
BEYOND
SMART CITIES
welcome to
BEYOND SMART CITIES


BEYOND
SMART CITIES
COMMISSIONING SPECIALIST
BEYOND SMART CITIES
CERTIFIED COMMISSIONING MANAGER
CCM TRAINING PROGRAM
ONLINE PROFESSIONAL COURSES LED BY THE WORLD'S TOP SPECIALISTS
ONLINE TRAINING BY KRISHNAJI PAWAR
LEED AP(BD+C), GSAS CGP, GCP, ISO 14001
LEARN.BEYONDSMARTCITIES.IN

BEYOND SMART CITIES

MODULE
07 - A

# Design Phase CXA Process

KRISHNAJI PAWAR - CEO & FOUNDER

LEED AP(BD+C),GSAS CGP,GCP,ISO 14001

WWW.BEYONDSMARTCITIES.IN





# CERTIFIED COMMISSIONING MANAGER - CCM TRAINING OVERVIEW

The commissioning authority (CxA) plays a crucial role in building commissioning quality assurance and construction documents. They help the design professional achieve the best system design and ensure that the design concepts meet the owner's performance objectives. CxAs prioritize commissionability considerations and functionality, avoiding design flaws.

# Learning Objectives

- Introduction & Design Phase Overview
- Design Phase Objectives
- Commissioning Team
- Design Phase Activities
- Systems Typically Commissioned
- Prepare a commissioning plan.
- Prepare specifications:
- Pre-Bid Conference
- Project Manual Review
- Commissioning Design Review
- Value Engineering
- Risk Management
- Design Commissioning Report

BEYOND SMART CITIES

# INTRODUCTION

- The schematic design phase follows predesign.
- Assuming the owner's commissioning authority participated fully in predesign, the CxA is fully knowledgeable about the owner's project requirements and can help the design phase succeed.
- Understanding the commissioning authority-design professional relationship is essential before discussing design details.
- The CxA's role is to help the design professional achieve the project's best system design and ensure that the DP's preferred design concepts meet all performance objectives in the owner's project requirements.
- Keep in mind the owner's building commissioning quality assurance process's two main principles during design: The commissioning authority ensures quality.

# COMMISSIONING MEETINGS

The commissioning provider (CxP) leads design phase commissioning meetings with the owner's representative and design team. They summarize the Commissioning Specification and Commissioning Plan, update OPR or CFR and BoD before construction, and include pre-installation meetings to meet technical requirements.Team meetings during design may cover:

- Design phase commissioning begins
- Owner/occupant/end-user interviews
- OPR or CFR review and update
- Basic Design Development
- Development of commissioning specs.
- Develop commissioning plan
- System Manual Outline
- Value engineering.
- Commissioning Design Review results and follow-up
- Finishing design commissioning report



# PREDESIGN CONFERENCE





- The owner must request and organize a predesign conference before the schematic design phase to start the project and create the best environment for all participants.
- The CxA should give a formal presentation to the design team because this may be the design professional's first time with a rigorous building commissioning program.
- To ensure sustainable operation and meet project requirements, the building commissioning program should begin with a detailed discussion of the quality assurance process from predesign to warranty period.
- A discussion of the CxA's quality assurance versus the DP's quality control is crucial.
- The CxA assists the DP with commissioning drawings and specifications and provides guidance as needed.

BEYOND SMART CITIES

# BASIS OF DESIGN (BOD)

- Although the design team creates the BoD, the owner, CxP, and design team are stakeholders.
- In addition to being an objective advocate for the owner, the CxP needs a good BoD. Understanding the BoD helps the CxP write the Cx Plan, which details checklists, testing, and other commissioning activities.
- The basis of design (BoD) has always been essential to design success.
- The BoD document should be created early in the design process as a draft that will be refined throughout.
- The design professional develops and ensures OPR compliance of the BoD. Each formal design review period, the CxA validates BoD data against the owner's project requirements to ensure all requirements are met.



# THE BASIS OF DESIGN (BOD)+

- The BoD summarizes the design team's process to develop a project that meets the OPR or CFR.
- As an objective advocate for the owner, the CxP should check that the BoD demonstrates the design team's thorough understanding of the owner's objectives and expectations.
- The BoD must also align with the design team's project specifications and drawings.
- As the CxP develops the Commissioning Specification and reviews the Project Manual during the Design Phase, the CxP should cross-reference both with the BoD and the OPR or CFR.
- Consistency across all of these documents is important to ensure that the construction team works with construction contract documents that accurately reflect the OPR or CFR.



# SYSTEMS TYPICALLY COMMISSIONED

- The owner should also consider commissioning building systems that are not typically included in the scope of commissioning services but that are critically important to facility operations.
- The CxP may help the owner identify these systems and explain the importance of commissioning them.
- Components of these crucial systems often connect to other systems, which makes them excellent candidates for commissioning, because the CxP has to first observe and test performance of each individual system, and then observe and test performance of the integrated systems.
- The equipment and systems to be commissioned are listed and described in the Owner's Project Requirements (OPR).



BEYOND SMART CITIES

# COMMISSIONING PROCESS

## DESIGN PHASE



WWW.BEYONDSMARTCITIES.IN

# Design Phase Overview

During the design phase, the commissioning process verifies that the design documentation (plans, specifications, basis of design (BOD), etc.) is consistent, contains commissioning requirements, and conforms to the owner's project requirements (OPR).

- Systems typically commissioned
- Commissioning plan
- Prepare commissioning specifications
- Design reviews
- Incorporate commissioning into the project schedule.



Commissioning Plan

Commissioning Specifications

Design Reviews

# Objectives

1. Share commissioning requirements with project team members.
2. Review the design documentation for OPR and BOD compliance.
3. Commissioning requirements should be in construction documents.
4. Increase project team engagement and cooperation.






# Commissioning Team

1. Owner Representative
2. User Representatives
3. Commissioning Provider (CxP)
4. Design Team
5. Construction Team (engaged when known)

**Implementation**





# Design Phase Activities



## 1. Update the commissioning plan and scope

The CxP creates a pre-design plan detailing the design and construction phases, updates it during design, and completes the CX plan for construction later.



## 2. Conduct a design phase commissioning kick-off meeting

Conduct a design phase commissioning kickoff meeting with the commissioning team to review the commissioning plan and activities.



## 3. The design team develops a basis of design (BOD)

The design team develops a basis of design (BOD).



## 4. Review the OPR and BOD for completeness and clarity (by the CxP)

The CxP will review OPR and BOD for clarity, attaching them to construction documents, but not legally binding, except for requirements outlined in drawings and specifications.



## 5. Ensure the OPR and BOD documents are updated

Ensure the OPR and BOD documents are updated and in alignment with each other to reflect any owner-approved changes made during the design process




## 6. The CxP provides focused design checklists for the design team

The design team utilizes CxP's design checklists to identify and implement essential design concepts, promoting better practice and facilitating the successful implementation of these ideas.

# Perform commissioning-focused reviews

1. **The CxP, a team of experts, ensures the completeness of design reviews by providing respectful comments.**

2. **summary, design reviews will accomplish the following:**
The OPR ensures the general quality of documents, ensuring compliance with discipline-specific requirements, accurate BOD alignment, feasible commissioning, and adequate O&M documentation and training requirements.

3. **Commissioning reviews ensure the OPR and BOD are met by simplifying the process. This includes HVAC system training, O&M documentation, and ongoing commissioning.**

4. **At minimum for commissioned equipment, OPR and BOD reviews should include general document quality, identifying inconsistent or unclear areas, and identifying areas that don't meet the OPR or represent good practice.**

5. **Thorough reviews produce control logic and control system integration requirements needed to fully implement operation sequences. It's best to finish before late construction documents make changes harder.**

6. **Before construction document phase design packages are submitted for review, the CxP encourages and facilitates integration meetings to coordinate systems and equipment that interact, such as HVAC and electrical M&V monitoring needs.**

# Perform commissioning-focused reviews



7. fire alarm and emergency power, lighting and access control with the BAS, and building enclosure integration with the HVAC system.



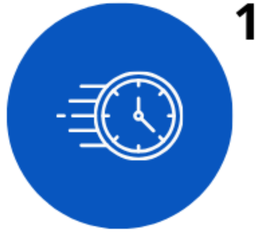
8. Projects' ideal review number and timing vary. Reviews are needed for larger, more complex projects. The owner and CxP should discuss the pros and cons of more review (design schedule, costs, benefits, etc.). Many projects need these back-checks:



9. 100% schematic design (primarily a review of the BOD) 100% design development
50% and 90% of the construction documents



10. Fewer reviews may be needed for simpler projects. Larger or more complex projects may require concept and design development reviews.



11. The design team should respond to design review comments in writing. The CxP, design team, and owner should understand the agreed-upon path forward for each comment after returning these responses.




12. At the next design submission, the CxP back-checks the comments from the previous review, i.e., confirms that the agreed-upon resolution for each comment from the previous review has been incorporated into the plans and specifications.

# The CxP verifies that facility operator training requirements comply with the OPR and are incorporated into the construction documents.

1. Training requirements should be exhaustive, with required training hours for all systems and assemblies summarized in one section for tracking and reference.

2. The training should utilize the O&M manual.

3. This should require the CxP to provide training on the purpose and application of the Systems Operations Guide.

4. Include verification requirements for training completion and effectiveness.

5. Video recordings of the majority of trainings provided to the owner are regarded as best practice.

6. It should be a requirement that trainees receive equipment-specific instruction at a level of specificity commensurate with their job responsibilities.




BEYOND SMART CITIES

BEYOND SMART CITIES

# Develop commissioning specifications



1. The specification should clearly outline contractor commissioning duties, including responsibilities for CxP, subconsultants, and non-contractor team members like the CM, Owner, and Design Team.



2. The requirements for submissions, commissioning meetings, and the development of the commissioning schedule are as follows:



3. Specifications for sampling should include allowed or required levels for commissioning tasks like design review, submittal review, field installation observation, construction checklist verification, functional testing, trend log analysis, and O&M manual review. Owners should define sampling level in RFPs.



4. Meeting commissioning process performance goals requires defining and following the testing scope. Each piece needs equipment-specific functional testing with content, format, rigor, sampling, and trending. Commissioning functional testing and contractor quality control are different.



5. Manual testing involves testing operations, modes, capacity, load modulation, interlocks, control strategies, alarms, packaged features, sequences, elements, power loss, and fire alarm events.




6. All larger, more complex, process-critical, and life-safety equipment must be individually tested. Some projects may benefit from testing only a sample of equipment or assemblies that are small, numerous, and not complex or critical for process or life safety.

BEYOND SMART CITIES

# Develop commissioning specifications +



7. All larger, more complex, process-critical, and life-safety equipment must be individually tested. Some projects may benefit from testing only a sample



8. Trending is required for building automation-monitored systems during functional testing after manual testing. Trends will verify all major control loops, equipment staging, time of day scheduling, etc.



9. Trending is required for building automation-monitored systems during functional testing after manual testing. Trends will verify all major control loops, equipment staging, time of day scheduling, etc.



10. Discuss how commissioning affects occupancy permits and project closeout.



11. Documenting projects. The CxP works with the owner to determine the scope of the project documentation and ensures the contract documents meet requirements.




12. By explaining the commissioning process and roles, the CxP helps the project team work together.

**Near the end of design, the CX plan and design documents should be updated to be consistent with each other.**

- Near the conclusion of design, the CX plan and design documents should be revised to ensure consistency.
- The Cx Plan should specify the responsibilities and roles of the contractor, CxP, owner, and designers, which may or may not be specified in the specifications.
- The CX Plan should also include the activities and parties responsible for the occupancy phase.







# DESIGN PHASE OVERVIEW +



The commissioning plan, OPR, and BOD should be provided to the contractor during bidding for information, not obligation, as a supplement to the construction documents to augment the commissioning specifications.

BEYOND SMART CITIES

BEYOND SMART CITIES

# CONTACT US


+91 6363032722

info@beyondsmartcities.in

learn.beyondsmartcities.in

#55,HMR  Layout ,Bengaluru ,India




BEYOND SMART CITIES

CERTIFIED COMMISSIONING SPECIALIST CCS

# THANK YOU

