



مؤثرترین سیستم برای مدیریت پروژه‌های صنعت ساخت

ارائه دهنده:

سید محمدرضا علوی پور

CMAA Authorized Trainer

(PhD, PMP, CMIT)

دانشگاه Illinois Tech آمریکا



About me

- ❑ Founder and CEO of Alavipour Construction Engineering and Management Institute (**ACEMI**)
- ❑ PhD in Construction Engineering and Management (**Illinois Tech**)
- ❑ **CMAA Authorized Trainer**
- ❑ Former Research Assistant (Professor **David Arditi**)
- ❑ Former Teaching Assistant (Professor **Raymond Lemming**)
- ❑ Former Research Associates of Construction Management Association of America (**CMAA**)
- ❑ Former Research Associates of Management Practices in Construction Industry (**MPIC**) of American Society of Civil Engineers (**ASCE**)
- ❑ Project Management Professional (**PMP**)
- ❑ Construction Manager in Training (**CMIT**)
- ❑ **Author** of 1st Construction Management Standard (Written in Farsi)
- ❑ **Translation** of 2nd **SCL Delay and Disruption Protocol** (Translated in Farsi)
- ❑ **Outstanding Reviewers** selected by the editor of COENG (ASCE) Journal (2021)
- ❑ **Outstanding Reviewers** selected by the editor of Journal of Procurement for 2022 (ASCE) Journal (2021)
- ❑ The member of **International Construction Law Conference Committee** (2020 & 2022)
- ❑ The referee of **1st National Construction Law Competition** (2022)
- ❑ Lecturer of many conferences internationally
- ❑ Researcher, Reviewer of international publications, Instructor and Consultant for more than 15 years



About me


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CMAA Authorized Trainers

A CMAA Trainer has successfully completed the Train the Trainer course and is authorized to teach CMAA's Body of Knowledge, which focuses on the core competencies of construction management, for CMAA or a CMAA license agreement holder. CMAA Trainers are proficient in instructing all levels of learners, from those seeking basic and fundamental CM skills to experienced professionals. CMAA Trainers can also assist with effective preparation for the [Certified Construction Manager \(CCM\)](#) exam and the [Professional Construction Management \(PCM\) Course](#).

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Name	Organization	City	State
M. Hosney Abdelgelil	AECOM	Houston	TX
David Ahern, CCM	Orange County Public Works	Santa Ana	CA
Jumoke Akin-Taylor	San Francisco Department of Public Works	San Francisco	CA
S. M. Reza Alavipour, Ph.D., CMIT	Alavipour Construction Engineering and Management Institute (ACEMI)	Tehran	Iran
Mohammed Aljuboori, CCM	Hill International, Inc.	Haverhill	MA
Kimberly Armstrong	Naval Facilities Engineering Systems Command NAVFAC	Washington	DC
John Arrabito, PE, CCM	Port Authority of NY & NJ	Brooklyn	NY



About me





About me



CMAA Trainer

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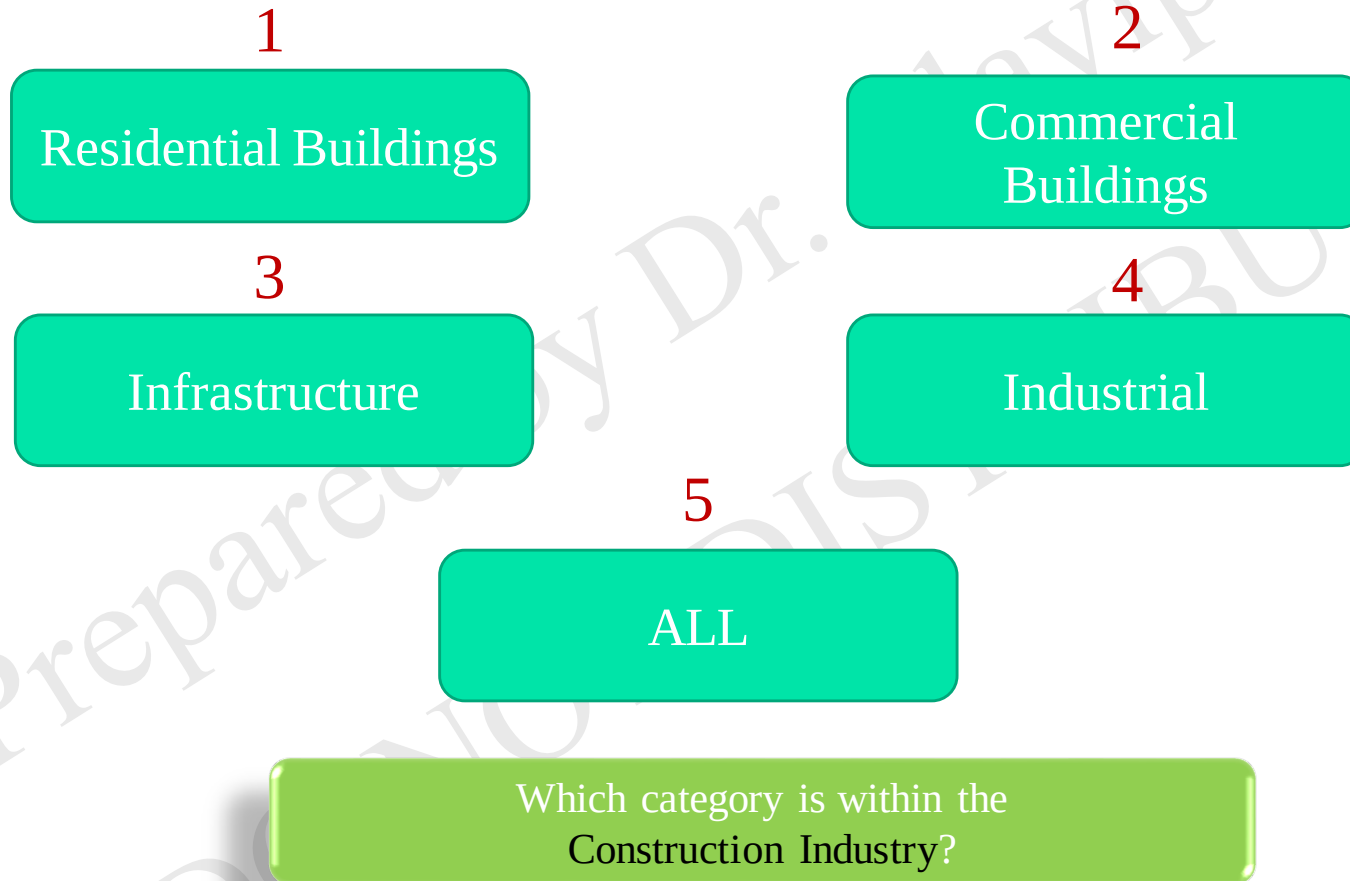
What we will learn?

- ☐ Q #1
- ☐ Q #2
- ☐ Q #3
- ☐ Q #4
- ☐ Q #5
- ☐ Project delivery methods
- ☐ Key construction management tools
- ☐ Key skills and functions of the successful construction manager
- ☐ Construction management from pre-design to post-construction

QUESTIONS



Question #1





Question #2

1

History of
Project
Management

2

History of
Construction
Management

Which one has older history?

Question #3

1

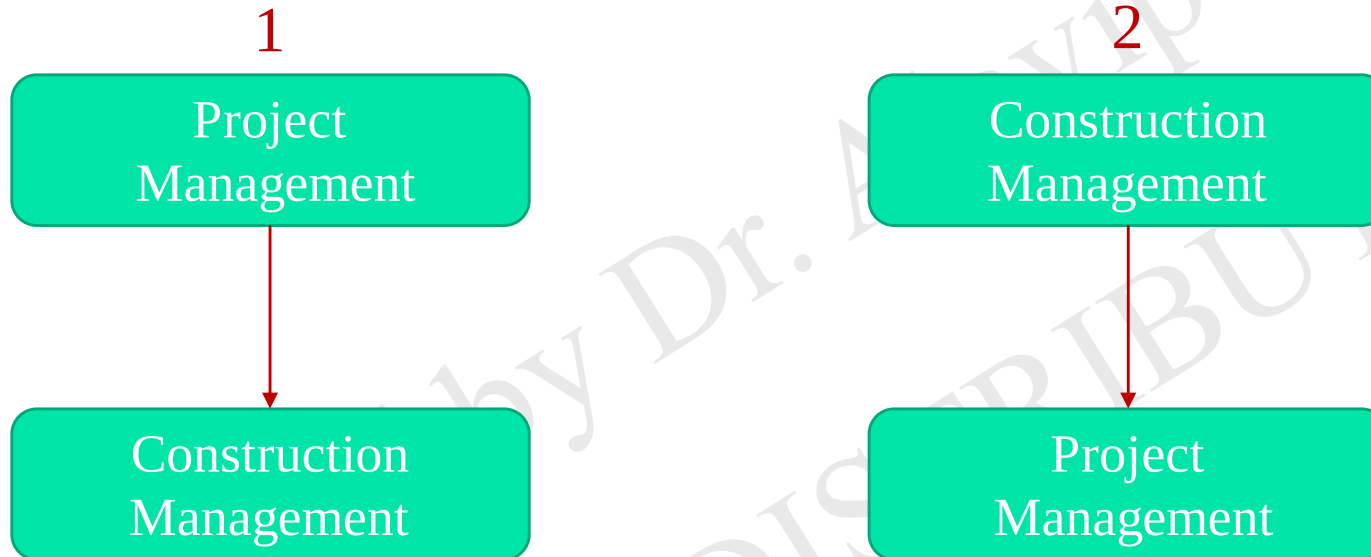
Standards of
Project
Management

2

Standards of
Construction
Management

Are they different?

Question #4



Which one is the true representation of Construction Management?



Question #5

1

Project
Manager

2

Construction
Manager

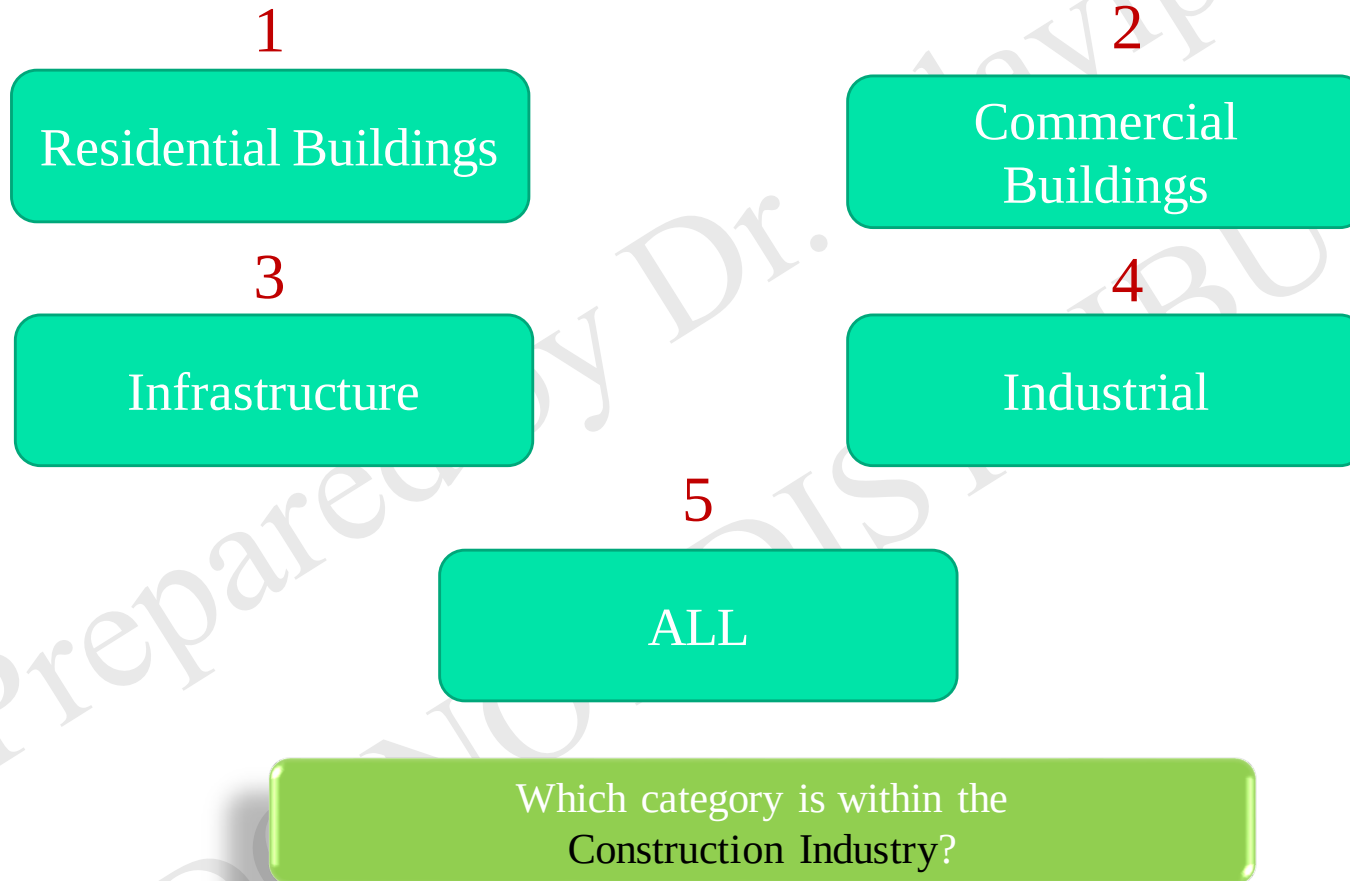
Who is the Leader and added in early stage to the Construction Projects?

Answer to Q #1:

Sectors of Construction Industry



Question #1





Sectors of Construction Industry

- ❑ Based on
 - ❖ North American Industry Classification System (NAICS)
 - ❖ Construction Management Association of America (CMAA)
 - ❖ Construction Industry Institute (CII)
 - ❖ Many Construction Management Books published in USA

There generally are **five basic sectors** of the industry:

- ◆◆ Residential building
- ◆◆ Commercial building
- ◆◆ Heavy civil construction
- ◆◆ Industrial construction
- ◆◆ Environmental construction

Answer to Q #2:

History of Project Management

Vs.

History of Construction Management



Question #2

1

History of
Project
Management

2

History of
Construction
Management

Which one has older history?



The history of general project management



2013



Strategic Accredited
Training Organizations

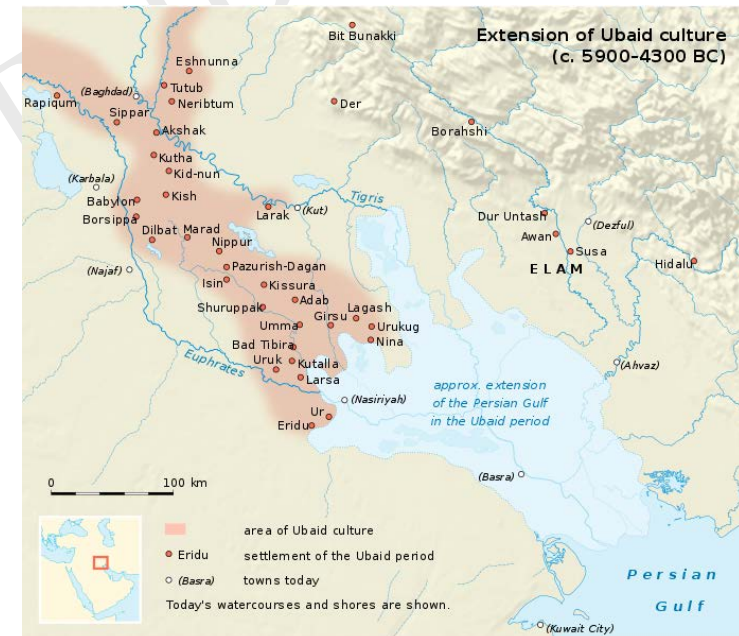
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QP3M3[®] | QP3O[®] | QMoP[®] | QMoV[®]

The history of construction management

❑ For about 3,000 to 4,000 years ago

1. Construction Management
2. Construction Law

Does general project management talk about
CONSTRUCTION LAW?





The history of construction management

 AMERICAN SOCIETY OF CIVIL ENGINEERS	1852	 CONSTRUCTION INSTITUTE	1975 2000
 The American Institute of Architects	1857	 Construction Management Association of America	1982
	1913	 Construction Industry Institute®	1983
 AGC THE CONSTRUCTION ASSOCIATION	1918	 The Society of Construction Law	1983
 aace International The Authority for Total Cost Management.	1956	 Lean Construction Institute Transforming Design and Construction	1997



The history of construction management

Historical perspective of CM

- ❑ 1852 American Society of Civil Engineers (**ASCE**)
- ❑ 1857 American Institute of Architects (**AIA**)
- ❑ 1888 AIA first published the Uniform Contract for use between owner and contractor
- ❑ 1911 First Set of Standard Documents of AIA
- ❑ 1913 Fédération Internationale des Ingénieurs Conseils (**FIDIC**)
- ❑ 1918 Associate General Contractors of America (**AGC**)
- ❑ 1956 American Association of Cost Engineering (**AACE**)



The history of construction management

Historical perspective of CM

- ❑ 1967 Associated Schools of Construction (**ASC**)
- ❑ The term “**construction management**” has become part of the construction vocabulary in the **late 1960's**.
 - ❖ **PMI founded in 1969.**
- ❑ Many architect/engineers and contracting companies claim that they have been practicing it for years **even before the 1960's**.
- ❑ It is generally accepted that the term reached a “**professional**” meaning **after 1970**.



The history of construction management

Historical perspective of CM

- ❑ 1971 American Institute of Constructors (**AIC**)
- ❑ 1972 Associate General Contractors of America (**AGC**) Guidelines
- ❑ 1973 American Institute of Architects (**AIA**) Form of Agreement
- ❑ 1974 **AGC** Form of Agreement
- ❑ 1975 American Society of Civil Engineers (**ASCE**) Committee on CM (current **MPIC**)
 - 1976 Definition of CM Process
 - 1979 Definition of CM Tasks
 - 1979 Specs for CM Services
 - 1979 Contractors' Views on CM
 - 1980 A/E's Views on CM

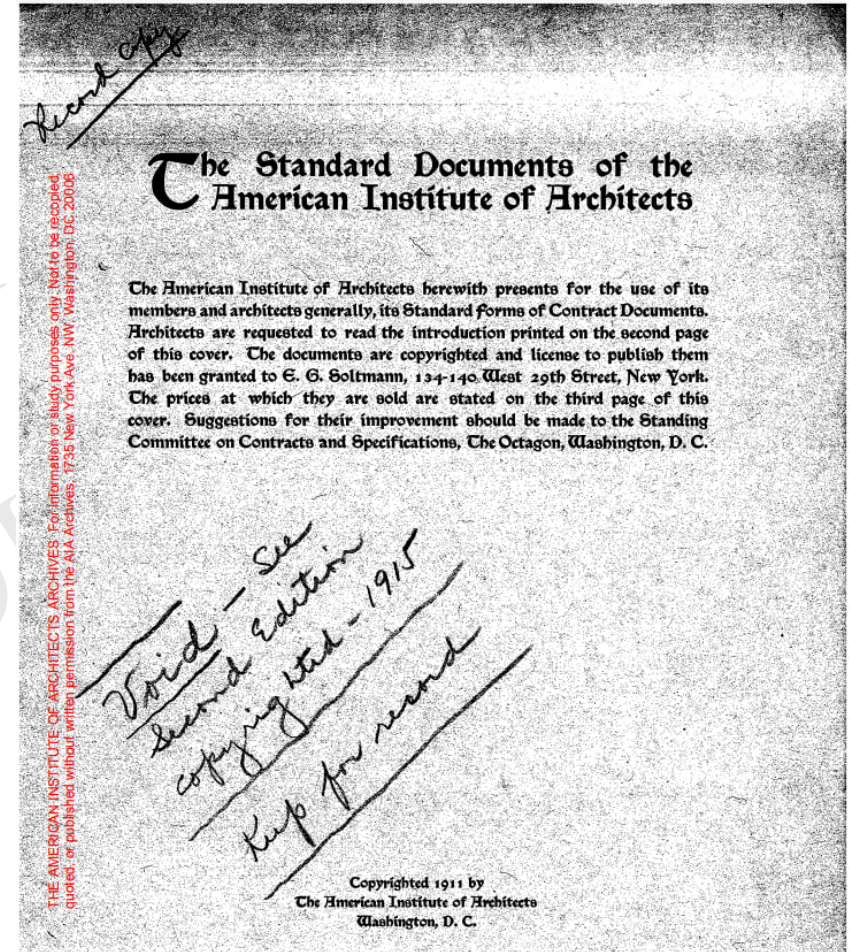
The history of construction management

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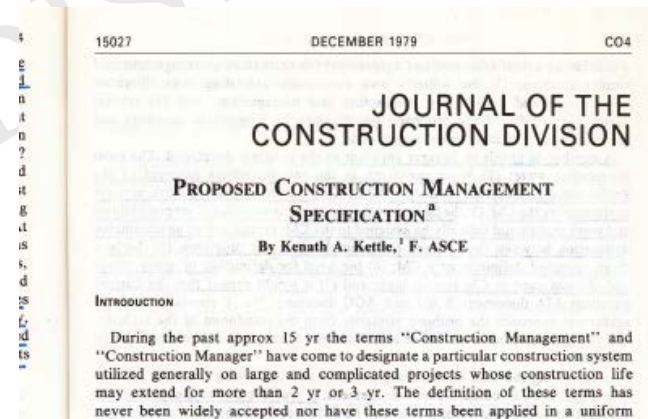
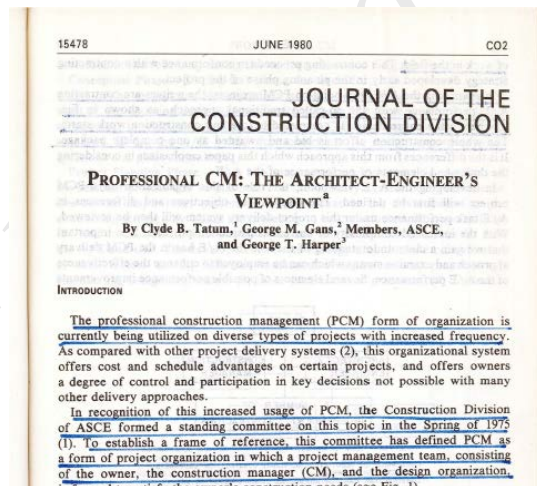
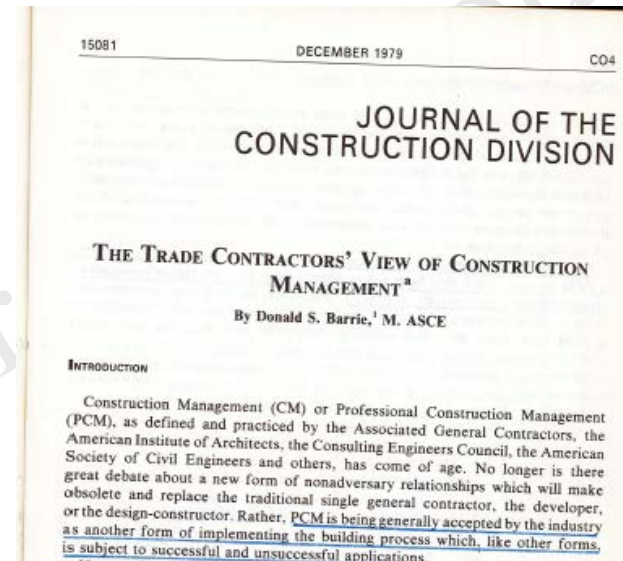
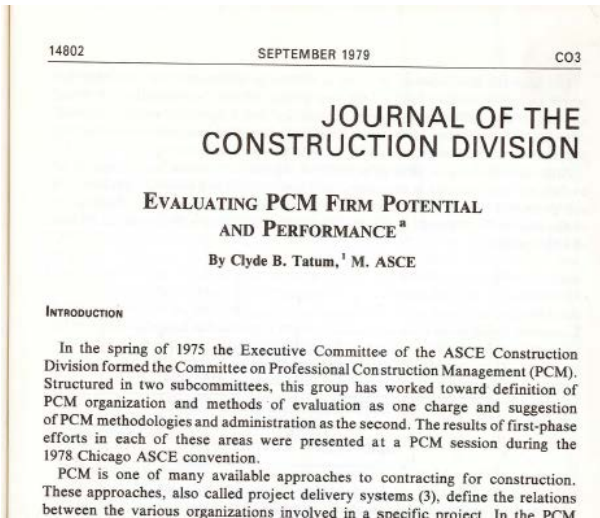
FORM OF CONTRACT
ADOPTED BY THE JOINT COMMITTEE OF THE
AMERICAN INSTITUTE OF ARCHITECTS,
THE
WESTERN ASSOCIATION OF ARCHITECTS
AND THE
NATIONAL ASSOCIATION OF BUILDERS.

ARCHITECT .

This Agreement, made the _____ day of _____
in the year one thousand _____ hundred and _____
by and between _____
_____ part of the first part,
(hereinafter designated the *Contractor*) and _____
_____ part of the second part
(hereinafter designated the *Owner*)
Witnesseth that the Contractor , being the said part of the first part, in consideration of the covenants and agreements herein contained on the part of the Owner , being the said part of the second part, do covenant, promise and agree with the said Owner , in manner following, that is to say:
1st. The Contractor shall and will well and sufficiently perform and finish, under the direction, and to the satisfaction of _____ Architect (acting as Agent of said Owner), all the work included in the _____



The history of construction management





The history of construction management

Historical perspective of CM

- ❑ 1982 Construction Management Association of America (**CMAA**)
1986 Manual of Practice
- ❑ 1983 Construction Industry Institute (**CII**)
- ❑ 1989 Engineering News Record (**ENR**) Top 100 CM Firms
- ❑ 1997 Lean Construction Institute (**LCI**)
- ❑ 1999 CM Contracting System (**Haltenhoff**)
- ❑ 2000 ASCE Construction Industry (**CI**)



The history of construction management

The CMAA logo is displayed in a large, bold, blue serif font. It is centered within a white rectangular box that has a blue vertical bar on its left side. The background of the slide features a faint, large watermark of the word 'Alavipour' and the letters 'JTE'.

Mission

The Mission of CMAA is to promote the profession of Construction Management and the use of qualified Construction Managers on capital projects and programs.

The history of construction management

In 2013, the Construction Industry Institute (CII) endorsed the CCM credential and *“urged its member companies to seriously consider the benefits the CCM can bring to the execution of their capital projects.”*



In 2016 the Society of American Military Engineers (**SAME**) endorsed the CCM, stating *“The Society’s determined that the CCM clearly identifies the most experienced and effective professional construction managers. Earning the CCM can advance your career, strengthen your proposals, and help you deliver successful projects.”*

The history of construction management



Answer to Q #3:

**Standards of
Project Management**

Vs.

**Standards of
Construction Management**

Question #3

1

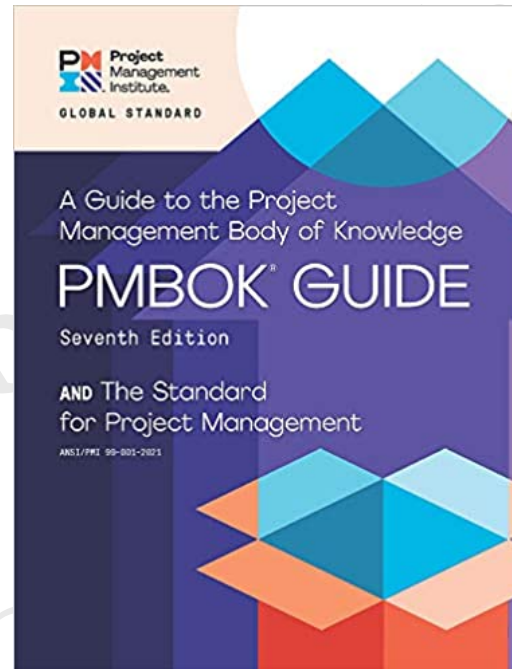
Standards of
Project
Management

2

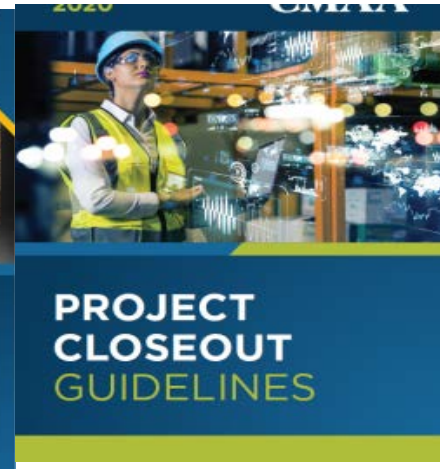
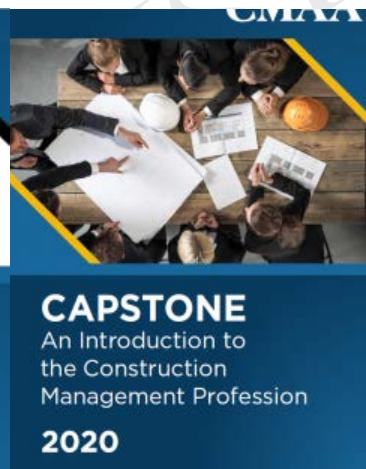
Standards of
Construction
Management

Are they different?

Project management standards

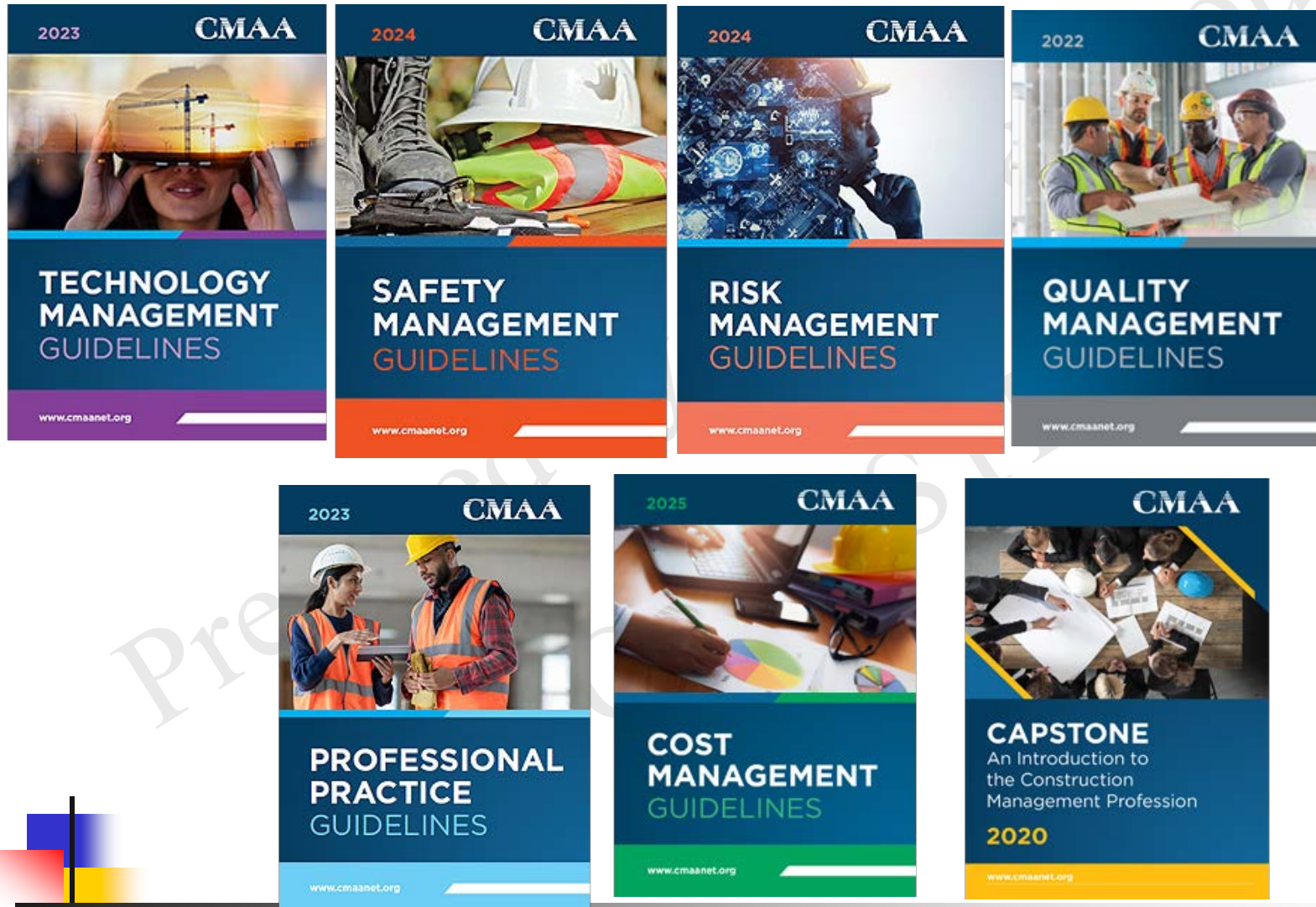


Construction management standards

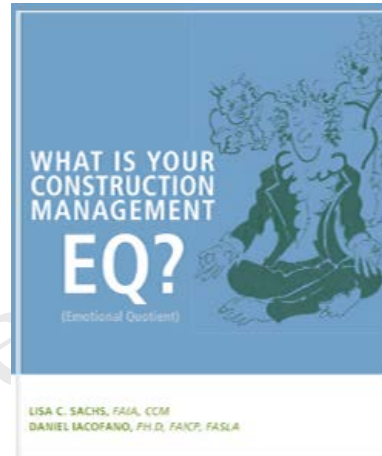
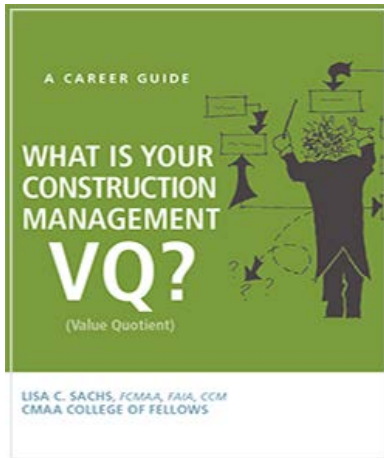




Construction management standards



Construction management standards



The history of construction management

Trends in Expectations about Duties and Responsibilities of Construction Managers

David Arditi, M.ASCE¹; S. M. Reza Alavipour, Ph.D.²; and
The Committee on Management Practices in Construction (ASCE Construction Institute)

Abstract: This paper discusses the findings of a study conducted under the direction and supervision of the ASCE Committee on Management Practices in Construction (MPIC) to investigate the expectations of the parties involved in the construction process including designers, general contractors, subcontractors, owners, construction managers (CMs), and educators, relative to construction managers' duties and responsibilities. Statistical analysis was conducted to investigate if consensus exists among the parties and to highlight the agreements and disagreements between them. The findings were compared against the findings of an identical study also commissioned by MPIC 10 years before this study was performed. This study raises awareness among project participants about the fact that they should reconcile their differences and have a common understanding of CM duties over all phases of the construction project since general agreement over CM duties makes CM scope negotiations all the easier. DOI: 10.1061/(ASCE)CO.1943-7862.0001661. © 2019 American Society of Civil Engineers.

Author keywords: Designers; General contractors; Subcontractors; Owners; Construction managers; Construction management.

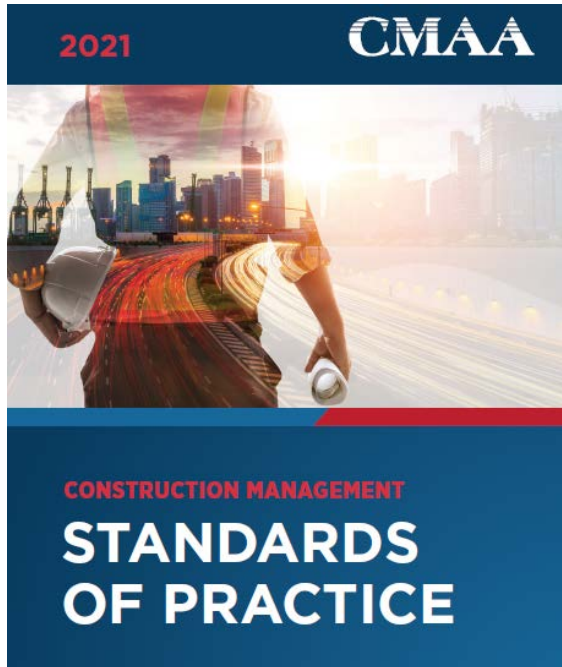


The history of construction management

Acknowledgments

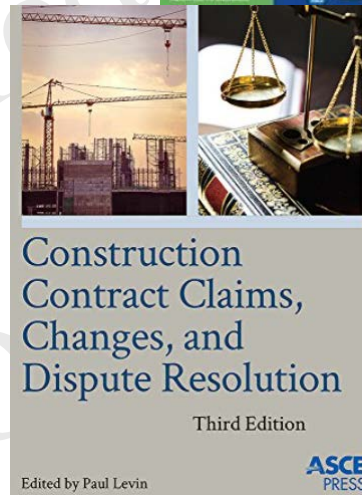
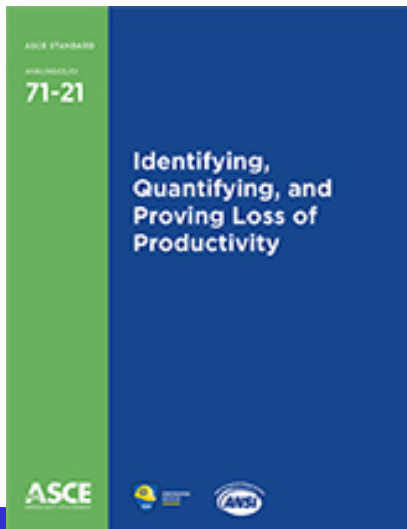
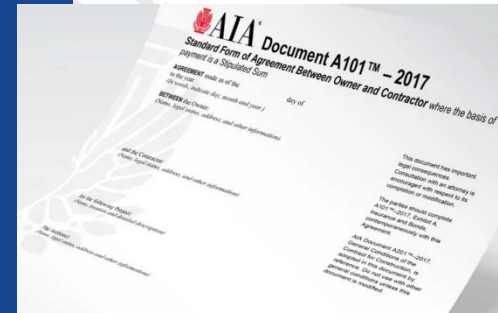
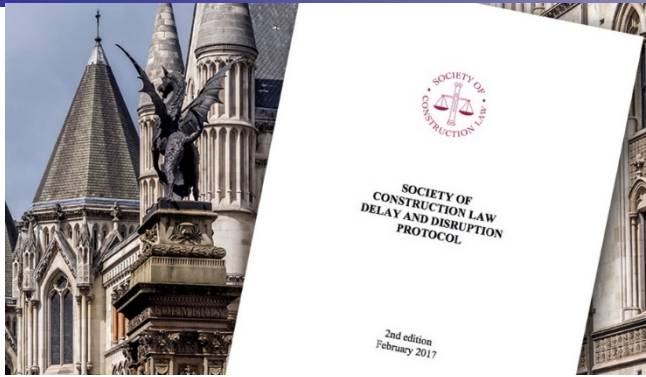
We gratefully acknowledge the financial support of ASCE and CMAA, in particular the help of Katerina Lachinova, executive director of the ASCE Construction Institute, and Bruce d'Agostino, former president of CMAA. We are thankful for the guidance, patience, and encouragement provided by the Committee on Management Practices in Construction (MPIC) of the ASCE Construction Institute. At the time this research was conducted, the members of the Committee on MPIC included Dr. Jennifer Shane (chair), Iowa State University, Ames, Iowa; Sean Mulholland (vice chair), Penrose/St. Francis Health Services, Colorado Springs, Colorado; Cary M. Junior (secretary), Malise Associates, Inc., Detroit; David S. Adams, Gannett Fleming, Inc., Lincoln, California; David Ardit, Illinois Institute of Technology, Chicago; Debra Brisk, Plymouth, Minnesota; Thomas A. Broz, Stantec Consulting Services, Inc., Irvine, California; Gabriel Cajigas, Tenaris/Gabca: PMO Eng., Humble, Texas; Raymond R. Crawford, WSP | Parsons Brinckerhoff, Inc., Herndon, Virginia; Melbourne Garber, Gideon GRC Consulting, Syoset, New York; Abdul Iscandari, WSP | Parsons Brinckerhoff, Inc., Chicago; Matthew M. McDole, LS Gallegos & Associates, Centennial, Colorado; Terry W. Micheau, S.P.U.R., San Francisco; Sinem Mollaoglu, Michigan State University, East Lansing, Michigan; Mehmet Egemen Ozbek, Colorado State University, Fort Collins, Colorado; Zachary Pucel, TranSystems, Schaumburg, Illinois; John E. Schaufelberger, University of Washington, Seattle; Asregedew Woldeesenbet, University of Nebraska–Lincoln, Omaha, Nebraska.

The history of construction management



<https://dralavipour.com/publications/construction-management-standards-of-practice>

Construction management standards



ICMS

ICMS: Global Consistency in Presenting
Construction Life Cycle Costs and Carbon
Emissions

3rd edition, November 2021

ICMS Coalition



Construction management standards

Portal
1

Knowledge Areas

Knowledge Areas Portal:

Portal
2

Project Phases

Portal
3

Project Functions or Roles

Portal
4

Best Practices

Portal
5

10-10 Metrics

Best Practices

A CII Best Practice is a process or method that, when executed effectively, leads to enhanced project performance. CII Best Practices have been proven through extensive industry use and/or validation.

[Home](#) > [Best Practices](#)

Click or tap on a Best Practice below to begin. Each Best Practice listing provides a secondary filter to narrow down results by project phase.

Advanced Work Packaging

Alignment

The condition where appropriate project participants are working within acceptable tolerances to develop and meet a uniformly defined and understood set of project objectives.

All Alignment Topic Summaries (3)

- Feasibility (2)
- Concept (3)
- Detailed Scope (3)
- Detailed Design (Engineering) (2)
- Procurement (2)
- Construction (2)
- Commission & Startup (2)
- Handover & Close-out (2)

Benchmarking & Metrics

Change Management

Constructability

Disputes Prevention & Resolution

Portals

[Knowledge Areas](#)
[Project Phases](#)
[Project Functions or Roles](#)
[10-10 Metrics](#)
[Best Practices](#)
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More filter options

Best Practices

[Best Practices Program](#)
[CII Best Practices Guide](#)
[Improving Project Performance, Version 4.0](#)
[CII Clinics](#)
[RT-166 Barriers to Implementation](#)
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[Best Practices Definitions](#)
[Glossary](#)

Construction management standards

How Oracle's Primavera Unifier Supports Best Practices A Digital Data Thread



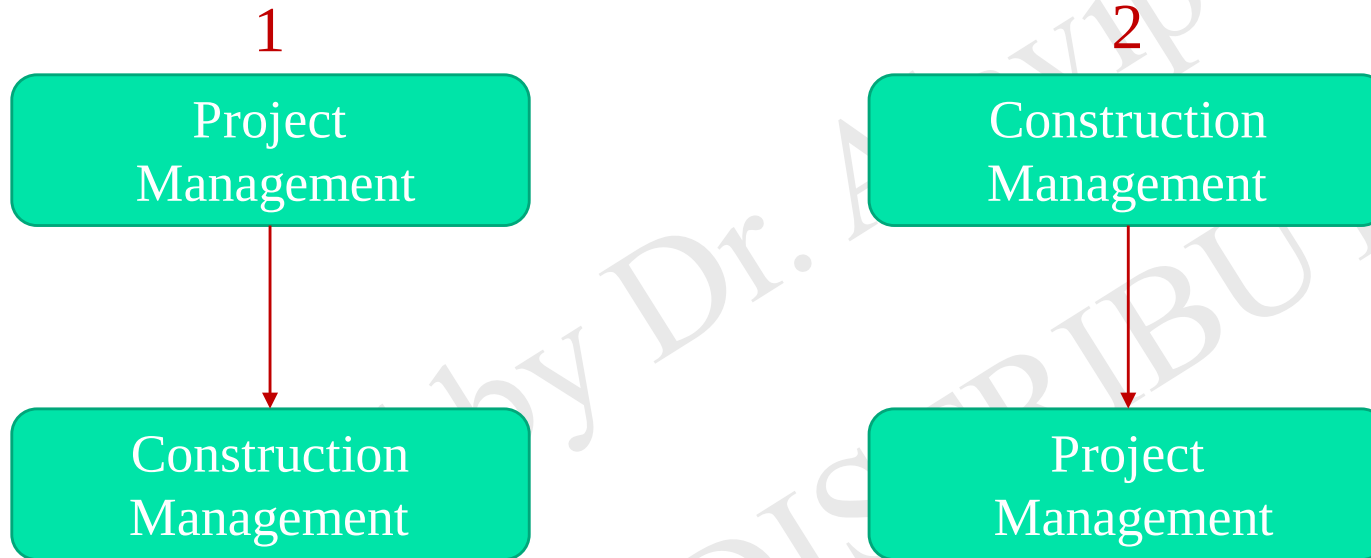
Answer to Q #4:

Construction Management Definition

Vs.

Project Management Definition

Question #4



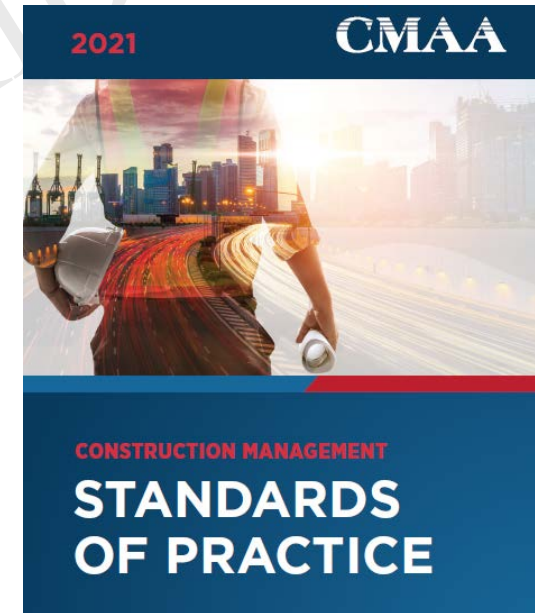
Which one is the true representation of Construction Management?

Construction management vs. project management

Construction Management

❑ A professional management practice applied to construction projects from project **inception to completion** for the purpose of controlling

1. Time
2. Cost
3. Scope
4. Quality



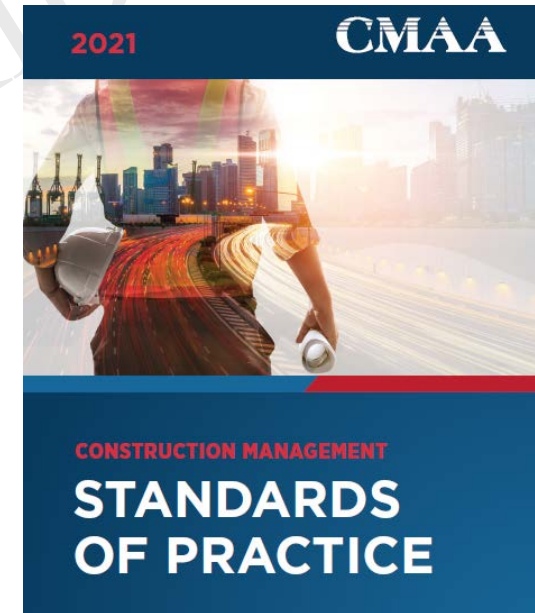
Construction management vs. project management

Construction Management

- ❑ A professional management practice applied to construction projects from project **inception to completion** for the purpose of controlling
 1. Time
 2. Cost
 3. Scope
 4. Quality

Project Management

- ❑ As applied to a construction project, the use of integrated systems and procedures by the **project team** to **accomplish** design and construction.



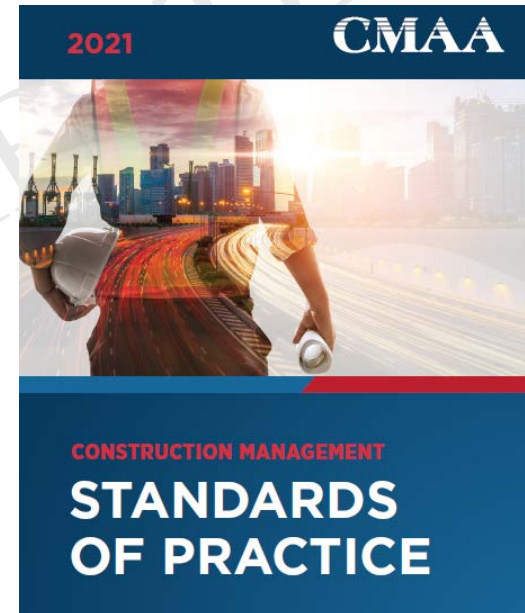
Construction management vs. project management

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Project Management

- ❑ As applied to a construction project, the use of integrated systems and procedures by the **project team** to **accomplish** design and construction.



Project management is an integral function of construction management and includes the overall responsibilities that a CONSTRUCTION MANAGER must be capable of performing.

Construction management vs. project management

What defines the primary difference between PM and CM?

CONSTRUCTION LAW



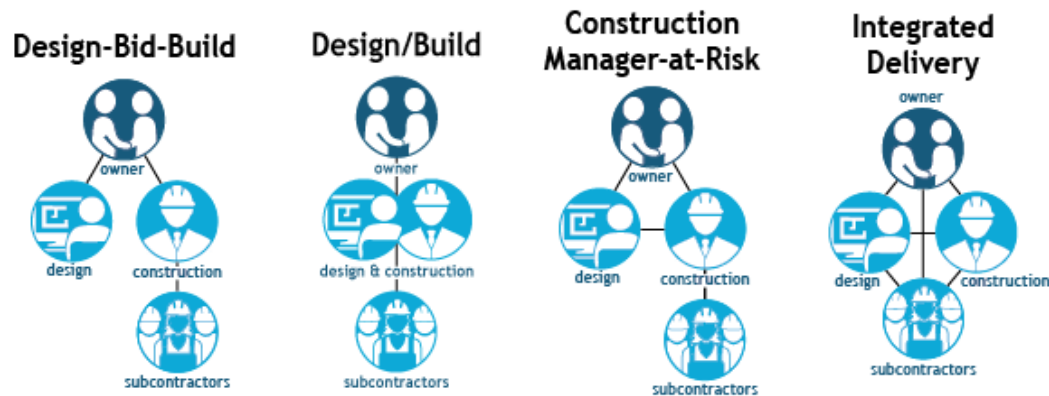
Project Management Standards are not designed to cover

CONSTRUCTION LAW

Construction management vs. project management

What tools construction projects need to cover
CONSTRUCTION LAW?

PROJECT DELIVERY METHODS



Project Management Standards are not
designed to cover

PROJECT DELIVERY METHODS

Answer to Q #5:

Leader of Construction Projects



Question #5

1

Project
Manager

2

Construction
Manager

Who is the Leader and added in early stage to the Construction Projects?

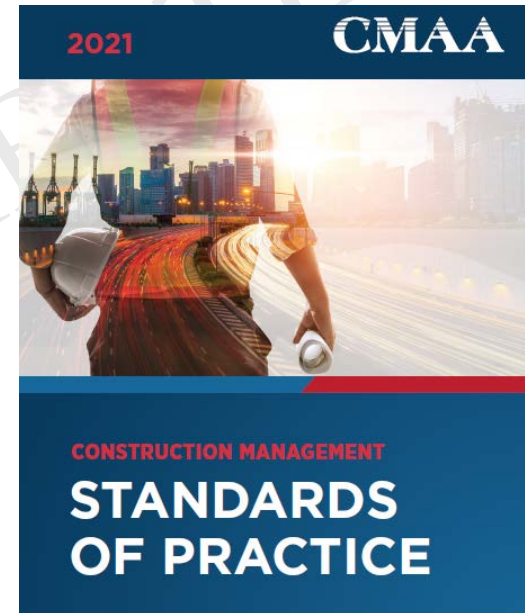
Leader of construction projects

Construction Management

❑ A professional management practice applied to construction projects from project **inception to completion** for the purpose of controlling

1. Time
2. Cost
3. Scope
4. Quality

What does inception to completion mean?



Leader of construction projects

Construction Manager:

- ❖ A professional construction manager manages the **entire project** and **program** with

1. Pre-planning,
2. Design,
3. Construction,
4. Close out, and

management expertise that can assure the **best possible project outcome**

no matter what type of project delivery method is used.

Is it only about management skills?



Leader of construction projects

Construction Manager:

- ❖ Comprehensive construction management services are used to

integrate the different facets of the construction process planning, design, procurement, construction, and activation for purpose of providing

1. Standardized **technical** expertise
2. Standardized **management** expertise on each project.

Project Management Standards do not require you to have

Technical expertise

What does technical mean?





Leader of construction projects

Construction Manager:

- ❖ NAAB (National Architectural Accrediting Board) are the primary accrediting organizations for engineering, architecture, and construction management degree programs.
- ❖ Qualifying degrees in construction management, construction science/ technology, civil engineering, industrial engineering, mechanical engineering, electrical engineering, chemical engineering, architectural engineering, and architecture that are accredited by ACCE, ABET, or NAAB will be accepted.



Project Delivery Methods



Four project delivery methods



Design-Bid-Build



**Multi-prime
CM**



**CM
at Risk**



**Design/
Build**

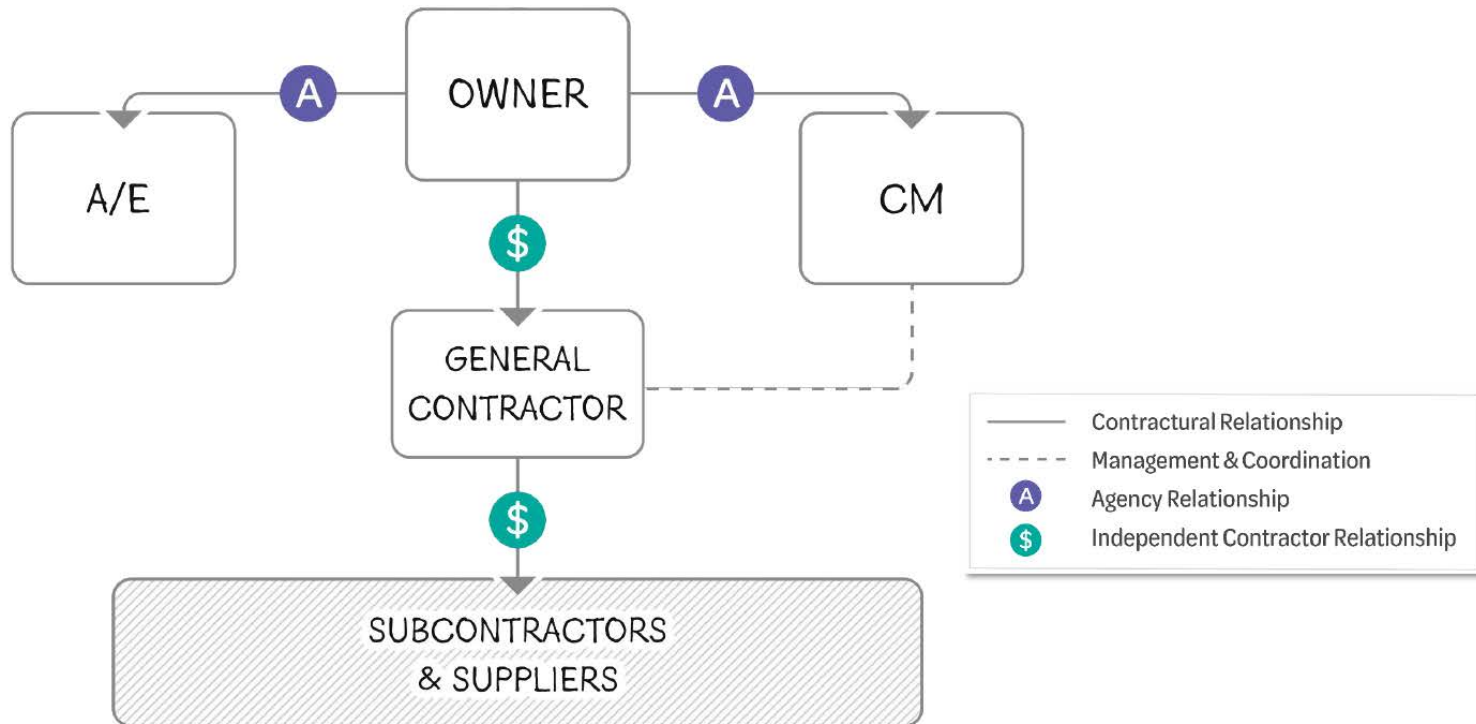
Project Delivery Methods

Design-Bid-Build



Design-Bid-Build

Design-Bid-Build





7 primary points for getting the best from Design–Bid–Build

1. Pre-qualify if possible
2. Have construction expert on Owner's side
 - ❖ Owner's staff, CM, A/E or mix
3. Need effective design phase services
 - ❖ Conceptual estimating and cost management
 - ❖ Constructability



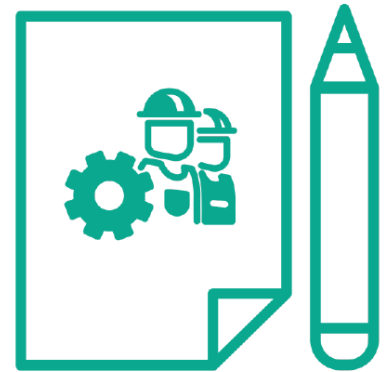
Getting the best from Design-Bid-Build

4. Owner/CM: Keep the initiative-Stay on top of:
 - ❖ Decisions needed
 - ❖ Requests for information
 - ❖ Change order requests
 - ❖ Schedule
5. Pre-bid and pre-construction meetings
6. Manage changes
7. Gain GC's trust and confidence on the jobsite

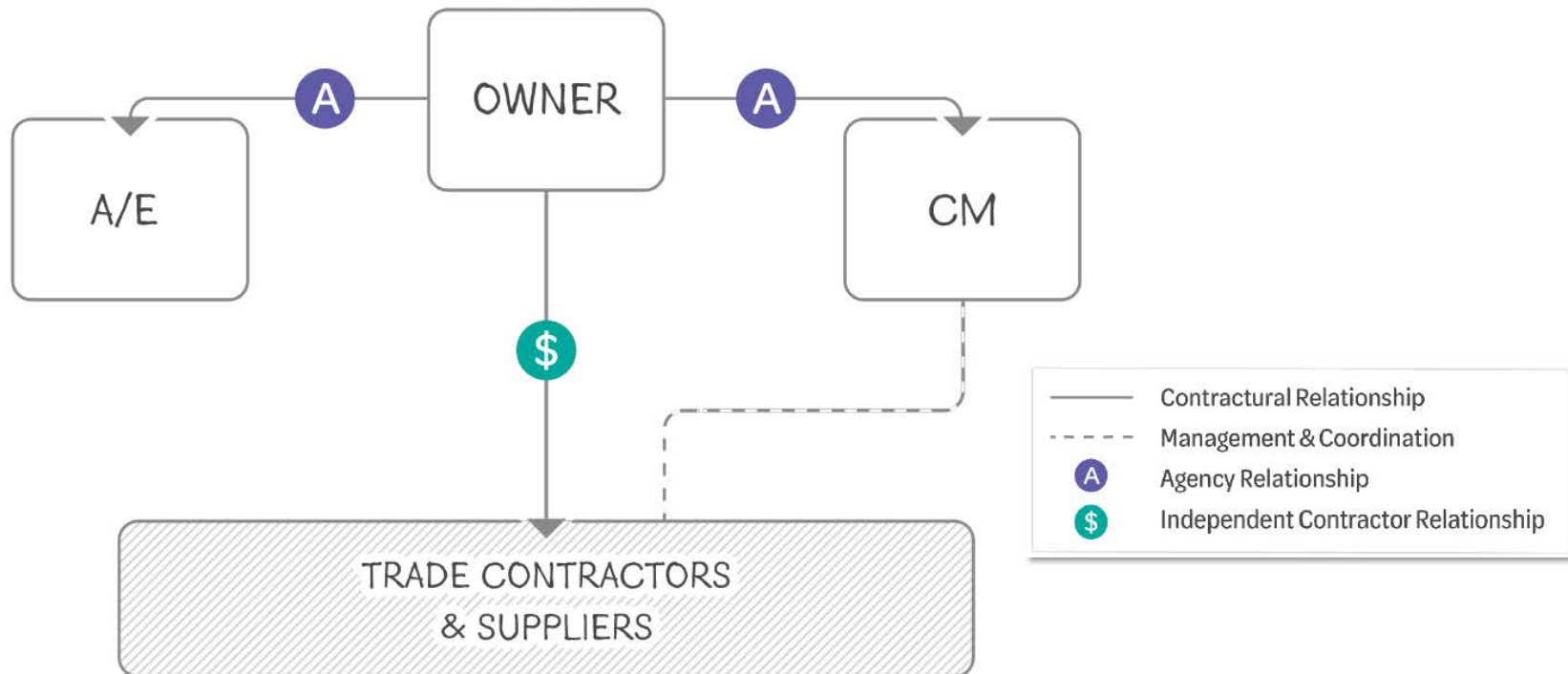


Project Delivery Methods

Multi-Prime CM



Multi-Prime CM





4 primary points for getting the best from Multi-Prime CM

1. Requires careful and informed CM selection
 - ❖ Experience as agent of Owner
 - ❖ Design phase skills
 - ❖ Procurement capability
 - ❖ Construction and Subcontractor coordination experience
2. Effective multiple trade contractor bidding process
3. CM as single point of contact with trade contractors
4. CM's responsibility to manage and coordinate trade contractors

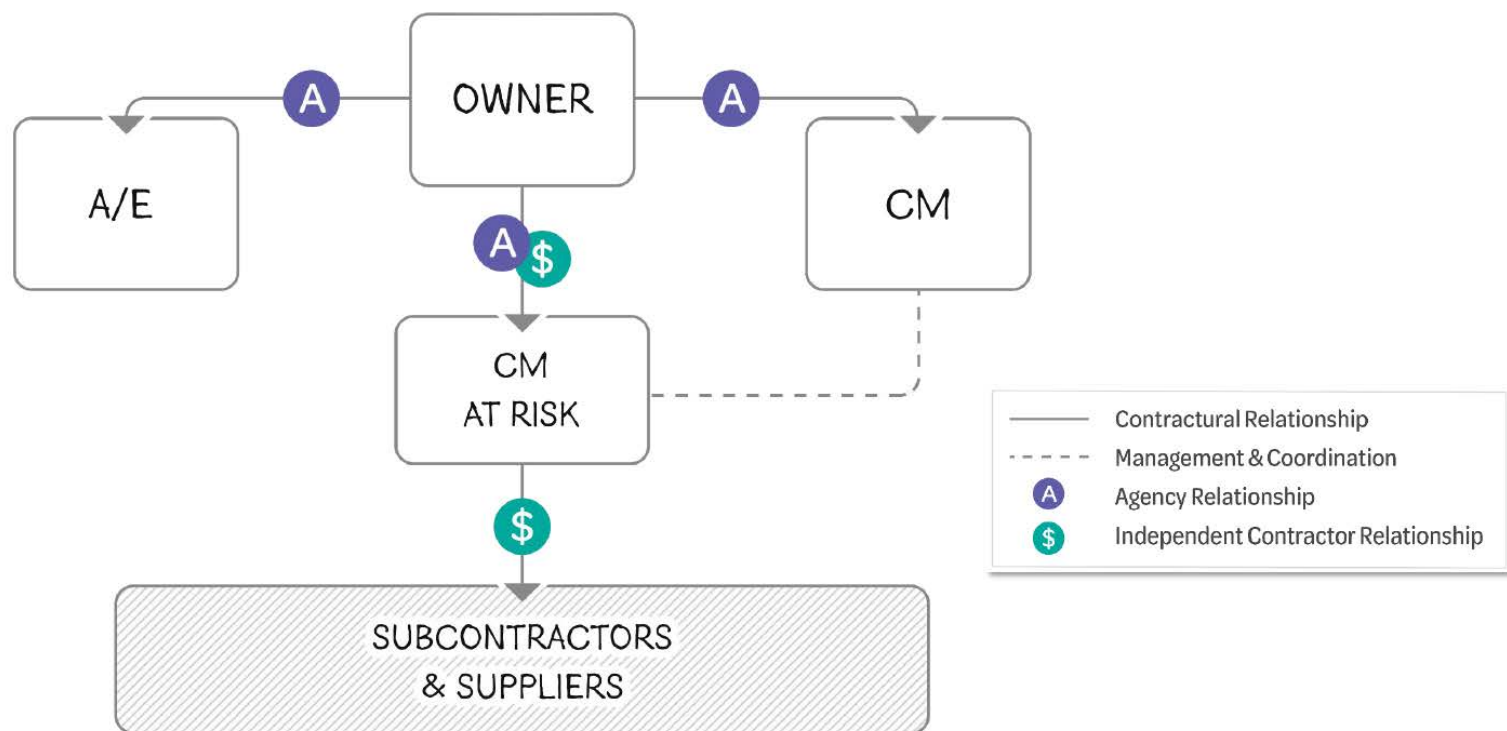


Project Delivery Methods

CM at Risk



CM at Risk





3 primary points for getting the best from CM at Risk

1. Requires careful and informed CM selection
2. Importance of open book approach
3. Qualifications of CM
 - ❖ Conceptual estimating
 - ❖ Design phase management
 - ❖ Experience as agent and independent contractor
 - ❖ Ethics and professionalism



Basis for CM at risk selection & ramifications

1. Qualifications, then negotiate fee
2. Mix of qualifications and fee
3. Fee only
4. Fee and cost of general conditions
5. Bid guaranteed maximum price

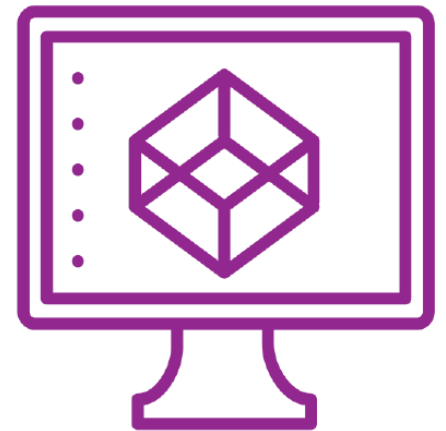


When the CM at Risk guarantees price matters?

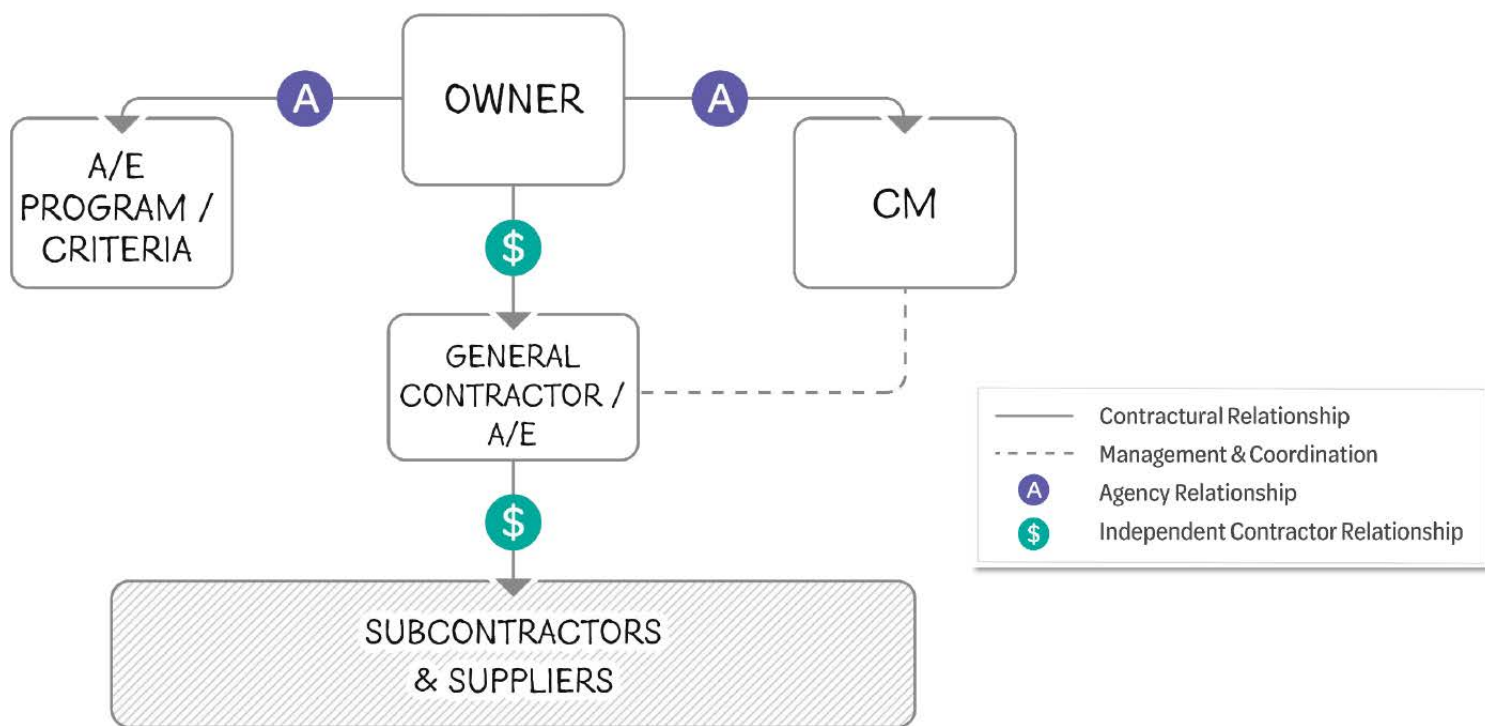
1. Early in design
2. Late in design
3. After subcontractor prices are firm

Project Delivery Methods

Design – Build



Design / Build



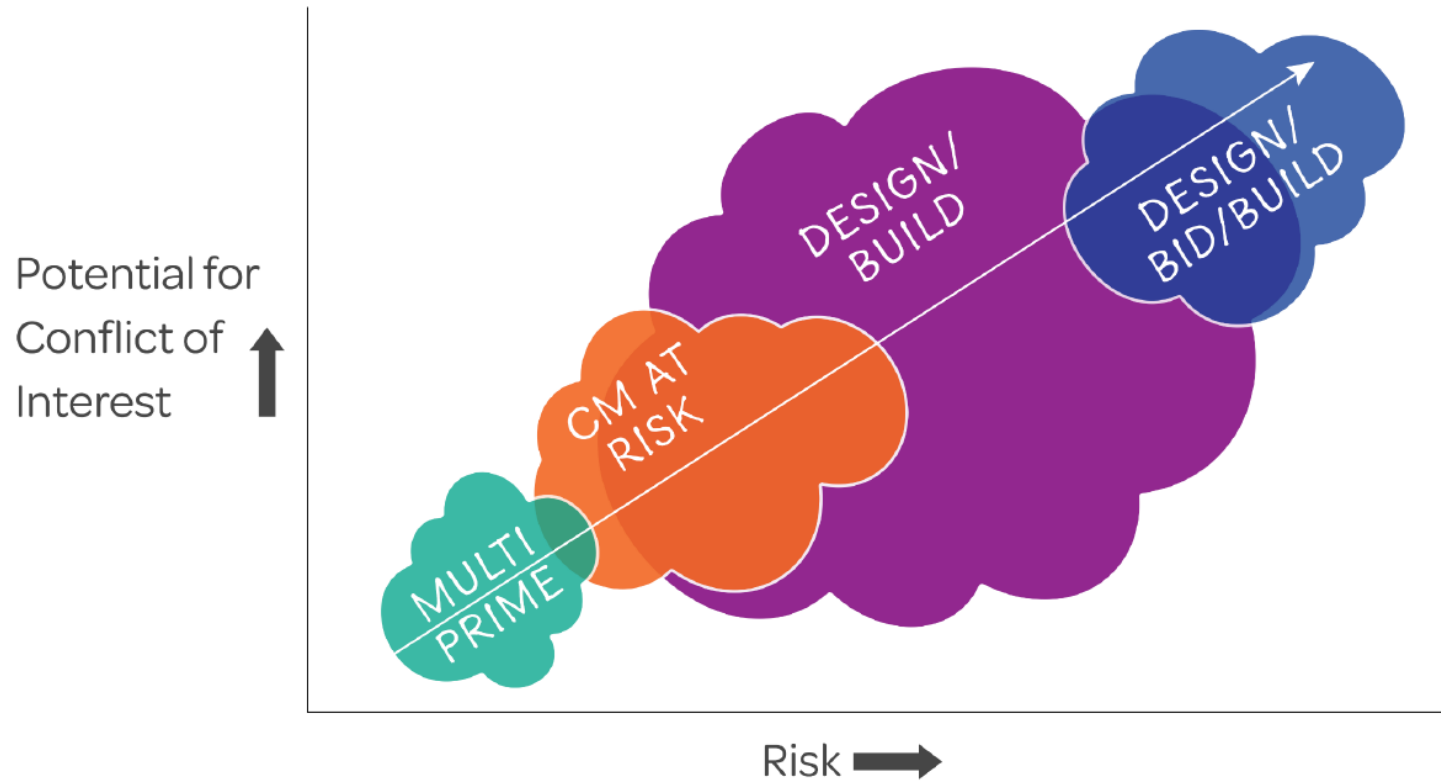


5 primary points for Getting the best from Design – Build

1. Requires careful and informed Design/Builder selection
2. Owner must be very responsive to retain the initiative
3. Owner must carefully define project requirements up front
4. Pre-qualify D/B Teams
5. Needs collaborative relationship between Contractor and Architect



RISK VS. POTENTIAL FOR CONFLICT OF INTEREST WITH OWNER



RISK VS. POTENTIAL FOR CONFLICT OF INTEREST WITH OWNER

All of these systems work well when applied thoughtfully.



Design-Bid-Build



**Multi-prime
CM**



**CM
at Risk**



**Design/
Build**

Key Construction Management Tools



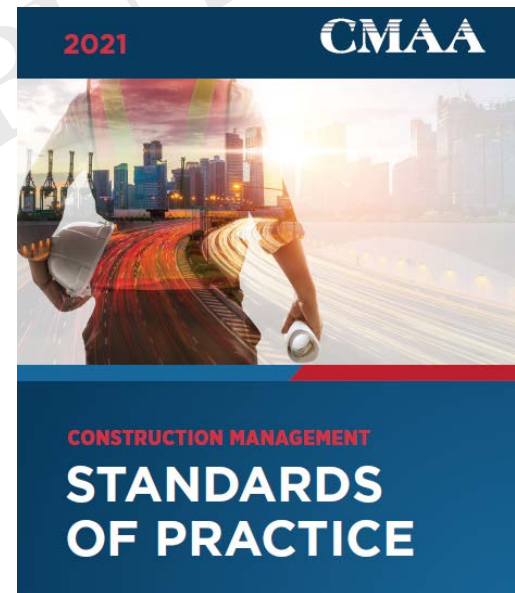
Key construction management tools

1. Development and coordination of contract documents and plans
2. The Project Management Plan (**PMP**)
3. The Construction Management Plan (**CMP**)
4. The Project Procedure Manual (**PPM**)
5. Quality Management Plan (**QMP**)
6. Construction Procurement Plan (**CPP**)
7. Project Safety Plan (**PSP**)
8. Management Information System (**MIS**)

Key Skills and Functions of the Successful Construction Manager

Construction management core competencies

- | | | |
|---|----------------------------|--------------------------|
| 1. Professional Construction Management | 5. Quality Management | 9. Technology Management |
| 2. Project Management | 6. Contract Administration | 10. Risk Management |
| 3. Cost Management | 7. Safety Management | 11. Program Management |
| 4. Time Management | 8. Sustainability | |





Construction management core competencies

1. CM professional practice
2. CM project management
3. Cost management
4. Time management
5. Quality management
6. Contract administration
7. Safety management



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CONSTRUCTION MANAGEMENT
CORE COMPETENCIES

Construction Management
From
Pre-Design
To
Post-Construction



Pre-design phase

Understand the concepts of the project development

Start the project organization

Start Project Management Plan

Start Project Procedures Manual

Initiate Designer(s) selection

Conduct Pre-design project conference

Identify Management Information System

Conduct special studies/reports (soils, existing drawings)

Constructability reviews

Identify “construction lessons learned” prior to design



Design phase

Document review (phased)

Meetings

Document distribution

Cost control: independent phased cost estimates

Scope verification and sign-offs

Time control: milestone development

Project funding

Consultant coordination

Public relations

Permit approval oversight

Front-end documents: contract, general and supplementary conditions



Procurement phase – Before bidding/selection

Public Relations

Develop requirements for selection of pre-qualified bidders

Understanding basic content required of contract general conditions

Developing bidding or proposal procedures

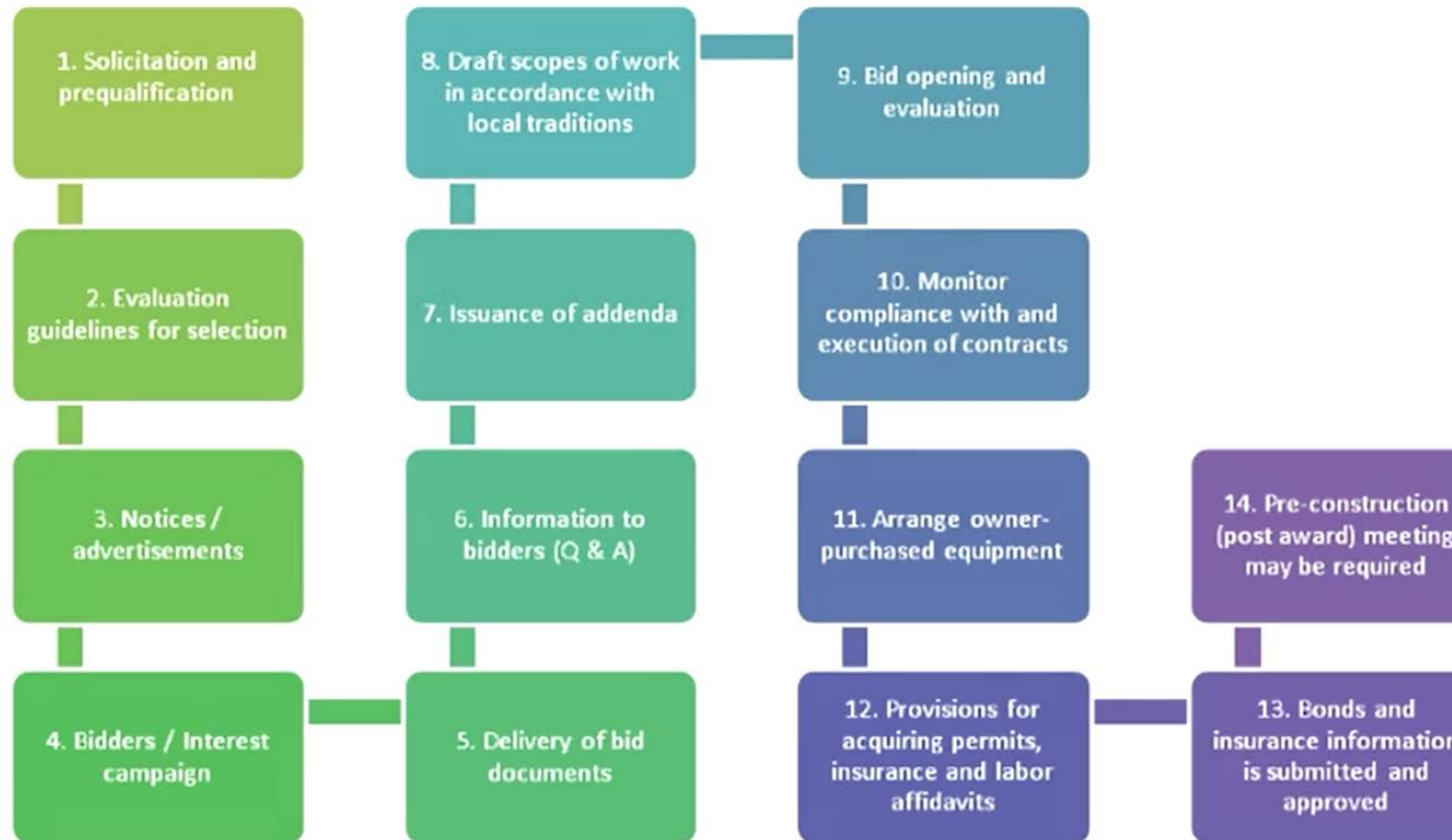
Assessing bidding climates

Assessing and evaluating bidder or proposer qualifications

Addressing risk management issues

Prepared by
DO NOT DISCLOSE

Procurement phase – Bidding and contracting process





Construction phase

Time management	Quality management
Claims management	Dispute resolution
Management reporting	Management of owner-purchase materials and equipment
Managing on-site facilities	Managing safety policy/plan
Cost-loaded CPM	Contractor's schedule of payments
Budget and cost reporting	Contract Modifications (change orders)
Record drawings	Record keeping
Coordination	Meetings
Public relations	Utility, environmental requirements and off-site improvement oversight



Near the end of construction

Preliminary inspection prior to occupancy

Punch list work

Substantial completion

Commissioning

Start-up

Beneficial occupancy

Final inspection

Final completion

Organization of OandM manuals, warranties, training



Post-construction

- ☐ Preparing and transmitting documents connected with the final payment
- ☐ Assembling the as-built drawings and documents
- ☐ Contractor follow-up
- ☐ Owner move-in or start-up
- ☐ Contractor call-back on warrantee work
- ☐ Contractor closeout

برای یادگیری بیشتر
دوره جامع مدیریت ساخت راهنمای جامعی برایتان خواهد بود

<https://dralavipour.com/general-course/construction-management>

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دفتر آموزش



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