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Commissioning Supplemental Instructions and Clarifications

A.1. Commissioning Summary of the Work

All information in this Supplemental Instructions shall override information in Specification 019100 General Commission where it differs. All other requirements shall remain if not altered or enhanced herein.

Commissioning is a systematic process to ensure all building systems perform correctly and interactively according to the Basis of Design and the Owner's Project Requirements. A formal commissioning plan is developed to guide the commissioning-related activities of all the parties participating in the commissioning process. The commissioning process requires full participation of these parties throughout the design and construction phases, and continues beyond the acceptance of the building systems, to building occupancy and post occupancy.

Elements of building commissioning include:

1. Review of submittal data.
2. Incorporation of specific system or equipment data.
3. Incorporation of complete controls sequences of operation.
4. Any modifications to the contract.
5. Specific systems/equipment checklists and testing.
6. Integrated systems testing.
7. Clearly and thoroughly documentation and approval of the systems design and how it meets the design intent, installation, and O&M requirements.
8. Documentation of proper training of operators and facility maintenance staff.
9. Providing the VA with an unbiased, objective view of the built systems and equipment installation, operation, and functional performance.
10. Final Approval of fully and optimally performing systems
11. Final Documentation of the process and systems performance
12. Follow through with tweaking during the testing and ramp up phase until occupancy and in Post Occupancy as required.

A.2. Construction Specific Commissioning Plan

The Construction Specific Commissioning Plan shall be completed and submitted by the General Contractor; otherwise noted as the Contractor or Prime Contractor. The contractor as defined in the Specification 019100 shall be represented by the roles of the *Commissioning Manager* and the Sub-Contractors of commissioned systems of systems or products shall be represented by the *Commissioning Representative*.

The purpose of the *Construction Specific Commissioning Plan* is to define clear direction to the commissioning team on the planned implementation, execution, validation, and documentation of all commissioning requirements and activities associated with the delivery of a complete and optimally functioning facility. This plan shall be completed for site specific equipment and systems by the Contractor. A shell plan indicating the planned table of contents shall be submitted to outline all the requirements of the Commissioning Plan and Project Specific requirements within 60 days from the NTP. The plan shall be amended with detailed information as the project develops and

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Submittals are reviewed for each major specification division and subcontractor requiring a system or product. Coordination between the trades and the amongst the Quality and Division Specifications and actual placement of the systems and products shall be the responsibility of the Contractor and all system elements shall be compatible and meet with the approved submittal for each system.

The Elements of a Project Specific Commissioning Plan; (consider when developing the TOC)

- A. Introduction and Summary
 - Include the overall goals of the Commissioning team; Project Specific Roles and Responsibilities; Contact list of all positions involved in the process and their information; i.e. Commissioning Manager; Commissioning Representative; Project Managers/Engineers; Superintendent; Executive Leadership if applicable
 - Include how the process works to deliver the project. How does it tie into the Quality Control and BIM (Coordination process of the GC and the Specialty/Major Subs? How can these items be combined administratively? Are some of the position's collateral with other positions? Finish Manager? This is a shell with all the details we know as the project progresses filled in as we go; the Contractor has the information at this stage and will communicate it through this medium
- B. Commissioning by Specialty
 - Include a placeholder and identify each of the aspects of the project that will be commissioned under a tab; Identify each Commissioning Representative by Commissioned system. List in detail the standard requirements for each section (TOC) Note: Even if the details are not filled in to start; as the project progresses it is a process to fill in the details.
 - Other Influences on the process and the Risk Management Plan for Success and how it will become a working document to turn into a win-win situation.
- C. Master Schedule
 - Include the preliminary IMS and then how it will be updated to reflect changes
 - Include all meetings required and the Milestone Meetings and Events that make sure items are accomplished
- D. Administrative Procedures and Documentation
 - Meetings
 - Correspondence
 - Documentation and how critical information will be updated (weekly/monthly)?
 - Reports; Issues; Issues Resolution
 - Testing
 - Close-out
- Final Reports
 - Who does what and when?
 - What is included (Preliminary TOC)
- Lessons Learned and Post Occupancy
 - Team report on this Quality Process
 - Should not wait until the end
 - Time to celebrate a job well done!!

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The Preliminary Project Specific Commissioning Plan shall achieve the following.

1. Will use all the resources of the Commissioning Team to develop a working process.
2. Establish the commissioning guidelines.
3. Identify the commissioning team including each major sub-contractor.
4. Provide roles and responsibilities of each team member.
5. Establish the lines of communication for all team members
6. List all key commissioning activities.
7. List all systems, identifying and detailing components included within each process.
8. Outline all deliverables to be provided.
9. Establish key milestone dates associated with the completion of the commissioning activities.
10. Identify long lead times and essential submittal review and shut down/outages.
11. Coordinate all aspects of the project including the Quality Control, Schedule and Close-out activities.
12. Establish Retest as required until the system or product meets the required quality standards.
13. Provide the reporting methods (checklists).
14. Update the Commissioning Plan as required and provide a final detailed report
15. Identify any post construction commissioning activities.
16. Set goals and milestone schedules for the Commissioning Process; Remember this is not a final report but a process and a way to work to get the work completed as a team.

A.3. Synopsis of the Roles and Responsibilities

National Facility Solutions, LLC (NFS) is providing whole building commissioning services and is the Commissioning Agent for the new construction and renovations at the VA Medical Center in Perry Point. They will be responsible for managing the Commissioning Process and have duties as defined in the Specification. They will review contractor submittals and RFIs pertaining to commissioned systems or products, attend all pre-construction meetings as defined in the quality control specifications, schedule and conduct all meetings, provide field observation reports at each stage of the process, create and document an issue list that will be updated on a monthly basis, assist the Resident Engineers Office in maintaining Quality Control and Coordination of all systems.

The Commissioning Agent will review and recommend approval of all commissioning related submittals and RFIs. They will assist in scheduling the Close-out activities and with the issue resolution of the systems. They will attend the Post Construction Warranty meeting.

The Architect of Record is Polt Design. They and the Project Engineers shall assist as required to clarify and Design documents and requirements. They will review all RFIs and Submittals and recommend approval to the Resident Engineers Office. They will visit monthly and provide a site observation report to include deficiencies and deviations from the design specifications and/or submittal reviews. They may visit more often as required in the height of the construction of their specialty and when their council is required.

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They will provide documentation of each field visit with a chronologically documented report. This shall be presented at the monthly meeting and maintained each issue until it is resolved. They will perform other quality assurance and act as a consultant on all potential and required changes by issuing recommendations and back up design information and finding of facts and possibly cost estimates on potential changes. Remember the earlier the problems are brought to the surface the easier they are to solve and have less impact on the Team.

Both the Commissioning Agent and the Architect/Engineers of Record will review of the design intent and basis of design during the submittal process. Design Intent defines the benchmark for system performance. They both will be fully engaged in the Commissioning and Quality Assurance Process.

The VA is represented by the Procuring Contracting Officer and the Project Manager. The VA field staff is represented by the Administrative Contracting Officer (ACO) or Senior Resident Engineer (SRE) and the Project Resident Engineers. All terminology in the Specification referring to Resident Engineer shall be replaced to note the *ACO/SRE or Designated Representative*. The VAMC Project and Operations and Maintenance Staff will be fully engaged in the process.

Whole Building Commissioning has the following Phases and information shall be included in the Draft Construction Specific Commissioning Plan. As more detailed information becomes apparent the information shall be compiled to be included in the *Final Report* from the Contractor.

Pre- Construction

- Preliminary *Construction Specific Commissioning Plan* with outline Table of Contents, Schedule and names of Sub-Contractors of Systems to be commissioned defining process and Submittals; Kick Off Meeting.
- Integration of Coordination Meetings with BIM review and Coordination meetings
- Pre-Construction/Start up Commissioning and Quality Assurance Coordination Meeting by system or product
- Submittals and RFI Review and Approval Required
- Start Up Schedule for each Commissioned System and Products; Integration with Quality Spec.
- Final *Construction Specific Commissioning Plan Documentation and Systems Manual*

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Construction Phase overview including coordination with Project Specific Information

- Continuation of Submittals and RFI Review and Approval
- Continuation of Quality Assurance meetings and activities as defined in the Quality Specification and herein
- Submit Updated *Construction Specific Commissioning Plan as Appended* during the Construction Phase at least at 6-month intervals. Meeting for Milestone Check
- Final Testing Phase
- Close-out and Construction Completion
- Append the Final Commissioning Plan with Systems and Product Information as approved

Close-out Phase

- O&M Submittals (Must have final submitted min 1 week prior to training)
- Training Plan and Recorded O&M Training for each commissioned system
- Final Construction Commissioning Report Appended to include all aspects of the Commissioning including Testing and Acceptance

Post Construction and Project Warranty Period

- List of Contacts to call by Commissioned System and others under Warranty
- Ramp up and required service to keep the facility operational
- Ten-month Warranty Inspection

Throughout the commissioning process this plan will be updated with any project, system or component changes, improvements, recommendations or key events that have an effect on the overall process.

Additional updates will occur to this plan throughout the project based on input, progress and changes associated with the commissioning of this project. National Facility Solutions, LLC (NFS) will be responsible for updating the plan and issuing as necessary.

B.1. Goals and Objectives

The primary goal of the commissioning process is to integrate the project commissioning team in order to collectively deliver to the VA a fully functional facility in accordance with the Owner's Project Requirements and Basis of Design. The secondary goal is to facilitate a collaborative environment that assists each team member in being successful in achieving their respective project goals. Achieving these goals requires full integration and involvement of the commissioning team with representation from the User, Designer, Constructor, and all participating sub-contractors. In addition, achieving these goals requires clear guidelines for the

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execution of this process.

The purpose of the commissioning process is to provide the VA with assurance that building systems and equipment have been installed in accordance with Contract Documents and operate within specified performance guidelines.

These commissioning objectives include the following.

1. Initiation and Execution of an Integrated project specific commissioning plan.
2. Verify and document that the equipment is installed and started per manufacturer's recommendations and to industry accepted minimum standards.
3. Verify and document that equipment and systems receive complete operational checkout by the installing contractors.
4. Conduct a submittal review.
5. Verify and document equipment and system performance based on pre-functional and functional testing and checkout, including the validation of the air and water balance test results.
6. Verify the completeness of operations and maintenance materials.
7. Verify that the facility's operations personnel are adequately trained on the operation and maintenance of building equipment.

B.2. Abbreviations and Definitions

The following are common abbreviations and definitions used throughout this report:

- CA – Construction Administrator
- CC – Controls Contractor
- Cx – Commissioning
- CxA – Commissioning Authority.
- DID – Design Intent Document
- DM – Design Manager
- EC – Electrical Contractor
- FAC – Fire Alarm Contractor
- FPC – Fire Protection Contractor
- FPT – Functional Performance Test
- FY – Fiscal Year
- HVAC – Heating, Ventilation and Air Conditioning
- IST – Integrated Systems Test
- LEED-NC – Leadership in Energy & Environmental Design – New Construction
- MC – Mechanical Contractor
- NIST/NBS – National Institute of Standards and Technology/ National Bureau of Standards
- O&M – Operations and Maintenance
- PFC – Pre-Functional Checklist
- QC – Quality Control
- RFI – Request for Information
- RI – Resident Inspector
- TAB – Test, Adjust and Balance
- (VA) (CO) (SRE) (RE) (OR) – Owner/VA Representative

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B.3. Detailed Roles and Responsibilities

▪ Subcontractors and/or Vendors

1. Provide all pre-construction requirements including the required aspects of the commissioning plan in accordance with their systems or products. They shall assure quality by providing detailed and coordinated submittals; provide quality control coordination as identified in the quality control requirements, assure all detailing is in accordance with manufactures instructions and provide a final commissioning report and training for their specific systems and products.
2. Attend commissioning scoping meeting and additional meetings, as necessary.
3. Provide additional requested documentation, prior to normal O&M manual submittals to the VA for development of start-up and functional testing procedures.
4. Assist in clarification of operation and control of commissioned equipment should the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
5. During the startup and checkout process, execute the mechanical-related portions of the construction checklists for all commissioned equipment. Perform and clearly document all completed startup and system operational checkout procedures.
6. Resolve pre-functional and other punch list items before functional testing. Air and water TAB shall be completed with discrepancies and problems resolved before functional testing.
7. Perform functional performance testing, under the purview of the commissioning team, for commissioned equipment. Include the testing plan in the Commissioning Plan.
8. Resolve equipment or system deficiencies and retest as required verifying modified performance.
9. Prepare O&M manuals according to the Specifications; provide prior to training and conduct training.
10. Updating original sequences of operation to as-built conditions.
11. Provide training of the Using Agencies training of personnel as specified.
12. Coordinate with equipment manufacturers to determine requirements to maintain the validity of warranties.
13. Execute seasonal or deferred functional performance testing, as necessary.
14. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for issues identified during the warranty period.
15. Coordinate all information as required by the BIM requirements.
16. The Vendors shall take a part in the process including attending pre-construction and close-out inspections as necessary as a Quality and Commissioning Team member to assure all detailing and quality meets all aspects of the products supplied to allow efficient and functional requirements that meet both the design and quality specification of the company. Assure and convey to the VA that the contractor has met the requirements for the Warranty.

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B.4. Commissioning Process and Activities in the Execution of the Commissioning Plan

1. The Contractor, Architect and Engineer of Record, Commissioning Agent and VA will review the commissioning plan. The approved document will be distributed to commissioning team members for their information and action.
2. Upon review and approval of the draft plan, the commissioning agent will utilize submittal documentation to incorporate into the plan the Pre-Functional checklists. The update to the plan will be submitted to the team for review and comment.
3. The final section of the plan (Functional Performance Tests) will be developed by the commissioning agent upon receipt of the Approved submittal information.
4. The time line of plan completion will be executed within the requirements of the project schedule. As necessary due to changes or additions to the commissioning scope, the plan will be updated and reviewed, and revisions will be completed by the Contractor and distributed.
5. All correspondence shall take the form of an Chronological numbered memo and distributed to all members of the commissioning team. A team charter shall be prepared by the Commissioning Agent and approved at the Pre-Construction Commissioning Kick-off Meeting. This meeting will include the VA Representatives and all sub-contractors involved in the commissioning process, including, but not limited to, site utilities, building enclosure, mechanical, plumbing, electrical, controls, and TAB subcontractors.
6. The Commissioning Agent shall formulate the Agenda and Prepare and Update the Meeting Minutes in coordination with the ACO/SRE.
7. The commissioning authority provides leadership by fostering and communicating goals for the commissioning process, including verification of roles and responsibilities of team members, and clearly defining and documenting pass/fail criteria. Each commissioning team member shares responsibility to support the commissioning process and achieve a quality installation.
8. The sequence and timing of commissioning activities shall be incorporated into the overall project schedule. The commissioning authority identifies the required commissioning activities. Coordination requires input from the VA and the Prime. Cooperation among the parties facilitates integration of commissioning into the total construction program.
9. The CxA obtains and reviews submittal data from a commissioning and maintenance perspective. The CxA consults with the VA, designer and the Prime regarding conformance with the design intent. The VA initiates and closes the submittal process.
10. The Commissioning Agent will conduct on-site construction observations and will update the Issue Log of any deficiencies noted. On site observations are conducted to verify compliance with manufacturer's installation and start-up instructions and recommendations, compliance with the design intent, and meeting the requirements for efficient operation and maintenance. Construction observation is not for the express purpose of ensuring compliance with codes and standards. Regularly scheduled meetings are held for site coordination, reporting on construction and commissioning progress, and resolution of any identified

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issues or deficiencies. Construction observation activities will be coordinated with the owner's Operation and Maintenance staff to facilitate their participation in the commissioning process and familiarize them to the building systems that they will ultimately be required to operate and maintain.

11. The Commissioning Agent will provide services to track Construction Issues. They will schedule site visits to witness equipment and system installations. Each site visit will have a specific agenda and will be coordinated with the Commissioning Team. The Commissioning Agent will attend planning and job-site meetings, in order to remain informed on construction progress and to integrate commissioning processes and concerns into the entire building process. The Commissioning Agent will attend monthly meetings and keep apprised of change orders that may affect commissioned equipment or the commissioning schedule.
12. All deficiencies found from site visits and functional performance testing will be reviewed with the VA and Contractor and documented in the Issues Log. The Issues log will provide in detail the nature of the issue, the systems or component it is related to, the individual or party responsible to resolve and any proposed solution. The issues log will be issued to The Prime in excel format for incorporation into the master construction issues log. The Commissioning Agent will communicate and coordinate all issues through the VA for resolution management.
13. The specification issued for construction will be used as reference for this project will be used as the baseline in the assembly of the Pre-functional checklists. These commissioning activities as well as manufacturer recommendations and other accepted standards will be used to assemble the final checklist. Since the submittals will be referenced in the assembly of the checklists, the checklist will not be submitted for review until the final approved submittal has been received.
14. During site visits, the commissioning agent may verify checklist completion in conjunction with the team. The completion of the checklist is the responsibility of the installing sub-contractors lead by their commissioning representative. As the checklist activities are completed with the construction of the project, the checklists are to be signed off by the installer.

B.5. Construction Activities and Quality Assurance

1. The **Pre-Functional Checklists** are developed and completed for all systems and equipment included within the commissioning scope. The checklist captures equipment nameplate and characteristics data and confirms the as-built status of the equipment or system. The checklists ensure that the systems are complete and operational and document the installation of components and completion of systems. The checklists have been prepared by the commissioning agent from manufacturer's data, drawings and specifications provided through the submittal process and are to include the required installation, checkout, and start up procedures. The installing Subcontractor/Commissioning Representative and

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Commissioning Manager date and initial the checklists as the construction and start-up is completed. The commissioning agent reviews and verifies the completed checklists before scheduling the functional performance testing. The Prime will aid in supervising this process by managing the pre-functional checklist books, either by keeping them in the job-site trailer, or by giving them to the appropriate contractor for completing. **Refer to the attachments for the pre-functional checklists for the project components.**

2. The **Functional Performance Tests** will be developed by the Commissioning Agent. The functional testing for the systems based on the drawings, specification, manufacturers' requirements and the facility control contractors' sequence of operation. These tests will be designed to focus on the overall systems performance as compared to testing and validating the control points of the system. During the functional performance testing, the systems interactions under various conditions and modes of operation. The systems are run through all of the sequences of operation and the response of components is verified. Testing proceeds from components to sub-systems to systems, and finally to interlocks and connections between systems. Control systems are difference for each type of system being commissioned and will vary based on the data given to the VA and approved through the submittal process.
3. The development of the Functional Tests will be completed when the final approved submittal has been received and Sequence of Operations has been reviewed. This information is required to enable the development of relevant and accurate Functional Tests.
These tests will be scheduled by the Contractor, as recommended and coordinated by the Commissioning Agent upon completion of all the system pre-functional requirements. The witnessing of the testing will be performed at a minimum by the Commissioning Agent, a VA Representative, Relevant Sub-Contractors, the Associated system Architect/Engineer and the Contractor. The owner's and maintenance staff representatives will be invited to attend.
4. All testing shall be incorporated into the project schedule. Contractor shall provide no less than 7 calendar days' notice of testing. The Commissioning Agent will witness selected Contractor tests as planned and approved. Contractor tests shall be completed prior to scheduling Systems Functional Performance Testing.
5. The Commissioning Agent will maintain the Issues log throughout all functional testing and will issue results within 3 days. The Contractor will dispute any issues within 3 days.
6. **Key Modes of Operation to be Evaluated Include:**
 - Occupied Mode - Reviewing/testing system performance during the occupied mode.
 - Un-Occupied Mode - Reviewing/testing system performance during the unoccupied mode.
 - Alarming - Reviewing and initiating alarming conditions and confirm alarming notification.
 - External Systems Integration - Reviewing external systems integration to confirm systems integration is complete and functional. (Example: Fire Alarm System interface with the HVAC System)

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B.6. O&M Documentation and Training

1. The training for the facility will be completed after the commissioning process has been completed and all systems are functional. The VA staff will be invited to all commissioning activities to generate a clear understanding of how the systems operate. However, the commissioning of the facility is not considered owner training. At the time of the owner training, all operations and maintenance manuals will be available for review.

For each training session, the contractors will provide a detailed agenda for each piece of equipment or system for which training is required. The agenda describes the training scope, duration, and methods, along with the name and qualifications of the trainers. NFS will work with the Prime to develop a plan for including in the training session contractors/trainers from different disciplines, when appropriate. The trainer documents each training session (duration, general subjects covered, and attendees. The Commissioning Agent will witness any of the training sessions and will not be present for training.

All O&M training will be recorded and will be coordinated with the Contractor by the Commissioning Agent. Approved O&M manuals must be delivered a minimum of one (1) week prior to the scheduled training.

C. Post Construction and Close-out Activities

C.1. Final Commissioning Report

NFS will lead the preparation of the report and will request project related memos from the Prime for inclusion in the report.

Final Commissioning Report: A final Commissioning Report will be compiled which summarizes all of the tasks, findings, and documentation of the commissioning process. The report will address the actual performance of the building systems in reference to the design documents. All test reports by various sub-contractors, manufacturers and controlling authorities will be incorporated into the final report.

The commissioning report includes:

- i. An evaluation of the operating condition of the systems at the time of functional test completion, Deficiencies that were discovered and the measures taken to correct them.
- ii. Functional test procedures and results.
- iii. Reports that document all commissioning field activities as they progressed.
- iv. Description and estimated schedule of required deferred testing.

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b. Milestones - Team

The deliverables to prepare over the course of the commissioning effort are as follows:

- Commissioning Plan -- Revised / updated during construction, acceptance, and warranty phases of the project.
- Reconcile Design Intent and Basis of Design for the building systems being proposed and then commissioned.
- Reconcile all specifications to perform Quality Control and Assurance
- Pre-Functional Checklists for all building systems being commissioned.
- Commissioning Responsibilities Matrix - Summarizes all activities and identifies responsible party to complete.
- Functional Performance Test Reports.
- Issues Log; updated Monthly throughout the course of the commissioning process.
- Operations and Maintenance Manuals and Training Schedule
- Ready for Final Inspection – by each system and all commissioned items
- Project Completion
- Final Commissioning Report.

7. The following systems will be commissioned in this project, unless they are not included in the final contract.

- Air Handling Systems
- Chilled Water Systems
- Heating Hot Water Systems
- Exhaust Systems
- Unitary Heating Systems
- Electrical Systems
- Plumbing Systems
- Communication Systems
- Electronic Safety and Security Systems
- Fire Protection Systems
- *Medical Gas and Air Systems*
- Fuel Oil Systems
- Conveyor Systems- Elevators
- *Building Enclosure*
- *Utility Commissioning*

Recap of Essential Changes to requirements according to the Commissioning Specification 019100:

- Page 24 (1.12) A; Commissioning (Add *Requirements*) (strike *plan*); A document prepared by the Contractor in accordance with the requirements that follow
- Page 28 (1.13) A; The Commissioning Agent has prepared a Preliminary Commissioning (Add *Examples*) (strike *plan*) based on the final Construction Documents.
- Page 25 thru 28 (B) thru (I) will be prepared by the Commissioning Agent using the team approach with the VA personnel, AE and Contractor required lead representatives responsible for full cooperation in assisting in information gathering resolution and completion.

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ATTACHMENTS:

See the attached Documents entitled Appendices for sample forms, processes and procedures for developing the Project Specific Commissioning Plan

- APPENDIX A – SITE BUILDING INFORMATION
- APPENDIX B – EQUIPMENT TO BE COMMISSIONED
- APPENDIX C – PREFUNCTIONAL CHECKLISTS
- APPENDIX D – SAMPLE FUNCTIONAL PERFORMANCE TEST
- APPENDIX E – UTILITY COMMISSIONING SPEC

OTHER CITED REFERENCES: (Use latest publications in all publication references in the Specifications to develop your Project Specific Commissioning Plan

- BUILDING ENCLOSURE COMMISSIONING ESSENTIALS Reference; NIBS *Guidelines for Exterior Enclosure for the Commissioning Process*. The entire building enclosure is to be commissioned.
- General Reference ASHRAE; *The Commissioning Process Guideline* and the *VA Whole Building Process Manual*

END OF *Commissioning Supplemental Instructions and Clarifications* AMENDMENT