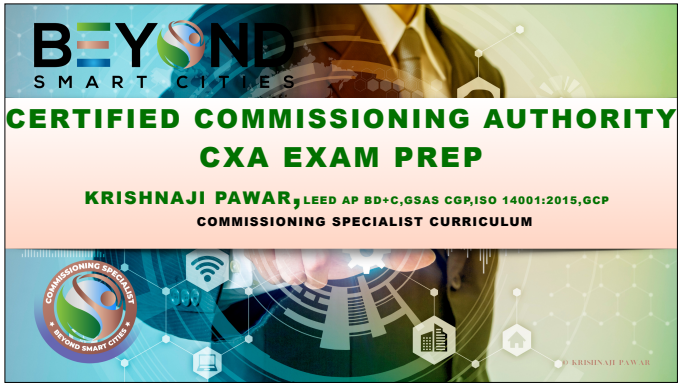

BEYOND
SMART CITIES
CERTIFIED COMMISSIONING AUTHORITY
CXA EXAM PREP
KRISHNAJI PAWAR, LEED AP BD+C,GSAS CGP,ISO 14001:2015,GCP
COMMISSIONING SPECIALIST CURRICULUM


GREEN BUILDING COMMISSIONING
DESIGN PHASE COMMISSIONING
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LEARNING OBJECTIVES
Design Phase Commissioning
Design Phase Commissioning Objectives
Design Phase Commissioning Activities
Design Phase Commissioning Plan
Design Review Process
Design Professional's Design Review Submittal Requirements
Design Development Stage Questions



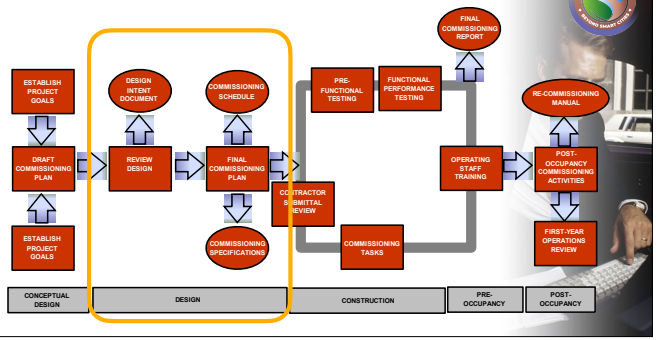
COMMISSIONING PROCESS

Commissioning is the process of planning, documenting, scheduling, testing, adjusting, verifying, and training, to provide a facility that operates as a fully functional system per the Owner's Project Requirements.

The goal of the Commissioning Process is to enhance the quality of the delivered project by focusing the design and construction team on the Owner's goals for a functional and energy efficient building.

A quality-focused process for enhancing the delivery of a project and includes verifying and documenting that the facility and its systems and assemblies are planned, designed, installed, tested, operated and maintained to meet the Owner's Project Requirements.

TYPICAL COMMISSIONING PROCESS



DESIGN PHASE COMMISSIONING

- Design-phase commissioning allows for early identification and application of the building owner's requests & requirements.
- Owner's vision for the building: This describes how the owner sees the building in conjunction with the community around it.
- The economic factors that will influence the actual construction must be considered, such as project budget, construction schedule, sources of funding, and procedures for handling cost or schedule overruns.
- The OPR must address how green, or energy efficient and sustainable, the building must be.
- Limitations and constraints: Design work must also take into consideration any limitations or required factors of the building's design,
- Design-phase commissioning should be detailed enough to identify potential future expansion needs



DESIGN PHASE CXA OBJECTIVES

- Communicate the commissioning requirements to other project team members.
- Verify, through review, that the design documentation is consistent with the OPR and BOD.
- Ensure that commissioning requirements are included in the construction documents
- Build Engagement and cooperation among the project team members.

DESIGN PHASE CXA ACTIVITIES

- ☑ Update the commissioning plan and scope. If a plan has not been developed, the CxP creates one as described in the pre-design phase covering the Design Phase in final detail and summarily the Construction Phase.
- ☑ Conduct a design phase commissioning kick-off meeting to review the commissioning plan and activities with the commissioning team.
- ☑ The Design Team develops a Basis of Design (BOD)
- ☑ Review the OPR and BOD for completeness and clarity (by the CxP).
- ☑ 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.
- ☑ The CxP provides focused design checklists for the design team



DESIGN PHASE CXA ACTIVITIES +

- ☑ The CxP confirms that facility operator training requirements are in compliance with the OPR and are included in the construction documents.
- ☑ Develop commissioning specifications to ensure that commissioning requirements are included in the construction documents.
- ☑ The Cx Plan should include the details of the responsibilities and roles of the Contractor as well as those of the CxP, Owner and Designers which may or may not be articulated in detail in the specifications.
- ☑ 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.



DESIGN PHASE COMMISSIONING PLAN



The Design Team and the results of a Team-Building Meeting where roles and responsibilities of each member of the Design team is specified,

Develop Design Options and list those results,

Develop the Basis of Design, which is defined as a document containing all of the information needed to carry out the Design Intent, including environmental information (weather and interior), budget and financial goals, design needs, and lists of any applicable codes, regulations, etc.

Create a Communication Plan where lines of communication are described; the Communication Plan is actually a section of the Commission Plan that states in word or diagram form how communication among the Team will be managed.

DESIGN REVIEW PROCESS

The Design Review Process is vital to the purpose of the Commissioning Authority, and occurs throughout the project at scheduled and unscheduled (audit) times.

- General Design Review Process : To generally review the design, the reviewer should start with the Design Intent Document (DID), also known as the owner's project requirements (OPR).
- The Basis of Design Document (BOD) should be reviewed third in line after first reviewing the Owner's Project Requirements and then the general drawing review.
- The Discipline-Specific Design review process looks at each system drawing and evaluates it for understandability, flow-down of Basis of Design document requirements and the Owner's Project Requirements, and its place in Commissioning the facility as a whole.

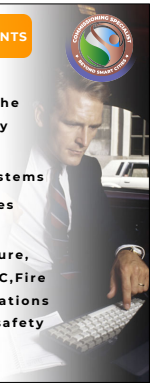
DESIGN REVIEW PROCESS +

- The reviewer should check the Specifications to make certain they are clear. Since general specifications or specifications from other projects are sometimes used, the reviewer should also ascertain that the specification sections cover only the current project.
- The most critical system to commission is the life safety systems. The second most critical system to commission is the building automation system. The building automation system,or BAS, is extremely sensitive, and often not well understood by the design team and Commissioning Authority alike, since the software that runs the BAS is almost always project-specific.
- In reality, BAS documentation should be specific and should usually include control logic diagrams or a series of "if-then" statements that completely outline the sequence of control including the identification of the equipment, the required operating conditions, and the criteria for resulting performance.

DESIGN PROFESSIONAL'S DESIGN REVIEW SUBMITTAL REQUIREMENTS

The information that should be included in the Design Professional's Design Review Submittal Requirements, for the Schematic sub-phase of the Design Phase is broken down by section as follows:

- ☑ Specification: Written description of the materials and systems
- ☑ Electronic files including CADD: Examples of the CADD files from each consultant used for the project
- ☑ Site, landscaping,Exterior of the building ,building structure, interior of the building, elevators, plumbing and pipes,HVAC,Fire Safety,Lighting, electrical wiring and power, telecommunications and data systems, services facilities, handicap access and safety health provisions



DESIGN DEVELOPMENT STAGE QUESTIONS

The following are examples of the types of questions that should be asked during Design Development:

- ☑ Can the largest components, such as fan wheel, motor, coil, etc. be moved into & out of their respective rooms?
- ☑ Can components such as heating or cooling coils be moved, repaired, or replaced without disturbing surrounding systems?
- ☑ Are components that are located in overhead ceiling areas easily reached without endangering the safety of the maintenance person or other types of equipment?
- ☑ It is also important for the Commissioning Authority to make use of his or her operating engineering experience and to ask any unresolved questions regarding building operations.

