



Advancing Professional  
Construction and Program  
Management Worldwide

# CONSTRUCTION MANAGEMENT CORE COMPETENCIES

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A Guide to the Construction Management Core Competencies and their Body of Knowledge

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## CM PROFESSIONAL PRACTICE

- A. The Construction Manager as a Professional
  - 1. CM’s role and responsibilities as a professional and leader
- B. Historical Evolution of CM
  - 1. Early construction management projects
  - 2. Evolution of CM in the public sector
  - 3. Problems encountered at the Federal level
  - 4. Role of associations in the development of CM
  - 5. Role of the Construction Management Association of America (CMAA)
  - 6. Establishment of standards of professional practice
  - 7. Standard forms of agreement
  - 8. Certification of the Construction Manager
- C. Ethics of Professional Practice
  - 1. Ethics as a marketing issue
  - 2. Ethics as a project delivery issue
- D. Delivery Methods for Construction Projects
  - 1. Factors impacting the project delivery function

2. Traditional approach to project delivery
    - a. Contracting options
    - b. Advantages and disadvantages of the traditional system
  3. Design-Build as a delivery system
    - a. Advantages and disadvantages of the design/build approach
  4. Construction Management as a delivery system
    - a. Definitions of CM
- E. Forms of Construction Management
1. Placing CM on the agency at risk spectrum
  2. Legal relationships between owner and CM
    - a. Fiduciary responsibility and the potential conflict of interest
    - b. Defining the CM standard of care
    - c. Creating and maintaining the owner-CM relationship
  3. Forms of CM contract
    - a. CM as an agent of the owner
      - i. Pure Agent
      - ii. ACM-Single Prime
      - iii. ACM-Multi Prime
    - b. Guaranteed Maximum Price CM (GMP)
    - c. CM as an independent contractor
    - d. Dual Services CM
    - e. Extended Services CM
- F. Procurement and Compensation of Professional CM Services
1. Owner selection of the project team
    - a. Determining the project delivery system
    - b. Criteria for the project team
    - c. Selection of the Construction Manager
  2. CM professional services contract issues
    - a. Standard form versus specially developed contracts
    - b. Legal and other review processes
    - c. Public sector procurement of CM services
  3. CM compensation
    - a. Basic CM fee structures
      - i. Fixed fee
      - ii. Fixed fee plus costs
      - iii. Percentage of construction costs
      - iv. Cost reimbursement
      - v. Guaranteed Maximum Price (GMP)

- b. General condition items
- G. Consultant Agreements in CM Practice
  - 1. Relationship of agreements to the project delivery process
  - 2. CM consulting agreements
    - a. CMAA and AIA approaches
  - 3. CMAA standard form contracts
  - 4. Responsibilities defined by the Agency CM Series
    - a. Leadership role of the CM
    - b. General conditions for Agency CM
  - 5. Responsibilities defined by the GMP CM Series
- H. Legal Obligations of the Construction Manager
  - 1. Professional practice liabilities
    - a. Design defects
    - b. Cost estimates
    - c. Scheduling and Coordination
    - d. Inspection
    - e. Contractor payment applications
  - 2. CM Third-Party liability issues
    - a. Contractor claims for project coordination and scheduling
    - b. Personal injury claims
  - 3. Employment practices and labor relations
    - a. Employment discrimination laws
      - i. Civil Rights Act of the 1964 Title VII
      - ii. Americans with Disabilities Act of 1990
      - iii. Age Discrimination in Employment Act of 1967
      - iv. Equal Pay Act of 1963
      - v. Civil Rights Acts of 1866 and 1871
      - vi. Immigration Reform and Control Act of 1986
      - vii. Jobsite labor disputes
  - 4. Drug and alcohol abuse in the workplace
  - 5. Federal compensation law
    - a. Fair Labor Standards Act
    - b. Davis-Bacon Act
    - c. Service Contract Labor Standards Act
  - 6. Parental and family rights
    - a. Family and Medical Leave Act of 1993
  - 7. Employee privacy and statutory individual rights
  - 8. Environmental regulations

- a. Role of the Environmental Protection Agency
- b. CERCLA/Superfund
- c. Resource Conservation and Recovery Act (RCRA)
- d. Clean Air Act
- e. Clean Water Act
- f. National Environmental Policy Act of 1969
- g. Toxic Substances Control Act

## **CM PROJECT MANAGEMENT**

### A. Definitions:

1. Agency
2. Agency CM
3. Beneficial Occupancy
4. Bulletin
5. Changes Conditions
6. Change Order
7. Constructibility
8. Construction Management Plan
9. Construction Manager
10. Critical Path Method
11. Direct Costs
12. Fast Track
13. Force Account
14. Multiple Prime Contracts
15. Phased Construction
16. Project Procedures Manual
17. Quality Assurance
18. Quality Control
19. Schedule of Values
20. Scope Changes
21. Substantial Completion
22. Supplementary Conditions
23. Value Analysis

### B. The Construction Management Plan

1. The purpose and content of the CM Plan
2. Stating measurable objectives for the project
  - a. Methods and standards of measure commonly used to describe projects
  - b. Qualitative/performance criteria essential to describe projects

3. Selecting and prioritizing pertinent reference documents
4. Summarizing detailed project data for team members
5. Organization of the project
  - a. Understanding relationships between project control systems, procedures and tasks
  - b. Types of project organization, decision and authority structures
  - c. Understanding organizational structures of other team members
  - d. Defining the roles and responsibilities of project team members
    - i. Using the “responsibility matrix” to communicate lines of responsibility and authority
6. Site use planning
  - a. Knowledge of construction sequences and operations
  - b. Components required for site mobilization/use over project duration
  - c. Identifying unique site conditions which may impact construction operations
    - i. Alternative or prescriptive sequences to optimize site utilization
7. Contract administration
  - a. Understanding the contractual relationships of team members
  - b. Applications of basic contracting/procurement strategies:
    - i. Single Prime/Multi Prime
    - ii. Lump Sum/Cost Plus/Guaranteed Maximum Price
    - iii. Design-Build
    - iv. Fast Track
    - v. Phased Purchase
    - vi. Long Lead Procurement
    - vii. Owner Assignment
  - c. Identifying and resolving conflicts duplications or omissions in contractual responsibilities
  - d. Developing contract administration and documentation procedures specific to project needs
  - e. Analyzing contracting strategies to meet project cost and schedule goals within legal constraints
    - i. Quantifying the risks and benefits of alternate contracting strategies
8. Risk management
  - a. Understanding the elements of project design and construction likely to give rise to disputes or claims
    - i. General liability risks

- ii. Special liability risks
    - iii. Applying principles and techniques of risk management
    - iv. Available alternative dispute resolution options
      - Applicable laws and standards
  - 9. The Project Procedures Manual
    - a. Purpose and contents
    - b. Level of detail appropriate
  - 10. Project funding
    - a. Preparing information required to support owner's funding requirements (cash flow, budgets, estimates, schedules, program definitions, project descriptions, etc)
- C. Design Professional Selection
  - 1. Design resources required to meet specific project requirements
  - 2. Basic tasks and responsibilities of design professionals
  - 3. Defining criteria for qualifications and experience of design professionals in relation to the project
  - 4. Basic contracting strategies for design professional services
    - a. Understanding design professional contract standards
      - i. Basic service vs. extra services
    - b. The design professional Request for Qualifications/Proposals
    - c. Analyzing the fee proposal and distribution
- D. Construction Contract Documents Development
  - 1. Responsibilities of the parties to a contract
  - 2. Basic forms of agreement
  - 3. Basic content requirements of a complete set of contract documents
  - 4. Sources of risk arising out of design and construction processes
    - a. Sources of design efforts and omissions and construction deficiencies leading to construction problems and disputes
  - 5. Understand degree to which risk can be managed, shifted or insured via construction documents
  - 6. Insurance requirements and options developed by the owner for the project
  - 7. Knowledge of basic building materials, systems and construction techniques
  - 8. Information required for proper coordination of construction processes
  - 9. Understanding how sequences of construction relate to drawings
  - 10. Understanding how drawings and various levels of detail or integrated to create a complete depiction of the project
- E. Procurement of Construction Services
  - 1. Public relations—means of reaching potential bidders

2. Assessing bidding climates
  3. Requirements for selection of pre-qualified bidders for bid advertisement
  4. Assessing and evaluating bidder qualifications relative to project requirements
  5. Understanding basic content required of contract general conditions
  6. Addressing risk management issues in contractor's pre-award meetings
- F. Information Management
1. Defining expected outcomes of the information management system
    - a. Data requirements to meet reporting goals
    - b. Client expectations and requirements
    - c. Appropriate levels of detail
    - d. Distribution of reports
    - e. Procedures for information plan revisions
  2. Providing timely flow of information to the project team
    - a. Overall status and forecast of outcome vs estimate plan
  3. Understanding design report formats
  4. Understanding cost/benefit analyses of various information systems levels
  5. Procedures for retrieval and processing of information
  6. Developing appropriate public relations information
  7. Understand real/perceived impacts of project on the community

## **COST MANAGEMENT**

- A. Project and Construction Budget
1. Conceptual budgeting methods, components and factors
    - a. Interpreting conceptual budgets provided by the owner and assessing impacts on the project cost management plan
    - b. Integrating the owner's conceptual budget into the overall cost management plan
  2. Development of a project/construction budget
    - a. Project and owner objectives and cost constraints
    - b. Procurement strategies, resource availability, productivity and other factors
      - i. Site, market, environmental, escalation, and other terms impacting budget
- B. Cost Management System
1. Defining the purpose and objectives of a cost management system
    - a. Utilizing available resources to develop, coordinate and implement the system
    - b. Understanding the concept of cost planning
  2. Need for and utilization of project feasibility studies

3. Using cost models to monitor cost during progress of design
  4. Cash flow needs and availability based on the project progress schedule
    - a. Developing a compatible cash flow schedule
  5. Impact of external economic factors on project cost
  6. Methods of project funding and how they impact project cost and schedule
- C. Estimating
1. Selection estimating techniques appropriate to the project and its phases
  2. Identifying factors for conceptual estimating
  3. Significance and validity of parameters for cost estimating
  4. Concept of range estimating
  5. Relationship of a quantity survey-based cost estimate to procurement strategies
    - a. Applications of quantity surveys to cost estimating
- D. Cost Compliance Monitoring
1. Defining the objectives of the cost management plan
  2. Developing and implementing a cost monitoring and compliance system utilizing available resources
    - a. Specifying cost monitoring methods and frequency of updating, cost tracking and reporting
- E. Design Phase Cost Management
1. Estimating the cost and budget impact of design elements
  2. Evaluating design detail and changes and estimating their cost impact on the budget
  3. Establishing effective value analysis program
    - a. Alternate systems, methods, components and materials
    - b. Trade off factors in terms of first vs lifetime cost, availability, time of delivery, esthetics, etc.
- F. Construction Phase Cost Management
1. Specifying cost monitoring and management procedures
  2. Understanding risks of project budgeting and cost analysis efforts
  3. Specifying, developing and implementing an effective schedule of values for prompt and equitable payment requests evaluation
    - a. Specifying, developing and implementing an integrated cost-loaded schedule
  4. Developing and implementing an effective change order control and evaluation system
    - a. Factors governing cost changes during construction
  5. Specifying, developing and implementing an effective procedure for controlling, analyzing and evaluating cost of potential claims
- G. Cost Control



1. Utilization of manhour/cost forecasting productivity studies, impact analysis, efficiency losses, etc
2. Bid preparation and review and contract awards
  - a. Contracting procedures and types; advantages and constraints
3. Interactions and relationships among project development team
  - a. Responsibilities and management structure of project management team

## TIME MANAGEMENT

- A. Time Management System
  1. Relationship between project requirements and scheduling requirements
  2. Understanding costs of implementing various scheduling systems
- B. Schedule Development
  1. Understanding how schedule types are developed and utilized
    - a. Common scheduling terms:
      - i. Float, fragnet, activity, loop precedence, time-scaled network, etc.
    - b. Determining appropriate level of detail for each type of schedule and project phase
    - c. Applications of a cost-loaded schedule
    - d. Types of bar graphs and CPM schedules
    - e. Costs and benefits of manually prepared and computer generated schedules
    - f. Available computer programs for scheduling and their applications on various types and sizes of projects
  2. Scheduling reports
    - a. Selection and sorting of activities
    - b. Utilization of reports
    - c. Frequency of progress reporting as it relates to project type and phase
    - d. Graphic approaches to progress reporting
    - e. Summarizing schedule reports information into the project narrative
    - f. Specifying report format (manual and computer generated) at the appropriate level for project participants
- C. Pre-Design Scheduling
  1. Application of resources to the project schedule
  2. Identification of project milestones
    - a. Schedule calculations
    - b. Forward and backward pass
    - c. Determining the critical path for a simple network
    - d. Early/late dates and float values for activities in a network

- e. Evaluating progress on activities and determining relative percentages for work progress
- D. Design Phase Scheduling
  - 1. Difference between statusing the schedule for progress (updating) and revising the schedule to reflect changes that have or will occur
  - 2. Implementing schedule revisions and assessing and minimizing impact on project dates and costs
- E. Construction Phase Scheduling
  - 1. Understanding when a recovery schedule should be required during the course of a project
    - a. The relationship of the recovery schedule to the base project schedule
    - b. Determining the appropriate period of schedule recovery
    - c. Types and uses of forms of recovery schedules
  - 2. Schedule impact of suspension of work, concurrent delays, compensable and non-compensable delays
  - 3. Time impact analysis using as-planned, as-adjusted and as-built schedules
  - 4. Float—its use and legal implications
  - 5. Preparation and use of change order fragnets
  - 6. Defining procedures for management of schedules to avoid risks
    - a. Impact of change orders on schedule
    - b. Anticipating potential claims for time extensions
    - c. Using the schedule to evaluate and mitigate potential claims
    - d. Being “claims conscious”
  - 7. Understanding risks of management of schedules
  - 8. Understanding how the reporting and document control system interacts with the change order process extensions

## QUALITY MANAGEMENT

- A. Preparing the Quality Management Plan
  - 1. Purpose and content of the Quality Management Plan
  - 2. Elements that comprise the quality management portion of a project budget
  - 3. Defining client/owner/user objectives and goals and incorporating them into the Quality Management Plan
  - 4. Stating measurable quality objectives for the project
  - 5. Distinguishing quality management systems and their applicability to different contracting methodologies
  - 6. Understanding the interrelationships between basic project systems, procedures, and task elements and their relationship to quality management

7. Integrating contract drawings, specifications, general and special provisions, codes, submittals, changes and applicable regulations into quality management
  8. Computer software available for project, cost, and schedule management and estimating
  9. Understanding how the Quality Management Plan integrates into other project plans and procedures
- B. Selecting the Project Team
1. Understanding the selection process
  2. Defining measurable (qualifications) data for selecting project participants
- C. Design Phase Quality Management
1. Requirements for design reviews: program, technical, constructibility, etc
    - a. Understanding the purpose of a constructibility review
    - b. Identifying construction elements which affect the quality of the work
  2. Evaluating bid submittals with regard to quality requirements
- D. Construction Phase Quality Management
1. Conformance of work to contract documents and applicable codes and regulations
  2. Understanding which items of work require inspection
  3. Relationship to the overall project quality of:
    - a. Periodic monitoring, observation and inspection
    - b. Implementation of a project documentation procedure
    - c. Management of change order procedures
    - d. Risk management during the construction phase
      - i. Monitoring of project safety plans and implementation of safety plans for CM's own employees
      - ii. Responsibility of contractors for safety of contractors' employees
      - iii. Assigning responsibility for managing claims
- E. Field Inspection Services
1. Use and capabilities of construction materials used
  2. Inspection reports and assessing their impact on the project
  3. Evaluating the inspection capabilities of inspection services companies and staff
- F. Construction Quality Control Plan
1. Purpose and content of the Construction Quality Control Plan (CQC)
- G. Material Acceptance
1. Understanding which materials require testing on the project
  2. Evaluating capabilities of material testing companies
  3. Establishing minimum or maximum criteria for materials to be tested
  4. Determining applicable codes and regulations pertinent to materials being tested
  5. Material testing reports and assessing their impact on the project

6. General use and capabilities of materials used in construction
  7. Material performance and its relationship to project quality
  8. Developing corrective procedures for deficient and on-conforming work
- H. Quality Management Documentation
1. Quality control document retrieval and archival
    - a. Identifying quality management data requiring tracking
    - b. Procedures for communicating quality management data to other project parties

## **CONTRACT ADMINISTRATION**

- A. Project Contract Format
1. Evaluating a project to determine the appropriate delivery technique(s)
  2. Understanding risk sharing methods
  3. Defining the roles and responsibilities of the parties under each delivery technique
  4. Defining advantages and disadvantages of each delivery technique
- B. Design Phase Contract Administration
1. Understanding design processes and procedures
  2. Importance of team member communication and interaction
  3. Understand the project milestone schedule
  4. Defining design phase milestones, tasks and responsibilities of team members
    - a. Understanding design requirements at various design milestones (concept, schematic, design development etc)
  5. Understanding the requirements for different types of design reviews (program, technical, constructibility, etc)
  6. Project legal requirements relative to proprietary specifications
  7. Documenting results of design reviews and communicating same to team members
- C. Construction Procurement
1. Understanding construction contracting delivery methods
  2. Bid packaging concepts and bid package interface requirements
    - a. Bid packaging related to project needs and market conditions
  3. Disputes avoidance procedures and team building (partnering) concepts
  4. Developing a construction contract procurement plan
  5. Reading and understanding contract documents
  6. Market survey techniques and procedures
  7. Contractor pre-qualification techniques
  8. Preparing a project advertisement
  9. Understanding bid process protocol
    - a. Bidding regulations in the public sector

- b. Importance of consistency in the bid process
    - c. Bid and performance guarantees, such as bid and performance bonds, letters of credit, etc
  - 10. Defining bid package scope and cost
    - a. Understanding project needs in terms of the bidding process
    - b. Negotiation procedures relative to determining bidder understanding of scope of requirements
  - 11. Contractor needs relative to bidding
  - 12. Establishing procedures for conducting bid evaluations
  - 13. Preparing recommendations for contract awards
- D. Contract Document Preparation
  - 1. Contract provisions, general conditions and special conditions and their interaction and precedence
    - a. Applicable provisions for tax exempt status, wage rates (Davis Bacon), and minority participation
  - 2. Project and jurisdiction permit, insurance and labor requirements
  - 3. Specification requirements of the contract, including inspections required during manufacture and at delivery
- E. Communications Procedures
  - 1. Defining documentation requirements for all aspects of the project
- F. Construction Phase Contract Administration
  - 1. Construction contract methods
    - a. fixed price contracts
    - b. Fixed fee plus cost contracts
    - c. Guaranteed maximum price contracts
    - d. Negotiated contracts
    - e. Time and material contracts
  - 2. Developing a checklist for contract deliverables
  - 3. Monitoring contractor compliance with contract requirements
  - 4. Documentation requirements for all aspects of the project
    - a. Defining a system for contract documentation
    - b. Project communications portion of the Project Procedures Manual
    - c. Purpose of and interaction between contract document requests for information, owner directives, submittals, changes orders, periodic contract reports, photographs, payment requests, and related documents
  - 5. Understanding team members' responsibilities relative to the submittal process
    - a. Defining the flow process for all submittals
    - b. Defining a contract change

- c. Requirements relative to as-built drawings
      - i. Defining the process for as-built review and approval
    - d. Requirements for shop drawings, coordination drawings, change orders, field orders, requests for information, etc
  - 6. Specification requirements of the contract, including inspections required during manufacture and at delivery
  - 7. Contractor's procurement, expediting, delivery and installation processes relative to material and equipment furnished by contractor or owner
  - 8. Defining contractors' responsibility for quality
    - a. Criteria for quality in construction and understanding when criteria are not being met
    - b. Corrective procedures for deficient and non-conforming work
- G. Project Closeout
  - 1. Relationships among and responsibilities of team members relative to project acceptance and closeout
  - 2. Establishing the process and documentation required during the acceptance and closeout process
  - 3. Preparing and administering punch lists
    - a. Understanding guarantees, warranties, and punchlist requirement
    - b. Processes for inspection and correction of work
    - c. Defining team member responsibilities and timing for inspection and correction
  - 4. Roles of sureties and regulatory agencies in closeout and acceptance process
  - 5. Requirement for submission, collection and assembly of operating and maintenance information
  - 6. Understand contract requirements relative to record documents
    - a. Project requirements for permanent retention of project files and submittals
    - b. Legal requirements for retention of project files
    - c. Documentation requirements for turnover
  - 7. Establishing a tracking procedure for all closeout items
    - a. Items which require finalization, such as changes, claims, training, punchlist, guarantees/warranties, certification of substantial completion, final lien waivers
  - 8. Issue resolution process pertaining to open changes and claims
  - 9. Requirements for operational training
    - a. Scheduling and documentation of training performed
  - 10. Project requirements to be completed prior to final payment

- a. Understanding project accounting records
11. Occupancy/start-up requirements

## **SAFETY MANAGEMENT**

- A. Sources of Safety Liability
  - 1. Contractual services and the CM's duty to injured workers
  - 2. Actions of the CM and the duty to injured workers
  - 3. Liability imposed by statute
  - 4. State-level safety legislation
  - 5. The Occupational Safety and Health Act (OSHA)
- B. Immunity and Indemnity from Safety Risk
  - 1. Insurance coverage for safety-related claims
  - 2. Applicability of Workers' Compensation Laws
  - 3. Indemnification for safety
- C. Safety Records
  - 1. Purpose of pre-qualifying contractors
  - 2. Contractor's OSHA 200 form
  - 3. Understand incident, frequency, and severity rates for comparison with national averages
  - 4. Importance of the contractor's Experience Modification Rate (EMR)
- D. Project Safety Manual
  - 1. Basic components of a Safety Program
    - a. Review of contractor jobsite safety programs
- E. Project Emergency Plan
  - 1. Coordination of police, fire, rescue, and emergency medical services prior to beginning construction
- F. Contractor's Safety Program
  - 1. Need to avoid assumption of other parties' safety responsibilities
  - 2. Risks associated with on-site safety and the respective roles and responsibilities of on-site employers
  - 3. Role of labor and safety participation
  - 4. Safety coordination among contractors
  - 5. Job hazard analysis
  - 6. Contractor and CM safety training requirements
  - 7. Safety enforcement responsibilities
  - 8. Role of the Project Safety Committee
- G. Allocating Risk
  - 1. Risk identification and assessment

2. Risk allocation principles
- H. Insurance for CM Services
    1. Common project risks
    2. Types of insurance coverage
    3. Insurance requirements for projects
  - I. Alternative Forms of dispute Resolution
    1. Arbitration
    2. Mediation
    3. Mini-Trial
    4. Dispute Review Board
    5. Mediation/Arbitration
  - J. Partnering
  - K. Definition
  - L. Benefits to the parties
  - M. Process of partnering