

RIDER 101 - SCOPE OF SERVICES
FACILITY COMMISSIONING SERVICES
FOR
MISCELLANEOUS ASSIGNMENT
OF
LIMITED SCOPE

1. OBJECTIVE

- 1.1. The University of Texas MD Anderson Cancer Center (“MD Anderson” or “Owner”) requires facility commissioning services (“Commissioning Services”) for projects or assignments related to the construction or renovation of MD Anderson’s facilities, re-commissioning of existing systems that support its facilities, or facility system assessments. The types of facilities for which Commissioning Services may be needed include inpatient care facilities, ambulatory treatment (i.e. outpatient care) facilities, general office facilities, research laboratories, central plant, or combinations thereof.
- 1.2. MD Anderson will contract directly with a Commissioning Services provider (“Service Provider” or “Commissioning Authority”) as an extension of Owner’s designated staff, to perform technical reviews of project design documents, observe completion of construction, verify equipment and system start-up by MD Anderson’s Construction Contractor, observe pre-functional tests and functional performance tests of individual systems and integrated systems against requirements of the Project Contract Documents, track deficiencies, and recommend solutions. Service Provider will have authority only as delegated by Owner and will have no authority to alter design or installation procedures. In general, Construction Contractor will have responsibility for the overall commissioning process.
- 1.3. Service Provider’s Role
 - 1.3.1. When acting as MD Anderson’s representative on a Project, Service Provider may be involved from a project’s design phase through the warranty phase. The primary role of the Service Provider during the design phase will be to review design intent to meet MD Anderson’s needs, develop project specific commissioning specifications referencing MD Anderson’s master construction specifications, and review design documents to ensure the design meets MD Anderson’s objectives.
 - 1.3.2. During construction and through the warranty period, Service Provider, with input from Construction Contractor, will write and coordinate execution of a Commissioning Plan, which includes observing and documenting each system’s performance to ensure that systems function in accordance with the Construction Contract Documents. Service Provider is not responsible for the design or for construction scheduling, cost estimating, or construction management, but may assist with resolving scheduling conflicts, problem solving on technical issues, or resolving non-conformance issues or deficiencies. MD Anderson’s Construction Contract Documents require the Construction Contractor to

organize, schedule, and conduct system start-up, to perform pre-functional tests, and to perform all system functional performance tests and integrated system tests.

- 1.3.3. Service Provider will ensure that sufficient staffing will be available for and appropriate to the complexity of scope, investigation, planning, design, sequencing, construction and close-out throughout the duration of Service Provider's Assignment

2. DEFINITIONS

- 2.1. **Architect/Engineer ("A/E")** – Architect/Engineer (A/E) means a person registered as an architect pursuant to Tex. Occ. Code Ann., Chapter 1051, as a landscape architect pursuant to Tex. Occ. Code Ann., Chapter 1052, a person licensed as a professional engineer pursuant Tex. Occ. Code Ann., Chapter 1001, and/or a firm contracted by MD Anderson, either directly through a design-build contractor to provide professional architectural or engineering services and to exercise overall responsibility for the design of a Project or a significant portion thereof, and to perform the contract administration responsibilities set forth in the Construction Contract.
- 2.2. **Commissioning** – As used herein, “Commissioning” means a systematic process confirming that building components and systems have been installed, properly started, and consistently operated according to criteria set forth in the Construction Contract Documents, that all systems are complete and functioning in accordance with the project Design Intent Document at the onset of Substantial Completion, and that the Construction contractor has provided MD Anderson's facility staff with adequate system documentation and training prior to MD Anderson's acceptance of the Project or a portion thereof.
- 2.3. **Commissioning Plan** – Commissioning Plan shall have the meaning set forth in MD Anderson's Master Construction Specification Section 01 91 00, General Commissioning Requirements, a copy of which is attached hereto.
- 2.4. **Construction Contract Documents** – Construction Contract Documents are those documents identified as a component of the agreement (Contract) between Owner and Construction Contractor. They may include, but are not limited to, Drawings; Specifications; General Conditions and Owner's Special Conditions; and all pre-solicitation submittal deadline addenda.
- 2.5. **Construction Contractor** – Construction Contractor means the individual, corporation, limited liability company, partnership, firm, or other entity contracted to perform the Construction Work, regardless of the type of construction contract used, so that the term as used herein includes a construction manager-at-risk or a design-build contractor as well as a general or prime contractor.
- 2.6. **Construction Work** – Construction Work means the administration, procurement, materials, equipment, construction and all services necessary for Construction Contractor, and/or its agents, to fulfill Construction Contractor's obligations under the Construction Contract.
- 2.7. **Deliverable** – Deliverable shall mean the specific output(s) created as the result of the Work performed during the course of a Work Assignment.

- 2.8. **Design Intent Document** – Design Intent Document shall mean the document furnished by the A/E that describes the complete architectural and engineering design intent for the Project including design guiding principles, assumptions, issues, recommendations, and narrative assessment of the architectural and infrastructure systems .
- 2.9. **Drawings** - Drawings mean that product of A/E which graphically depicts the Construction Work.
- 2.10. **Equipment Matrix** – Equipment Matrix shall have the meaning set forth in MD Anderson’s Master Construction Specification Section 01 91 00, General Commissioning Requirements, a copy of which is attached hereto.
- 2.11. **MD Anderson’s Design Guidelines** – MD Anderson’s Design Guidelines include *Master Construction Specifications, Design Guideline Elements* and other supplemental resources such as *Interior Finishes Standards, Installation Details* and *HVAC Control Contract Document Requirements*, are all combined under the heading of the MD Anderson’s (Owner’s) Design Guidelines. They are to be used in the development of contract documents for all MD Anderson Cancer Center design and construction projects and can be found at the following site: [MD Anderson's Design Guidelines](#).
- 2.12. **Project** – *Project* means all activities necessary for realization MD Anderson’s desired outcome of the construction including all ancillary and related work. This includes design, contract award(s), execution of the Construction Work itself, work by Owner’s forces and/or other contractors and fulfillment of all Construction Contract and warranty obligations.
- 2.13. **Service Provider** – Service Provider, when used in this document or any attachment hereto, shall mean Contractor as defined in the Agreement.
- 2.14. **Specifications** – Specifications mean the written product of A/E that establishes the quality and/or performance of products utilized in the Construction Work and processes to be used, including testing and verification for producing the Construction Work.
3. DETERMINATION OF WORK ASSIGNMENT SCOPE AND COMPENSATION TO BE PAID
- 3.1. **Work Assignment Scope.** The specific scope of services for each Work Assignment shall be determined in advance and in writing between MD Anderson and Service Provider.
- 3.2. **Request for Proposal (“RFP”).** MD Anderson will prepare an RFP identifying the Work Assignment by describing, in general, the intended scope and character of the Work Assignment, the schedule for completing the Work Assignment, the services to be provided by Contractor, and the MD Anderson representative who will be overseeing the Work Assignment (“**Work Assignment Representative**”).
- 3.3. **Proposal.** In response to an RFP, Service Provider shall provide MD Anderson with a written Proposal. The Proposal shall include the following:
- 3.3.1. A narrative description of Service Provider’s understanding of the required scope of services;

- 3.3.2. A detailed statement of the services to be provided and the Deliverables to be produced by Service Provider;
- 3.3.3. A description of particular phases in which the services are to be performed, if applicable;
- 3.3.4. A Fee Proposal detailing:
 - 3.3.4.1. the total proposed fee for providing the Commissioning Services, expressed as a “not-to-exceed” amount;
 - 3.3.4.2. the total proposed not-to-exceed amount for providing any Additional Services, and
 - 3.3.4.3. the total estimated amount for Reimbursable Expenses;
- 3.3.5. A proposed date to commence providing the Commissioning Services;
- 3.3.6. A list of all subcontractors, persons and firms that Service Provider proposes to use in the performance of its Work Assignment;
- 3.3.7. A schedule of hourly billing rates for any subcontractors that Service Provider proposes to use in the performance of Service Provider’s Work Assignment;
- 3.3.8. A HUB Subcontracting Plan, if required;
- 3.3.9. Any qualifications or conditions applicable to the Proposal; and
- 3.3.10. A summary statement of the amount of all previous Work Assignments initiated under this Agreement as of the date of the Proposal.
- 3.4. **HUB Requirements.** For any Proposal for which the total proposed price is \$100,000 or more, Service Provider shall submit HUB Subcontracting Plan in accordance with MD Anderson’s Rider 104, Policy on Utilization of Historically Underutilized Businesses.
- 3.5. **Proposal Review:** MD Anderson and Service Provider shall review Service Provider’s Proposal and negotiate any changes, clarifications or modifications thereto. Service Provider shall submit a revised Proposal incorporating any changes, clarifications or modifications made in the review process. MD Anderson may accept, reject or seek modification of any Proposal.
- 3.6. **Notice to Proceed:** Upon acceptance of a Proposal by MD Anderson, MD Anderson will issue a written Purchase Order to Service Provider. Subsequent to or concurrent with the issuing of the Purchase Order, MD Anderson will issue a written Notice to Proceed, which will authorize Service Provider to begin rendering the services identified in the Proposal on the date specified in the Notice to Proceed. The Notice to Proceed will include the Purchase Order number specific to the Work Assignment.

4. TERMINATION OF WORK ASSIGNMENT

- 4.1. **Termination for Cause:** Any Work Assignment being implemented pursuant to the terms of the Agreement may be terminated by either party upon ten (10) days' written notice should the other party fail substantially to perform in accordance with its terms through no fault of the terminating party and such failure is not fully cured prior to the expiration of the notice period. Upon termination for cause, MD Anderson will make no further payment to Service Provider. If a termination for cause under this section is later determined to have been improper, the termination shall automatically convert to a termination for convenience and Service Provider's recovery for termination shall be strictly limited to the compensation allowable under paragraph 4.3.
- 4.2. **Termination for Convenience:** Any Work Assignment being implemented pursuant to the terms of this Agreement may be terminated for convenience by MD Anderson in whole or in part, upon at least ten (10) days' written notice to Service Provider.
- 4.3. **Compensation:** In the event of termination not the fault of Service Provider, Service Provider shall be entitled to compensation for all Work satisfactorily performed prior to the termination date, together with approved Reimbursable Expenses then due, provided Service Provider delivers to MD Anderson statements, accounts, reports and other materials as required for payment along with all reports, documents and other materials prepared by Service Provider prior to termination.

5. GENERAL DESCRIPTION OF SERVICES

The following indicates services that Service Provider may be required to perform based on a specific Work Assignment RFP.

5.1. Design Phase

- 5.1.1. Develop and communicate an understanding of project requirements in conjunction with MD Anderson, Construction Contractor, and the project design team. For renovation projects, this will include becoming familiar with existing building and associated existing equipment and systems that may be impacted by the construction or renovation.
- 5.1.2. Review MD Anderson's Design Guidelines and the project facility program or pre-design report (if applicable) to develop familiarity with the Project scope.
- 5.1.3. Review and comment on design phase project deliverables, including Design Intent Document, drawings, control sequences and specifications for clarity, completeness, and compliance with MD Anderson's Design Guidelines at various stages of development (during schematic design, design development and construction document phases).
- 5.1.4. During the schematic design and design development phases, recommend alternative design approaches or value engineering items based on project design phase reviews that will provide equal or better performance at lower life cycle cost, including initial cost, utility costs, and operating and maintenance costs.
- 5.1.5. Provide input to the project team that will improve or reduce system maintenance and operating costs over the life of the equipment and systems.

- 5.1.6. Assist the project design team with preparation of project-specific commissioning specifications for all commissioned equipment based on MD Anderson's Design Guidelines.
- 5.1.7. Participate in design review meetings and technical work sessions with MD Anderson, the project design team, and Construction Contractor.

5.2. Construction Phase

- 5.2.1. Represent MD Anderson in review and approval of Contractor's 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.
- 5.2.2. With Construction Contractor's input, write the project-specific Commissioning Plan.
- 5.2.3. Participate in Construction Contractor's commissioning meetings, including pre-installation meetings and pre-commissioning meetings with subcontractors.
- 5.2.4. Review and comment on Construction Contractor's product and shop drawing submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with project design team and MD Anderson reviews.
- 5.2.5. Review and comment on test, adjust, and balance ("TAB") reports for compliance with ASHRAE 170 as well as USP 800 where applicable.
- 5.2.6. Before start-up, gather and review current control sequences and interlocks and work with Construction Contractor and the project design team until sufficient clarity has been obtained, in writing, to enable preparation of detailed test procedures.
- 5.2.7. With assistance from Construction Contractor, A/E and equipment manufacturers, write the functional performance and integrated system test procedures for equipment and systems.
- 5.2.8. Verify start-up and pre-functional testing of all systems as defined in the Commissioning Plan. Ensure equipment tags in field are accurate with the Equipment Matrix. Monitor and witness execution of functional performance tests, demonstration of other tests (such as ductwork and pipe pressure testing), integrated systems testing, and document results, follow-up, and signoffs. Functional performance tests are to include operating the system and components through each of the written sequences of operation, and other significant modes and sequences, including but not limited to start-up, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment.
- 5.2.9. Provide recommendations to resolve deficiencies noted during the commissioning process.
- 5.2.10. Perform site visits, as necessary, to observe component and system installations and document findings in an inspection report. Attend selected project construction meetings

to obtain information on construction progress. Review project construction meeting minutes for revisions/substitutions relating to the commissioning process.

- 5.2.11. Review requests for information and change orders for impact on the Commissioning Plan and Construction Contract Documents.
- 5.2.12. Analyze functional performance test trend logs and monitoring data to verify performance.
- 5.2.13. Maintain a master deficiency and resolution log and a separate record of tests. Provide written progress reports and test results with recommended actions to MD Anderson.
- 5.2.14. Review equipment warranties to ensure that MD Anderson's responsibilities are clearly defined.
- 5.2.15. Participate in training of MD Anderson's operating and maintenance personnel. Construction Contractor will have primary training responsibility.
- 5.2.16. Review operating and maintenance ("O&M") manuals for commissioned equipment and systems.
- 5.2.17. Review and assist in the preparation and organization of Construction Contractor's commissioning documentation, in the form of a "Commissioning and Close-out Manual." The Commissioning and Close-out Manual is to contain all documentation related to the commissioning process, including but not limited to: pre-functional checklists and test results, all related correspondence, functional performance test procedures and results; integrated systems test procedures and results, deficiency reports, data trends, punch lists, and signoffs.
- 5.2.18. Service Provider's project deliverables will be in the form of a Commissioning Report that will become part of the Construction Contractor's Commissioning and Close-out Manual. The Commissioning Report is to include written narratives and other documentation of Service Provider's deliverables during the commissioning process, such as written test procedures, test results and remedial recommendations, meeting records, deficiency records, etc. All deliverables must be provided to MD Anderson in electronic file format.

5.3. Warranty Period

- 5.3.1. Facilitate opposite season or deferred testing and deficiency corrections and provide the final testing documentation for the Commissioning and Close-out Manual and O&M manuals.
- 5.3.2. Upon MD Anderson's request and schedule, return to the site during the 12-month warranty period and review with MD Anderson's O&M personnel the current building operation and the condition of outstanding issues related to the original and seasonal commissioning. Identify problems or concerns that operating personnel may have with operating the building as originally intended and recommend solutions.

- 5.3.3. Provide suggestions for improvements and for recording suggested changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract.
- 5.3.4. Assist MD Anderson in developing reports and documents and requests for services to remedy outstanding problems.
- 5.3.5. Upon MD Anderson's request and schedule, return to the site at 6 months and 11 months for a post-occupancy evaluation of the current building operation.

5.4. Systems to be Commissioned

Depending on specific project scope and requirements, the following systems and assemblies will be commissioned:

- 5.4.1. Building automation system, including linkages to remote monitoring and control sites and any security-related control systems or interlocks.
- 5.4.2. Heating, ventilating and air conditioning systems including stairwell pressurization systems, smoke control systems, fire/smoke dampers.
- 5.4.3. Mechanical equipment alignment and vibration testing.
- 5.4.4. Lighting control systems.
- 5.4.5. Lightning protection.
- 5.4.6. Refrigeration systems.
- 5.4.7. Emergency power systems including generators and automatic transfer switches.
- 5.4.8. Uninterruptible power supply (UPS) systems.
- 5.4.9. Life safety systems (fire alarm, egress pressurization, fire detection and protection).
- 5.4.10. Room and building pressurization.
- 5.4.11. Chemical fume hood and biological safety cabinet airflow.
- 5.4.12. Normal power systems.
- 5.4.13. Domestic and process water pumping and mixing systems.
- 5.4.14. Equipment sound control systems and testing.
- 5.4.15. Network and telecommunication systems.
- 5.4.16. Communication systems including nurse call systems.
- 5.4.17. Security systems.
- 5.4.18. Irrigation systems.
- 5.4.19. Plumbing systems.
- 5.4.20. Conveying systems.
- 5.4.21. Medical air, gas and vacuum systems.
- 5.4.22. Building envelope.
- 5.4.23. Commercial solar sun/shading control systems (automated and manual).
- 5.4.24. Other unique systems as directed by MD Anderson.

Attachments

- Attachment 1 – MD Anderson Master Construction Specification Section 01 91 00, *General Commissioning Requirements*
- Attachment 2 – Request for Proposal Form
- Attachment 3 – Assignment Proposal Form
- Attachment 4 – Additional Services Proposal Form
- Attachment 5 – Notice to Proceed Form

RIDER 101

SCOPE OF SERVICES

ATTACHMENT 1:

SPECIFICATION SECTION 01 91 00

GENERAL COMMISSIONING REQUIREMENTS

SECTION 01 91 00 – GENERAL COMMISSIONING REQUIREMENTS

PART 1 – GENERAL

1.1. RELATED DOCUMENTS

- 1.1.1. The Contractor's attention is specifically directed, but not limited to, the Uniform General Conditions for University of Texas System Building Construction Contracts (UTUGCs) for other requirements.
- 1.1.2. Specifications throughout all Divisions of the Project Manual, which pertain to operable equipment and/or building systems, are directly applicable to this Section, and this Section is directly applicable to them.

1.2. SUMMARY

- 1.2.1. This Section establishes general and administrative requirements pertaining to commissioning of equipment, devices, and building systems installed on renovation and new construction projects delivered under various contracting methodologies. Technical requirements for commissioning of particular systems and components are established in the Contract Documents.
- 1.2.2. It is of primary concern that all operable systems installed in the Project perform in accordance with the Contract Documents and the specified Owner's operational needs. During Commissioning, the Contractor systematically demonstrates to the Owner that the operable systems are properly performing in strict accordance with the Contract Documents.
- 1.2.3. Commissioning requires cooperation and involvement of all parties throughout the construction process. The Contractor shall deliver a successful Commissioning process. Successful Commissioning requires that installation of all building systems complies with Contract Document requirements and that full operational check-out and necessary adjustments are performed prior to Substantial Completion, with the exception of deferred tests approved in advance by Owner.
- 1.2.4. Commissioning will encompass and coordinate traditionally separate functions of system documentation, Inspection, Prefunctional Checklists and start-up, control system calibration and point-to-point checkout, testing, adjusting, and balancing, Functional Performance Tests, Integrated System Tests, Contractor demonstration to the Owner, and training of Owner's personnel. This requires assembling all related documentation into one Commissioning Manual. Commissioning is intended to achieve the following specific objectives of the Contract Documents.
 - 1.2.4.1. Verify and document proper installation and design parameters of equipment, systems, and integrated systems.
 - 1.2.4.2. Ensure that operating and maintenance and Commissioning documentation requirements are complete.
 - 1.2.4.3. Provide Owner with functional buildings and systems that meet the Contract Document requirements at Substantial Completion.

1.3. DEFINITIONS

Capitalized terms used in this Section shall have the meanings as set forth in the Contract, the UTUGCs, or both, unless otherwise defined or modified below.

- 1.3.1. Commissioning: A systematic process confirming that building systems have been installed, properly started, and consistently operated in strict accordance with the Contract Documents, that all systems are complete and functioning in accordance with the Contract Documents at Substantial Completion, and that Contractor has provided Owner adequate system documentation and training. Commissioning includes Deferred Tests, as approved by Owner.
- 1.3.2. Commissioning Authority: Party employed on the Project, by Owner under a Separate Contract, to provide certain commissioning services as defined herein under Commissioning Authority's Role and Responsibilities. Commissioning Authority does not have authority to alter design or installation procedures without the written approval of Owner and the A/E.
- 1.3.3. Commissioning Plan: A document that provides the structure, schedule, and coordination plan for Commissioning during the construction phase and through the warranty period. The Commissioning Plan will describe the project and systems to be commissioned, Commissioning activities, procedures to follow throughout Commissioning, roles and responsibilities for each participant, and general description of testing and verification methods. The Commissioning Plan must satisfy all Test Requirements set forth in the Contract Documents.
 - 1.3.3.1 Download an electronic version of the Commissioning Plan Template for submittal purposes at the following website:

<https://www.mdanderson.org/content/dam/mdanderson/documents/about-md-anderson/about-us/doing-business/owner's-design-guidelines/supplemental-resources/Commissioning%20Plan%20Template.zip>
- 1.3.4. Commissioning Team: Working group made up of representative(s) from the A/E, Contractor, Test, Adjust, and Balance Firm, Building Automation System vendor, specialty manufacturers and suppliers, Owner, and Commissioning Authority. Contractor will provide ad-hoc representation of Subcontractors on the Commissioning Team as required for implementation of the Commissioning Plan.
- 1.3.5. Deferred Tests: Functional Performance or Integrated System Tests performed after Substantial Completion, with Owner's approval, due to seasonal requirements, site conditions, or both, that prohibit the test from being performed prior to Substantial Completion.
- 1.3.6. Deficiency: Condition of a component, piece of equipment, or system that is not in compliance with the Contract Documents.
- 1.3.7. Factory Testing: Testing of equipment at the factory, by factory personnel with an Owner's representative present, if deemed necessary by Owner.
- 1.3.8. Functional Performance Test: Test of dynamic function and operation of equipment and systems executed by Contractor. Systems are tested shall be 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 start-ups and Prefunctional Checklists are complete.
- 1.3.9. Functional Performance Test Procedures: Commissioning protocols and detailed test procedures and instructions in tabular and script-type format that fully describe system configuration and steps required to determine if the system is performing and functioning properly.
- 1.3.10. Integrated System Test: Test of dynamic function and operation of multiple systems. Integrated System Tests are conducted under various modes, such as fire alarm and emergency situations, life safety conditions, power failure, etc. Systems are integrally operated

through all specified sequences of operation. Components are verified to be responding in accordance with Contract Documents. Integrated System Tests are executed after Functional Performance Tests are complete and prior to Substantial Completion. Integrated System Tests provide verification that the integrated systems will properly function according to the Contract Documents.

- 1.3.11. Integrated System Test Procedures: Commissioning protocols and detailed test procedures and instructions in tabular and script-type format that fully describe system configurations and steps required to determine if the interacting systems are performing and functioning properly.
 - 1.3.12. Manual Test: Use of hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing trend data to make the "observation").
 - 1.3.13. Non-Compliance Report (NCR): A tool used to document an item or condition that does not meet the Contract Documents.
 - 1.3.14. Prefunctional Checklist: A list of static inspections and material or component tests that verify proper installation of equipment (e.g., belt tension, oil levels, labels affixed, gages in place, sensors calibrated, etc.). The word Prefunctional refers to before Functional tests. Prefunctional Checklists must include the manufacturer's start-up checklist(s).
 - 1.3.15. Start-up: The activities where equipment is initially energized tested and operated. Start-up is completed prior to Functional Performance Tests.
 - 1.3.16. Test, Adjust, and Balance (TAB) Firm: The Owner may engage a Test, Adjust, and Balance Firm for the Project under a Separate Contract. When engaged for the Project, the TAB Firm shall be a part of the Commissioning Team and shall provide services as set forth in the Specifications.
 - 1.3.17. Test Requirements: Requirements specifying what systems, modes and functions, etc. must be tested. Test Requirements are not detailed test procedures. Test Requirements and acceptance criteria are specified in the Contract Documents.
 - 1.3.18. Training Plan: A detailed plan prepared by the Contractor, and reviewed by the Owner, that outlines the training activities, instructors, time durations, and system requirements in accordance with the Contract Documents and Commissioning Plan.
 - 1.3.19. Trending: Data collection of monitoring points using the Building Automation System or dataloggers.
- 1.4. COORDINATION

1.4.1. Commissioning Team:

1.4.1.1. Owner's Members

- 1.4.1.1.1. Representatives assigned by Owner's Designated Representative
- 1.4.1.1.2. Commissioning Authority, when engaged for the Project.
- 1.4.1.1.3. A/E.
- 1.4.1.1.4. TAB Firm, when engaged for the Project.

1.4.1.2. Contractor's Members:

- 1.4.1.2.1. Individuals, each having authority to act on behalf of the entity they represent, explicitly organized to implement all Commissioning activities through coordinated actions.
- 1.4.1.2.2. Representatives of Contractor, including but not limited to, project manager and commissioning coordinator, Subcontractors, installers, and equipment suppliers. Owner must approve Contractor's commissioning coordinator.

1.4.2. Scheduling:

- 1.4.2.1. Contractor shall integrate all Commissioning activities into the Baseline Schedule and the Work Progress Schedule. All parties will address scheduling problems and make necessary notifications in a timely manner to expedite all Commissioning activities.
- 1.4.2.2. Contractor shall provide the initial schedule of primary Commissioning activities at the pre-commissioning meeting. Prior to the first Start-up or Prefunctional Checklist test occurring, Contractor shall have incorporated and integrated all Commissioning activities into the Baseline Schedule and Work Progress Schedule with appropriately linked predecessors and successors.

1.5. ROLES AND RESPONSIBILITIES

- 1.5.1. Roles and responsibilities of Commissioning Team members are provided in this Section to clarify the commissioning process.

1.5.2. Owner's Role and Responsibilities:

- 1.5.2.1. Review Specifications containing Commissioning requirements.
- 1.5.2.2. Provide Owner's Test Requirements to Commissioning Team.
- 1.5.2.3. Approve the Commissioning Plan, Training Program and Contractor's schedule for completing all Commissioning activities.
- 1.5.2.4. Participate in Commissioning activities, including the following:
 - 1.5.2.4.1. Commissioning Team meetings.
 - 1.5.2.4.2. Review and approve Commissioning Plan, Training Plan, Prefunctional Checklists, Functional Performance Test Procedures, Functional Performance Tests, Integrated System Test Procedures, Integrated System Tests, Deferred Tests, Trending, Training Plan and other Commissioning documents.
 - 1.5.2.4.3. Attendance at Contractor's training sessions in operation and maintenance of systems and equipment.
 - 1.5.2.4.4. Observation of Contractor's demonstration of systems and equipment operation.
 - 1.5.2.4.5.

1.5.3. Commissioning Authority's Role and Responsibilities, when engaged for the project.

- 1.5.3.1. Prepare and submit the Commissioning Plan for Owner's approval.

- 1.5.3.2. Review, comment and approve on Contractor's schedule for Commissioning activities.
- 1.5.3.3. Participate in Contractor-led Pre-Commissioning Meeting.
- 1.5.3.4. Conduct and document Commissioning Team meetings.
- 1.5.3.5. Perform site visits as necessary or in conjunction with Commissioning Team meetings to observe component and system installations. Attend selected Project progress meetings to obtain information on construction progress.
- 1.5.3.6. Review and comment on Submittals and coordination drawings applicable to systems being commissioned.
- 1.5.3.7. Review and comment on Contractor-prepared Prefunctional Checklist and other Contractor-prepared documents, including Operating and Maintenance Manuals and Training Plan.
- 1.5.3.8. Prior to equipment Start-ups, review the control sequences and coordinate with the Contractor and A/E in order to prepare the Functional Performance Test and Integrated System Test procedures.
- 1.5.3.9. Witness equipment Start-ups as executed by Contractor.
- 1.5.3.10. Write Functional Performance Test Procedures and Integrated System Test Procedures for Contractor's execution of tests.
- 1.5.3.11. Witness, verify, and document results of Functional Performance Tests and Integrated System Tests.
- 1.5.3.12. Coordinate resolution of Deficiencies identified during Commissioning, Deferred Tests, and during the warranty period.
- 1.5.3.13. Review Contractor's Training Plan.
- 1.5.3.14. Compile Commissioning documentation for Contractor-prepared Commissioning and Closeout Manual including test documentation, Deficiency reports and solution results; non-compliance issue tracking; and recommendations on continuous commissioning, best practices, and preventive maintenance.
- 1.5.4. Architect/Engineer's Role and Responsibilities:
 - 1.5.4.1. Attend Commissioning Team meetings.
 - 1.5.4.2. Review and Approve Commissioning Plan, Training Plan, Prefunctional Checklist, Functional Performance Test Procedures, Functional Performance Tests, Integrated System Test Procedures, Integrated System Tests, Deferred Tests, and other Commissioning documents.
 - 1.5.4.3. Review and Approve Contractor's Training Plan.
 - 1.5.4.4. Review and Approve Test, Adjust, and Balance plan as defined in Specification 23 05 90 and 23 05 93.
 - 1.5.4.5. Approve technical requirements for correction of Deficiencies identified during Commissioning, Deferred Tests, and during the warranty period.

1.5.4.6. Review Operating and Maintenance Manuals.

1.5.5. Contractor's Role and Responsibilities:

- 1.5.5.1 Produce for Owner, Commissioning Authority and A/E's approval, the Commissioning Plan, Prefunctional Checklist, Functional Performance Test Procedures, Integrated System Test Procedures, Equipment Matrix of all devices, systems and equipment supplied, and other Commissioning documents.
 - 1.5.5.1.1 Commissioning Authority will produce the Commissioning Plan, project-specific Functional Performance Test Procedures, and project-specific Integrated System Test Procedures.
 - 1.5.5.1.2 Contractor shall review and provide comments on documents produced by the Commissioning Authority, and shall accept the Commissioning Plan, Functional Performance Test Procedures, and Integrated System Test Procedures as approved by Owner.
- 1.5.5.2 As the Project progresses, add specific checklists, test procedures, schedules, recorded results, action lists, signoff sheets and other documents for the Commissioning and Close-out Manual. Administer updates to the Commissioning and Close-out Manual with the intent that all Commissioning Team members will have up-to-date documentation as the Commissioning progresses.
- 1.5.5.3 Provide an individual, subject to Owner's approval, experienced in construction and Commissioning of building systems to organize, schedule, conduct, and document the Commissioning Plan and the Commissioning process. The Contractor shall assign this individual to act as the Contractor's Commissioning Coordinator. The Contractor's Commissioning Coordinator may have additional duties such as MEP Coordinator, but not as Project Manager or Superintendent. Submit qualifications demonstrating the Commissioning Coordinator's technical expertise and experience to the Owner for approval. In the event that Contractor chooses to subcontract its Commissioning obligations, then Contractor must submit the subcontractor's qualifications and personnel to Owner for Owner's approval.
- 1.5.5.4 Furnish and install systems that meet all requirements of the Contract Documents. Perform construction inspections, Start-ups, Prefunctional Checklists, Functional Performance Tests, and Integrated System Tests in accordance with the Contract Documents and Commissioning Plan. Correct any Deficiencies identified during these processes.
- 1.5.5.5 Ensure that Commissioning activities are incorporated into the Baseline Schedule and the Work Progress Schedule.
- 1.5.5.6 Submit inspection and Start-up documentation to Owner in accordance with this Section – 01 91 00 General Commissioning Requirements, Section 01 45 00 – Project Quality Control, Section 01 77 00 – Project Close-out Procedures, Specifications, and the Commissioning Plan.
- 1.5.5.7 Furnish copies of all Submittals, manufacturers' literature, maintenance information, and any other information required for the Commissioning process. Contractor must submit to Owner installation and checkout materials actually shipped inside equipment and actual field checkout sheet forms used by factory or field technicians. Cross-reference Section 01 31 00 – Project Administration and Section 01 77 00 – Project Close-out Procedures (Operating and Maintenance Manuals) for additional required documentation.

- 1.5.5.8 Schedule and conduct pre-installation meetings and pre-commissioning meetings with Subcontractors and equipment suppliers related to Commissioning. Contractor must invite A/E and Owner to attend the pre-installation meetings and pre-commissioning meetings.
- 1.5.5.9 Provide qualified personnel, including Subcontractors as required, to fully perform the testing and operational demonstrations required by the Contract Documents and the Commissioning Plan, including any Deferred Tests or re-testing related to warranty work.
- 1.5.5.10 Correct Deficiencies identified during any stage of commissioning prior to proceeding, unless approved by Owner.
- 1.5.5.11 Provide training to Owner. Coordinate Subcontractor and vendor participation in training sessions.
- 1.5.5.12 Perform Deferred Tests and make necessary amendments to Operating and Maintenance Manuals and Record Documents for applicable issues identified during the Deferred Tests.
- 1.5.5.13 Contractor shall be responsible for the following activities, and may contract with a Building Automation System (BAS) vendor for these activities.
 - 1.5.5.13.1 Provide on-site technician skilled in software programming and hardware operation to exercise sequences of operation and to correct controls deficiencies identified during Commissioning. Contractor must provide Record Documents reflecting correction of controls deficiencies identified during Commissioning.
 - 1.5.5.13.2 Provide instrumentation, computer, software and communication resources necessary to demonstrate compliance with the Contract Documents and the Commissioning Plan during the Prefunctional Checklist activities, Functional Performance Tests and Integrated System Tests of Building Automation System equipment.
 - 1.5.5.13.3 Attend pre-commissioning meetings and Commissioning meetings including seasonal, post occupancy, or deferred Commissioning meetings and activities as deemed appropriate by Owner. Prepare BAS Training Plans with Commissioning Team and perform training as specified in Contract Documents and Commissioning Plan.
 - 1.5.5.13.4 Maintain comprehensive system calibration and checkout records. Submit records to Owner.
 - 1.5.5.13.5 Set up, capture, analyze, and report trend logs as requested by Owner to substantiate proper systems operation.
- 1.5.6 Test, Adjust, and Balance Firm's Role and Responsibilities, when engaged for the project:
 - 1.5.6.1 Attend pre-commissioning meetings and Commissioning Team meetings including seasonal, post occupancy, or deferred Commissioning meetings and activities as deemed appropriate Owner.
 - 1.5.6.2 Submit Test, Adjust, and Balance Plan and forms describing methodology for performance of Test, Adjust, and Balance procedures specific to this Project to Owner/Engineer of record for review.

- 1.5.6.3 Cooperate with Contractor and Contractor's Building Automation System vendor, if any, during Commissioning.
- 1.5.6.4 Re-balance as needed to correct any Deficiencies identified during Commissioning.
- 1.5.6.5 Review BAS graphics and performance tests for accuracy, note deficiencies.
- 1.5.6.6 Provide T A B data to Contractor and Commissioning Team before Contractor begins Functional Performance Tests.

1.6 EQUIPMENT DOCUMENTATION REQUIREMENTS

1.6.1 Equipment Matrix:

- 1.6.1.1 Contractor shall submit a complete listing of all equipment, devices, and systems, with certain information as herein noted, within twenty-one (21) days of issuance of the Notice to Proceed with Construction and at least seven (7) days prior to submission of the first Application for Payment. This listing shall be referred to as the Equipment Matrix. Download an electronic version of this spreadsheet in Microsoft Excel format to use as a template for submittal purposes at the following website:

<https://www.mdanderson.org/content/dam/mdanderson/documents/about-md-anderson/about-us/doing-business/owners-design-guidelines/supplemental-resources/Equipment%20Matrix%20Template.xlsx>

- 1.6.1.2 Contractor shall coordinate Contractor's response to this requirement with Contractor's preparation of the Baseline Schedule, Work Progress Schedule, Submittal Schedule, Schedule of Values, and list of all equipment. Refer to Section 01 32 00 – Project Planning and Scheduling and Section 01 31 00 – Project Administration.

- 1.6.1.2.1 To the extent practical, Contractor should minimize redundant efforts in favor of a single, organized approach to all documentation required for Project equipment, systems, and devices.

- 1.6.1.3 The Equipment Matrix shall be formatted as a spreadsheet per Owner's template, with capability for printing various selected data columns to meet documentation requirements at various stages of construction, and for different purposes as required by various Technical Sections. The Equipment Matrix shall be updated as the Project progresses and submitted periodically as requested by Owner. Provide Owner with an electronic version of the final approved Equipment Matrix at or before Project Close-out.

- 1.6.1.3.1 Contractor may elect to combine the Submittal Schedule and Equipment Matrix into one spreadsheet (with multiple tabbed sheets) that Contractor updates as the Project progresses.

- 1.6.1.4 The Equipment Matrix shall identify all operable devices and equipment grouped by the Construction Specification Institute (CSI) Master Format under the system they are primarily categorized under. When sorted by the column for system identification, the resulting printout must identify all system components, regardless of whether they are mechanical, electrical, or otherwise.

- 1.6.1.5 Contractor shall continue to update the Equipment Matrix for each device or system. Owner will assist the Contractor in collecting information on Owner-furnished and Contractor-installed equipment. The Equipment Matrix shall include the following column headings, as a minimum, for each device per specification 20 05 53:

- 1.6.1.5.1 Equipment Plan Designation: Equipment Naming Convention (equipment acronym and sequential number) from Contract Documents.
- 1.6.1.5.2 Specification Section number.
- 1.6.1.5.3 Building ID: Shall be obtained from Owner.
- 1.6.1.5.4 Location / Room Number: Owner's Wayfinding Codes from Owner's Space Management database referring to room number or building location. Shall be obtained from Owner.
- 1.6.1.5.5 Asset Short Description: The asset short description is to be a very short textual description. Type a brief, identifying description for the asset followed by a comma then the "Equipment Plan Designation". If multiple units, of same type, include equipment ID number from the Construction Documents. This field is limited to 80 characters. Example= Pump, Secondary Chilled Water, SCHWP-01-2B.
- 1.6.1.5.6 Asset Long Description: A more complete description of the asset to make it clearer to the Owner's maintenance group. Include any distinguishing details relevant to identifying the asset from other identical units (color, physical location within a room, and so on. Example: Horizontal split case pump located in North end of room.
- 1.6.1.5.7 System Level Asset: Type of system that the equipment serves. Shall be obtained from Owner. Example: Domestic Hot Water
- 1.6.1.5.8 Product submittal reference number(s).
- 1.6.1.5.9 Product submittal approval date.
- 1.6.1.5.10 Name of installing Subcontractor.
- 1.6.1.5.11 Installing Subcontractor contact information.
- 1.6.1.5.12 Equipment Manufacturer.
- 1.6.1.5.13 Equipment model number.
- 1.6.1.5.14 Equipment serial number.
- 1.6.1.5.15 Emergency Power: Note whether equipment is served from emergency power system.
- 1.6.1.5.16 Equipment manufacturer's representative (Vendor).
- 1.6.1.5.17 Equipment manufacturer's representative (Vendor) contact information.
- 1.6.1.5.18 Manufacturer's purchase order number.
- 1.6.1.5.19 Asset Cost: Equipment purchase price excluding all auxiliary costs.
- 1.6.1.5.20 Start-up Date: Date of initial equipment or device start-up by the Contractor.
- 1.6.1.5.21 Prefunctional Checklist completion date.
- 1.6.1.5.22 Functional Performance Test completion date.
- 1.6.1.5.23 Integrated Systems Test completion date.

1.6.1.5.24 Substantial Completion date.

1.6.1.5.25 Manufacturer's warranty start date.

1.6.1.5.26 Warranty End Date: The date on which the asset warranty ends. (Default is one year after the Substantial Completion Date unless a longer warranty period is requested or provided.)

1.6.1.6 Owner will furnish the following additional information; allow column headings for this data:

1.6.1.6.1 Asset Number

1.6.1.6.2 Parent ID

1.6.1.6.3 Asset Group Code

1.6.1.6.4 Cost Center

1.6.1.6.5 Critical Factor

1.6.1.6.6 Estimated Asset Life

1.6.1.6.7 Asset Status

1.6.1.6.8 Work Group

1.6.1.6.9 Work Area

PART 2- EXECUTION

2.1 COMMISSIONING PLAN

2.1.1 When a CxA has not been engaged for the project, Contractor shall submit draft Commissioning Plan to Owner and A/E for review within twenty-one (21) days of issuance of the Notice to Proceed with Construction or within ninety (90) days prior to initial installation of materials or equipment that will undergo Start-up and Functional Performance Tests, as directed by Owner.

2.1.2 Contractor shall allow in the Work Progress Schedule a minimum of twenty-one (21) days after the receipt by the Owner of the draft Commissioning Plan Submittal for the Owner to submit review comments to Contractor.

2.1.3 Contractor shall incorporate Owner's review comments and resubmit the revised Commissioning Plan to Owner within fourteen (14) days of receipt of the review comments.

2.1.4 Contractor shall allow in the Work Progress Schedule an additional fourteen (14) days for Owner's approval of the resubmitted Commissioning Plan that incorporates Owner's review comments.

2.1.5 PRE-COMMISSIONING MEETING

2.1.6 Upon obtaining Owner's approval of the Commissioning Plan, Contractor shall schedule, plan, and conduct a Pre-Commissioning Meeting with all parties involved in Commissioning. This meeting should include the major Subcontractors, specialty

manufacturers/suppliers, A/E, Test, Adjust, and Balance Firm, Commissioning Authority, and Owner's representatives as participants.

2.1.7 Contractor shall prepare for the Pre-Commissioning Meeting by creating drafts of the following documents with input from the Owner. Commissioning Authority, when engaged for the project, will prepare the Commissioning Plan, Functional Performance Test Procedures and Integrated System Test Procedures.

2.1.7.1 Approved Commissioning Plan including the Equipment Matrix and the Close-out and Documentation Matrix as defined in Section 01 77 00 – Project Close-out Procedures.

2.1.7.2 Baseline Schedule and Work Progress Schedule incorporating Commissioning activities.

2.1.7.3 Prefunctional Checklists.

2.1.7.4 Functional Performance Test Procedures.

2.1.7.5 Integrated System Test Procedures.

2.1.8 Contractor or Commissioning Authority when engaged for the project shall conduct the Pre-Commissioning Meeting and review all aspects of the Commissioning Plan. All documentation will be discussed and all test procedures and forms reviewed for approval with the Owner. Contractor shall prepare an outline noting responsibilities of the various parties involved in Commissioning for review at this meeting.

2.1.9 The Commissioning Plan shall be reviewed with all attendees and the scope of work discussed. Contractor should be prepared to distribute copies of the pertinent sections to the various Subcontractors involved in Commissioning.

2.1.10 Contractor shall present Commissioning target dates for the Project. These dates and durations shall be incorporated in the Baseline Schedule and the Work Progress Schedule in accordance with Section 01 32 00 – Project Planning and Scheduling.

2.2 REPORTING

2.2.1 Contractor shall provide status reports to Owner at frequencies directed by Owner.

2.2.2 Contractor shall communicate at least monthly with all members of the Commissioning Team, keeping them apprised of Commissioning progress and scheduling changes.

2.2.3 Contractor shall submit Non-Compliance and Deficiency reports to Owner within five (5) days of the date the Non-Compliance or Deficiency is first observed. This includes responses to items noted by the Commissioning Authority.

2.2.4 Contractor shall provide final Commissioning documentation to Owner in accordance with Section 01 77 00 – Project Close-out Procedures, which will become part of the Commissioning and Close-out Manual.

2.3 TEST EQUIPMENT

2.3.1 Contractor shall provide all specialized tools, test equipment and instruments required to execute start-up, checkout, and testing of equipment.

- 2.3.2 All specialized tools, test equipment and instruments required to execute start-up, checkout, and testing of equipment shall be of sufficient quality and accuracy to test and measure system performance within specified tolerances. A testing laboratory must have calibrated test equipment within the previous twelve (12) months. Calibration shall be NIST traceable. Contractor must calibrate test equipment and instruments according to manufacturer's recommended intervals and whenever the test equipment is dropped or damaged. Calibration tags must be affixed to the test equipment or certificates readily available.

2.4 PRE FUNCTIONAL CHECKLIST

- 2.4.1 Contractor shall provide a Prefunctional Checklist for each system to Owner, Commissioning Authority and A/E for review.
- 2.4.1.1 Contractor shall provide a draft version of each individual Prefunctional Checklist at a pre-installation meeting for the system. Based on discussions at a pre-installation meeting and subsequent as-constructed conditions, Contractor shall amend and revise each Prefunctional Checklist as appropriate prior to requesting system inspection from the Owner.
- 2.4.1.2 Contractor shall submit the final approved Prefunctional Checklist and all supporting documentation prior to requesting Start-up and Functional Performance Tests.
- 2.4.2 Contractor shall review the installation and Contract Documents for each system and shall provide written confirmation of the following if not included in the Prefunctional Checklist.
- 2.4.2.1 All required test reports and certifications have been submitted and accepted by Owner. Contractor must provide certification of acceptance from manufacturer's representative.
- 2.4.2.2 Evidence that A/E has approved all Submittals for each component device.
- 2.4.2.3 All valve charts, wiring diagrams, control schematics, electrical panel directories, etc. have been submitted and approved, and that all devices have been installed in accordance with the Contract Documents.
- 2.4.2.4 All tabulated data has been submitted for each system and for each device.
- 2.4.2.5 Each component device has been installed in accordance with applicable codes, the Contract Documents, and manufacturer's written recommendations.

2.5 INITIAL START-UP

- 2.5.1 Start-up of Independent Devices:
- 2.5.1.1 Prior to Start-up, Contractor shall not energize or activate, or allow to be energized or activated, any operable device until Contractor has verified to Contractor's own satisfaction that all Contract Document requirements for the operable device have been met and have been documented in the Prefunctional Checklists.
- 2.5.1.2 Contractor may energize or start-up independent devices for operational check-out and testing only after Contractor and manufacturer's representative or engineering technician (if required by the Contract Documents) have inspected and accepted the installation. The installation must not vary from provisions of the applicable Specifications and the manufacturer's written recommendations for Start-up.
- 2.5.1.3 When Start-up of equipment or systems have the potential to impact Owner's daily operations or when the Contract Documents require the Owner to witness Start-up,

Contractor must provide advance notice to Owner in accordance with the procedures outlined in the Contract Documents prior to Start-up. Contractor may not proceed with Start-up without the Owner's written approval.

2.5.2 Start-up of Building Systems:

2.5.2.1 Contractor shall not energize or activate any building system until the following conditions have been met:

2.5.2.1.1 Contractor has verified that all wiring and support components for equipment are complete and have been tested in accordance with the technical specifications and the manufacturer's written recommendations.

2.5.2.1.2 Contractor has verified that each component device has been checked for proper lubrication, vibration isolation, drive rotation, belt tension, control sequence, or other conditions that may cause damage.

2.5.2.1.3 Contractor has verified that all tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer and are in compliance with applicable Contract Documents.

2.5.2.1.4 Contractor has received approved building system final inspection reports. Refer to Section 01 45 00 – Project Quality Control.

2.5.2.1.5 Contractor has provided the Owner and A/E with a written fourteen (14) day notice of intent to start-up the system for operational check-out. The notification procedures outlined in the Contract Documents shall be utilized.

2.5.2.2 Contractor shall perform Start-up under supervision of the responsible manufacturer's representative in accordance with manufacturer's instructions and specification requirements.

2.5.2.3 Contractor shall coordinate and schedule system(s) Start-up in a timely manner so that each component or system can operate for a period of time that is sufficient to evaluate and adjust performance as necessary. All building systems shall be operational and must have been successfully inspected by Owner, through attendance and concurrence with results of the Prefunctional Checklists or as otherwise approved by Owner, prior to the Contractor proceeding with Functional Performance Tests.

2.5.2.4 Contractor shall clearly list outstanding items or initial Start-up and Prefunctional Checklists items not completed successfully. Contractor shall obtain from Subcontractor completed forms documenting any outstanding Deficiency within five (5) days of completion of tests.

2.5.2.5 Contractor shall review completed Deficiency forms to determine if outstanding items prevent execution of the Functional Performance Tests and shall issue any necessary responses to the Commissioning Team.

2.6 REQUEST FOR START-UP AND FUNCTIONAL PERFORMANCE TESTS

2.6.2 Contractor shall notify Owner to request: (1) initial energization or operation of equipment and systems; and (2) an inspection of any system or system component for readiness prior to Functional Performance Tests.

2.6.2.1 Request for Start-up. Contractor must certify that: (1) electrical and mechanical connections have been installed and are safe for initial Start-up; (2) Contractor has

complied with Owner's utilities outage notifications; and (3) Start-up will not harm Owner's daily routine operations.

2.6.2.2 Contractor shall complete the applicable Prefunctional Checklist(s) signed by Contractor and CxA if engaged for the project, evidencing Contractor's own thorough inspection of the system and completion of Start-up activities required by the Contract Documents and the Commissioning Plan. Contractor shall submit required supporting documentation, including but not limited to, factory start-up forms, operational testing data, and certifications.

2.6.2.3 Request for Functional Performance Test. Contractor must certify that the Contractor has verified that the installation, Start-up, Prefunctional Checklists, and initial operation of the system or component are in accordance with the Contract Documents and the Commissioning Plan including manufacturer's instructions, manufacturer's requirements for maintenance of warranty, and verification that the system is ready for Functional Performance Tests. Contractor must certify that the manufacturer's representative has verified that the installation, Start-up, and initial operation of the system or component are in accordance with the manufacturer's published recommendations.

2.6.2 Contractor must obtain Owner's approval prior to proceeding with the Start-up or Functional Performance Test. All construction inspections must be completed. Any and all Deficiencies and all items included in the Non-Compliance Report have been brought into compliance with the Contract Documents..

2.7 FUNCTIONAL PERFORMANCE TESTS

2.7.2 Objective and Scope:

2.7.2.1 The objective of a Functional Performance Test is to demonstrate that the entire individual system operates according to the Contract Documents.

2.7.2.2 Contractor shall operate each system through all modes of operation (occupied, unoccupied, warm-up, cool-down, etc.) for specified system responses. Contractor is required to demonstrate to Owner's satisfaction each operational sequence.

2.7.2 Development of Functional Performance Test Procedures:

2.7.2.1 The purpose of a Functional Performance Test is to verify and document compliance with the stated criteria of acceptance. Contractor or Commissioning Authority if engaged for the project shall develop specific script-type test procedures and associated test forms to verify and document proper operation of each piece of equipment and system.

2.7.2.2 Contractor or Commissioning Authority if engaged for the project shall prepare Functional Performance Test Procedure forms as part of the Commissioning Plan. Once approved by Owner, Contractor shall utilize the forms for all testing activities.

2.7.2.3 Functional Performance Test Procedure forms must include the following:

2.7.2.3.1 System and equipment or component name(s).

2.7.2.3.2 Equipment location and identification number as identified in the Equipment Matrix.

2.7.2.3.3 Unique test identification number and reference to unique Prefunctional Checklist identification numbers for the equipment.

- 2.7.2.3.4 Date and time of test.
 - 2.7.2.3.5 Project name.
 - 2.7.2.3.6 Participating parties.
 - 2.7.2.3.7 Specific sequence of operation or other specified parameters, including performance data being verified.
 - 2.7.2.3.8 Instructions for setting up a Functional Performance Test.
 - 2.7.2.3.9 Specific script-type, step-by-step procedures to perform a Functional Performance Test, in a clear, sequential and repeatable format that is customized for the system being tested.
 - 2.7.2.3.10 A Pass / Fail checkbox (or data entry box as appropriate) for clearly indicating whether or not proper performance of each part of a Functional Performance Test was achieved and space for actual readings.
 - 2.7.2.3.11 Section for comments.
 - 2.7.2.3.12 Signatures and date block for participant and Owner approvals.
- 2.7.2 Contractor shall operate, or cause to be operated, each system, device, or equipment item, both intermittently and continuously, for a duration period as indicated in the Specification(s) for each item and/or in accordance with the manufacturer's written recommendations, the Contract Documents and the Commissioning Plan.
- 2.7.2 Contractor shall operate each component device and each building system to the full extent of its capability, from minimum to maximum, and under automatic control and manual control.
- 2.7.2 Contractor and manufacturer's representatives shall supervise and coordinate adjustments and balancing of all devices and systems for proper operation prior to requesting a Functional Performance Test(s).
- 2.7.2.1 Where final balancing of a system is to be performed by Owner, such as final air balancing, Contractor shall provide all services indicated in the applicable Specifications and under this Section, including the following, prior to Owner's final balancing.
- 2.7.2.1.1 Operational verification of all component devices and the total system, including automatic controls when applicable. Operational verification includes verification that all motors, fans, dampers, and other operable devices are performing in compliance with Specifications throughout their operable range and that all devices are controlled as described in the specified sequence of operation.
 - 2.7.2.1.2 All tabulated data, motor amperage readings, valve tag verifications, and other data required by the Specifications.
- 2.7.2.2 Where final balancing of a system or particular components of a system are not specifically indicated to be performed by Owner, Contractor shall provide final balancing and adjustments for operation within specified tolerances prior to Functional Performance Test of such system.
- 2.7.2.3 Coordination and Scheduling. Members of the Commissioning Team, including Owner, may observe Functional Performance Tests of equipment components and systems. Contractor shall provide written notice to Owner at least ten (10) days prior to Functional

Performance Tests of equipment components and systems. Contractor shall notify Owner in advance of any changes to the Functional Performance Test schedule. Owner may require Contractor to reschedule Functional Performance Tests to ensure availability of Owner's representative(s).

2.7.2.4 Contractor conducts Functional Performance Tests after system Start-up and Pre-functional Checklists are satisfactorily completed and have been approved by Owner. Air balancing and water balancing shall be completed before Functional Performance Tests.

2.7.2.5 Contractor conducts Integrated System Tests after Functional Performance Tests are satisfactorily completed and have been approved by Owner.

2.8 INTEGRATED SYSTEM TESTS

2.8.1 Objective and Scope:

2.8.1.1 The objective of an Integrated System Test is to demonstrate that each system operates jointly with other systems according to the Contract Documents.

2.8.1.2 Contractor shall operate each system jointly with other systems, through selected modes of operation (fire alarm integration with HVAC, emergency power modes, equipment failures among related systems, etc.) for specified system responses. Contractor is required to demonstrate to Owner's satisfaction each operational sequence.

2.8.2 Development of Integrated System Test Procedures:

2.8.2.1 The purpose of an Integrated System Test is to verify and document compliance with the stated criteria of acceptance. Contractor or Commissioning Authority if engaged for the project shall develop specific script-type test procedures and associated test forms to verify and document proper operation of each piece of equipment and system, jointly and independently of other systems.

2.8.2.2 Contractor or Commissioning Authority if engaged for the project shall prepare Integrated System Test Procedure forms as part of the Commissioning Plan. Once approved by Commissioning Team., Contractor shall utilize the forms for all testing activities.

2.8.2.3 Integrated System Test Procedure forms must include the following.

2.8.2.3.1 System and equipment or component name(s).

2.8.2.3.2 System and equipment location and identification number as identified in the Equipment Matrix.

2.8.2.3.3 Unique test identification number and reference to unique Functional Performance Test identification numbers for the system and equipment.

2.8.2.3.4 Date and time of test.

2.8.2.3.5 Project name.

2.8.2.3.6 Participating parties.

2.8.2.3.7 Specific sequence of operation or other specified parameters, including performance data being verified.

2.8.2.3.8 Instructions for setting up an Integrated System Test.

- 2.8.2.3.9 Specific script-type, step-by-step procedures to perform an Integrated System Test, in a clear, sequential and repeatable format that is customized for the system being tested.
- 2.8.2.3.10 A Pass / Fail checkbox (or data entry box as appropriate) for clearly indicating whether or not proper performance of each part of an Integrated System Test was achieved and space for actual readings.
- 2.8.2.3.11 Section for comments.
- 2.8.2.3.12 Signatures and date block for participant and Owner approvals.
- 2.8.3 Contractor shall operate, or cause to be operated, each system, device, or equipment item, both intermittently and continuously, for a duration period as indicated in the Specifications for each item and in accordance with the manufacturer's written recommendations, the Contract Documents and the Commissioning Plan.
- 2.8.4 Coordination and Scheduling.
 - 2.8.4.1 Members of the Commissioning Team, including Owner may observe Integrated System Tests of equipment components and systems. Contractor shall provide written notice to Owner at least fourteen (14) days prior to Integrated System Tests of equipment components and systems. Contractor shall notify Owner and A/E in advance of any changes to the Integrated System Test schedule. Owner may require Contractor to reschedule Integrated System Tests to ensure availability of Owner's representative(s).
 - 2.8.4.2 Contractor conducts Integrated System Tests after Functional Performance Tests are satisfactorily completed and have been approved by Owner.

2.9 DOCUMENTATION AND NON-CONFORMANCE

2.9.1 Documentation:

- 2.9.1.1 Contractor shall witness and document the results of all Functional Performance Tests and Integrated Systems Tests using specific procedural forms developed for that purpose or an approved electronic database program. Prior to testing, Contractor shall submit these forms to the Owner and A/E for review and approval. Contractor will include the completed, filled-out forms in the Commissioning and Close-out Manual.

2.9.2 Non-Conformance:

- 2.9.2.1 Contractor shall record results of Functional Performance Tests and Integrated System Tests. Contractor or Commissioning Authority if engaged for the project shall report all Deficiencies and non-conformance issues to Commissioning Team.in accordance with the procedures outlined in the Commissioning Plan.
- 2.9.1.2 At the sole discretion of Owner, Owner may permit Contractor to make corrections of minor Deficiencies observed during a Functional Performance Test or during an Integrated System Test. However, the Contractor must document the Deficiency and resolution on the appropriate report form.
- 2.9.1.3 Contractor shall make every effort to expedite testing and minimize unnecessary delays, while not compromising the integrity of a Functional Performance Test or an Integrated Systems Test.
- 2.9.1.4 Contractor, A/E and Owner will attempt to resolve Deficiencies in the following manner.

- 2.9.1.4.1 When there is no dispute about a Deficiency and Contractor accepts responsibility for correction.
 - 2.9.1.4.1.1 Commissioning Authority if engaged for the project or Contractor documents the Deficiency and the corrective actions, and then proceeds to another test or sequence. A Deficiency report is submitted to Owner. Contractor corrects the Deficiency, completes the statement of correction form certifying that the equipment or system is ready for retesting, and sends the certification to Owner.
 - 2.9.1.4.1.2 Contractor reschedules test with Owner.
- 2.9.1.4.2 When there is a dispute about whether or not the test indicates a Deficiency or the Contractor's responsibility for correction of the apparent Deficiency.
 - 2.9.1.4.2.1 Commissioning Authority if engaged for the project or Contractor documents the apparent Deficiency. A Deficiency report is submitted to Owner, including the apparent Deficiency.
 - 2.9.1.4.2.2 Contractor facilitates resolution of the Deficiency and provides recommendations to the Owner. Contractor and Owner may bring other parties into the discussions as needed. Final technical interpretive authority is with the A/E. Final acceptance authority is with the Owner.
 - 2.9.1.4.2.3 Contractor documents the resolution process.
 - 2.9.1.4.2.4 If Owner and the A/E agree with Contractor's interpretation and proposed resolution, Contractor forwards response to Owner. Contractor reschedules test with Owner. Contractor must repeat this process until satisfactory performance and Owner's approval is obtained.

2.10 DEMONSTRATION AND OWNER TRAINING

- 2.10.1 Contractor, in coordination with Owner shall develop the Training Plan with project specific requirements for Owner Training, after reviewing the different systems to be installed and commissioned. The purpose of the Training Plan is to specifically communicate the required content and training durations required by the Owner based upon the type of equipment and the Owner's past experience.
- 2.10.2 Refer to Section 01 79 00 - Demonstration and Training for specific requirements.

2.11 DEFERRED TESTS

2.11.1 Deferred Tests:

- 2.11.1.1 Deferred Tests shall be identified in writing and shall be approved by Owner.
 - 2.11.1.1.1 Contractor shall complete Deferred Tests as part of this Contract during the Warranty Period. Contractor shall schedule this activity with Owner. Contractor shall perform tests and document and correct Deficiencies. Owner may observe the tests and review and approve test documentation and Deficiency corrections.
 - 2.11.1.1.2 Contractor shall incorporate final updates to the Commissioning and Close-out Manual.

- 2.11.1.1.3 If any check or test cannot be completed prior to Substantial Completion due to the building structure, required occupancy condition, or other condition, performance of such test may be delayed to later in the Warranty Period, upon approval of the Owner.
- 2.11.1.1.4 Commissioning of systems which provide Life Safety (passive or active) to the building and its occupants shall not be deferred unless occupancy is deferred.

2.12 COMMISSIONING DOCUMENTATION

- 2.12.1 Contractor shall compile and organize all Commissioning documentation into a Commissioning and Close-out Manual and deliver to the Owner as specified in Section 01 77 00 – Project Close-out Procedures.
- 2.12.2 The Commissioning and Close-out Manual submitted to Owner shall contain all Commissioning documentation, including, but not limited to:
 - 2.12.2.1 The Commissioning Plan.
 - 2.12.2.2 Final Baseline Schedule filtered to show only the Commissioning activities.
 - 2.12.2.3 Completed Equipment Matrix.
 - 2.12.2.4 Completed Prefunctional Checklists with all required attachments,
 - 2.12.2.5 Functional Performance Test Procedures and results.
 - 2.12.2.6 Integrated System Test Procedures and results.
 - 2.12.2.7 Training Plan and all supporting documentation. Refer to Section 01 79 00 – Demonstration and Training for specific requirements.
 - 2.12.2.8 Deficiency reports and solution results.
 - 2.12.2.9 Recommendations on continuous Commissioning, best practices, and preventive maintenance.
 - 2.12.2.10 Refer to Section 01 77 00 – Project Close-out Procedures for additional Close-out documentation to be included in the Commissioning and Close-out Manual.

END OF SECTION 01 91 00

Attachment No. 1 – Equipment Matrix

Download an Electronic Version of the Equipment Matrix template at the following Internet Address:

<https://www.mdanderson.org/content/dam/mdanderson/documents/about-md-anderson/about-us/doing-business/owner's-design-guidelines/supplemental-resources/Commissioning%20Plan%20Template.zip>

	E	C	D	E	F	G	H	I	J	K	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	
1	CONTRACTOR:																							
2	MDA PROJECT NO.:																							
3	DATE SUBMITTED:																							
4	Template Version: 2.0 (06/01)																							
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RIDER 101

SCOPE OF SERVICES

ATTACHMENT 2:

REQUEST FOR PROPOSAL FORM

REQUEST FOR PROPOSAL

Date: [Month d, yyyy]

To: [Service Provider]

Attn: [Service Provider's representative]

From: [Sender's Name]
 [Sender's Position Title], and
 Owner's Assignment Representative

Ref.: Request for Proposal
 MD Anderson Assignment Name: [Enter MD Anderson assignment name]
 MD Anderson Assignment Number [Enter MD Anderson assignment number]
 MD Anderson Agreement No. [Enter MD Anderson agreement no.]

Pursuant to the terms of the referenced MD Anderson Agreement, MD Anderson hereby requests a written Proposal for the assignment referenced above and further described below.

Assignment Location: Enter assignment location information

Scope of Work:

This Assignment shall include certain Commissioning Services more particularly described as follows:

[Provide general description of the Commissioning Services that are required for this particular assignment.]

Initial Schedule: The initial key milestone dates for this Assignment are as follows:

Activity:	Date
Proposal Submitted	mm/dd/yy
Proposal Accepted	mm/dd/yy
Kickoff Meeting	mm/dd/yy
Services Start	mm/dd/yy
Services Complete	mm/dd/yy

HUB Requirements: MD Anderson anticipates that the Total Fee associated with this Assignment will be less than \$100,000. Therefore, MD Anderson does not anticipate that a HUB Subcontracting Plan will be required for this Assignment. As set forth in Article ___ of the Agreement, in the event the proposed not-to-exceed Total Fee equals or exceeds \$100,000, the Proposal must include a HUB Subcontracting Plan (HSP) for the proposed not-to-exceed amount for the Total Fee.

OR

MD Anderson anticipates that the Total Fee associated with this Assignment will equal or exceed \$100,000 and has determined that subcontracting opportunities are probable in connection with this Assignment. As set forth in Article ___ of the Agreement, in the event the proposed not-to-exceed Total Fee equals or exceeds \$100,000, the Proposal must include a HUB Subcontracting Plan (HSP) for the proposed not-to-exceed amount for the Total Fee.

Additional Services: Within your Proposal, please expressly itemize and identify any services that you propose to provide as Additional Services. Your proposal is to include a description of each Additional Service to be provided and a detailed breakdown of the personnel, by Classification as listed in Attachment ___ to Exhibit ___ of the Agreement, who will be engaged in providing the Additional Service, the Hourly Rate for that Classification, an estimate of the number of work-hours that will be required in providing the Additional Service, and an extended line item amount. To the extent you propose to subcontract for the Additional Services, your proposal is to include a description of the service to be subcontracted and a detailed breakdown of the personnel, by work classification, who will be engaged in providing the subcontracted services, the hourly rate for that classification, an estimate of the number of work-hours that will be required in providing the subcontracted service, and an extended line item amount. Your Proposal is to include a summary not-to-exceed amount for each proposed Additional Service and the detailed breakdown is to be included as an attachment to your Proposal.

Reimbursable Expenses: Within your Proposal, please include a proposed not-to-exceed allowance for Reimbursable Expenses.

Please submit your Proposal, including a proposed baseline schedule, to me no later than the date included in the Initial Schedule that is set forth above.

Attachments: [list attachments as appropriate]

Copy: [include a destination or path to where an image of this Request for Proposal is to be uploaded.]

Editorial guidelines:

- *Blue text indicates information to be provided by the project manager when preparing to issue this Request for Proposal to the Service Provider.*
- *For the section on HUB Requirements, only one of the option paragraphs should be included. The paragraph to be used will vary from project to project. All unused paragraphs should be deleted along with all "OR"s.*

- *All text color should be changed to **black**.*
- *All editorial guidelines, including these paragraphs, should be deleted prior to sending this document to the Service Provider.*

RIDER 101
SCOPE OF SERVICES

ATTACHMENT 3:
ASSIGNMENT PROPOSAL FORM

RIDER 101 ATTACHMENT 3 – FORM OF PROPOSAL
FORM OF ASSIGNMENT PROPOSAL

Name of Agreement: Agreement for Providing Commissioning Services

MD Anderson Master Agreement Number: _____

MD Anderson Assignment Name: _____

MD Anderson Assignment Number: _____

Date Month d, yyyy

To: Owner's Assignment
Representative: _____

Street Address: _____

City, State, Zip: _____

From: Service Provider: _____

Street Address: _____

City, State, Zip: _____

Please refer to the Agreement with an Effective Date of _____ between MD Anderson Cancer Center ("MD Anderson") and the undersigned ("Service Provider") as amended to the date hereof (such agreement as so modified and amended being hereafter called the "Agreement") pursuant to which Service Provider is to perform certain services. The terms, which are defined in the Agreement, shall have the same meanings when used in this Assignment Proposal.

In response to MD Anderson's Request for Proposal, dated _____, _____, Service Provider proposes the following:

Commissioning Services:

[Using Rider 102 to the Agreement, identify the classifications for the workers to be involved in providing Commissioning Services for this Assignment and the not-to-exceed number of work-hours the workers in that classification will be involved in providing the services. Provide the not-to-exceed extended amount for each classification and the total not-to-exceed amount for Commissioning Services.]

Worker Classification	Hourly Rate	Not-to-Exceed Hours	Not-to-Exceed Extended Amt.
Total:			

Additional Services: Owner has requested the performance of the services described below which, in accord with the terms of the Agreement, are to be provided as Additional Services. A detailed breakdown for each Additional Service summarized below is included as an attachment to this Proposal.

Description of Proposed Additional Service	Proposed Not-to-Exceed Amount
Proposed Not-to-Exceed Amount for Additional Services	

Reimbursable Expenses: Service Provider anticipates incurring certain Reimbursable Expenses in completing the work associated with this Assignment. The estimate for these expenses is as follows:

Description of Reimbursable Expense	Proposed Not-to-Exceed Amount
Proposed Not-to-Exceed Amount for Reimbursable Expenses	

Proposed Schedule: Services Provider will perform the services as set forth in the Owner's Request for Proposal, except as follows.

Proposed Fee Summary:

Not-to-Exceed Amount for:	Proposed Amount
Commissioning Services Fee	
Additional Services Fee	
Reimbursable Expenses	
Total Not-to-Exceed Amount for this Assignment Proposal	

Service Provider

By: _____

Name: _____

Title: _____

Date: _____

Commissioning Assignment Summary:

	Commissioning Services	Additional Services	Reimbursable Expenses	Commissioning Assignment Total
This Proposal				
Previous Proposals				
Totals:				

RIDER 101
SCOPE OF SERVICES

ATTACHMENT 4:
ADDITIONAL SERVICES PROPOSAL FORM

ADDITIONAL SERVICES PROPOSAL

Name of Agreement: Agreement for Providing Commissioning Services

MD Anderson Agreement Number: _____

MD Anderson Purchase Order Number: _____

MD Anderson Assignment Name: _____

MD Anderson Assignment Number: _____

Date Month dd, yyyy

To: Owner's Assignment Representative: _____

Street Address: _____

City, State, Zip: _____

From: Service Provider: _____

Street Address: _____

City, State, Zip: _____

Please refer to the Agreement with an Effective Date of _____ between The University of Texas MD Anderson Cancer Center ("MD Anderson") and the undersigned ("Service Provider") as amended to the date hereof (such agreement as so modified and amended being hereafter called the "Agreement") pursuant to which Service Provider is to perform certain services. Capitalized terms used herein, which are defined in the Agreement, shall have the same meanings when used in this Additional Services Proposal.

Owner has requested the performance of the services described below which, in accord with the terms of the Agreement, Service Provider deems to be Additional Services. A detailed breakdown for each Additional Service summarized below is included as an attachment to this Additional Services Proposal.

Description of Proposed Additional Service	Proposed Not-to-Exceed Amount
Proposed Not-to-Exceed Amount for Additional Services	

Subcontractor Costs: Services Provider proposes to engage Subcontractors, as described below, in order to deliver these proposed Additional Services and proposes that the costs associated with

these consultants not be included within the Additional Services fees set forth above. A detailed breakdown for each of these Subcontractor Costs is included as an attachment to this Additional Services Proposal.

Description of Proposed Subcontractor Cost	Proposed Not-to-Exceed Amount
Proposed Not-to-Exceed Amount for Subcontractors	

Reimbursable Expenses: Service Provider anticipates incurring certain Reimbursable Expenses in completing the work associated with these proposed Additional Services. The estimate for these expenses is as follows:

Description of Reimbursable Expense	Proposed Not-to-Exceed Amount
Proposed Not-to-Exceed Amount for Reimbursable Expenses	

Schedule: Services Provider will provide these services as set forth below.

Milestone/Task Description	Proposed Completion Date

Additional Services Proposal Fee Summary:

Not-to-Exceed Amount for:	Proposed Amount
Additional Services Fee	
Subcontractor Costs	
Reimbursable Expenses	
Total Not-to-Exceed Amount for these Additional Services	

Service Provider

By: _____

Name: _____

Title: _____

Date: _____

Current Assignment Summary

ORIGINAL PURCHASE ORDER AMOUNT:	\$ _____.
Previous Additions:	\$ _____.
Previous Deductions:	\$ _____.
NET BALANCE OF PURCHASE ORDER AMOUNT:	\$ _____.
THIS Addition/(Deduction):	\$ _____.
ADJUSTED PURCHASE ORDER AMOUNT:	\$ _____.

RIDER 101
SCOPE OF SERVICES

ATTACHMENT 5:
NOTICE TO PROCEED FORM

NOTICE TO PROCEED

Date: Month dd, yyyy

To: Service Provider

Attn: [Enter Name of Service Provider's Assignment Representative]

From: [Enter name and position of Owner's Assignment Representative] and Owner's Assignment Representative

Ref.: Notice to Proceed

MD Anderson Assignment Name: [_____]

MD Anderson Assignment Number: [_____]

MD Anderson Agreement No. [_____] for Providing Commissioning Services

Service Provider's Assignment Proposal No.: [_____]

Pursuant to the terms of the referenced MD Anderson Agreement, MD Anderson hereby notifies, effective [Month dd, yyyy], [enter name of Service Provider as it appears in the Agreement] (Service Provider) to proceed with providing certain Commissioning Services as set forth in MD Anderson's Assignment RFP dated [Month dd, yyyy] and Service Provider's Assignment Proposal No. [_____].

Please be advised that the MD Anderson Purchase Order Number specific to this Assignment is _____.

Please do not hesitate to contact me if you have any questions concerning this authorization.

Copy: [Enter copy recipients or filing directions as appropriate.]