



استراتژی مدیریت قرارداد

برای مدیران پروژه

راهنمای مدیریت قرارداد مختص مدیران پروژه (Contract Administration Guidelines)

بخش دوم: مدیریت قرارداد در فاز قبل از طراحی

ارائه دهنده:

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What we will learn?

- ☐ Introduction to pre-design phase
- ☐ Project management plan (PMP)
- ☐ Construction management plan (CMP)
- ☐ Project procedures manual (PPM)
- ☐ Documentation system
- ☐ Project delivery
- ☐ Project management information system
- ☐ Sustainability plan
- ☐ Owner's project requirement (OPR) document
- ☐ Conceptual studies
- ☐ Pre-design cost investigation
- ☐ Master schedule
- ☐ Milestone schedule
- ☐ Design consultant selection
- ☐ DESIGN CONSULTANT contract

PROJECT MANAGEMENT INFORMATION SYSTEM

Why PMIS?

❑ During this phase, the CM should establish the PMIS that will keep the **project team informed** as to

1. Overall status and
2. Forecast of the project

compared to the established PMP.

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Requirements of PMIS

- ☐ The **PMIS** must also provide security for the information contained within,
 1. As some documents are not appropriate to share widely
 2. While other documents must be available to all team members.

- ☐ Finally, the **PMIS** must be simple to understand and use since **some members** of the project staff may be using the system for the first time and may not have the benefit of experience with a similar project control system.

What should CM do here?

CM role in PMIS

- ❑ To **satisfy the need** for a system that is simple to use, easy to understand, and capable of efficiently handling many common tasks,
the **CM** should consider using an automated PMIS.
- ❖ While **not essential**, a computerized PMIS allows the CM the ability to track, monitor, and organize thousands of items with a **minimum investment of manpower**.

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PMIS coverage

☐ Information should include

1. Schedule and progress reporting,
2. Drawing schedules,
3. Budget versus cost of services, and
4. Change requests (approved and pending) for design services

When should the system report?

PMIS coverage

- ☐ The system should issue the **first reports** during the design phase, and thereafter on an agreed frequency.

Who should use financial report and why?

PMIS coverage

- ☐ **Both** the owner and CM must be able to use **financial reporting** to plan, monitor, and effectively control the application of available project funds.
- ☐ The reports should be **formatted** in a way that
 1. Allows continuous data input throughout the project and
 2. Should serve as a budgeting and cost control tool.

What should be covered by financial report?



PMIS coverage

☐ Financial reporting should cover

1. Budgeted, authorized, and committed funds;
2. Expenditures to date;
3. Cost to complete;
4. Invoices;
5. Payment and retention;
6. Change orders;
7. Projected total costs; and
8. Projected cash flow.

How much important to have computerized system?

Computerized systems

❑ Finally, **non-computerized systems**

- ❖ Tend to limit the number of items that can be addressed,
- ❖ Rely heavily on individual staff members' capabilities, and
- ❖ Are not able to quickly create status reports for specific problem areas.

❑ **Computerized management systems**

1. Allow data transmission between parties via electronic media and
2. Enhance overall efficiency and economy

What tools should include?

Tools for tracking project details include:	
✓ Document log ✓ Submittal log ✓ Material status report ✓ Follow-up list	✓ Change order log ✓ Requests for Information (RFI) log ✓ Issues book ✓ Reports

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Project tools

❑ For examples, see Appendix F: Project Tools.

- ❖ Document Log
- ❖ Submittal Log
- ❖ Material Status Report
- ❖ Follow-Up List
- ❖ Change order Log

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Periodic observation report

**DAILY FIELD
OBSERVATION REPORT**

PROJECT: _____ REPORT NUMBER: _____

OWNER: _____ DATE: _____ TIME: _____

RE: _____ A/E PROJECT NUMBER: _____

WEATHER ☐ Clear ☐ Snow ☐ Warm ☐ Overcast ☐ Foggy ☐ Hot ☐ Rain ☐ Cold ☐ _____	SITE CONDITIONS ☐ Clear ☐ Dusty ☐ Muddy ☐ _____ ☐ Temperature Range _____	DAY ☐ Monday ☐ Thursday ☐ Tuesday ☐ Friday ☐ Wednesday ☐ _____
---	--	--

PERSONS CONTACTED:

WORK OBSERVED:

ITEMS DISCUSSED:

MATERIALS DELIVERED:

REQUESTED REVISIONS OR INTERPRETATIONS:

NONCONFORMING WORK REPORTED THIS DATE TO CONTRACTOR:

REMARKS:
☐ Attachments

SIGNED BY: _____ **DATE:** _____

COPIES: ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ _____ ☐ _____ ☐ File

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Periodic observation report

**WEEKLY/MONTHLY
PROGRESS REPORT**



PROJECT: _____ REPORT NUMBER: _____
 OWNER: _____ REPORT DATE: _____
 CONTRACTOR: _____ A/E PROJECT NUMBER: _____

Contract Completion Date/Time: _____ Approved Time Extensions (Days): _____
 Date Construction Started: _____ Contract Completion Date/Days: _____
 Revised Completion Date: _____ Percent of Project Completion: _____
 Percent of Time Used: _____ Days Elapsed: _____
 Is Project on Schedule: _____ If not, why? _____

SUMMARY OF CONSTRUCTION ACTIVITIES SINCE LAST REPORT:

☐ Attachments

SIGNED BY: _____ DATE: _____
 COPIES: ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ _____ ☐ _____ ☐ File

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Periodic observation report

COMMUNICATION RECORD

PROJECT: _____ DATE: _____
A/E PROJECT NUMBER: _____

TO: _____ ☐ LETTER DATED: _____
☐ FAX DATED: _____

FROM: _____ ☐ TELEPHONE CALL DATED: _____

RE: _____ CONTACT: _____

THIS CONFIRMS AND RECORDS OUR INTERPRETATION OF THE UNDERSTANDING REACHED CONCERNING MATTERS INDICATED. UNLESS NOTIFIED IN WRITING WITHIN SEVEN DAYS OF THE DATE BELOW, WE WILL ASSUME THAT THE FOLLOWING INTERPRETATION OR DESCRIPTION IS COMPLETE AND ACCURATE.

☐ Attachments

SIGNED BY: _____ DATE: _____

COPIES: ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

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Periodic observation report

MEMORANDUM

PROJECT: _____

DATE: _____

A/E PROJECT NUMBER: _____

TO: _____

FROM: _____

RE: _____

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FEEDBACK



PROJECT: _____ ☐ SPECIFICATION ITEM: _____

TO: _____ ☐ DRAWING ITEM: _____

RE: _____ DATE: _____

_____ A/E PROJECT NUMBER: _____

_____ CONTRACT FOR: _____

Use this form to suggest improvements based on actual experience. The improvements may involve changes in the master specification or the standard drawing detail library.

DETAILED EXPLANATION:

SUGGESTED IMPROVEMENT:

SUPPORTING DATA ATTACHED: ☐ Specification ☐ Drawing ☐ Photograph ☐ Video ☐ _____

SIGNED BY: _____

DATE: _____

COPIES: ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

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SUSTAINABILITY PLAN

Sustainability meaning

Sustainable development means meeting the needs of the present without compromising the ability of future generations to meet their own needs.

For information on creating a sustainability plan, see *CMAA Sustainability Guidelines*

CM role in sustainability plan

☐ The CM helps the owner

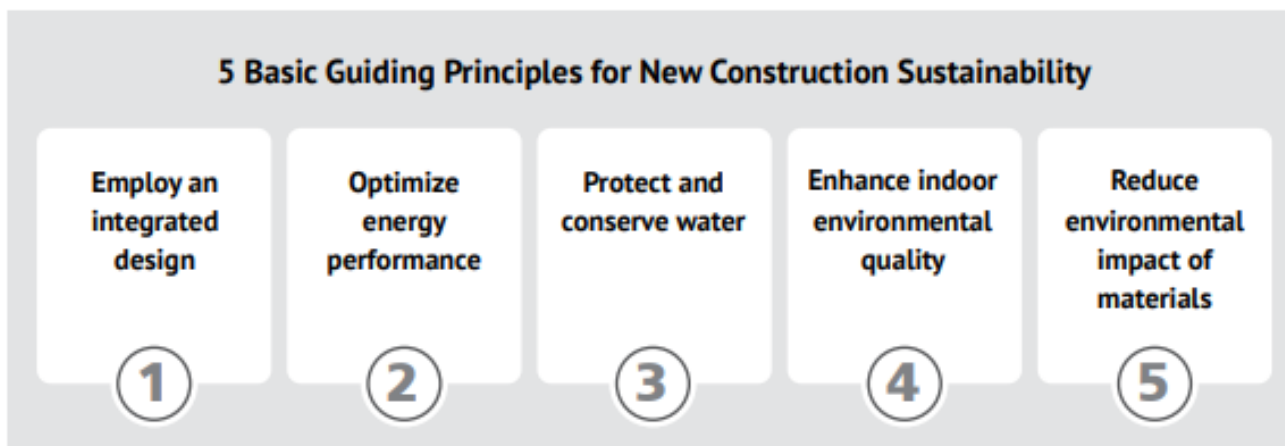
1. Establish sustainability goals and objectives and
2. Develops the sustainability plan

which may be part of the **owner's project requirement (OPR) document.**

☐ **Many conceptual** design and estimation iterations may be required

before a project meets the owner's time, cost, quality, sustainability, and other performance requirements.

5 basic guiding principles for new construction sustainability



OWNER'S PROJECT REQUIREMENT (OPR) DOCUMENT

OPR coverage

- ❑ This document provides
 1. An overview of the **project and specific guidance** to the design team
 2. With a **focus** on performance and expectations for the project.

Who should prepare OPR?

OPR coverage

- ❑ The **OPR** is prepared by the owner of a project to convey
 1. The functional requirements of a project
 2. The expectations of the project's use and operation

What if the owner has not prepared this document?

CM role in OPR

- ☐ If the owner has **not already prepared** an OPR,
then the **CM can work with them** to develop one.
- ☐ During the **development** of the OPR,
the **CM can advise the owner** on the cost and schedule impact of these goals,
so the **owner** can make informed decisions and tradeoffs of the goals
before the project is **designed**.

What issues the OPR should address at minimum?

Owner and user requirements

- ❑ The OPR should address the following minimum issues as applicable to the project:
 1. Owner and user requirements
 2. Environmental and sustainability goals
 3. Energy efficiency goals
 4. Indoor environmental quality requirements
 5. Equipment and system expectations
 6. Building occupant and operation and maintenance (O&M) personnel requirements

Sample

See
LU Template Owners Project Requirements
&
LU Template Owners Project Requirements
PDF files

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CONCEPTUAL STUDIES

Cost estimates and schedules

	 CSI'S FACILITY LIFE CYCLE STAGES	 OMNICLASS ¹	 THE AMERICAN INSTITUTE OF ARCHITECTS (AIA) ¹	 CONSENSUS DOCS ²	 CONSTRUCTION MANAGEMENT ASSOCIATION OF AMERICA (CMAA) ⁴	 THE ENGINEERS JOINT CONTRACT DOCUMENT COMMITTEE (EJCDC) ⁵	 AIA INTEGRATED PROJECT DELIVERY (IPD) ⁶
	Implementation Phase	Inception Phase Conceptualization Phase	Not Applicable	Not Applicable	Pre-Design Phase	Study and Report Phase	Conceptualization
Design	Design	Criteria Definition Phase Design Phase	Schematic Design Phase Design Development Phase	Schematic Design Design Development	Design Phase	Preliminary Design Phase Final Design Phase	Criteria Design (expanded schematic design) Design Development Implementation Documents
Construction Documents	Construction Documents	Coordination Phase	Construction Documents Phase	Construction Documents	Procurement Phase	Bidding or Negotiating Phase	Agency Coordination (Use of BIM and early involvement) Buyout
Procurement	Procurement	Implementation Phase	Procurement Phase	Bidding or Negotiation	Construction Phase	Construction Phase	Construction
Construction	Construction	Handover Phase	Construction Phase	Construction Phase	Post-Construction Phase	Post-Construction Phase ⁷	Closeout
Facility Management	Facility Management	Operations Phase Closure Phase	Not Applicable	Not Applicable	Not Applicable		Criteria Design (expanded schematic design)

Cost estimates and schedules

- ❑ The CM **assists** the owner and/or designer by **preparing** initial cost estimates and construction schedules to **support** preliminary feasibility and design studies.

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Materials and methods

- ❑ The CM may also **make recommendations** regarding construction materials and methods that are either
 1. Best suited or common to the proposed project and its location, or
 2. Feasible alternatives to meet the project's sustainability goals.

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Design alternatives and value engineering

☐ The CM may assist the owner in **evaluating**

1. Preliminary design alternatives and
2. Performing value engineering

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Site considerations

❑ Additional **project site considerations** include

1. Ensuring research is performed on **existing facility/site information** (via record drawings/as-builts) documentation,
2. Evaluating **existing conditions**, and
3. Reviewing **code compliance issues**.

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Site considerations

Documentation of Existing Project (As-Built)

- ✓ Used as owner's final record of the project; must be accurate
- ✓ Include conditions such as: footing depth, pipe inverts, relocated utilities
- ✓ Agreed construction changes
- ✓ Work section completion dates

Sustainability

- ☐ Working with the owner to determine **sustainability goals** for the project, the CM can help **determine** cost and schedule impacts of **obtaining** these goals.
- ☐ Construction financing alternatives need to be evaluated to determine the **viability** of a project.

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PRE-DESIGN COST INVESTIGATION

Cost management plan

- ❑ The CM establishes a cost management plan,
which becomes the **basis and framework**
within which the **costs** of the project are controlled.

What includes in cost management plan at this step?

Cost management plan

❑ This includes

providing cost estimating support for

1. Project feasibility and energy conservation studies
2. As well as conceptual budgeting

**What elements included in cost models
developed by CM?**

Cost models

- ❑ The CM develops **cost models** to identify all **project costs** including
 1. Probable costs of construction,
 2. Site acquisition,
 3. Permits,
 4. Consultants,
 5. Escalation, and
 6. Financing.

What happens once master budget established?

Master budget and cash flow

❑ Once the **master budget** for the project is **established**,

1. Preliminary cash flow and
2. Funding studies

should be performed to include

approval of release of any contingency funds.

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MASTER SCHEDULE

Master schedule

❑ The master schedule

1. Provides details about the **front-end activities** of the project during the pre-design and design phases and
2. Highlights **major project milestones** such as substantial and final completion

Who develops it and to what extent?

Details in master schedule

- ❑ The **CM develops** the master schedule to govern the life of the project by establishing the **overall schedule** completion goals of future phases, including construction and post-construction.

Master Schedule Development

A master schedule is a **single integrated project schedule** that the CM uses to coordinate all the work for a project. The master schedule **increases in detail over time** as contracts are awarded and design is developed. It can **begin as a summary level milestone schedule** and ultimately may **include the detailed schedules** prepared by the **contractors for design and construction**. For work that is **more than year away**, a **summary level master schedule is sufficient**. However, a **more detailed plan** should be in place **when work is within 9 to 3 months** of the planned start for the work. Work planned **within three months of the master schedule** start date should have a well-defined plan in place.

Does it include budget?

Budget in master schedule

- ❑ The **CM** also takes the **budget into consideration**

since the duration of the overall project (and the duration of each phase) has a **significant impact** on project cost.

How to update?

Update master schedule

- ☐ The **master schedule** should be updated each month at a minimum or at shorter appropriate intervals.
- ☐ The update is a simple process, indicating
 1. Activities **completed**,
 2. Activities in **progress**, and
 3. Their **percentage** of progress

When to revise?

Revise master schedule

- ☐ Any **necessary revisions** to the durations and sequence of activities should also be made at this time.

Any action needs to be taken?

Potential delays

- ☐ The CM must take **immediate action** if any potential delays are identified as well.
- ☐ **Timely resolution** of issues and **decisions** is critical to keeping the project on schedule.

How?

Delays evaluation

☐ Any delays need to be evaluated to determine

1. Cause,
2. Cost impact, and
3. Responsible party

for documenting in the time impact analysis (TIA) and for future claims.

What should be done next?

Recovery

❑ **Recovery options** must be identified and explored along with the possible impact to cost or quality.

❑ **Recommendations** must be made to the client related to

1. Recovering the delays or
2. Accepting the delay and the resultant impact

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MILESTONE SCHEDULE

Purpose of milestone schedule

- ❑ The milestone schedule acts as a “**pull out**” from the master schedule.
- ❑ The purpose of a milestone schedule is to **highlight** the key events in a project, as an executive level summary.

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Purpose of milestone schedule

- ❑ Since the **master schedule** consists of activities, especially related to pre-design, the **milestone schedule** helps the project team be cognizant of the “**big picture**”

by identifying

1. Key milestone activities
2. Critical dates for their completion.

Why the CM needs milestone schedule?

Purpose of milestone schedule

□ By

1. Establishing the milestone schedule and
2. Monitoring it with each **update** of the master schedule,
the **CM can keep** the project team
 - i. Abreast of critical time elements and
 - ii. Their status throughout the course of the project

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DESIGN CONSULTANT SELECTION

CM selection

- ❑ One advantage of **selecting a CM early** in the project (or having a CM on staff) is that

if the **chosen delivery method** requires a separate design contract,
CM may assist the owner in selecting a designer.

Sample of this help?

CM help in selecting design consultant

☐ This includes developing

1. Statements of Qualifications (SOQ),
2. Requests for Proposals (RFP) and
3. Criteria to be used in evaluating the proposals

What happens next?

CM help in selecting design consultant

☐ The **CM** then assists the owner in

1. Reviewing proposals,
2. Conducting interviews, and
3. Evaluating the short-listed candidates

to make a **final selection**.

☐ This may entail

1. Checking references and
2. Verifying past project performance

CM help in selecting design consultant

- ❑ Once the **selection is made**,

CM may also assist the owner in contract negotiations.

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CM help in selecting design consultant

BEST PRACTICE

Engaging a CM early in the process (pre-design phase) can save money, avoid/mitigate problems, and produce higher quality results for owners.

DESIGN CONSULTANT CONTRACT

CM role in preparing design contract

- ❑ If requested, the **CM assists the owner** in
 1. Preparing the **designer's contract**
 2. Ensuring that the **contract scope of work** is clear and complete
 3. Ensuring that the **submittal requirements** for the deliverables are explicit

- ❑ **Specific responsibilities** for the designer must be delineated and carefully coordinated with those of the **owner and CM** to **prevent overlap**.

CM role in preparing design contract

- ❑ The designer's contract should include
 1. A detailed design phase **schedule** and
 2. Specific design phase project **controls**
 3. There should also be a section on
 - i. Professional **liability and errors**
 - ii. **Omissions insurance** requirements

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CM role in preparing design contract

AMERICAN INSTITUTE OF ARCHITECTS	AIA Document B101™ Standard Form of Agreement Between Owner and Architect
CONSENSUSDOCS	ConsensusDocs® 240 Standard Agreement and Owner and Design Professional
CONSTRUCTION MANAGEMENT ASSOCIATION OF AMERICA	CMAA does not have a standard Owner/Designer agreement form for CM at Risk. Document A-4 Standard Form of Agreement Between Owner and Designer (Construction Manager as Owner's Agent)
DESIGN-BUILD INSTITUTE OF AMERICA	There is NO agreement between Owner and Design Consultant DBIA 540 Standard Form of Preliminary Agreement Between Design-Builder and Design Consultant
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE	EJCDC E-500 Standard Form of Agreement Between Owner and Engineer for Professional Services



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بخش سوم: مدیریت قرارداد در فاز طراحی

ارائه دهنده:

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What we will learn?

- ☐ Design contract administration and coordination
- ☐ Master schedule
- ☐ Quality management system (QMS)
- ☐ Design reviews
- ☐ Sustainability reviews
- ☐ Construction contract specifications and drawings
- ☐ Technical specification reviews
- ☐ Constructability review
- ☐ Commissioning review
- ☐ Value engineering review
- ☐ Construction contract packaging
- ☐ Construction phase budget
- ☐ Pre-bid construction phase schedule
- ☐ Additional project-specific tasks

INTRODUCTION TO DESIGN PHASE

Objective of this phase

- ❑ The goal during this phase is to **produce** a complete set of contract documents that define a project **within** the owner's established budget, performance, time, and quality requirements.
- ❑ In many ways, this is the most critical project phase.
- ❑ Many of the **obstacles** that surface during construction and post-construction can be **avoided** by developing good design documents and taking appropriate action in the design phase.

What criterial is established in design phase?

Objective of this phase

☐ The design phase establishes

1. Financial,
2. Legal,
3. Sustainability, and
4. Quality-based

criteria for the project

What CM should coordinate?

Coordination by CM

- ☐ In this phase, the CM may be asked to **coordinate**
 1. Design contract(s),
 2. Manage the development of drawings and specifications,
 3. Develop more detailed cost and schedule parameters,
 4. Develop contract documents, and
 5. Make sure that the design conforms to the owner's requirements

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CM design tasks – Appendix A

Design Phase Tasks	
✓ Design Contracts ✓ Master Schedule ✓ Communication ✓ Design Reviews ✓ Sustainability Reviews ✓ Construction Specifications (owner-provided equipment)/Drawings	✓ Technical Specification Reviews ✓ Constructability Reviews ✓ Value Engineering ✓ Construction Contract Packaging ✓ Construction Budget ✓ Pre-Bid Construction Schedule

BEST PRACTICE

Always seek legal counsel when modifying contract terms.

CM design tasks – Appendix F

- ❑ See Appendix F: RACI (Responsible, Accountable, Consulted, Informed) Sample.

ATTACHMENT A SCOPE OF SERVICES This Attachment A is attached to and part of the Agreement for Program Manager between CLIENT and COMPANY dated DATE for the PROGRAM NAME. Capitalized terms used herein shall have the same meanings as in the agreement.				
Program Manager - Responsibility Matrix				
DATE				
R - Responsible A - Approve C - Contribute I - Informed				
		Scope Item	Owner	Program Mgmt
Notes				
The Program Manager shall provide the following services; these services shall include but not be limited to:				

CM design tasks – Appendix F

❑ See Appendix F: RACI (Responsible, Accountable, Consulted, Informed) Sample.

B. Project Programming and Design Phase - Interfacing with the Facilities Services				
1	Coordinate the design team's activities assuring that the design phase program and procedures are implemented by all parties.	A,I	R	
2	Provide reports, reviews, and recommendations, and / or coordination in the following areas: schedules, public relations, design reviews, progress meetings, permitting and agency review, owner approvals, advanced purchases, cost management procedures, design phase schedule, updates to management plan, updates to the master schedule, value engineering, cost monitoring, and cost adjustment sessions.	A,I	R	
3	Assist owner and determining needs for surveying, geotechnical, and materials testing services, and other related services.	A	C,R	
4	Review, implement, and monitor the program schedule. update master program schedule as necessary to reflect any changes.	A,I	R	
5	Implement and maintain cost control procedures throughout the design phase of the program projects. Develop cost estimates and a value engineering assessment at the end of the schematics, design development, and at 75% and 100% construction documents, addressing constructability, possible cost saving materials, sequencing of construction, and / or construction techniques. recommend revisions or actions if required to maintain project and program budget.	A	R	

CM design tasks – Appendix F

❑ See Appendix F: RACI (Responsible, Accountable, Consulted, Informed) Sample.

6	Conduct reviews of in-progress design documents during each phase of design to ensure adherence to the program.	A,C	R	Program management organization Shelby responsible for design reviews in accordance with the established guidelines, and shall ensure that design reviews are scheduled and completed in
7	Participate in design progress meetings through the schematic design and design development phases with the owner, the project managers, design consultant, and other appropriate parties to ensure adherence to the program.	A,C	R	The program management organization will have a full requirement to track progress through all phases of design and shall maintain the overall schedule and highlight course corrections if necessary to keep on track
8	Coordinate with the owner to develop a construction delivery strategy that meets the owner's objectives and minimizes disruptions to the educational program.	A,C	R	
9	provide periodic reports that summarize design progress, schedule and cost status, changes and other significant information for the program as a whole.	I	R	

**DESIGN CONTRACT
ADMINISTRATION AND
COORDINATION**

CM role in design contract administration and coordination

What is the Professional Standard of Care?

The common law standard of care for performance of design professional (DP) services is generally defined as the ordinary and reasonable care usually exercised by one in that profession, on the same type of project, at the same time and in the same place, under similar circumstances and conditions. Perfect performance is not required by the common law.

The contract documents establish the level of acceptable quality of workmanship and industry standard of care which allow for some degree of construction and material tolerances and clearances. Depending on the application and its use, tolerances and clearances should be reasonable and include an industry acceptable margin of deviation. For example, a reasonable clearance should be allowed between the structure and the facade to allow the facade to be installed plumb from the ground to the coping without interference from structural elements.

CM role in design contract administration and coordination

AIA DOCUMENT B101™ Standard Form of Agreement between Owner and Architect	"2.2 The Architect shall perform its services consistent with the professional skill and care ordinarily provided by architects practicing in the same or similar locality under the same or similar circumstances. The Architect shall perform its services as expeditiously as is consistent with such professional skill and care and the orderly progress of the Project."
CONSENSUSDOCS® 240 Standard Agreement Between Owner and Design Professional	"2.1 STANDARD OF CARE Design Professional... Services shall be performed with the standard of professional skill and care required for a project of similar size, location, scope, and complexity, during the time in which the Services are provided."
CMAA CMAR-4 Standard Form of Contract Between Owner and Designer	"2.5. The Designer shall perform its services hereunder properly and in accordance with the standards of its profession. The Designer acknowledges its sole responsibility as a professional for the design of the Project and for performing certain design related services during its construction. The Designer also acknowledges that in the performance of services under the Agreement between the Owner and CM, the CM will be relying upon the performance by the Designer of services under this Agreement. Except as set forth herein, the Designer shall not have any other duties and responsibilities with respect to the Project. The Designer shall be entitled to rely upon the CM for the proper performance of services undertaken by CM pursuant to the Agreement between the Owner and CM..."
DBIA 540 Standard Form of Agreement between Design-Builder and Design Consultant	"2.2 Standard of Care. 2.2.1 The standard of care for all design professional services performed by Design Consultant and its Design Sub-Consultants pursuant to this Agreement shall be the care and skill ordinarily used by members of the design profession practicing under similar conditions at the same time and locality of the Project."
EJCDC® C-500 Agreement between Owner and Engineer for Professional Services	"6.01 A Standard of Care: The standard of care for all professional engineering and related services performed or furnished by Engineer under this Agreement will be the care and skill ordinarily used by members of the subject profession practicing under similar circumstances at the same time and in the same locality. Engineer makes no warranties, express or implied, under this Agreement or otherwise, in connection with any services performed or furnished by Engineer."

CM role in design contract administration and coordination

- ☐ The CM **reviews** the contract, including the scope of work, of each designer and sub-consultant, to
fully understand what is **expected** of each.
- ☐ The CM must have a **working knowledge** of design practice and standard procedures of a design firm, including
 1. Deliverables
 2. Scheduling requirements
 3. Productivity capacity

Could the CM modify design documents?

CM role in design contract administration and coordination

- ❑ CMs may be **responsible** for **modifying** the design contract with input from legal counsel.
- ❖ The **design consultants** are responsible for **their performance**.

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CM role in design contract administration and coordination

- ❑ The CM's role is **primarily** coordination and guidance to
 1. **Assist the owner** in its contract administration of the schedule and
 2. **Conduct** meetings to
 - i. Communicate the owner's desired features and
 - ii. All available project information to the designer to facilitate the design process.

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CM role in design contract administration and coordination

The CM Should:

- ✓ Assess the impact of scope changes on the designer's schedule and fee and provide the owner with a preliminary estimate of the cost of scope revisions prior to their implementation.
- ✓ Review the designer's progress to assure timely completion.
- ✓ Review the designer's payment request and submit appropriate recommendations to the owner.
- ✓ Ensure all consultants under contract to the owner are providing input as required during the design phase.

PMP in design phase

- Additionally, the **PMP** prepared in the pre-design phase is **updated** to include the designer and any other new team members in the **project organization** and **staffing plan**.

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PPM in design phase

- ❑ The **PPM** is also revised to **update procedures** for implementing and maintaining the project record, submittal, and document control system(s).
- ❑ The **CM** uses this manual to
 1. **Explain** the procedures for implementing and maintaining **lines of communication**
 2. As well as the roles, responsibilities, and authority of **all team members**.

How to update and revise PPM?

PPM in contract administration and coordination

❑ It should be revised to

1. **Describe** the designer's quality assurance procedures
2. **Evaluate** the specific documentation and reporting requirements.
3. **Provide** the accepted method to **address changes** in the designer's scope of work.

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Basis of design (BOD)

- ☐ During the design phase, it is important that the design team **prepare** basis of design (BOD) document.
- ☐ This document **describes**
how the **design meets** the owner's goals outlined in the OPR.
- ☐ The BOD **provides** the construction and commissioning teams
with a **complete narrative** of
 1. Project design
 2. Intent of the design team
- ☐ It is important for the **CM to ensure** that key elements of OPR
developed during pre-design are **addressed** in the BOD.

Detailed project cost

- ❑ The CM also assists the **owner** in **monitoring** the designer's contract costs by preparing a detailed project cost report for all design stages.

- ❑ The **report** is updated monthly and includes:

Monthly Project Cost Report for all design stages should include:

- ✓ Tracking of designer's actual versus budgeted cost
- ✓ Changes in budget or added items of work for each consultant
- ✓ Progress to date in terms of workforce hours expended and percent complete
- ✓ Estimate of final cost to complete

MASTER SCHEDULE

Master schedule in design phase

☐ Once

1. Design scope of work is **finalized** and
2. Final design schedule is **submitted** by the design firm(s),

CM amends the **master schedule** to include a detailed design schedule.

What should be included in master schedule at this stage?

Master schedule preparation in design phase

❑ The **master schedule** should have

1. Design,
2. Review,
3. Agency approvals and
4. Permitting

milestones

to include:

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Master schedule preparation in design phase

❑ The **master schedule** should include:

- ❖ Schematic design, review periods, and cost estimate preparation.
- ❖ Value engineering, sustainability, and constructability reviews.
- ❖ Design development, review period, cost estimate preparation.
- ❖ Agency approvals, time, and funding authorization milestones.
- ❖ Review of design documents to ensure goals from the OPR are included in the design documents.
- ❖ Completion of the BOD document by the design team.
- ❖ Construction document completion, with approval time at appropriate percentage of completion, accompanied by review periods and cost estimate preparation.

Master schedule preparation in design phase

BEST PRACTICE

In partnering, the CM should obtain each stakeholder's input in the schedule development and confirm acceptance by the entire project team before implementation.

How to update?

Schedule update report

- ❑ The CM issues a monthly schedule update report usually in both **graphic** and **narrative format**

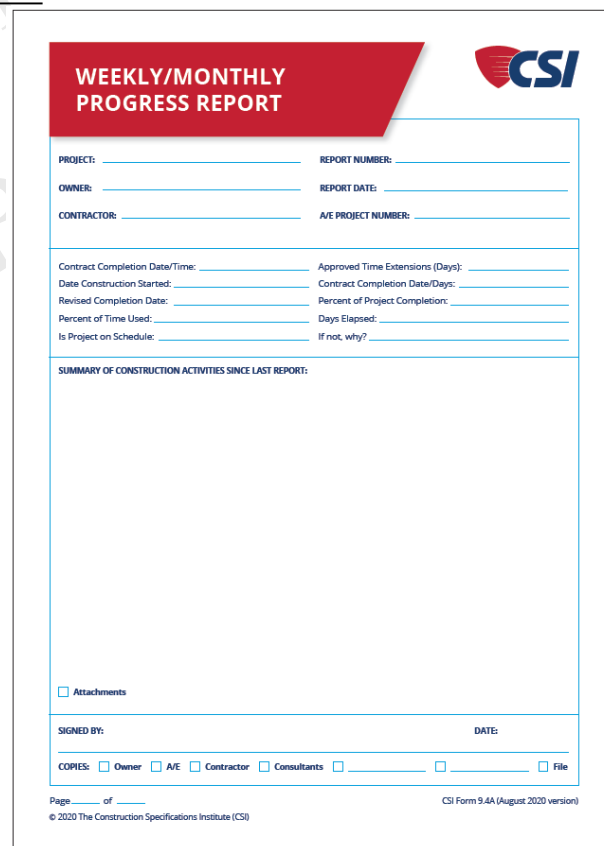
that **clearly identifies** the scheduled completion dates of both design and the overall project.

- ❑ In the report, there is also a discussion and detailed analysis of

1. **Any changes** to schedule during the **last period** and
2. **Effect** on the **completion dates**

- ❑ The CM provides its recommendations for corrective action, if **required**.

What if the revision is needed?



WEEKLY/MONTHLY PROGRESS REPORT

PROJECT: _____ REPORT NUMBER: _____

OWNER: _____ REPORT DATE: _____

CONTRACTOR: _____ A/E PROJECT NUMBER: _____

Contract Completion Date/Time: _____ Approved Time Extensions (Days): _____

Date Construction Started: _____ Contract Completion Date/Days: _____

Revised Completion Date: _____ Percent of Project Completion: _____

Percent of Time Used: _____ Days Elapsed: _____

Is Project on Schedule: _____ If not, why? _____

SUMMARY OF CONSTRUCTION ACTIVITIES SINCE LAST REPORT:

☐ Attachments

SIGNED BY: _____ DATE: _____

COPIES: ☐ Owner ☐ A/E ☐ Contractor ☐ Consultants ☐ _____ ☐ _____ ☐ File

Page _____ of _____

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Revision to master schedule

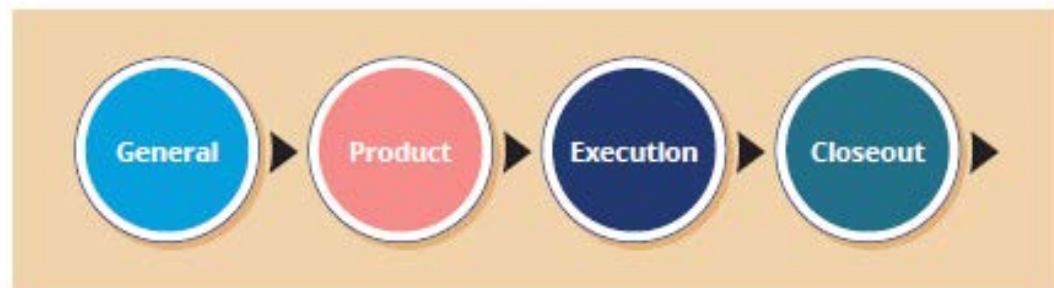
- ❑ The CM conducts periodic design progress meetings to **identify** and **discuss** design problems that affect **project progress**.
- ❑ Based on these **meetings**, **CM adjusts** master schedule activity durations, logic, and completion dates to reflect actual progress of the design work.
- ❑ The **CM** also **evaluates** the construction schedule considering the **revised design schedule** with special attention to secondary, or ripple, impacts necessitating even further revision of the **construction schedule**.

QUALITY MANAGEMENT SYSTEM (QMS)

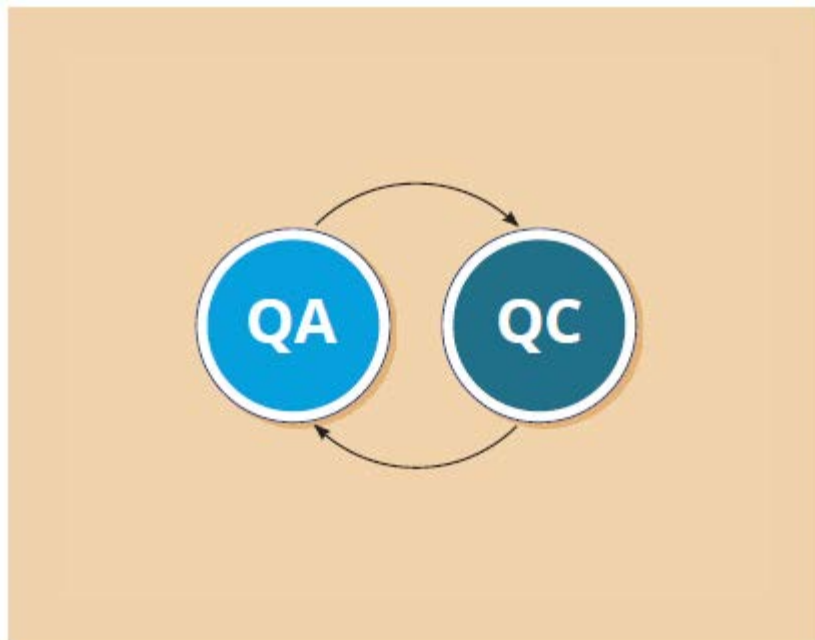
CM role in quality management at design phase

- ❑ During the **design phase**, the CM should determine the **specific approach** to achieving **quality** in the **design documentation**.
- ❑ It is important that the agency CM ensure that the **QMS** of the contractors and subcontractors **meet** the **requirements** of the owner's QMS to **confirm** that the appropriate level of design quality management activities is taking place to address quality control and quality assurance.

Four imperatives of quality & quality decision flowchart



Closed loop of QA and QC & total quality management





CM role in quality management at design phase

- ❑ Also see Quality in Construction Phase.

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DESIGN REVIEWS

Design review tasks

❑ Design reviews include the following tasks:

- ❖ **Review** the design narrative and/or program.
- ❖ **Verify** agency reviews/approvals required.
- ❖ **Schedule/conduct** periodic design conferences.
- ❖ **Schedule conferences** with regulatory agencies.
- ❖ Review the **design team's BOD** (assuming they addressed all items from the OPR) and attainment of sustainability goals for the project.

Design review tasks

❑ Design reviews include the following tasks:

- ❖ **Perform** design reviews through **all design phases** ensuring that **owner comments** are included.
- ❖ **Develop** and **review** a cost estimate of the design **based on drawings** for that phase.
- ❖ **Review** final design/development submittal, and **make recommendations** if design is **trending over budget**.
- ❖ **Incorporate** revisions and **obtain approval** to proceed.

Appendix F

- ☐ Design Schedule Sample
- ☐ Design Closeout File Retention Checklist

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SUSTAINABILITY REVIEWS

Sustainable design

- ☐ The owner, architect, and CM should agree on the detailed scope and number of sustainability reviews that will be **required in design** based on the requirements and goals set at the **initial stage** of the project.
- ☐ The basic objectives of sustainability are to
 1. **Reduce consumption** of non-renewable resources,
 2. **Minimize waste** and
 3. **Create** healthy, productive environments.

CONSTRUCTION CONTRACT SPECIFICATIONS AND DRAWINGS

Drawings and specifications

- ❑ Construction specifications describe the **required materials, execution, and quality of performance**

whereas drawings and other graphic documents are used to show size and extent of construction and geometric relations **between** the various construction components.

- ❑ The specifications incorporate various standards, codes, and other publications and thus provide guidance on the **full requirements of the contract**.

Construction specifications

- ❑ Organizations such as the Construction Specifications Institute (CSI) provide standardized classifications that can be used as the organizational structure for **construction projects**.
- ❑ There are **other formats** that can be used depending on whether the project is public or private.
 - ❖ For example, the Federal Highway Administration uses their own formats for bridge and highway construction.

Construction specifications

- ❑ The **CSI MasterFormat specifications** have evolved from 16 to 50 divisions and use a **standard numbering system** to facilitate the use of software applications such as CAD, Building Information Modeling (BIM), cost estimating, code checking, and scheduling.
(MasterFormat divisions 15-20, 24, 29, 30, 36-39, 47, 49, 50 are reserved for future use.

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Construction specifications

IN SUMMARY

The CM should ensure the required specifications are addressed by the design team in the agreed upon format.

Construction specifications

Procurement and Contracting Requirements Group

» Division 00 - Procurement and Contracting Requirements

Construction specifications

Division 01 — General Requirements. The general requirements in specifications Division 01 specify administrative requirements, procedural requirements, and temporary facilities and controls. Division 01 sections govern the execution of the work specified in Divisions 02 through 49. Division 01 requirements avoid the need to repeat these requirements in other divisions or sections of the specifications. Individual specification sections relate back to Division 01 for clarification.

Specifications Group

GENERAL REQUIREMENTS SUBGROUP

- » Division 01 - General Requirements

FACILITY CONSTRUCTION SUBGROUP

- » Division 02 - Existing Conditions
- » Division 03 - Concrete
- » Division 04 - Masonry
- » Division 05 - Metals
- » Division 06 - Wood, Plastics, Composites
- » Division 07 - Thermal and Moisture Protection
- » Division 08 - Openings
- » Division 09 - Finishes
- » Division 10 - Specialties
- » Division 11 - Equipment
- » Division 12 - Furnishings
- » Division 13 - Special Construction
- » Division 14 - Conveying Equipment

FACILITY SERVICES SUBGROUP

- » Division 21 - Fire Suppression
- » Division 22 - Plumbing
- » Division 23 - Heating, Ventilating, and Air Conditioning (HVAC)
- » Division 25 - Integrated Automation
- » Division 26 - Electrical
- » Division 27 - Communications
- » Division 28 - Electronic Safety and Security

SITE AND INFRASTRUCTURE SUBGROUP

- » Division 31 - Earthwork
- » Division 32 - Exterior Improvements
- » Division 33 - Utilities
- » Division 34 - Transportation
- » Division 35 - Waterway and Marine Construction

PROCESS EQUIPMENT SUBGROUP

- » Division 40 - Process Integration
- » Division 41 - Material Processing and Handling Equipment
- » Division 42 - Process Heating, Cooling, and Drying Equipment
- » Division 43 - Process Gas and Liquid Handling, Purification and Storage Equipment
- » Division 44 - Pollution and Waste Control Equipment
- » Division 45 - Industry-Specific Manufacturing Equipment
- » Division 46 - Water and Wastewater Equipment
- » Division 48 - Electrical Power Generation

Construction specifications

DIVISION 01 - GENERAL REQUIREMENTS

01 00 00	General Requirements	01 70 00	Execution and Closeout Requirements
01 10 00	Summary	01 71 00	Examination and Preparation
01 11 00	Summary of Work	01 73 00	Execution
01 12 00	Multiple Contract Summary	01 74 00	Cleaning and Waste Management
01 14 00	Work Restrictions	01 75 00	Starting and Adjusting
01 18 00	Project Utility Sources	01 76 00	Protecting Installed Construction
01 20 00	Price and Payment Procedures	01 77 00	Closeout Procedures
01 21 00	Allowances	01 78 00	Closeout Submittals
01 22 00	Unit Prices	01 79 00	Demonstration and Training
01 23 00	Alternates	01 80 00	Performance Requirements
01 24 00	Value Analysis	01 81 00	Facility Performance Requirements
01 25 00	Substitution Procedures	01 82 00	Facility Substructure Performance Requirements
01 26 00	Contract Modification Procedures	01 83 00	Facility Shell Performance Requirements
01 29 00	Payment Procedures	01 84 00	Interiors Performance Requirements
01 30 00	Administrative Requirements	01 85 00	Conveying Equipment Performance Requirements
01 31 00	Project Management and Coordination	01 86 00	Facility Services Performance Requirements
01 32 00	Construction Progress Documentation	01 87 00	Equipment and Furnishings Performance
01 33 00	Submittal Procedures	01 88 00	Other Facility Construction Performance Requirements
01 35 00	Special Procedures	01 89 00	Site Construction Performance Requirements
01 40 00	Quality Requirements	01 90 00	Life Cycle Activities
01 41 00	Regulatory Requirements	01 91 00	Commissioning
01 42 00	References	01 92 00	Facility Operation
01 43 00	Quality Assurance	01 93 00	Facility Maintenance
01 45 00	Quality Control	01 94 00	Facility Decommissioning
01 50 00	Temporary Facilities and Controls		
01 51 00	Temporary Utilities		
01 52 00	Construction Facilities		
01 53 00	Temporary Construction		
01 54 00	Construction Aids		
01 55 00	Vehicular Access and Parking		
01 56 00	Temporary Barriers and Enclosures		
01 57 00	Temporary Controls		
01 58 00	Project Identification		
01 60 00	Product Requirements		
01 61 00	Common Product Requirements		
01 62 00	Product Options		
01 64 00	Owner-Furnished Products		
01 65 00	Product Delivery Requirements		
01 66 00	Product Storage and Handling Requirements		

TECHNICAL SPECIFICATION REVIEWS

General points in reviewing technical specifications

- ☐ The general construction requirements must also be **consistent** with actual project requirements.
- ☐ Review **warranty** and **guarantee** provisions for both acceptability and feasibility.
- ☐ The **contract documents** are intended to be read together and integrated as a whole.
- ☐ All **conflicts** between specification sections, or between specifications and drawings, should be resolved.
 - ❖ **Unless** otherwise stated in the contract, case law generally supports **written specifications** as ruling over graphical information.

OPR and technical specifications

- ☐ The **CM** should review the technical specifications to **confirm** necessary requirements to meet the goals and preferences **set forth in the OPR** are included.
- ☐ The **technical specifications** should include requirements for such things as
 1. Resource management
 2. Indoor air quality requirements
 3. Commissioning of building systems

Scheduling specifications

- ❑ The **CM** should prepare the scheduling specifications based on complexity of the project in terms of
 1. Level of detail
 2. Software required
 3. Scheduling capability of likely contractors for the project

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Scheduling specifications

☐ The CM should

1. **Prepare** the specification section on scheduling
2. **Establish** milestone dates and any constraints
3. If appropriate, placed upon the sequence of the work or duration of key activities.

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Scheduling specifications

- ❑ The **scheduling provisions** must discuss
 1. Preparation and acceptance of the **contractor's schedule**
 2. Responsibility and procedures for **updating** and **revising** the schedule

What if the schedule is resource loaded?

Scheduling specifications

- ☐ If the schedule is to be resource loaded and progress payments made based on the **schedule update**, **scheduling provisions** must agree with the payment provisions of the contract.

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Scheduling specifications

- ☐ The **specifications** should also **clearly outline** how changes may be introduced into the **schedule** in the event unforeseen conditions are encountered.
- ☐ The **CM** should clarify in the **schedule specification** the **basis** upon which the contractor may be entitled to a time extension.

What points to mention about milestones?

Scheduling specifications

- ❑ The CM must also verify that the **achievement** of any milestones is clear, including
 1. Any provisions
 2. Substantial completion
 3. Beneficial occupancy
 4. Final acceptance
 5. Any warranty milestones related to the contractor's fulfillment of the schedule requirements

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Scheduling specifications

Beneficial Occupancy

The use of the constructed facility by the owner prior to final completion of the construction.

Substantial Completion

The date, certified by the designer or CM or both, that the contractor has reached that stage of completion when the facility may be used for its intended purposes, even though all work is not fully completed.

Scheduling specifications

SUBSTANTIAL COMPLETION VERSUS BENEFICIAL OCCUPANCY OR USE

The meaning of *substantial completion* as it applies to a construction project has been found to be somewhat ambiguous. Although the AIA and EJCDC General Conditions both provide a good definition and are quite acceptable as far as they go, they do not determine the responsibilities of the owner, architect/engineer, and contractor, nor do they recommend how certain matters should be resolved.

By a general definition, the owner's occupancy of a project prior to its being 100 percent complete may be defined as "beneficial occupancy." Thus, the terms *substantial completion* and *beneficial occupancy* (or "use") are complementary.

The date of *substantial completion* or *beneficial occupancy* will normally establish the beginning of the specified period on the guarantees, unless a prior commitment has been made for acceptance of a portion of the total project

CONSTRUCTABILITY REVIEW

موسسه مهندسی و مدیریت ساخت علوی پور (ACEMI)

دفتر آموزش



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