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ONLINE PROFESSIONAL COURSES LED BY THE WORLD'S TOP SPECIALISTS
ONLINE TRAINING BY KRISHNAJI PAWAR
LEED AP(BD+C), GSAS CGP, GCP, ISO 14001
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MODULE

07 - C

Predesign Phase CXA Process



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CERTIFIED COMMISSIONING MANAGER - CCM TRAINING OVERVIEW

Qualified CxAs focus on functionality and commissionability questions rather than comments, allowing them to analyze operating conditions and provide sensible answers. They reference the owner's project requirements, promoting discipline in the commissioning process. The commissioning authority ensures quality, while designers control it.

Learning Objectives

- Introduction
- Design Phase Overview
- Predesign Conference
- Basis of Design
- Commissioning Plan
- Design Review and Process
- Commissioning Specifications
- Pre-Bid Conference
- Project Manual Review
- Commissioning Design Review
- Value Engineering
- Risk Management
- Design Commissioning Report

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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.

DESIAN REVIEW: SCHEMATIC DESIGN PHASE

- This is the design professional's first formal review, so carefully compare the schematic design review submittal to the owner's requirements.
- Avoid wasting owner and CxA time on incomplete documents.
- Note that the schematic design review phase emphasizes general design review.
- The most important building operations and maintenance concern is providing enough space for regularly accessed systems and equipment.
- This is when design requirements that meet owner project requirements become complicated.
- Therefore, now is the time to focus on the construction phase commissioning process needed to achieve results.
- As space and budget issues go unresolved, they become harder to fix in later design phases.





DESIGN REVIEW : DESIGN DEVELOPMENT PHASE



- All philosophical design decisions must be finalized and documented by the end of the design development phase, making it arguably the most crucial design phase.
- The design must not advance until all review criteria for design development have been satisfied.
- Critical to the overall success of the project is the documentation of the owner's project requirements and the design basis.
- This phase is the time to vigorously challenge the design philosophies and provisions and to ask perceptive questions, so that both the design professional and the owner are completely satisfied with the quality of the project at this stage.
- The design development review should determine whether the system design and control sequences meet the project owner's specifications.
- The building automation system (BAS) is the most important system to commission after life safety systems.
- Frequently, the building automation system is too far behind the rest of the design.

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DESIGN REVIEW : DESIGN DEVELOPMENT PHASE +

- commissioning, operating conditions, and performance requirements for each instance.
- According to the commissioning plan, the design development phase commissioning specifications should list the contractor's commissioning duties.
- Because volumes, pressures, and temperatures vary widely during operation, energy recovery systems are difficult to control.
- It's crucial to consider equipment operation and maintenance and repair.
- The commissioning authority's operating engineer experience is crucial during design development review.





DESIGN REVIEW : CONSTRUCTION DOCUMENTS PHASE



- At this point in the process, the final sizing of distribution systems and control components and the completion of specifications are necessary.
- The construction documents and commissioning specifications outline the roles and responsibilities of all commissioning process participants.
- In addition, the commissioning specifications must be described in detail.
- elucidate the specifications for each commissioning test.
- Later in this chapter, a more comprehensive discussion of the content and organization of commissioning specifications will be provided.

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DEVELOPMENT AND DISTRIBUTION OF DESIGN REVIEW COMMENTS





- The predesign conference discussed authority and communication protocols for building commissioning quality assurance program participants.
- While many informal lines of communication legitimately exist among many participants to keep the project moving at an optimal pace, formal communication protocols are sometimes necessary.
- considered formal review comments.
- If formal communication is not delegated, the owner must send design review comments to the DP.
- The commissioning authority reports to the owner, so the CxA's review comments must be delivered to the owner for integration with other design reviewers.
- The CxA can greatly impact the design review process and should not hesitate to influence the quality and character of all owner staff comments.
- First, the CxA must create a comment review format that the DP can read, understand, and distribute to others who must address the issues.
- Brief and concise review comments ensure all aspects are addressed.
- Face-to-face collaboration strengthens the DP team.

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COMMISSIONING SPECIFICATIONS

- The specifications can make or break a project based on what they say and how well they say it.
- It takes both art and science to come up with good specifications.
- Not All firms are good at coming up with quality standards.
- And when it comes to specs for commissioning, many, if not most, designProfessionals don't know nearly enough about what makes a good commissioning specification.
- Also, the commissioning industry hasn't grown up enough for the experts in the specification The writing business has come up with standards for commissioning.
- So, most of the time, a design professional is breaking new ground with each new commission-specification.

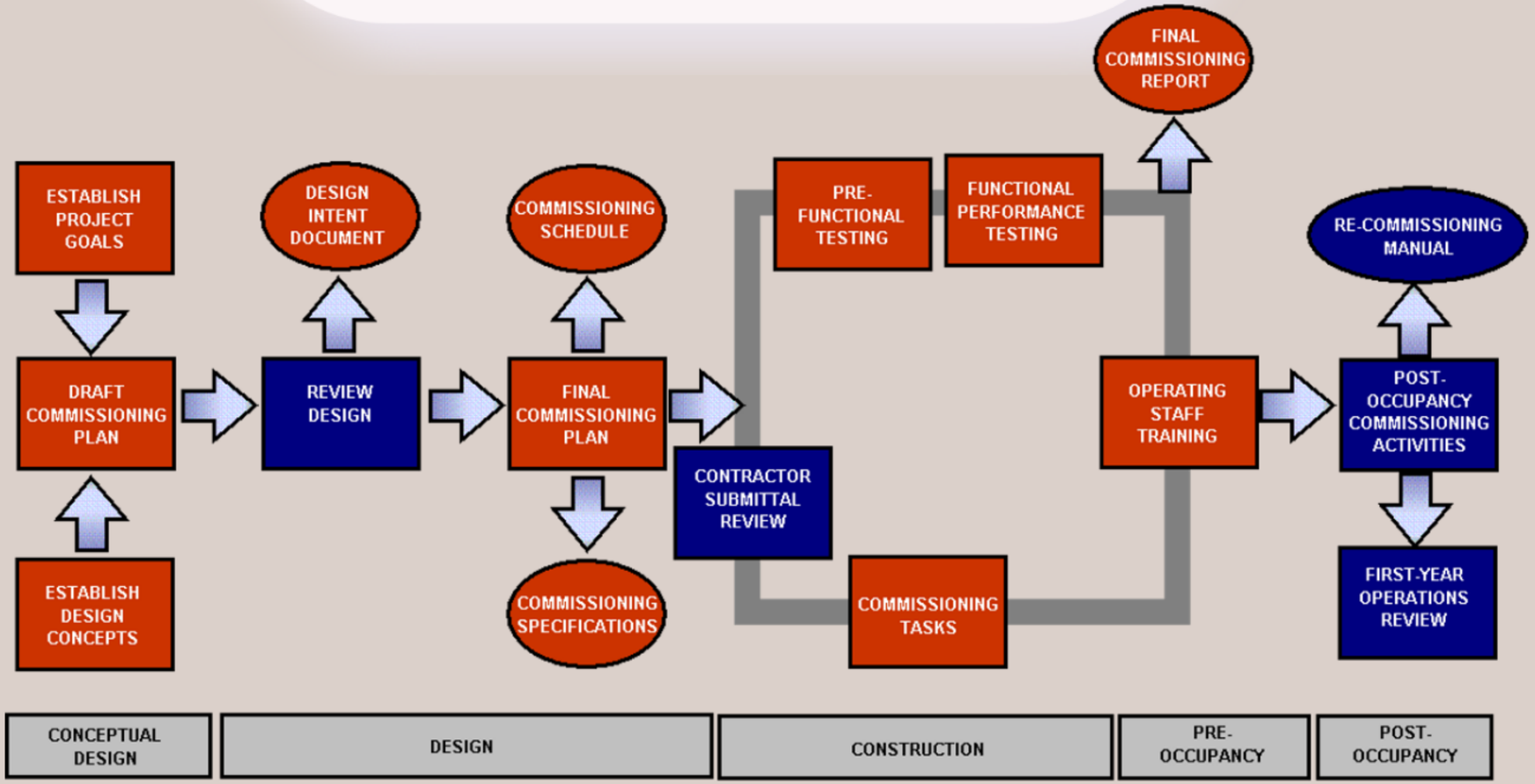


COMMISSIONING SPECIFICATIONS+

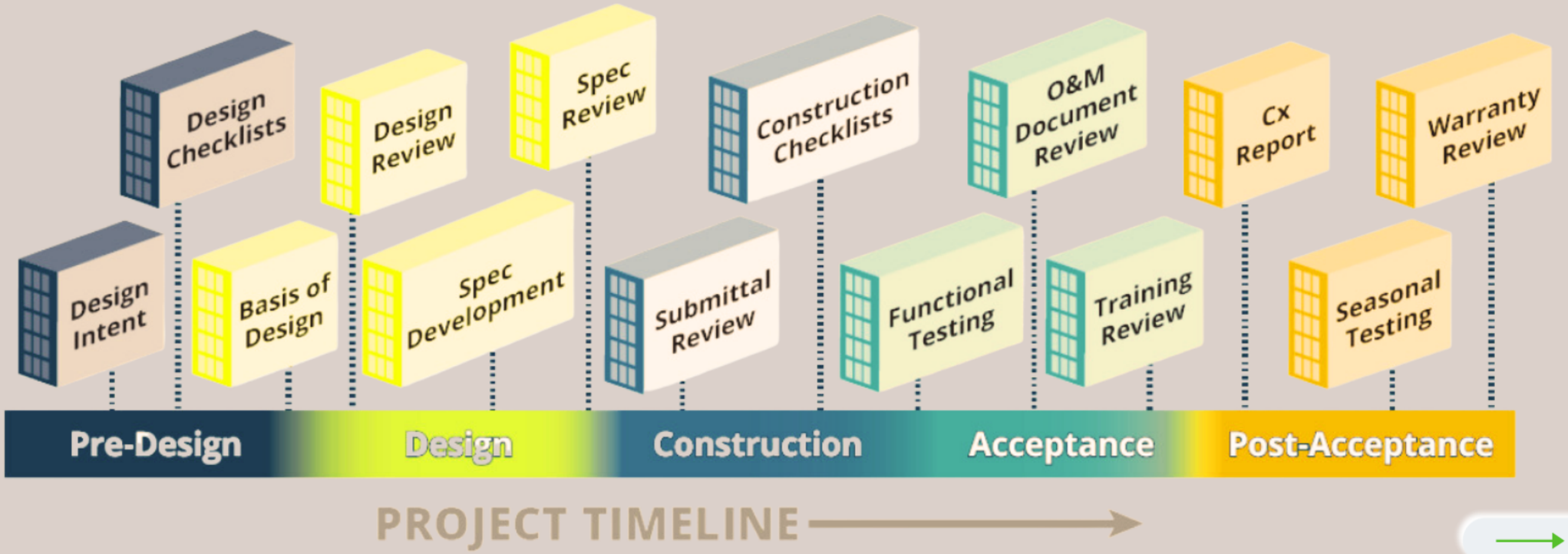
- A skilled commissioning authority has another big chance to have a big impact on the success of the commissioning program by making sure that the important parts of the commissioning specifications have been covered.
- The The next few paragraphs can only summarize requirements; they can't guarantee that design professionals who read them will immediately start making commissioning specifications for the content and quality needed to get the job done.
- It takes a long time, a lot of practice, and a lot of thought and intuition to learn how to do so.



Phases of Commissioning



Commissioning Activities



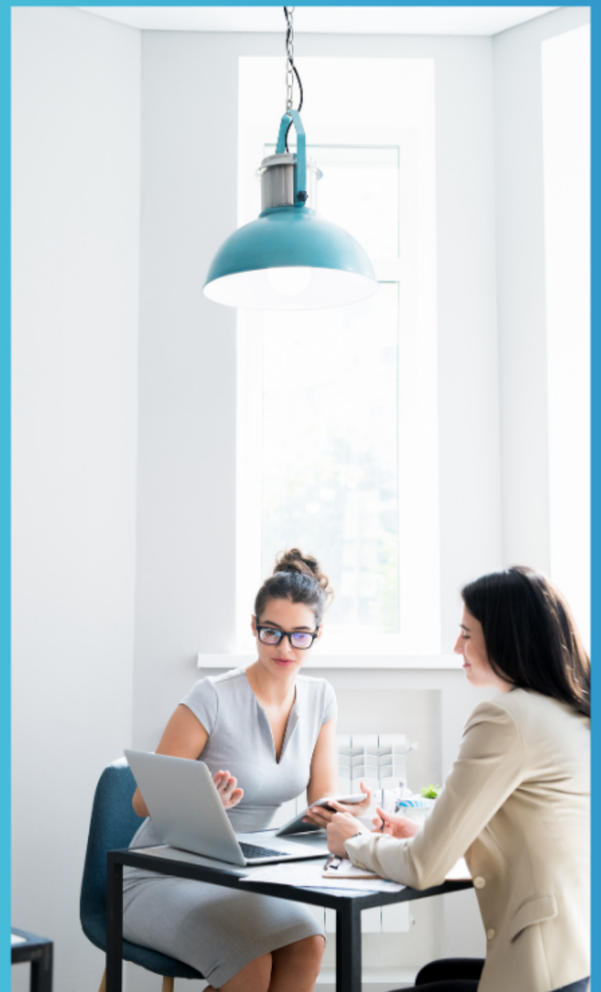
PROJECT MANUAL REVIEW

- The project manual contains the technical project specifications that enable the construction team to implement the design team's vision for the building.
- In addition to the specifications, the project manual includes bidding requirements, contract forms, general conditions, and supplementary conditions.
- The Commissioning Provider (CxP) develops the Commissioning Specification for inclusion in the Project Manual, but the CxP should also review the Project Manual to identify incorrect, inadvertent, and important references to commissioning within the project specifications.
- By scouring the project manual for commissioning-related discrepancies, the CxP provides a beneficial service to the owner and project team generally, and the Cx Team specifically.
- Digital document search tools can help the CxP quickly and easily find commissioning-related conflicts in the project manual.



COMMISSIONING DESIGN REVIEW





- The review of the design documents, or commissioning design review, is an extremely important but often overlooked or undervalued part of the commissioning process.
- For the Commissioning Design Review, the Commissioning Provider (CxP) reviews design documents (i.e., drawings and specifications) and the Basis of Design (BoD) as they are produced by the design team during the Design Phase.
- The commissioning design review is one of the CxP's principal commissioning activities during the design phase.
- The design team's response to the Commissioning Design Review may include changes to the BoD, which in turn may motivate the CxP to make corresponding changes to the Commissioning Plan (Cx Plan).
- The CxP completes the Commissioning Design Review with the mindset of evaluating the extent to which the design meets the OPR or CFR.

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VALUE ENGINEERING

- Owners often require value engineering or value management to lower building project startup costs.
- This analysis may influence the owner's decision to proceed with a project's current design.
- The independent third-party commissioning provider (CxP) can help value engineering by providing objective process analysis and feedback to the owner.
- The CxP must look beyond initial costs when considering value engineering project design options.
- Total cost of ownership (TCO) includes initial costs, future operations, and long-term project decisions.
- The CxP should reduce owner TCO.
- A full TCO analysis considers the owner's financial impacts throughout the project.
- Value engineering and lifecycle cost analysis often miss hidden costs, but TCO may.



VALUE ENGINEERING+





- TCO analysis can help capital development and O&M staff make owner-friendly building design and construction decisions.
- CxPs can best serve owners by independently assessing future costs and effects of equipment and system choices.
- The TCO CxP should assess the broader effects of value engineering-identified building equipment and system design alternatives.
- The design team may overlook the possibility that proposed changes to one building system may increase the first costs or ongoing O&M costs of other building systems in a new construction project or existing facility.
- Value engineering design alternatives should be examined by the CxP for energy consumption and indoor environmental quality.
- Emergency operations and non-standard conditions should be considered by the CxP when evaluating value engineering results.

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VALUE ENGINEERING++

As a representative of the owner's interests, when the owner, design team, and CxP discuss design alternatives developed through value engineering, the CxP should encourage the following best practices:

- Utilize a cost estimator to confirm that the costs presented by the contractor or another party are valid and reasonable.
- Request detailed lists of the individual components and anticipated effects factored into developing each design option.
- Identify the risks to the owner of accepting a design alternative but not receiving updated design documents reflecting the full impacts of that decision.
- Evaluate the comprehensive effects of each decision on future operations and maintenance (O&M) expenses.
- Encourage the owner to establish prices and schedule timeframes for reversing or modifying a previous decision.



VALUE ENGINEERING+++





- Understanding and analyzing the potential effects of design alternatives on the project's compliance with the OPR or CFR should be the primary responsibility of the CxP during the value engineering process.
- The CxP's efforts during this phase of the project may determine whether the owner is completely satisfied upon project completion and handover or frustrated with not achieving the desired and intended results now and throughout the life of the project.
- By performing TCO analysis and being straightforward with the owner about the potential consequences of various design options identified through value engineering, the CxP can assist the owner in making decisions more likely to result in a successful project.

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COMMISSIONING AS RISK MANAGEMENT

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- Most people familiar with commissioning recognize the quality assurance benefits of the commissioning process.
- By identifying design and construction issues for the owner and project team, a commissioning agent helps to improve the overall quality of a building project.
- Commissioning as Risk Management While quality assurance is an important aspect of the commissioning process, a more owner-centric concept is emerging in the commissioning industry: risk management.
- Risk management is important for building owners because it helps to protect the returns on their financial investments.
- The early adopters of risk management in commissioning are not surprisingly those that face some of the greatest risks for system or product failures.
- Risk management is an important part of pharmaceutical manufacturing, an industry that faces considerable risks in terms of product waste and product safety.
- "Minimizing Risk, Maximizing Value As the scope of the commissioning effort increases, there is an opportunity to manage more of the risk associated with the project elements.
- Although "risk management" has not yet become a part of the conversations I have regularly with commissioning clients, it is evident that our clients are increasingly seeing the value of an expanded commissioning scope.



DESIGN COMMISSIONING REPORT





- A design commissioning report includes the commissioning requirements, process, documentation, and findings and is sent to the owner for approval along with the construction contractor's turn-over documentation.
- Typically, the design commissioning report includes a table with team members' responsibilities for preparing, reviewing, and accepting the results and documentation.
- Commissioning plans should outline an executive summary, commissioning process narrative, and CX process results.
- The report should also include design and submittal review comments and resolution, commissioning-related meeting minutes, corrective action reports, blank verification test reports for future use, completed training forms, installation and system readiness and startup checklists, current Issues and Resolution logs, and tests and field observation reports for commissioned systems, equipment, assemblies, and building features.

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Design Phase Prepare Commissioning Plan:

- **Communication protocol**
- **Roles and responsibilities**
- **Deliverables**
- **Systems to be commissioned**
- **Cx schedule summary**
- **Sample deliverables (SVCs,FPTs, RTF)**
- **Living document updated throughout the project**



Prepare specifications:

- **Specifications are the responsibility of designers.**
- **General sections and industry-specific ones**
- **Roles and responsibilities**
- **Systems to be commissioned**

General	• General Cx Requirements • Envelope Cx Requirements
Division 22	• Plumbing Systems Commissioning
Division 23	• HVAC Systems Commissioning

Prepare specifications:

- **SVCs and FPTs**
- **Cx involvement with training**
- **Reference to related sections**





DESIGN REVIEWS



- Not a peer review or code audit
- Interaction between CxA and A/E is important to review success.
- Conformity to OPR
- Maintainability
- Full coordination

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DESIGN REVIEWS +



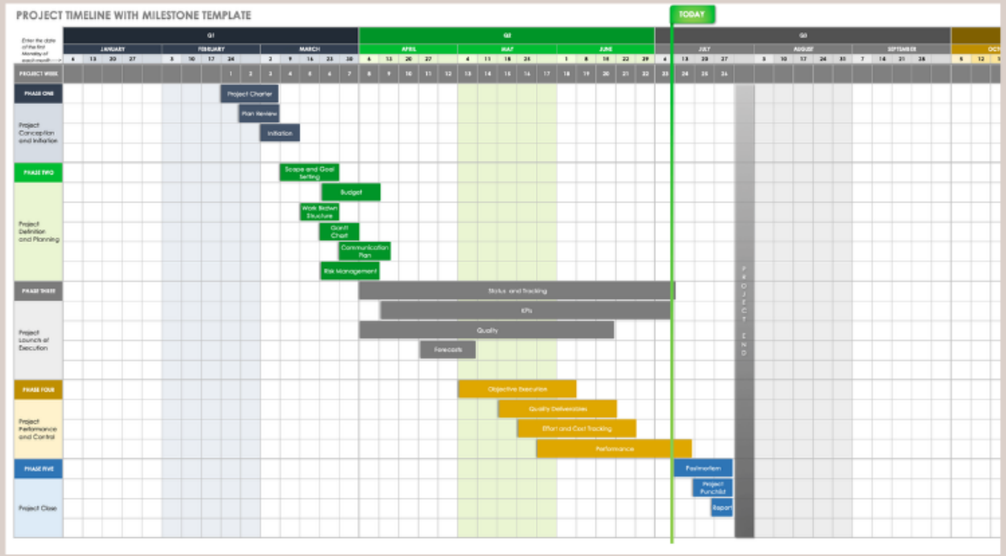


- Appropriate TAB infrastructure
- Adequate information
- Training necessities
- Explicit order of operations
- Energy model assessment
- Involvement of

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Cx Schedule Milestones

Incorporate commissioning into the project timeline.



- **Define activities related to commissioning in the schedule.**
- **Timetable, especially for project phases**
- **Define the meeting frequency with CX.**
- **Critical path of procurement activities**

Support and activities

- **Pre-BidMeeting**
- **Prepare for the kick-off meeting**
- **Contact the awarded General Contractor**



PRE-BID CONFERENCE

- Assuming the project is not design/build or a negotiated construction contract, the final step of the design phase is to solicit bids and award the construction contract.
- For the vast majority of projects, it is customary to require bidders to attend a pre-bid conference (which is required for contract award) on a predetermined date prior to the bid opening.
- When commissioning is included in the project, it is strongly recommended to hold a pre-bid conference because many bidders are unlikely to fully comprehend the scope of the requirements.
- Potential prime contractors should be encouraged to hire a qualified testing contractor to assist them in preparing a bid for the commissioning program, as the testing contractor will have the most comprehensive understanding of the commissioning requirements and their implications in order to develop a viable estimate.
- A well-organized pre-bid conference will play a significant role in assuaging any concerns that the specified commissioning program may generate.



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