioning events at commissioning kick-off meeting. As construction progresses, more detailed schedules are developed by the Commissioning Team.

1.5 SUBMITTALS

- A. Provide CA with documentation required for commissioning work. At minimum, documentation shall include: detailed start-up procedures, full sequences of operation, O&M data, performance data, performance test procedures, control drawings and details of Government contracted tests. In addition, installation and checkout materials actually shipped inside equipment and actual field checkout sheet forms used by factory or field technicians shall be submitted to CA.
- B. CA shall review submittals for conformance as it related to commissioning. Review is primarily intended to aid in development of functional testing procedures and only secondarily to verify compliance with equipment specifications.

1.6 START-UP PLAN

- A. Sub-contractor responsible for purchase, installation and start-up of equipment develops and submits start-up plan by combining manufacturer's detailed start-up and checkout procedures with normally used field checkout sheets.
- B. Start-up plan shall include the following:
 1. Separate tagged dividers for each system or equipment item to include start up and testing checklists:
 - a. Equipment item sections as required
 - b. Piping and flushing testing.
 - c. Duct leak testing, sealing and cleaning, etc.
 - d. Testing and balancing procedures.
 - e. Controls systems check-out and point to point verification.
- C. COTR reviews submitted start-up plan for content and format.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. Provide specialized tool, test equipment and instruments required to execute start-up, checkout and functional performance testing of equipment under their contract.

- B. Test equipment shall be of sufficient quality and accuracy to test and/or measure system performance with tolerances specified. A testing laboratory shall have calibrated test equipment within the previous 12 months. Calibration shall be NIST traceable. Equipment shall be calibrated according to manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 COMMISSIONING OVERVIEW

- A. The following provides a brief overview of typical commissioning tasks during construction and general order in which they occur:
 - 1. CA develops pre-functional checklists and equipment and systems Functional Performance Test procedures based on design documents and submittal data. Pre-functional checklists and Functional Performance Test procedures are included in a Commissioning Plan which is distributed to the Commissioning Team members for review.
 - 2. CA conducts kick-off meeting early in construction process to establish membership of commissioning team and review commissioning team member responsibilities. The Commissioning Plan pre-functional checklists and Functional Performance Tests procedures are reviewed and comments from the team members are addressed.
 - 3. CA schedules subsequent meetings as necessary to plan, coordinate and schedule commissioning activities. Deficiencies and problem resolution will also be discussed at these meetings.
 - 4. Sub-contractors execute pre-functional checklists and inform CA when the pre-functional checklist items are complete by phase. The various sub-contractors will execute and document the pre-functional checklists in phases such as setting equipment, piping equipment, insulation, electrical connections, etc. The purpose is to execute the process and complete the checklist as the Work is being completed and will not wait until the end of the installation to complete the checklists.
 - 5. CA will spot-check the sub-contractor completed pre-functional checklists during periodic site visits. CA spot-check verification will occur at approximately 50% and 100% installation completion. Sub-contractors provide the necessary personnel to assist CA (e.g. remove A/C unit covers, open electrical panel covers, etc.) with the PFC spot-check verification.
 - 6. Sub-contractors perform start-up and initial checkout. Sub-contractors assemble start-up documentation and submit to CA for verification of completion of start-up activities prior to functional performance tests.
 - 7. Functional Performance Tests are executed by sub-contractors, under supervision and documented by the CA.
 - 8. Items of non-compliance in material, installation or set-up will be corrected at Contractor's expense and system shall be retested.
 - 9. CA issues final Commissioning Report.
- B. Systems to be Commissioned

The following equipment will be commissioned:

1. VRF systems
2. Exhaust Fans
3. Heat Pumps
4. Split system DOAS
5. Packaged roof-top DOAS
6. Piping
7. DDC control system
8. Ductwork
9. Testing and Balancing
10. Lighting, dimming controls, occupancy sensors
11. Fire protection/Fire Alarm systems
12. Audio Visual systems
13. Security systems
14. Communication systems

3.2 RESPONSIBILITIES

- A. Commissioning Agent (CA): The CA is not responsible for design concept, design criteria, code compliance, general construction scheduling, cost estimating, or construction management. The primary role of the CA is to develop and coordinate the execution of a testing plan to verify and document that systems are functioning in accordance with the design intent and Construction Documents.
1. Construction and Acceptance Phase:
 - a. Coordinates and directs all commissioning activities. Work with the Commissioning Team to confirm that commissioning activities are scheduled.
 - b. Maintain an up-to-date Commissioning Plan.
 - c. Plan and conduct the commissioning scoping meeting.
 - d. Request and review additional information required to perform commissioning tasks, including Operation and Maintenance materials, start-up and checkout procedures, and sequence of operation.
 - e. Review submittals applicable to commissioned systems, concurrent with standard submittal review.
 - f. Develop start-up and checkout plans with Sub-contractors. Write and distribute pre-functional checklists.
 - g. Perform site visits, as necessary to observe components and system installations. Attend construction job-site meetings, as necessary, to monitor construction and commissioning progress.

- h. Review completed pre-functional checklists and start-up reports.
 - i. Assist with coordination of start-up requirements with TAB requirements.
 - j. Write functional performance test procedures for equipment and systems.
 - k. Coordinate, witness, and document functional performance tests completed by installers. Coordinate re-testing as necessary until satisfactory performance is verified.
 - l. Maintain a master deficiency and resolution record. Provide the Government with written progress report with test results and recommended actions.
 - m. Review the training proposed for Government's operating personnel.
 - n. Review O&M manuals.
 - o. Prepare final commissioning report summarizing final disposition of building system after functional testing.
2. Warranty Period:
- a. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
 - b. Assist in the development of a preventative maintenance plan and review as-built documentation.
- B. Design Team (AE):
- 1. Document design intent of Systems and sequence of operations documentation as required by CA.
 - 2. Attend commissioning scoping meeting and additional meetings, as necessary.
- C. Contractor:
- 1. Construction and Acceptance Phase:
 - a. Incorporate commissioning activities into the construction schedule.
 - b. Periodically update commissioning activities into construction schedule.
 - c. Submit copies of submittals for all equipment to be commissioned, with manufacturer start-up criteria, start-up checklists and operating and maintenance criteria to CA.
 - d. Review commissioning plan, pre-functional checklists, and FPT procedures.
 - e. Attend commissioning kick-off meeting and other commissioning team meetings.
 - f. Facilitate cooperation of sub-contractors detailed start-up plan.
 - g. Verify equipment and systems pre-functional checklists are completed by subcontractors for CA review on-site during periodic site visits. Assures CA at each phase of installation equipment and systems are ready so that CA may spot-check the pre-functional checklists to verify completion.
 - h. Submit one 100% completed hard copy and one PDF copy PFC checklists to CA prior to the start of functional testing.
 - i. Verify equipment and systems start-up activities are completed per Start-Up Plan and that equipment and systems are ready for execution of functional testing. Compile and submit executed Start-Up Plan documentation to CA for review prior to start of functional testing.
 - j. Insures resolution of non-compliance and deficiencies of construction related items identified by commissioning team. Obtains written documentation of completion from the appropriate sub-contractors.

2. Warranty Period

- a. Confirm that sub-contractors execute required seasonal or deferred functional performance testing.
- b. Confirm that sub-contractors correct deficiencies and make necessary adjustments during the warranty period.
- c. Attend end-of-warranty review.

D. Sub-contractors/Vendors:

1. Attend commissioning kick-off meeting and other commissioning team meetings.
2. Review commissioning plan, pre-functional checklists, and FPT procedures.
3. Complete (sign-off) Pre-functional Checklists during each phase of construction (installation, piping, ducting, insulation, controls, electrical) as the work is completed. Maintain Pre-functional Checklists during construction so that CA may review Prefunctional checklists to verify work completion.
4. Prepare Start-up Plans.
5. Execute all required equipment and systems testing as required by project specifications (e.g. duct pressure testing, piping pressure testing, piping flushing, etc.) and submit completed testing documentation to CA as a part of the executed Start-Up plan.
6. Execute equipment start-up procedures and complete start-up checklists per Start-Up Plan. Submit executed Start-Up Plan documentation to CONTRACTOR prior to start of functional testing.
7. Ensure installation work is complete, is in compliance with Contract Documents and is ready for Functional Performance Testing. Notify CT that equipment and systems are ready for Functional Performance Testing. Submit 100% complete pre-functional checklists to CA for review prior to start of functional testing.
8. Execute FPTs developed by CA as described in Contract Documents and commissioning plan.
9. Provide, for use during commissioning, certified and calibrated instrumentation required to take measurements of system and equipment performance during functional performance testing.
10. Provide necessary personnel to assist CA in execution of PFC and FPT commissioning work (e.g. remove electrical panels, remove air handling unit or fan coil unit panels, provide access to roof areas or secured mechanical rooms, open access doors, etc.) as required to complete work.
11. Assist CT with developing a comprehensive commissioning schedule.

E. Controls Contractor (CC):

1. Attend commissioning kick-off meeting and other commissioning team meetings.
2. Completely install and thoroughly inspect start-up, test, adjust, calibrate and document systems and equipment under Building Automation/Controls Contract.
3. Provide laptop computer, software and training to accommodate TAB Contractor in system balancing.
4. Maintain database of control parameters submitted by TAB Contractor subsequent to field adjustment and measurements.
5. Maintain comprehensive records of all control system start-up records per Start-Up Plan including but not limited to system calibration checkout records and point-to-point checklists. Submit all executed control system start-up records to CA prior to start of functional testing.

6. Set up trend logs as requested by CA to substantial proper system operation.
7. Provide instrumentation, computer, software and communication resources necessary to demonstrate total operation of building systems during Functional Performance Testing of control system equipment.
8. Provide on-site technician skilled in software programming and hardware operation to exercise sequences of operation and to correct control deficiencies identified during functional performance testing.

F. Test, Adjust and Balance (TAB) Agency:

1. Attend commissioning kick-off meeting and other commissioning team meetings.
2. Submit TAB plan and forms describing methodology for execution of test and balance procedures specific to this project to CT for review.
3. Cooperate with execution of required Work.
4. Submit copy of final TAB report to CA for review prior to start of functional testing.
5. Rebalance deficient areas identified during commissioning.
6. Provide on-site technician, as necessary, skilled in TAB procedures to provide verification of equipment and system performance and TAB reading during functional performance testing.

3.3 COMMISSIONING TEAM (CT) MEETINGS

- A. CT meetings will be held periodically as determined by the CA with frequency increasing as construction advances and systems become operational. Attendance is mandatory. CA will record minutes and attendance. CA will chair CT meetings.
- B. Discussions held at CT meetings shall include, but not be limited to: systems/equipment startup, scheduling, testing, documentation, deficiencies and problem resolution.

3.4 REPORTING

- A. CA will provide regular status reports to Commissioning Team, with increasing frequency as construction and commissioning progresses.
- B. CA will regularly communicate with members of commissioning team, keeping them apprised of commissioning progress.
- C. CA shall submit non-compliance and deficiency reports to Government and Construction Manager.
- D. CA shall provide a preliminary commissioning report, as required by DC Green Construction Code Section 903, to the Government prior to the final inspection, and have a copy available to the code official upon request.
- E. CA shall provide a final summary report to Government within 180 days after the date of issuance of the first certificate of occupancy for occupiable space in a story above grade plane, and a copy shall be made available to the code official upon request

3.5 INSTALLATION CHECKOUTS (PRE-FUNCTIONAL CHECKLISTS)

- A. The objective of the Pre-functional checklist is to verify and document that the equipment/systems are provided and installed according to documented design intent and Contract Documents.
- B. Pre-functional checklists are provided by the CA and executed by the installing sub-contractors. Sample copies of pre-functional checklists are included in Section 018130 "Pre-functional Checklists". The sample copies are provided to give the Sub-contractors a general idea of the work required to complete the pre-functional checklists. The pre-functional checklists included are prototypical, and do not reflect specific requirements of this project's plans or specification. Specific pre-functional checklist items may be added, modified or deleted in the Cx plan delivered to the Sub-contractor in order to reflect the final construction document requirements. Contractor and Sub-contractors shall review final construction documentation for applicable details and specifications related to equipment to be commissioned in order to fully ascertain all of the pre-functional checklist requirements.
- C. The sub-contractors will execute the pre-functional checklists in phases as work is completed such as setting equipment, piping equipment, insulating it, making up electrical connections, etc. The purpose is to execute the commissioning process and complete the checklists as the work is being completed and not to wait until the end of the installation to complete the checklists.
- D. Sub-contractors shall provide CA with signed and dated copy of completed pre-functional checklists. Only individuals having direct knowledge that a line item task was actually performed will initial or check that item off. Sub-contractor shall clearly list pre-functional checklist items not completed successfully. Completed forms documenting any outstanding deficiencies shall be provided to CA within two working days of completion. The intent of this process is for the sub-contractor personnel directly responsible for each respective checklist item to "sign-off" and document work completion.
- E. Maintain a single master hard copy of the PFC checklists executed by the sub-contractors onsite for CA review during periodic site visits.
- F. The CA will complete a sampling or "spot-check" verification of the sub-contractor completed pre-functional checklists prior to the start of functional performance testing. CA reviews deficiency report to determine if outstanding items prevent scheduling of Functional Performance Testing.
- G. Sub-contractors shall submit updated pre-functional checklist and Statement of Correction on any checklist deficiency item.
- H. CA reviews report to determine if outstanding items prevent scheduling of Functional Performance Testing.
- I. Any pre-functional checklist item marked as complete which is later found to be incomplete and causes re-verification work by CA or delays during Functional Performance Testing will be back-charged to the responsible party.

3.6 EQUIPMENT START-UP

- A. Sub-contractors shall schedule equipment start-up with Commissioning Team. Sub-contractor shall execute equipment start-up per the start-up Plan.
- B. Sub-contractor shall execute equipment start-up per start-up plan, document results and forward copy of completed start-up plan and checklists to Contractor. Contractor to compile all executed start-up documentation into Start-Up notebooks and submits to CA for review to verify completion of start-up activities. Only individuals having direct knowledge that a line item task was actually performed will initial or check that item off. Executed start-up plan must be submitted to CA prior to start of functional testing.
- C. Sub-contractor shall clearly list outstanding items or initial start-up tests that are not completed successfully. Completed forms documenting any outstanding deficiencies shall be provided to CA within two working days of completion.
- D. Sub-contractors shall submit an updated Start-up Report and Statement of Correction on any incomplete or non-compliance report.
- E. Any start-up testing marked as complete which is later found to be incomplete and causes reverification work by CA or delays during Functional Performance Testing will be back-charged to the responsible party.

3.7 FUNCTIONAL PERFORMANCE TEST

- A. Objectives and Scope:
 - 1. The objective of Functional Performance Testing is to demonstrate each system is operating according to documented design intent and Contract Documents. Functional Performance Testing facilitates bringing system from a state of substantial completion to full dynamic operation. Additionally, during Functional Performance Testing, areas of deficient performance are identified and corrected, improving operation and functioning of systems.
 - 2. Each system shall be operated through all modes of operation (occupied, unoccupied, warm-up, cool-down, etc.) where there is a specified system response. Verifying each sequence in the sequences of operation is required.
- B. Development and Test Procedures:
 - 1. The purpose of any given specific test is to verify and document compliance with stated criteria of acceptance given on test form. CA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Sub-contractor responsible to execute test will provide limited assistance to CA in developing procedure (i.e., answering questions about equipment, operation, sequences, etc.) Prior to execution, CA shall provide a copy of test procedures to Sub-contractor. Sub-contractor will review tests for feasibility, safety and equipment warranty protection. CA shall submit tests to Government, CM and A/E and other Commissioning Team members for review.
 - 2. Test procedure forms developed by the CA will include (but not be limited to) the following information:

- a. System and equipment or component name(s)
 - b. Equipment location and ID number
 - c. Date
 - d. Project name
 - e. Participating parties
 - f. Specific sequence of operation or other specified parameters being verified
 - g. Instructions for setting up test
 - h. Specific step-by-step procedures to execute test, in a clear, sequential and repeatable format
 - i. A Yes/No checkbox to allow for clearly marking whether or not proper performance of each part of the test was achieved
 - j. Section for comments
 - k. Signatures and date block for participants
3. Sample copies of Functional Performance Test (FPT) forms are included at the end of this specification. The sample copies are provided to give the Sub-contractors a general idea of the work required to complete the FPT. Sample FPT forms included are not “all inclusive”. Specific FPT items may be added, modified or deleted in the Cx plan delivered to the Sub-contractor in order to reflect the final construction document requirements. Sub-contractors shall review final construction documentation for applicable details and specifications related to equipment to be commissioned in order to fully ascertain all FPT requirements.
 4. Sub-contractors shall provide CA with signed and dated copy of completed FPT checklists to verify that the FPTs are ready for CA verification. Only individuals having direct knowledge that a line item sequence of operations was actually checked will initial or check that item off.
- C. Coordination and Scheduling:
1. Contractor will provide sufficient notice to CA regarding completion of schedule for equipment and systems. Contractor will schedule Functional Performance Test with CT. CA shall witness and document functional testing of equipment and systems. Subcontractor shall execute test under direction of CA.
 2. The Contractor/sub-contractor must submit the 100% completed “master” hard-copy Prefunctional checklists as a prerequisite to scheduling functional performance tests.
 3. The Contractor/sub-contractor must submit the fully executed start-up plan including all equipment and systems testing documentation (e.g. duct and piping pressure testing, cleaning/flushing documentation, etc.), and all executed start up and initial check-out documentation as a prerequisite to scheduling functional performance tests.
 4. The T&B sub-contractor shall complete all test and balance work and submit final Test and Balance report for review by A/E and CA prior to start of Commissioning Functional Testing. A/E shall review final test and balance report for acceptance. CA review of final T&B report is cursory (not for acceptance) and is primarily intended to insure that the equipment and systems are ready to be functionally tested.
 5. The control sub-contractor must submit all control systems start-up and initial checkout documentation (including point-to-point verifications, etc.) as a prerequisite to scheduling functional testing. The control sub-contractor shall also submit executed copies of the commissioning functional tests (signed and dated by the control sub-contractor technician directly responsible for verification of the control sequence or system operation) to the CA as a prerequisite to scheduling functional testing (to show that the control subcontractor has actually tested and verified each sequence prior to CA witnessing the functional testing).

3.8 DOCUMENTATION, NON-COMFORMANCE AND APPROVAL OF TESTS

A. Documentation:

1. CA will witness and document results of FPT using specific Functional Performance Test developed for that purpose. Prior to testing, FPTs are provided to the Commissioning Team for review and approval. CA will include filled out FPTs in Commissioning Turnover Package.

B. Non-Conformance:

1. CA will record results of functional testing. Deficiency or non-conformance issues will be noted and reported to Contractor and Government on standard non-compliance FPT form.
2. Corrections of minor deficiencies identified may be made during tests at discretion of CA. In such cases, deficiency and resolution will be documented on FPT form.
3. Every effort will be made to expedite testing and minimize unnecessary delays, while not comprising integrity of tests. CA shall not overlook deficient work or loosen acceptance criteria to satisfy scheduling or cost issues unless directed to do by the Government.
4. Deficiencies are handled in the following manner:
 - a. When there is no dispute on deficiency and Sub-contractor accepts responsibility for remedial action:
 - 1) CA documents deficiency and Sub-contractors response and intentions and they go on to another test or sequence. CA submits deficiency report to Contractor and Government. Copy is provided to Sub-contractor.
 - 2) Sub-contractor corrects deficiency, completes statement of correction form certifying that equipment is ready to be tested and send it back to Contractor. Contractor forwards response to CA. Contractor reschedules test with Sub-contractor. When there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
 - a) CA documents deficiency and Contractors response and they go on to another test or sequence. CA submits deficiency report to Contractor and Government. Copy is provided to Sub-contractor.
 - b) Contractor facilitates resolution of deficiency. Other parties are brought into discussions as needed. Final interpretive authority is A/E. Final acceptance authority is with the Government.
 - 3) Contractor documents resolution process.
 - 4) Once interpretation and resolution has been decided, appropriate party corrects deficiency, and verifies correction to Contractor. Contractor forwards response to CA. Contractor reschedules test and test is repeated until satisfactory performance is achieved.

C. Cost of Retesting:

1. Cost for Sub-contractor to retest FPT, if they are responsible for deficiency, will be theirs. If Sub-contractor is not responsible, cost recover for retesting will be negotiated with Contractor.

2. Time for CA to direct any retesting required because a specific pre-functional checklist or start-up test items reported to have been successfully completed, but determined during Functional Performance Testing to be faulty, may be back-charged to Sub-contractor. CA costs for re-testing are \$2000.00 per man-day.

D. Approval:

1. CA notes each satisfactorily demonstrated function on test form. CA, A/E and Government provide formal approval of FPT. CA recommends acceptance of each test to Government. The Government gives final approval, providing a signature to Contractor and Sub-contractor.

3.9 COMMISSIONING DOCUMENTATION

A. CA is responsible to compile and organize commissioning records. CA shall deliver Cx records to the Government in Commissioning Binders. Turnover Package to include the following:

1. Commissioning Plan
2. Pre-functional Checklists
3. Completed Functional Performance Test records
4. Deficiency Reports
5. Systems Manual (includes BOD, single line diagrams, maintenance schedule, retesting schedule, etc.)
6. Preliminary Commissioning Report as required by 2013 DC Green Construction Code Section 903.2.
7. Final Commissioning Report

B. Final Report Details

1. Final Commissioning Report will include:
 - a. An executive summary
 - b. List of participants and roles
 - c. Brief building description
 - d. Overview of commissioning and testing scope and general description of testing and verification methods.
2. The Final Report will contain evaluation regarding disposition of equipment, systems and documentation in the following areas:
 - a. Conformance to specifications
 - b. Equipment installation
 - c. Functional performance
 - d. Design intent
3. All outstanding non-compliance items will be specifically listed. Recommendations for improvement to equipment or operations, future actions, etc., will also be listed. Each non-compliance issue will be referenced to specific FPT where deficiency is documented.

3.10 TRAINING OF GOVERNMENT PERSONNEL

- A. Sub-contractors will provide complete training in start-up, operation and maintenance of all equipment under contract.
- B. Contractor and Sub-contractors will be responsible for developing Government training plan, scheduling of Government training, execution of Government training and documentation of completed Government training.
- C. A/E will be responsible for approving content and adequacy of Government training.
- D. CA will be responsible for monitoring completion of Government training.
- E. Sub-contractor will submit a written training plan to A/E and CA for review and approval with submission of shop drawings. Plan will cover the following elements:
 - 1. Equipment (included in training)
 - 2. Intended audience
 - 3. Location of training
 - 4. Objectives
 - 5. Subjects covered
 - 6. Duration of training on each subject
 - 7. Instructor for each subject
 - 8. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
 - 9. Instructors and qualifications
- F. Contractor schedules training with CA, Government and Sub-contractors. CA develops criteria to determine training satisfactorily completed. Contractor schedules training sessions with appropriate personnel.

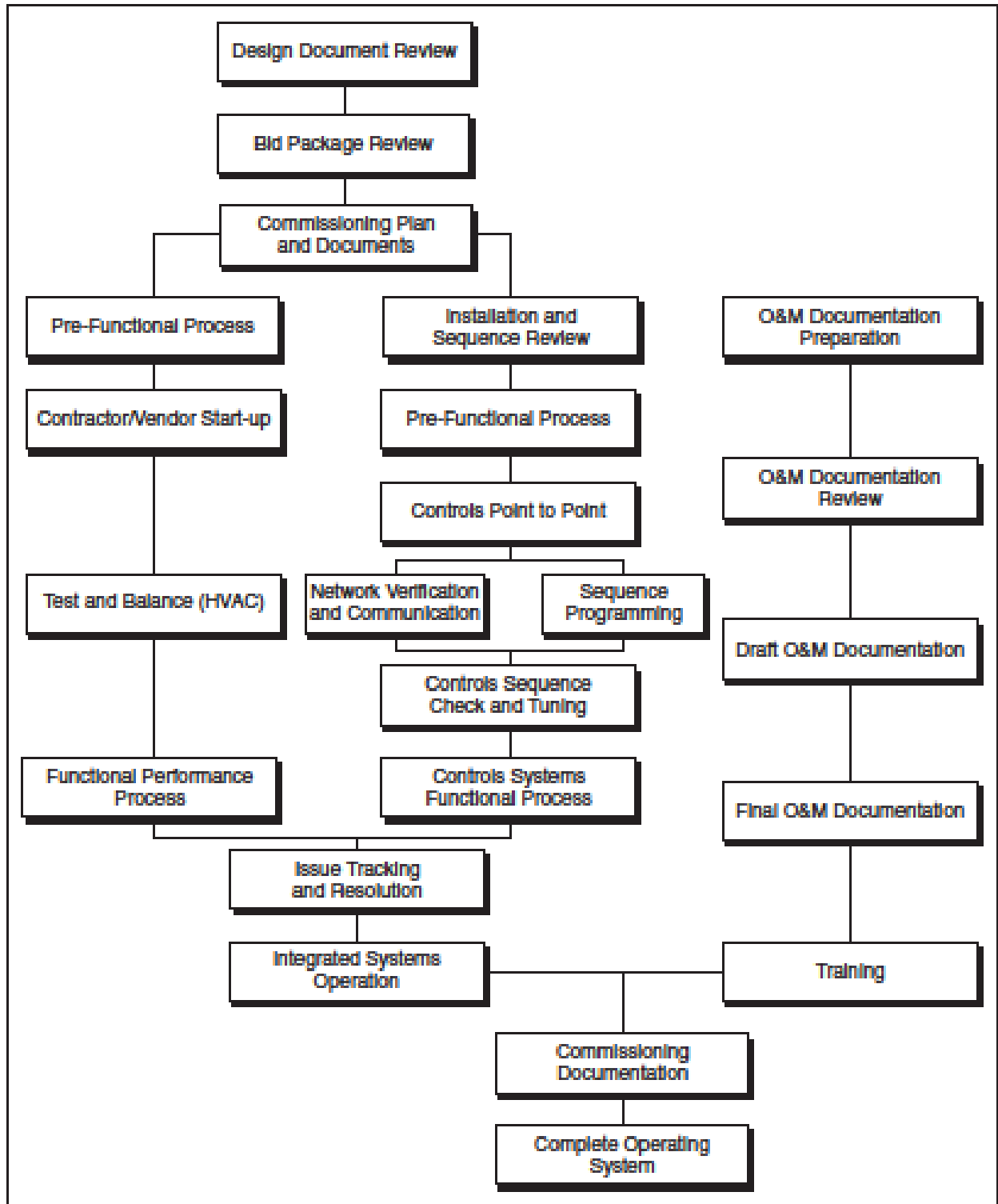
3.11 DEFERRED TESTING

- A. Deferred Seasonal Testing:
 - 1. During warranty period, seasonal testing (test delayed until weather conditions are closer to system's design) will be completed as part of this contract. Contractor will coordinate this activity. Tests will be executed, documented and deficiencies corrected by the appropriate contractor(s), with CA witnessing. CA will incorporate final updates to Turnover Package as necessary.
- B. Unforeseen Deferred Tests:
 - 1. Any check or test not completed due to building structure, required occupancy condition, or other deficiency, may be delayed upon approval of Government. These tests will be rescheduled as soon as possible.
- C. Deferred Final Testing (DFT) due to limitations imposed by existing building mechanical systems being corrected:

1. The existing heating hot water distribution and AHU serving the area under the scope of this project are anticipated to be replaced within one year upon the completion of this project. Mechanical system components identified to be under DFT in par. 3.1.B “Systems to be commissioned” will undergo their final commissioning upon completion of the building infrastructure upgrade. Prior to this, the pre-final commissioning contacted upon completion of construction of this project, will commission the affected mechanical systems to the extent possible under the limitations of the existing building infrastructure.

END OF SECTION 018100

Note: The Sample Commissioning Process Chart follows:



**GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF GENERAL SERVICES**



EXHIBIT C

[EXHIBIT WILL APPEAR ON THE FOLLOWING PAGE]

