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(This annex is not a mandatory part of the referring ASHRAE SSPC 300 standard or guideline. It is merely informative and does not contain requirements necessary for conformance to the standard or guideline.)

(The following informative annex is provided to illustrate, explain, or support the ASHRAE SSPC 300 commissioning process. The information presented herein represents consensus good practice but does not contain mandatory commissioning process provisions. This informative annex supports more than one ASHRAE SSPC 300 commissioning standard or guideline and is not intended to serve as a standalone document. See the referring ASHRAE SSPC 300 standard or guideline for mandatory commissioning process requirements and guidance.)

ASHRAE SSPC 300 INFORMATIVE ANNEX 05—COMMISSIONING PROCESS PLAN

This informative annex provides a narrative and examples of how to develop and organize a Commissioning Process (Cx) Plan from project initiation through occupancy.

05.1 Commissioning Plan Overview

The purpose of the Cx Plan is to provide an overview and execution plan for the Cx specific to the project. The Predesign and Design Phase Cx Plan defines roles and responsibilities for the development of the OPR, BoD, and commissioning specifications. The Design Phase Cx Plan defines execution of the design review process, including Cx Design Review goals and objectives, report format, roles and responsibilities of each team member (Owner, architect, architect's Design Team, etc.) for reviewing and responding to commissioning review comments, and a conflict resolution process. The Design Phase Cx Plan provides a schedule for each deliverable and communication protocol.

The Construction Phase Cx Plan summarizes the Cx defined in the contract documents, including the Project Team's roles and responsibilities in execution of Cx during construction through warranty period, schedule for commissioning deliverables and activities, execution of commissioning activities, communication protocols, and issue resolution processes. For construction and renovation activities, the milestones should contain, for example, CxP Team meetings, submittals, installation checklists completion, startup plan start and finish, performance testing, Owner move-in, training, O&M and record drawing completion, deferred seasonal testing, warranty review, and final Cx report.

Appendices in the initiation and design stages of the project will state the requirements and responsibilities for the required deliverable. The final results and documentation for each item will be inserted in the final report.

It is not necessary to include copies of documents included in the Systems Manual in the final Cx report if that Cx report is included in the Systems Manual, but the location of the documents should be noted.

Depending on the size and scope of the Cx activities, it may be beneficial to have three Cx Plans: one for the Predesign Phase, one for the Design Phase, and one for the Construction Phase. If separate Cx Plans are used, then care must be taken to inform those that are involved in only a portion of the process of the previous material.

Checklists are often developed for the Cx Plan and used for listing criteria, process requirements, and performance testing. Checklists are, by definition, a list of items to be noted, checked, or remembered and are used in the context of the commissioning process for general evaluation, testing, training, and other design and construction requirements. Checklists should not be considered a detailed or exhaustive list of all items that may require further review and evaluation to ensure compliance with the Owner's Project Requirements (OPR) and Basis of Design (BoD). The skills and experience of the Commissioning Provider (CxP) and Cx specialists are needed in each Cx activity to interpret and apply the listed items.

05.2 EXAMPLE 1: Table of Contents—Grouped by Main Activity Schedule

COMMISSIONING PROCESS PLAN

1. OVERVIEW
2. Cx DESCRIPTION
3. PREDESIGN ACTIVITIES

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- 3.1 Develop Owner's Project Requirements
- 3.2 Develop Initial Cx Plan
  - 3.2A Define Cx scope and how it will be executed during the project
    - 3.2.A.i Step 1: Identify systems and assemblies to be commissioned.
    - 3.2.A.ii Step 2: Define team roles and responsibilities, coordinate with design, and schedule Cx activities with the Design Team.
    - 3.2.A.iii Step 3: Step-by-step execution of Cx activities and deliverables, with references to specification sections (references must be completed prior to bid).

4. DESIGN ACTIVITIES
   - 4.1 Develop and update Basis of Design
   - 4.2 Update Cx Plan
   - 4.3 Develop project specifications that include the commissioning activities and roles and responsibilities
   - 4.4 Review design project documents
   - 4.5 Conduct Cx Design Reviews
   - 4.6 Review of bid addenda
5. CONSTRUCTION ACTIVITIES
   - 5.1 Conduct preconstruction meeting
   - 5.2 Review requests for information (RFIs) and design changes within Cx scope
   - 5.3 Contractor submittal review
   - 5.4 Construction checklists
     - 5.4A Delivery process
     - 5.4B Preinstallation checks
     - 5.4C Installation and start-up checks
     - 5.4D Performance and coordination checks
   - 5.5 Testing
   - 5.6 Documentation
   - 5.7 Systems Manual
   - 5.8 Training
   - 5.9 Preliminary Cx Report
6. OCCUPANCY AND OPERATIONS ACTIVITIES
   - 6.1 Seasonal testing
   - 6.2 Ongoing training
   - 6.3 Warranty review
   - 6.4 Lessons-learned meeting and report
   - 6.5 Final Cx Report
7. CONTACT AND RESPONSIBILITY INFORMATION
8. SCHEDULE REQUIREMENTS

05.3 EXAMPLE 2: Table of Contents—Grouped by Main Activity/Deliverable Type

COMMISSIONING PROCESS PLAN

A. DESIGN PHASE
   1. TABLE OF CONTENTS
   2. OVERVIEW
   3. PROJECT INFORMATION SUMMARY
      - 3.1 Project Information
      - 3.2 Design Phase Project Team Position and Contact Information

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APPENDIX R—WARRANTY REVIEW
APPENDIX S—OPEN ISSUES
APPENDIX T—LESSONS LEARNED

05.4 The following is another (and more detailed) example outline for a Cx Plan. The basic structure of this example is such that each phase of the plan has its own section detailing what activities will be accomplished and guidance on who accomplishes that section, and how the deliverable is completed. The deliverables for each activity are included in an annex. Each section of the plan will have a description of the requirements for that subject. The intent of this format is for the Cx Plan to become the final Cx report at the end of the project by updating the plan and filling in the results for each section as the project progresses.

EXAMPLE 3: Commissioning Plan with Descriptions of Contents

COMMISSIONING PROCESS PLAN

This Cx Plan has been specifically developed for the ASHRAE Headquarters Facility project. The process and procedures in this Cx Plan have been specifically tailored to this project.

The structure of this Cx Plan includes the main body and the appendices. The specific sections include:

- **Commissioning Process Description:** This section provides an overview of the tasks being accomplished during the commissioning process. The information is tailored for the ASHRAE Headquarters Facility, focusing specifically on each phase of the project – predesign, design, construction, and occupancy and operations.
- **Predesign Phase:** Provides a detailed description of the Cx activities to be accomplished during the predesign phase of the project.
- **Design Phase:** Provides a detailed description of the Cx activities to be accomplished during the design phase of the project.
- **Construction Phase:** Provides a detailed description of the Cx activities to be accomplished during the construction phase of the project.
- **Occupancy and Operations Phase:** Provides a detailed description of the Cx activities to be accomplished during the occupancy and operations phase of the project.
- **Contact Information:** Provides detailed contact information for members of the Cx Team for quick reference.
- **Schedule Requirements:** There are specific sequences of events that must occur during the Cx. These events are detailed in this section.
- **Appendices:** Presents the information developed during the Cx. As work is completed, the results are added to the proper appendix, and the status and date of the document are inserted into the table below.

Appendices Status Log

Appendix	Name	Status	Comments
A	Owner's Project Requirements	Version 3	Current at 100% CD
B	Basis of Design	Version 2	Bid Set Version
C	Project Specifications	Completed	Bid Set Version
D	Communication Structures	Completed	
E	Roles and Responsibilities	Completed	
F	Commissioned Systems	Completed	
G	Cx Schedule	Draft	Integrated with Project Schedule
H	Pre-Bid Meeting	To Be Completed	
I	Pre-Construction Meeting	To Be Completed	
J	Design Submittal Review Criteria	Completed	

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Appendices Status Log

Appendix	Name	Status	Comments
K	Submittal Review	To Be Completed	
L	Cx Issues	To Be Completed	Part of Contractor's Software Program
M	Construction Checklists	To Be Completed	Separate Book
N	Systems Manual	To Be Completed	Completed by Contractor
O	Tests	To Be Completed	
P	Training	To Be Completed	
Q	Meeting Minutes	To Be Completed	Part of Contractor's Software Program
R	Correspondence	Ongoing	
S	Warranty Review	To Be Completed	
T	Lessons Learned	To Be Completed	

COMMISSIONING PROCESS DESCRIPTION

The intent of this section is to provide an overview of the tasks being accomplished as part of the commissioning effort for this project. The subsequent sections provide guidance on how these activities are to be accomplished for each phase of the project.

The general approach taken in implementing the Cx on this project is a prescriptive and sequential in order to focus the commissioning efforts on verifying that the OPR has been achieved. Details on the results of actually accomplishing the tasks are contained in the appendices.

PREDESIGN PHASE

The tasks to be accomplished during the predesign phase are:

- Develop Owner's Project Requirements
- Develop Initial Commissioning Plan
- Track Cx Issues

Develop Owner's Project Requirements

The Owner's Project Requirements (OPR) is a written document that details the functional requirements of a project and the expectations of how it will be used and operated. This includes project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. The OPR document is a condensed collection of vital information about a construction project. The document is intended for a wide audience, including the Owner, Design Team, Construction Team, operation and maintenance staff, future renovation teams, and anyone else who needs access to the original project information. The OPR is not a substitute for traditional architectural programming. It does contain some programming information, such as space usage. The OPR can be considered a living document because it is updated during design, during construction, and during occupancy. This document is provided to the building Owner upon completion of the project so that the information it contains is not lost over time.

Because the Cx began at the end of project design, the Cx Provider (CxP) should interpret the existing project documents and establish the OPR with the Project Team and finalize the initial draft. With this initial draft, the CxP should maintain the OPR throughout all phases of the project and verify that the OPR is being achieved.

Refer to Appendix A for the current OPR.

Develop Initial Commissioning Plan

Development of this initial commissioning plan involves deciding on the format of the plan, inserting the initial information, documenting the communication structures for the project, documenting the roles and responsibilities relative to the Cx, identifying the systems to be commissioned, and developing initial commissioning schedule requirements.

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The construction version of the commissioning plan will be created after contractor selection and will be provided to the Owner, to the architect/engineer, and to contractors in three-ring binders. The CxP will send updates to the commissioning plan electronically. Holders of a copy of the commissioning plan should then add paper copies of the updates to their three-ring binders; these updates are typically appendix additions.

Track Cx Issues

Through the Cx, the CxP will identify and track the resolution of Cx issues, which are defined as a finding that does not meet the OPR. The documentation of each Cx issue goes beyond the traditional description of the issue, who has responsibility, and the due date. The primary reason is that if the Cx works as it is supposed to, the Owner, architect/engineer, and contractor do not have issues at the end of construction.

To avoid the inevitable question ("Why did we pay for commissioning?"), the issues database also includes the cost to resolve selected issues and the saving achieved as a result of issue resolution. This cost information is meant to show the value that commissioning contributed to the project, i.e., cost the Owner would have incurred if commissioning had not been performed, and this information should not be used for other purposes.

The cost savings associated with a Cx issue are determined in a three-step process:

1. **Identify and Record Issues:** The documentation of the issue will be accomplished in the general contractor's project software program and will be tracked utilizing the "Issue Type" filed in the software, selecting "Commissioning."
2. **Calculate Avoided Costs:** The CxP will determine which issues are to be included in the cost analysis. Possible reasons for excluding a particular issue from a cost analysis could be a lack of adequate cost information, negligible effects on the project outcome, or commissioning playing a minimal role in the issue. Costs will be determined based upon the CxP's professional judgment and may include, but are not limited to, actual implementation costs (if a change order is required), industry reference materials such as standardized unit costs, and calculations of energy use or additional maintenance labor.
3. **Evaluate Range of Avoided Costs:** Typically, there could be a wide range of avoided costs. As an example: during mock-up construction of a VAV box, it is determined that the box could not be maintained. There are two possible scenarios to the avoided cost. The first scenario (maximum avoided cost) is if the issue was not identified during construction, and the Owner has long-term costs in both energy and maintenance. The second scenario (minimum avoided cost) is if the issue was identified early in construction and was corrected through a redesign change order, with the cost to the architect/engineer to redesign and the contractor to relocate the VAV boxes. By estimating the range of avoided cost, the entire Project Team is provided with feedback on the value of commissioning.

The CxP will provide periodic updates by email to the Owner, architect/engineer, and contractors on issues that are in the process of being resolved. Issues that have been resolved will be add to the issues and resolution log in the commissioning plan during the periodic updates of the commissioning plan.

The Cx Issues log will be contained in Appendix L.

DESIGN PHASE

The tasks to be accomplished during the design phase are:

- Review and Modify Project Specifications
- Verify Basis of Design
- Update Cx Plan
- Accomplish Design Reviews
- Develop Cx Contract Document Requirements
- Attend Prebid Meeting

Review and Modify Project Specifications

There will be specific Cx requirements included in the contractor's specifications, such as specific equipment and component performance documentation and construction checklists with appropriate cross-references. The requirements will be included into Divisions 01 through 49 Sections, and the obligations to perform these

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requirements must be in the contract between the Owner and the contractor. A detailed scope and responsibilities of the contractor will be included in the "Summary of Work" section of Division 01. The Cx requirements for documentation, training, and testing facility systems and assemblies are integrated in the commissioning sections of Divisions 01 through 49. Furthermore, responsibility for development of specification input documents will be given to the CxP because the responsibility of implementing and entering information will be that of the Owner, architect/engineer, and contractors.

These specification documents will also include the format in which contractor submittals and other submittals will be presented, training requirements deemed necessary, System Manual requirements, etc. With communication procedures finalized, these documents will be arranged in the list of deliverables that have an origin of development and a final destination of the person(s) who review such documents.

Refer to Appendix C for the Cx input to the project specifications.

Verify Basis of Design

The Basis of Design is created and maintained by the Design Team to document how their design achieves the OPR. The Design Team provides their current Basis of Design document with each design submittal. The CxP is responsible for reviewing the Basis of Design against the OPR to verify achievement of the OPR, to identify any inconsistency with the Design Team, and to resolve the inconsistency by changing the design (provided that the Design Team agrees to change), or by changing the OPR (provided that the Owner agrees to the change).

Update Commissioning Plan

The commissioning plan is a living document, requiring updates as the project progresses. During the Design Phase, additional details are added to how the Cx will be implemented during construction and the specific roles and responsibilities of key team members refined. The structure of the commissioning plan is such that most of these changes will be through the addition of material to the appendices.

Accomplish Design Reviews

This step is critical in the Cx since it is the responsibility of the CxP to review the design submittals to verify the achievement of the OPR. These design submittals are provided by the Design Team. The CxP follows a specific procedure for design review in order to evaluate achievement of the OPR and the identification of systemic issues.

A design review will be accomplished at each of the following design submittals:

- Programming Document
- Schematic Design
- Design Development
- 35% Construction Documents
- 95% Construction Documents
- 100% Construction Documents

The specific information to be reviewed for each design submittal is detailed in Appendix J.

When possible, three distinct reviews are complete on a drawing set: a general review, a coordination review, and a field-specific review. A review of the specifications and supporting documentation is also accomplished.

General Review

The general review entails a look at the general quality characteristics of 10% of the design documents. Characteristics to look for include: the legitimacy of the drawing set; legibility of information; continuity and labeling; and component details. The drawings should also include the OPR information. The criteria for the general review include:

- Legibility: all text and notes are legible and understandable
- Continuity: walls, pipes, and other systems that leave one page are shown entering the other page
- Consistency: pertinent notes and details are properly referenced
- Backgrounds: the same architectural backgrounds are used by all disciplines
- Room Numbers: room numbers are clearly defined and consistently applied from room to room and between

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disciplines

Coordination Review

The coordination review is accomplished to verify that the Design Team has coordinated their efforts between the various disciplines. This review utilizes random sampling of the drawings. Random sampling encompasses taking a random section of the drawing and reviewing this section for all trades (landscaping, architectural, structural, plumbing, mechanical, electrical, etc.). This sampling is performed for each architectural drawing sheet. The following are to be accomplished to complete the coordination review:

- Select sampling grid: utilize a 5 × 3 grid density and mark the cover page of the drawing set with the grid. Drill a hole through the drawing set at each grid intersection
- Determine sampling frequency: utilize 15% for this project. This means that every seventh grid is chosen; start with Grid 7 for the seven percent review. If there is not any equipment or systems to review in the selected grid, proceed to the next grid until coordination can be confirmed. It is desirable to review coordination in both relatively open areas (e.g., office space) and relatively tight areas (e.g., hallways)
- For each selected grid:
  - Locate identical grid area on other discipline sheets. Review for key OPR (maintainability, accessibility, constructability, and durability)
  - Document both discrepancies and achievement of the OPR
  - Review discrepancy list for systemic issues
  - Develop listing of systemic issues and one-time issues for the architect/engineer to address.

Field Specific Review

The field specific review is performed to determine if a specific discipline has achieved the OPR in the selection of their components and design of their systems. A random sampling procedure is again utilized for this verification. The grid layout used for the field specific review should be the same as the grid layout used for the coordination review. The sampling frequency is 15%. Grids that are completely blank (no walls, equipment, etc.) are not included in the count.

The specific OPR criteria are used for evaluating the success of each discipline's drawings. For each selected grid, accomplish the following for any component or system within the grid:

- Compare to each OPR criterion: mark as either pass or fail
  - Sizing calculations
  - Basis of Design
  - Schedules
  - Details
  - Specifications
  - Maintainability, accessibility, and constructability
- Interface with other systems
- Opportunity for improvement

Throughout this field specific review, problems or concerns for items that are found are documented with detailed notes. Both systemic and one-time issues are identified and documented.

Specification and Other Documentation Review

A review of the general quality of the specification for design documents and other documentation is performed. The review also involves random rational sampling in the five percent of documents that are reviewed. Although the actual details are checked during the field specific review, specification and other documentation review will focus on such specifics as excessive information, manufacturer listings, clear and concise design directions, and a clearly stated Basis of Design.

Design Review Comments

The comments documented during the design review are collated and a report generated. These comments are provided to the Design Team. They will be discussed at a design review meeting following receipt of design

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review comments; the intent is to resolve issues, not to create more.

Develop Cx Contract Document Requirements

Throughout the Cx, certain activities that pertain to quality assurance and quality control procedures must be performed as part of the construction contract. The contract documents will include the OPR and BoD, which will only be used for informational purposes in order to differentiate them from the contractors' contractual obligations. These aid the contractors in understanding the design and material requirements, any sustainability goals, and the desired use and intent of the facility. This information will aid the successful implementation of the Cx.

In addition, the draft construction checklists are completed during the construction documents phase of design. The CxP is responsible for creating the draft construction checklists and obtaining concurrence on the level of detail, format, and implementation with the Owner. The construction checklists will be maintained in Appendix M.

Attend Prebid Meeting

The Cx activities have been integrated into the contractors' specifications. The CxP will attend this prebid meeting to explain the key differences in this project in order to educate the contractors on the benefits of commissioning and the procedures for implementation.

Results of this meeting that are applicable to the Cx Plan (contractors' input, construction documents updates, etc.) will be summarized in Appendix H.

CONSTRUCTION PHASE

The tasks to be accomplished during the construction phase are:

- Conduct Pre-Construction Meeting
- Perform Contractor Submittal Review
- Verify Construction Checklists
- Review Training
- Complete Testing

Conduct Pre-Construction Meeting

Once the contractor is selected, the CxP will attend and participate in the pre-construction meeting. The CxP's role during the meeting is to review and discuss the OPR and communication protocols which the Project Team has developed. As part of this meeting, the CxP will discuss each segment of work to be commissioned, to emphasize how the Cx Plan will be implemented. The CxP will emphasize the importance of achieving the OPR.

Results of this meeting that are applicable to the Cx Plan (contractors' input, construction documents updates, etc.) will be summarized in Appendix I.

Perform Contractor Submittal Review

A major interface between the CxP and the contractors will be the review of contractor submittals for completeness and ability to meet the OPR. Upon receipt of the contractor's submittal log, the CxP will provide the contractor a listing of submittals that will be reviewed.

Reports detailing the CxP comments and suggestions regarding the submittal review will be provided to the design professionals and Owner, and will be included in Appendix K.

Verify Construction Checklists

The construction checklists are developed by the CxP during the design phase and modified during construction mobilization. The checklists are maintained and used by the general contractor, as well as used by the subcontractors. They will be tracked using a procedure acceptable to the Owner. The intent of the construction checklists is to convey pertinent information to the installers regarding the Owner's concerns on long-term operation of the facility and systems.

The structure of the checklists should be kept simple and concise by focusing on key elements. When

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information is known (manufacturer, model, etc.), this information is included on the checklist as provided by the CxP. Where multiple components are to be installed (lights, etc.) and information specific to each component is not required, there will be generic checklists not specific to any particular piece of equipment. The construction checklists are typically composed of three primary sections:

1. Delivery Book: Information to be verified upon delivery to the site
2. Pre-installation Checks: Items to be verified prior to installation (e.g., may have been in storage for an extended period)
3. Installation and Start-up Checks: Items to be verified during each installation step and at start-up

The checklists span the duration of time from equipment delivery to job site through the time that the system/component is started up and is operational. This includes testing, adjusting, and balancing (TAB) and control system tuning.

The development of construction checklists requires close coordination between the CxP and contractors to maximize the benefits of the checklists, and to tailor the checklists to the manner in which the contractors will manage the project.

During each site visit, the CxP will randomly verify 2% to 5% of the construction checklists which have been completed since the previous site visit. Both positive and negative items from this review are to be conveyed to the Project Team.

Appendix M contains sample construction checklists.

Review Training

The CxP will review the contractor's submitted training agenda and materials to verify that the OPR is properly represented and is beneficial to the end user. The CxP will attend key training sessions to verify that the training is being conducted properly and to ensure that the contractor understands the expectations of the training. The CxP accomplishes the following tasks during the construction phase:

- Review contractor's training agenda and materials
- Attend key training sessions
- Verify that the purpose of the training is understood
- Document results along with recommendations and issues resolved

Results from the training program are located in Appendix P.

Complete Testing

The purpose of Cx testing is to verify that building systems as a whole meet the performance requirements specified in the OPR. Before testing can be conducted, the proper operation of individual components and systems must be verified. This verification is accomplished as part of the construction checklist activity and typically includes the verification of individual control loops, point-to-point testing, and TAB (testing, adjusting, and balancing).

Random sampling will be used to conduct Cx tests. The tasks for developing and utilizing the tests include:

- Review of the OPR and identification of testing criteria
- Review of submittals for equipment restrictions and testing procedures
- Development of testing schedule
- Development of draft test procedures
- Obtainment of contractor and Owner input
- Finalization of test procedures
- Accomplishment of oversight of testing by the contractors
- Completion of test data records
- Verification of results of tests
- Retesting as needed
- Documentation of results, conclusions, and recommendations

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The results of these tasks are located in Appendix P.

OCCUPANCY AND OPERATIONS PHASE

The tasks to be accomplished during the occupancy and operations phase are:

- Final Cx Report
- Seasonal Testing
- Ongoing Training
- Warranty Review
- Lessons-Learned Meeting

Final Cx Report

The final Cx report will essentially be the filling in of the Cx Plan. This will minimize the potential for excess paperwork and rework. An executive summary and summary of the project will be added along with all of the documented issues. The executive summary will include the CxP's evaluation of achievement of the OPR, along with recommendations on resolving issues that are related to not achieving the OPR. The whole report will be scrutinized for completeness and accuracy.

Seasonal Testing

The CxP will coordinate the completion of any seasonal Cx testing required. The facility operations and maintenance personnel will perform the seasonal testing under the direction of the CxP. This provides the operations and maintenance personnel with hands-on experience that will help to maintain the OPR for the life of the facility.

Ongoing Training

The CxP will verify the completion of any ongoing training provided by the contractor, including updates of the Systems Manual and other project documentation.

Warranty Review

At the ten-month point of occupancy, the CxP will conduct a site visit with the Owner to critically review the operation of the systems and components to identify any items that should be repaired or replaced under warranty. A warranty review will include the following tasks:

- Review systems warranties
- Schedule a site visit
- Meet with Owner's operation and maintenance personnel
- Document issues
- Provide recommendations to Owner and contractor
- Include results in final Cx report

Results for the warranty review will be located in Appendix S.

Lessons-Learned Meeting

Because the Cx is based on the principal of quality, the lessons learned should always be analyzed for the purpose of providing continuous improvements to the process. The CxP will convene a lessons-learned meeting that will document the issues that arose during the Cx. This meeting will usually be conducted at the end of the first year of operation and involve the Owner's entire party, design professionals, contractors, and the CxP.

To minimize bias by the CxP, this lessons-learned meeting will be facilitated by a third-party, typically someone from the Owner or the CxP's firm who is not involved in the project.

Results from the lessons-learned meeting will be located in Appendix T.

Contact Information

Contact information for the Cx Team is provided in the following table.

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CONTACT INFORMATION

ROLE	NAME	COMPANY	ADDRESS	PHONE	CELL	EMAIL
Commissioning Provider (CxP)						
Mechanical Engineer						
CxP – Control Systems Engineer						
CxP – Electrical Engineer						
CxP – Life Safety Systems						
Laboratory Equipment Owner						
O&M Representative						
Owner's Representative						
Architect						
Structural Engineer						
Mechanical Engineer						
Electrical Engineer						
General Contractor						
Mechanical Contractor						
Sheet Metal Contractor						
Controls Contractor						
TAB Contractor						

Schedule Requirements

The following table describes the key milestones to be accomplished as related to the Cx activities. The first column labels the key milestones to be accomplished, and the second and third columns declare who is responsible for accomplishing that milestone.

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Milestone	Project Milestone	Commissioning Milestone
OPR		
Develop Specification Input		
Commissioning Plan		
Programming Document Review		
Schematic Design Review		
Design Development Review		
Controls Coordination Meeting		
35% Construction Document Review		
95% Construction Document Review		
100% Construction Document Review		
Project Schedule Prebid Meeting		
Preconstruction Meeting		
Construction Checklist		
Contractor Submittals		
Submittals Review		
System Manual Submittals		
Site Visits		
Develop Commissioning Process Tests		
Accomplish Commissioning Process Tests		
Complete Commissioning Process Tests		
Report Site Visits		
Systems Manual Review		
Training Agenda Review		
Training Sessions Training Results		
Operation and Warranty Review 1		
Operation and Warranty Review 2		
Final Commissioning Process Report		
Lessons Learned Meeting		

[Table will be filled in as project scheduled is developed]