|  |  |  |
| --- | --- | --- |
| Commissioning Plan  <Project Name>  <Project Address>,  <Project City>, NJ <Project Zip> | |  |
| **Submitted to:**  <TRC Contact Name>  TRC Advanced Energy | |  |
| **Submitted and Prepared by:**  <CxA Name>  <CxA Contact Name>  <CxA Contact Title>  <CxA Contact Email>  <CxA Contact Phone #> | **<Submission Date>**  **Revision X based on Guidelines Version X.X**  **Cx Plan Template v1.0 – 2025-05-01** |  |

A hard hat and rolled up blueprints

Description automatically generated

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# Glossary of Terms

|  |  |  |
| --- | --- | --- |
| **Term** | **Abbreviation** | **Description** |
| Air Handling Unit | AHU |  |
| Building Automation System | BAS |  |
| Basis Of Design | BOD |  |
| Commissioning | Cx |  |
| Commissioning Plan | Cx Plan |  |
| Commissioning Authority | CxA |  |
| Energy Conservation Measure | ECM |  |
| Energy Management System | EMS |  |
| Functional Performance Test | FPT |  |
| General Contractor | GC |  |
| Operations and Maintenance | O&M |  |
| Owner’s Project Requirements | OPR |  |
| Pre-Functional Test | PFT |  |
| Quality Assurance | QA |  |
| Quality Control | QC |  |
| Solar Heat Gain Coefficient | SHGC |  |

# Instructions

<Template Instructions to the engineering firm and/or CxA:

The intent of this document file is to provide an outline for the commissioning report and should be used as a reference document during the planning, design, construction, and commissioning process. It is also meant to supplement program guidelines with specific commissioning requirements. Please refer to the program guidelines regarding specific commissioning requirements.

All text in purple brackets < > are either:

* Notes that should be removed from the report,
* Placeholders to show where to insert project-specific information, or
* Sample text to demonstrate what type of project-specific information needs to be inserted.

Please make sure to:

* Replace all of these placeholders with project-specific text,
* Delete all brackets
* Delete these and all instruction.
* Edit this template as applicable for your project.>

# Disclaimer

<CxA to add company disclaimer, if desired, or delete section>

# Introduction

## Purpose of the Commissioning Plan

This document presents a Commissioning Plan (Cx Plan) for <Project Name> and focuses on the energy conservation measures (ECMs) as part of the <Program Name>.

This Cx Plan outlines the systematic process used to verify and document that all building systems are designed, installed, tested, operated, and maintained to meet Owner’s Project Requirements (OPR). This plan provides guidance for commissioning activities from project initiation through post-occupancy to ensure system functionality and performance.

## Cx Scope

This Cx plan encompasses all phases of the ECM commissioning lifecycle, from engineering design, planning and installation to testing, document verification, and training / handover to building operations. The scope includes, but is not limited to, verifying and testing that all systems are properly integrated, functioning as intended, and meet the specified performance criteria, as well as providing ongoing support for system optimization and training before handover.

## Cx Plan Objectives

Commissioning is a systematic process that will be used to ensure applicable mechanical, electrical, plumbing and control systems are engineered, constructed, started, automatically operated, transitioned to trained facilities staff, and documented in a manner which reliably and efficiently meets the Program Cx objectives.

This Cx Plan serves as a reference to the Cx team and others, providing guidance, interpretation and direction for each phase of the Cx program. The Cx Plan is intended to present realistic practices and protocols, if any, establish expectations, allocate responsibilities and provide structure, enabling maximum system performance. This Plan is flexible and may be updated from time to time in response to unique project requirements and team recommendations.

This Cx Plan is intended to complement and not add to typical installation requirements including warranties, submittals, start-up, test and balance, training, Operation & Maintenance (O&M) manuals, and record documentation that are generally a part of new construction project specifications and are furnished by the construction team. The Cx process is being overseen by a qualified Commissioning Authority (CxA), whose early involvement helped to guide the design process and including necessary Cx elements.

Please see Appendix A of this Cx Plan for qualifications of the CxA.

## Building Information

|  |  |
| --- | --- |
| **Component** | **Description** |
| **Project Name** | <Project Name> |
| **Project Type** | <New Construction / Existing Building Renovation> |
| **Facility Area** | <Total Square Footage> SqFt |
| **Facility Type** | <Facility Type (e.g., Office, Retail, Hospital, Laboratory)> |
| **Stories Above Grade** | <Number of Stories> |
| **Basement Level** | <Yes/No — Partly or Completely Below Grade> |
| **Structural System** | <Steel Frame / Concrete / Mass Timber / Other> |
| **Building Envelope** | <Wall and Roof Construction Types, Window Systems, U-Values, SHGC> |
| **HVAC System Overview:** | <Description of HVAC Systems — Packaged Units, Central Plant, VAV Systems, DOAS, etc.> |
| **Lighting System Overview:** | <Description of Lighting Systems — LED Fixtures, Controls, Daylighting Integration, etc.> |
| **Building Automation System:** | <System Name, Key Features, Integration with HVAC and Lighting> |
| **Hours of Operation** | <Hours per day, days per week> |
| **Occupant Types and Peak Occupancy** | <Office Staff, Students, Visitors, Patients, etc.; Approximate Peak Headcount> |
| **Special Occupancy Loads / Requirements** | <Server Rooms, High-Density Spaces, 24/7 Operation, etc.> |
| **Major Equipment and Special Spaces** | * <Data Centers / Server Rooms> * <Commercial Kitchens / Food Service Areas> * <Walk-in Coolers / Freezers> * <Laboratories / Clean Rooms> * <Pools / Spas> |

Table 1. Building Information

## Project Schedule

This table provides a high-level schedule for key milestones including engineering design, construction, testing, and commissioning.

|  |  |  |
| --- | --- | --- |
| **Project Milestone** | **Start Date** | **End Date** |
| Pre-design |  |  |
| Schematic Design |  |  |
| Design Development |  |  |
| Construction Documents |  |  |
| Project Bid |  |  |
| Construction |  |  |
| Start-up, Testing and Optimization |  |  |
| Close-out |  |  |

Table 2. Project Schedule

## Measures and Systems to be Commissioned

All ECMs, and systems affected by ECMs, are included in the Cx Plan. A summary of the measures and affected systems is included below.

<Insert summary table of ECMs including name, description, quantities, efficiencies, savings, and costs>

Additional systems incorporated in the Cx Plan, but are not directly associated with the ECMs above include:

* <System 1>
* <System 2>
* <System 3>

## Applicable Codes, Standards, and Guidelines

Creating a commissioning plan involves following a range of codes, standards, and guidelines that support the quality, safety, and performance of the systems being commissioned. The regulatory bodies and references listed below must be followed to maintain compliance with industry standards, safety protocols, and legal requirements, contributing to a successful and efficient commissioning process.

|  |  |
| --- | --- |
| **Code Type** | **Applicable Standards** |
| **Building and Energy Codes** | * New Jersey Uniform Construction Code (UCC) — (N.J.A.C. 5:23) * International Building Code (IBC) 2021 Edition — (adopted with NJ-specific amendments) * International Energy Conservation Code (IECC) 2021 Edition * ASHRAE Standard 90.1-2019 * New Jersey Rehabilitation Subcode — (N.J.A.C. 5:23-6) * <Add or remove standards as needed> |
| **Mechanical, Electrical and Fire Codes** | * International Mechanical Code (IMC) 2021 Edition * National Electrical Code (NEC), NFPA 70 – 2023 Edition * International Fire Code (IFC) 2021 Edition * NFPA 72 – National Fire Alarm and Signaling Code, 2022 Edition * <Add or remove standards as needed> |
| **Additional ASHRAE Standards** | * ASHRAE Guideline 0-2019 — The Commissioning Process * ASHRAE Guideline 1.1-2020 — Technical Requirements for HVAC&R Systems Commissioning * ASHRAE Standard 202-2018 — Commissioning Process for Buildings and Systems * ASHRAE Standard 62.1-2022 — Ventilation for Acceptable Indoor Air Quality * ASHRAE Standard 55-2020 — Thermal Environmental Conditions for Human Occupancy * <Add or remove standards as needed> |

Table 3. Applicable Codes, Standards, and Guidelines

# Cx Team, Roles and Responsibilities

## Project Team Information

The following table provides the responsible parties at each level of the project and lists their contact information if they need to be reached.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Role | Company Name | Contact Name | Title | Phone | Email |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Table 4. Cx Team Member Information

## Roles and Responsibilities

The following table summarizes the roles and responsibilities of each stakeholder participating in the commissioning process.

|  |  |
| --- | --- |
| Stakeholder | Responsibility |
| **Owner and/or Partner** | Defines project and commissioning (Cx) goals and provides overall support. Grants the Commissioning Authority (CxA) the authority to engage in construction activities within the project boundaries. Makes discretionary decisions based on input from the Cx team and other stakeholders. Establishes communication protocols, ensures the CxA is included in relevant document distribution, and facilitates participation in key project meetings. |
| **Commissioning Authority (CxA)** | Oversees and implements the execution of the Cx process by preparing Cx documentation and completing activities relating to construction, ECM testing, system modulation, facility staff training, and project closeout. |
| **General Contractor (GC)** | Designates a Cx coordinator to actively engage in the Cx process. Supports the implementation of the Cx Plan and its related activities. Manages and ensures the involvement and collaboration of subcontractors while incorporating Cx into the construction, startup, testing, training, and project closeout milestones. Oversees scheduling, preparation, and / or compilation of relevant documentation. |
| **Architect** | Responsible for architectural design and approvals. Prepares plans, specs, and reviews submittals and shop drawings. Supports Cx Plan strategies, participates in select tasks, conducts site inspections, prepares punch lists, advises on acceptance, and assists with project closeout. |
| **Mechanical & Electrical Engineers** | Responsible for professional engineering design and approvals. Prepares plans, specs, Basis of Design (BOD), and reviews equipment submittals. Coordinates with architects to support Cx Plan strategies, completion of Cx tasks, site inspections, preparation of punch lists, advises on Owner acceptance, and assists with project closeout. |
| **Mechanical & Electrical Contractors** | Assist with the Cx process by assigning a Cx coordinator who participates in Cx and related work tasks. |
| **EMS Controls Contractor** | Designates a Cx coordinator to be involved in the Cx process. Cx coordinator assists in Cx tasks, primarily preparing EMS data to show system sequences and performance are functioning correctly to advise the CxA on how to proceed with further Cx tasks. |
| **Building Operations and Maintenance Staff** | Represents the facility management team that will operate and maintain the building post-construction. Participates in training, testing, and final walkthroughs to ensure a smooth transition from construction to ongoing operations. Provides input on maintainability and system performance. |
| **Owner’s Project Manager or Representative** | Serves as the Owner’s direct representative, overseeing project execution to align with Owner objectives. Coordinates between the CxA, design team, and contractors to align commissioning activities with project goals. |
| **<Additional Stakeholder>** | <Responsibility Description> |

Table 5. Cx Team Member Responsibilities

## Communication Protocols

The communication protocols outlined below support the design, installation, testing, and operation of all systems in alignment with the OPR throughout the commissioning process.

Email Updates:

The CxA will provide weekly updates to all stakeholders detailing the following information:

1. **Commissioning progress on current tasks:** Details regarding the milestones of each system to be commissioned.
2. **Upcoming commissioning tasks:** List of the commissioning tasks which have action items upcoming next week.
3. **Commissioning schedule & adjustments**: Current commissioning project schedule and note any additions / changes to the schedule.
4. **Action(s) required:** A list of actions items, anticipated deadlines, and responsible parties.

# Commissioning Process and Methodology

<Provide a clear and concise description of the commissioning methodology for the project, including:

* The overall commissioning strategy and reference to any applicable industry standards
* A list of commissioning activities planned for each project phase (Design, Construction, Startup, Testing & Optimization, and Closeout).
* A description of any design-phase support or design-assist services provided (e.g., OPR/BOD development, design reviews).
* The approach for identifying, resolving, and reporting conflicts during design and construction.
* Methods for verifying construction compliance, with particular attention to ECMs and decarbonization strategies.
* The process for demonstrating successful equipment startup, system operation, and overall project commissioning, including use of pre-functional and functional performance testing.

Add or replace content in this section as necessary to align with the project’s scope of work.>

Activities discussed in this Cx Plan are included in the following phases:

1. Pre-design Phase
2. Design Phase
3. Construction Phase
4. Start-up/Testing and Optimization Phase
5. Closeout Phase

## Pre-design Phase

The objectives of the Cx process during the pre-design phase include:

* Developing OPR and BOD
* Delineating ECM interactivity with additional building systems.
* Establishing Cx scope and requirements.
* Selecting and engaging the CxA.

Deliverables: Draft OPR, preliminary Cx scope, CxA selection

## Design Phase

The objectives of the Cx process during the design phase include:

* Establishing the Cx process early in project development.
* Integrating Cx requirements into the project specifications and contract documents.
* Aligning design intent with the OPR and BOD
* Reviewing design documents for commissioning feasibility, ease of ongoing maintenance, energy efficiency, and decarbonization.
* Establishing communication protocols and defining team roles and responsibilities.
* Coordinating Cx activity with other quality assurance (QA) and quality control (QC) efforts.
* Developing preliminary commissioning documentation, including the Cx Plan, commissioning specification, and draft Functional Performance Test (FPT) procedures.

Deliverables: Initial Cx plan, Cx specifications (to be included in bid documents), Dinal PFT and FPT procedures and checklists, updated OPR and BOD (If applicable)

## Construction Phase

### Construction Phase Scoping Meeting

The CxA will organize an introductory meeting to ensure alignment with the commissioning process. Topics include:

* Introductions, roles, responsibilities, and expectations.
* Review of the Cx Plan and clarification of scope, interpretation, and key objectives.
* Documentation requirements for pre-testing, testing, and verification.
* Defining functional performance testing responsibilities.
* Establishing key milestones and schedule highlights.
* Obtaining consensus on commissioning strategies and workflows.

Deliverables: Updated Cx plan and schedule

### Regular Meetings and Site Walkthroughs

The CxA will conduct periodic meetings and site visits to:

* Track commissioning progress and coordinate field activities.
* Observe construction, equipment installation, startup, and testing.
* Verify compliance with the BOD and contract requirements.
* Coordinate EMS/BAS sequence validation and trend data analysis for system performance verification.

Deliverables: Meeting minutes, field reports, and progress memos, as applicable.

### Controls & EMS Commissioning

The CxA will coordinate periodic control system meetings to track progress for both primary and third-party-furnished controls, including:

* Review of shop drawings, submittals, and final sequences of operation.
* Advanced energy management strategies, including load shedding, peak demand control, and operational flexibility.
* Graphic interface and trend log verification for EMS/BAS systems.
* Sensor and device calibration planning.
* Finalize pre-functional test (PFT) plans and functional performance test (FPT) plans.

Deliverables: Final Cx plan, Final PFT and FPT procedures and checklists, EMS/BAS trend data (if available)

### Pre-Functional Testing (PFT) Checklists

The General Contractor (GC) will coordinate checklist development with oversight from the CxA. Checklists may include:

* In-house developed PFTs.
* Manufacturer-provided startup checklists.
* Technician-furnished startup documentation.

The CxA will review and provide feedback on PFT checklists and maintain a centralized tracking system to monitor equipment readiness for functional performance testing

Deliverables: Final PFTs, manufacturer startup checklists, technician startup documentation, centralized tracking log, PFT review comments

### Functional Performance Testing (FPT) Plans

Functional testing verifies that systems operate per design intent. The CxA will conduct tests to validate:

* EMS/BAS communication infrastructure and operator workstations.
* ECM equipment operation.
* System sequencing, scheduling, failure modes, and data logging.

The CxA will develop plans that summarize:

* Test procedures
* Expected results
* Discrepancies
* Corrective actions.

**Deliverables:** Final FPT procedure, test results summary, Discrepancy log with corrective actions

### Issue Resolution & Reporting

The CxA will document deficiencies found during pre-functional and functional testing. Procedures will address:

* Deficiency reporting and resolution workflows.
* Impact assessments on building performance and compliance.
* Communication protocols with the Owner, Project Team, and Program Manager.

**Deliverables:** Issues and resolution log, resolution tracking report

## Startup, Testing & Optimization Phase

### Pre-Functional Startup & Checkout

The GC will confirm completion of all pre-startup tasks, including:

* Utility services (power, water, gas) readiness.
* Duct and piping pressure testing, cleaning, and treatment completion.
* Equipment manufacturer startup procedures.

The CxA will observe startup procedures and:

* Provide real-time feedback.
* Identify and track installation discrepancies.

**Deliverables:** Pre-startup verification report, manufacturer startup documentation, installation issues and resolution log, CxA observation report.

### Functional Performance Testing (FPT) Execution

The CxA will perform testing using a structured, progressive approach including:

* Component-level verification
* Subsystem validation
* Full-system integration testing
* Inter-system connectivity, including life safety interactions
* Manual observation and testing
* EMS trend log analysis to validate long-term performance

**Deliverables:** FPT execution report, component verification records, subsystem validation report, full-system integration test results, EMS/BAS trend log analysis.

## Closeout Phase

### Closeout Meeting

Conducted at or near project completion to finalize commissioning activities. Key topics include:

* Verification of completed functional performance testing (unless exceptions are agreed upon).
* Review and acceptance of record documentation.

**Deliverables:** FPT completion verification report, record documentation acceptance report.

### Training & Knowledge Transfer

The CxA and GC will fulfill all training requirements. Training will cover:

* Operational best practices, continuous commissioning strategies, and energy management techniques.
* System troubleshooting and maintenance procedures.

Training documentation will include:

* Schedules
* Attendee lists
* Recorded sessions
* Reference materials.

**Deliverables:** Training schedule, training attendance records, attendee list, recorded training sessions (if applicable), training reference materials, training completion report

### Warranty Management

The CxA will compile warranty information, covering:

* Coverage period, inclusions/exclusions, and escalation procedures.
* Owner responsibilities for compliance.

**Deliverables:** Warranty documentation package, owner warranty responsibilities summary

### Final Commissioning Report

The CxA will aggregate and document all commissioning activities, including:

* Testing results, discrepancies, corrective actions, and final system performance evaluation.
* Long-term operational recommendations for facility staff.

**Deliverables:** Draft and final Cx reports

## Deliverable Summary

The following table summarizes CxA deliverables throughout the Cx process.

|  |  |  |
| --- | --- | --- |
| Phase | Activities | Deliverables |
| **Pre-Design Phase** | **OPR and BOD** | * Owner’s Project Requirements (OPR) * Basis of Design (BOD) * Commissioning Scope Document |
| **Design Phase** | **Cx Plan** | * Draft Cx Plan * Cx Specifications * Draft Pre-Functional Test (PFT) Checklists and Procedures * Draft Functional Performance Test (FPT) Checklists Procedures |
| **Construction Phase** | **Scoping Meeting** | * Updated Cx Plan * Finalized Construction Schedule |
| **Meetings and Site Walkthroughs** | * Meeting Minutes * Field Reports and Memos |
| **Controls & EMS Commissioning** | * Final PFT Checklists and Procedures * Final FPT Checklists and Procedures * Final Draft Cx Plan * Building Data from EMS/Controls Contractor |
| **Pre-Functional Testing (PFT)** | * Finalized PFT Checklists * Manufacturer Startup Checklists * Technician Startup Documentation * Organized PFT Tracking Documentation * CxA Feedback Reports |
| **Functional Performance Testing (FPT) Plans** | * Final FPT Procedures * Test Results Summaries * Discrepancy Log with Corrective Actions |
| **Issue Resolution & Reporting** | * Deficiency Log * Resolution Tracking Report |
| **Startup, Testing & Optimization Phase** | **Pre-Functional Startup & Checkout** | * Pre-Startup Verification Report * Manufacturer Startup Documentation * Installation Discrepancy Log * CxA Observation Report |
| **FPT Execution** | * FPT Execution Report * Component Verification Records * Subsystem Validation Reports * Full-System Integration Test Results * EMS Trend Log Analysis Summary |
| **Closeout Phase** | **Closeout Meeting** | * FPT Completion Verification Report * Record Documentation Acceptance Summary |
| **Training & Knowledge Transfer** | * Training Schedule * Training Attendance Records * Recorded Training Sessions (if applicable) * Reference Materials * Training Completion Report |
| **Warranty Management** | * Warranty Documentation Package * Owner Warranty Responsibilities Summary |
| **Final Cx Report** | * Draft Commissioning Report * Final Commissioning Report |

Table 6. Cx Process Deliverables

# Commissioning Schedule and Milestones

This detailed commissioning schedule outlines key Cx activities and milestones throughout the project, aligning with the overall design and construction timeline and project schedule. This schedule is organized into major commissioning phases, such as design, construction, and post-construction. A well-defined schedule helps coordinate efforts among the owner, design team, contractors, and CxA to facilitate a smooth and efficient commissioning process.

<Update tasks based on the Cx scope of work and enter dates and duration for each task. Schedules in other formats are acceptable.>

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # | Phase | Tasks | Start Date | End Date | Duration (Days) |
| 1 | **Design** | Complete Draft of OPR |  |  |  |
| 2 | **Design** | Start Schematic Design |  |  |  |
| 3 | **Design** | Cx Kick-off Meeting (Design) |  |  |  |
| 4 | **Design** | Develop Draft of Commissioning Plan |  |  |  |
| 5 | **Design** | CxA Schematic Design Review |  |  |  |
| 5 | **Design** | Complete Schematic Design |  |  |  |
| 6 | **Design** | Develop Draft of BOD |  |  |  |
| 7 | **Design** | CxA Design Development Review |  |  |  |
| 7 | **Design** | Complete Design Development |  |  |  |
| 8 | **Design** | Complete Construction Documents |  |  |  |
| 9 | **Construction** | Pre-bid Meeting |  |  |  |
| 10 | **Construction** | Finalize Construction Contracts |  |  |  |
| 11 | **Construction** | Pre-construction Meeting |  |  |  |
| 11 | **Construction** | Start Construction |  |  |  |
| 12 | **Construction** | Review and Approve All Submittals |  |  |  |
| 13 | **Construction** | Cx Kick-off Meeting (Construction) |  |  |  |
| 14 | **Construction** | Construction Inspections |  |  |  |
| 15 | **Construction** | Complete Construction / Pre-Functional Testing Checklists |  |  |  |
| 16 | **Post-Construction** | Complete Functional Performance Testing |  |  |  |
| 17 | **Post-Construction** | Complete O&M and Systems Manual |  |  |  |
| 18 | **Post-Construction** | Complete Training Manual |  |  |  |
| 19 | **Post-Construction** | Conduct Maintenance Staff Training |  |  |  |
| 20 | **Post-Construction** | Project Completion |  |  |  |
| 21 | **Post-Construction** | Address All Outstanding Issues and Discrepancies |  |  |  |
| 22 | **Post-Construction** | Warranty Review |  |  |  |
| 23 | **Post-Construction** | Finalize Cx Report |  |  |  |

Table 7. Cx Schedule

# Issues and Resolutions Log

The issues and resolution log serves as a centralized record for tracking and managing Cx-related issues that arise throughout the project. This log facilitates clear communication among project stakeholders, documents identified deficiencies and tracks corrective actions to support project completion in alignment with the OPR, BOD, and design intent.

All significant issues impacting building energy performance must be resolved prior to the approval of the commissioning report.

The CxA will document the issue resolution process using the following format:

<Replace template with company’s standard issues and resolution log>

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Issue ID | | Location | Building name, space type, room number, etc. | | |
| **Date Identified** |  | **Resolution Date** |  | | |
| **System ID** |  | **System Description** | Description of the affected system or equipment | | |
| **Manufacturer** |  | **Model Number** |  | | |
| **Description of Issues** | A clear, concise explanation of the problem, including observed performance deficiencies, deviations from specifications, or installation errors | | | | |
| **Phase** | **Root Cause** | **Priority Level** | **Responsible Party** | | **Current Status** |
| Design  Inspection  Pre-Functional  Functional Testing  Start-up  Walkthrough | Design Error  Installation  Programming  Malfunction  <Other> | 1 – Very High  2 – High  3 – Medium  4 – Low  5 – Very Low | Design Team  CxA  Owner  Contractor  <Other> | | Open  In Progress  Escalated  Closed |
| **Recommended Resolution** | The proposed corrective action(s) to resolve the issue. | | | | |
| **Solution** | Corrective actions implemented, including method of verification | | | | |
| **Notes** |  | | | | |
| **Verified By:** | Name, Title, Company | | | **Date:** | |
| **Approved By:** | Name, Title, Company | | | **Date:** | |

Table 8. Issues and Resolution Log Checklist

# Required Cx Plan Appendices

The following appendices provide supporting documentation, sample templates, and additional details referenced throughout this Commissioning Plan.

|  |  |
| --- | --- |
| Commissioning Plan Appendices | |
|  | **Owner’s Project Requirements**  A copy of the most recent OPR at the time of the Cx plan submission. |
|  | **Basis of Design**  A copy of the most recent BOD at the time of the Cx plan submission. |
|  | **Pre-functional Performance Test Forms**  Templates used to verify that equipment and systems are properly installed, started up, and prepared for functional testing. PFT forms document the completion of basic installation checks, manufacturer startup procedures, and operational readiness before system-level testing begins. |
|  | **Functional Performance Test Forms**  Templates used to document the testing of system operation against the design intent and sequences of operation. FPT forms detail test procedures, expected outcomes, and actual results, providing a structured approach for validating integrated system performance during commissioning. |
|  | **Training Curriculum**  Anticipated training for operations personnel including descriptions of training materials (e.g., manuals, videos), system demonstrations and walkthroughs, and on-going assistance. |
|  | **Issues and Resolution Log**  Template used to document issues, corrective actions, and responsible parties. |

Table 9. Cx Plan Appendices

# Commissioning Report

The following table provides an outline of the Cx report including a summary of content per section.

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| --- | --- |
| Section | Content |
| **Executive Summary** | * Overview of commissioning process * Summary of findings * General performance of systems * High-level recommendations |
| **Project Information** | * Project name and address * Owner and key project team members * Brief project description (size, type, systems commissioned) |
| **Cx Scope and Objectives** | * Systems and equipment commissioned * Scope of Cx activities * Specific owner goals (e.g., energy efficiency, indoor air quality, decarbonization) |
| **Cx Process Overview** | * Phases and activities performed (Pre-Design, Design, Construction, Startup, Closeout) * Summary of Cx Plan execution * Key milestones and timelines |
| **Systems Commissioned** | * List of systems and subsystems commissioned (e.g., HVAC, BAS, domestic hot water, lighting controls) * Summary of system functionality |
| **Summary of Issues and Resolutions** | * Overview of deficiencies identified * How issues were resolved (or if open items remain) * Impact of issues on project goals (e.g., performance, schedule) |
| **Testing and Verification Results** | * Summary of functional performance testing (FPT) outcomes * Verification of sequence of operations * Control system performance (trend log analysis, sensor calibration) |
| **Outstanding Issues and Recommendations** | * Unresolved deficiencies (if any) * Long-term operational and maintenance recommendations * Suggested energy-saving opportunities * Opportunities for continuous commissioning (ongoing monitoring) |
| **Warranty and post-construction** | * Key warranty information * Post-construction commissioning plans (if applicable) * Lessons learned / recommendations for seasonal testing |

Table 10. Commissioning Report Contents

The following table provides an outline of the Cx report appendices that will be provided as part of the Cx Report.

|  |  |
| --- | --- |
| Commissioning Report Appendices | |
|  | **Owner’s Project Requirements**  Final version of OPR |
|  | **Basis of Design**  Final version of the BOD |
|  | **Cx Plan**  Final version of the Cx Plan |
|  | **Pre-functional Performance Test Forms**  Completed forms used to verify that equipment and systems are properly installed, started up, and prepared for functional testing. |
|  | **Functional Performance Test Forms**  Completed forms used to document the testing of system operation against the design intent and sequences of operation. |
|  | **Contractor Start-up Reports**  Start-up documentation provided by contractors |
|  | **Building Envelope Cx Reports**  Summarizes testing and verification of opaque assemblies (e.g., walls, roof, floors) and fenestration (e.g., windows, skylights). |
|  | **Field Reports and Meeting Minutes**  CxA site visit reports, meetings, and communications. |
|  | **Issues and Resolution Log**  Tracks all Cx deficiencies and corrective actions |
|  | **Training Curriculum**  Completed training for operations personnel including descriptions of training materials (e.g., manuals, videos), system demonstrations and walkthroughs, and on-going assistance. |
|  | **Equipment Warranties**  Warranty documentation and terms for major mechanical systems and ECMs. |
|  | **Trend Log and EMS Screenshots (Optional)**  BAS/EMS data used to verify system operation. |

Table 9. Cx Report Appendices

# Appendix A – CxA Qualifications

<Cx process must be overseen by a qualified CxA. The CxA is a person or team with extensive experience in commissioning, building design, and construction, typically engaged at the onset of the project’s design phase.

The CxA must be independent of the design and construction teams and possess appropriate credentials and relevant industry experience.

**Documented CxA experience on at least two (2) building projects of similar technical complexity is required.** The CxA may be a qualified staff member of the engineering, a consultant retained by the Partner, or a consultant engaged by the Participant.

The CxA must be involved early in the design process to define commissioning components, specifications, and responsibilities prior to bid and construction. The intent of this requirement is to support projects funded through the program in achieving proper design, construction quality, and high-performance outcomes. For example, subcontractor contracts must include clear language outlining their responsibilities during the commissioning activities.

In addition to verifying the installation and operation of building systems, the CxA is responsible for collaborating with the engineering firm to incorporate energy savings assumptions into the Cx Plan and to identify any discrepancies between system operation and modeling assumptions.>

# Appendix B – Owner’s Project Requirements

< A copy of the most recent OPR at the time of the Cx plan submission. OPRs are recommended but optional>

# Appendix C – Basis of Design

< A copy of the most recent BOD at the time of the Cx plan submission. BODs are required for all projects>

# Appendix C – Pre-functional Performance Test Forms

< Templates used to verify that equipment and systems are properly installed, started up, and prepared for functional testing. PFT forms document the completion of basic installation checks, manufacturer startup procedures, and operational readiness before system-level testing begins..>

# Appendix D – Functional Performance Test Forms

< Templates used to document the testing of system operation against the design intent and sequences of operation. FPT forms detail test procedures, expected outcomes, and actual results, providing a structured approach for validating integrated system performance during commissioning.>

# Appendix E – Training Curriculum

< Anticipated training for operations personnel including descriptions of training materials (e.g., manuals, videos), system demonstrations and walkthroughs, and on-going assistance.>

# Appendix F – Issues and Resolution Log

<Template used to document issues, corrective actions, and responsible parties.>