مدیریت پروژه‌های صنعت ساخت

(ساختمانی، زیرساختی و صنعتی)

فصل دوم: مدیریت ساخت

تاریخچه، ساختار و اصول مدیریت ساخت

ارائه دهنده:

سید محمدرضا علوی‌پور

(PhD, PMP, CMIT)

دانشگاه Illinois Tech آمریکا

ACEMI

What we will learn?

- The history of general project management
- The history of construction management
- Two of well-known construction organizations
- Construction educational offerings
- Construction management certifications
- Construction management standards & best practices
- Project management definition
- Construction management definition
- Evaluating construction project success
- Construction project phases
- Project delivery
- Construction manager's duties and responsibilities
- Construction management organizations
- Do you have the right stuff?
- CM roadmap related to this section

THE HISTORY OF
GENERAL PROJECT MANAGEMENT

The history of general project management

When this path has been started?

IPMA® international project management association — **1965**

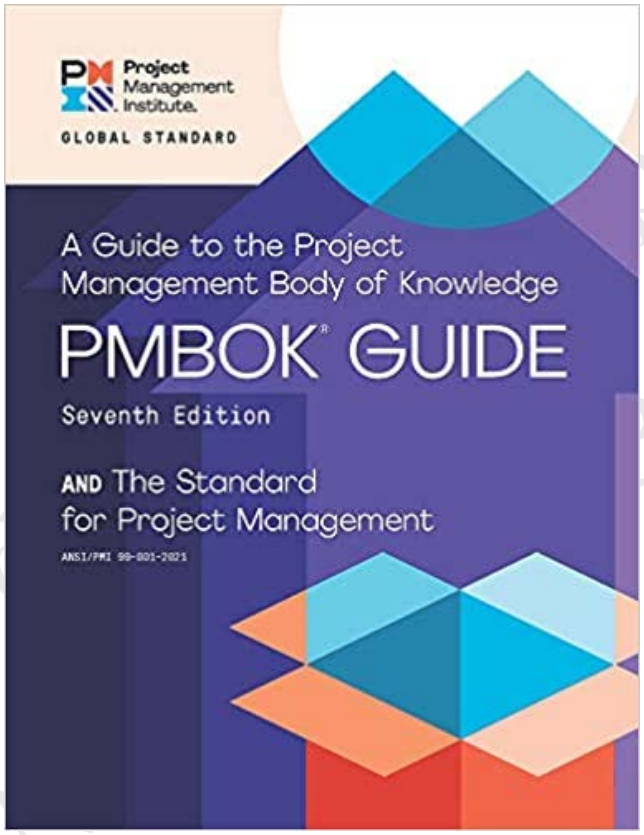
PMI® Project Management Institute — **1969**

2013

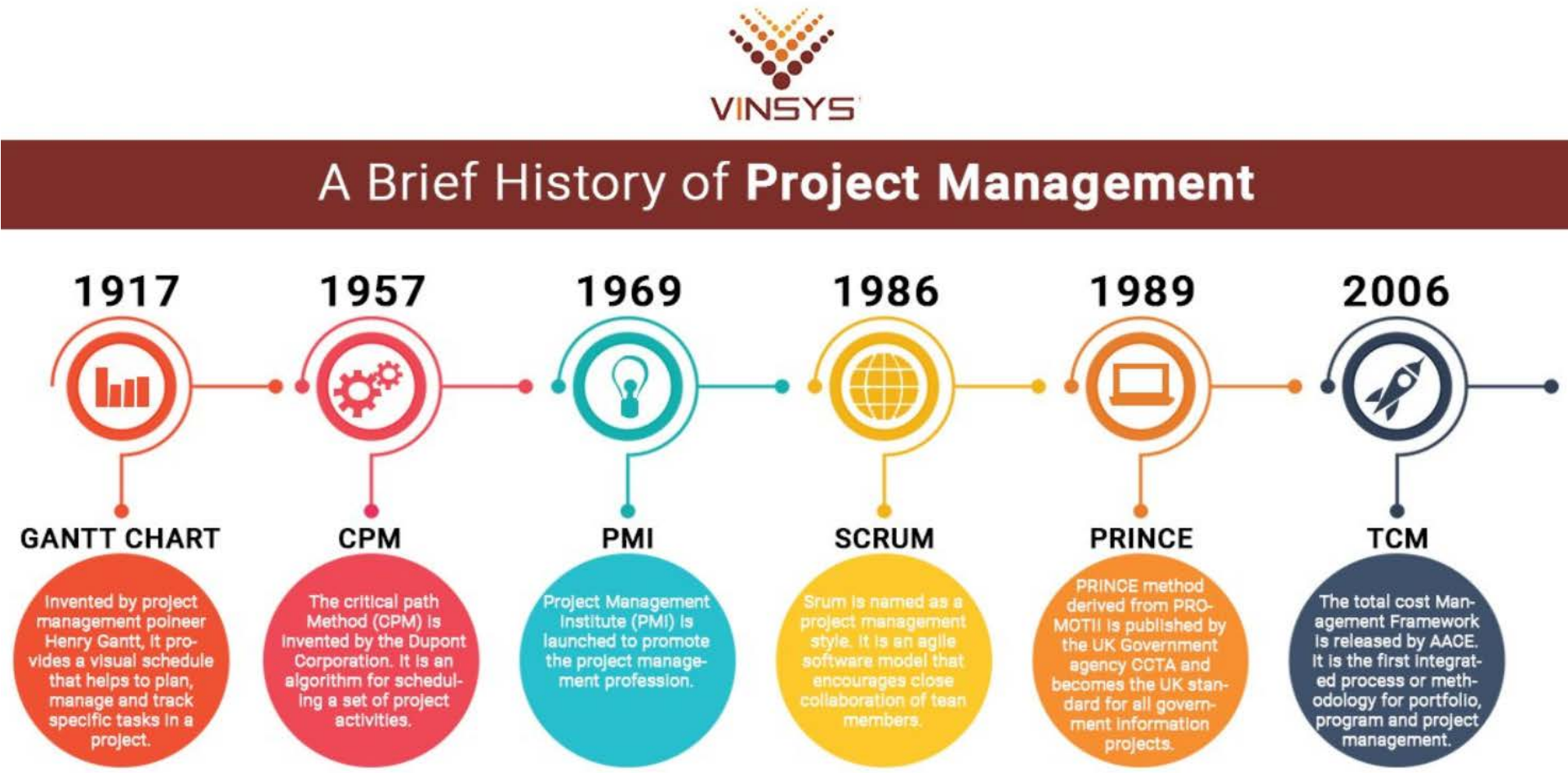
AXELOS GLOBAL BEST PRACTICE — Strategic Accredited Training Organizations

ITIL® | RESILIA® | PRINCE2® | PRINCE2 AGILE® | MSP® | M_o_R®
P3M3® | P3O® | MoP® | MoV®

The history of general project management



The history of general project management



THE HISTORY OF CONSTRUCTION MANAGEMENT

The history of construction management

One of the easiest ways to get acquainted with the construction management profession is to become familiar with the various professional organizations affiliated with the industry. At least 250 organizations are associated with construction and its practitioners.

The history of construction management

ASCE AMERICAN SOCIETY OF CIVIL ENGINEERS — 1852

CMAA Construction Management Association of America — 1982

The American Institute of Architects — 1857

CII 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

CI ASCE CONSTRUCTION INSTITUTE — 1975 2000

These are just a few!

The history of construction management

Historical perspective of CM

- 1852 American Society of Civil Engineers **(ASCE)**
- 1857 American Institute of Architects **(AIA)**
- 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**.

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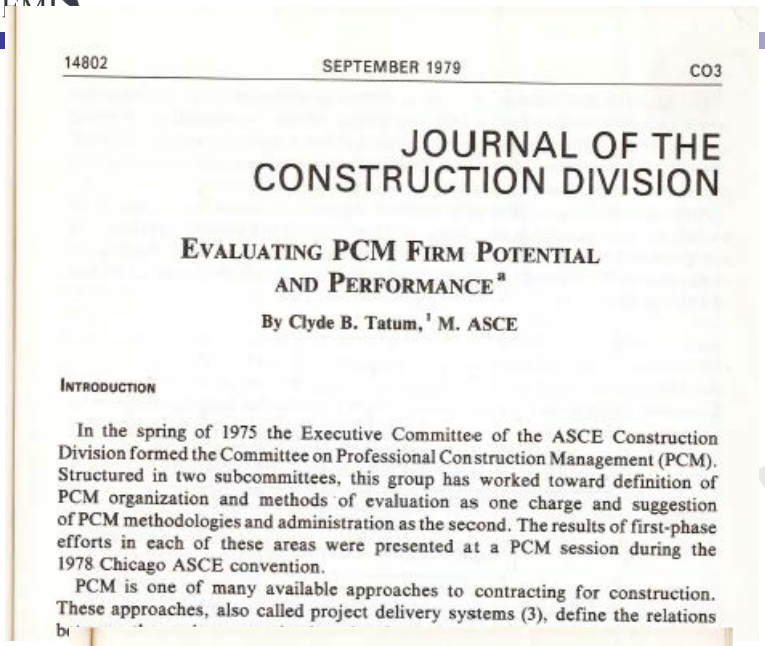
The history of construction management

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



14802 SEPTEMBER 1979 CO3

JOURNAL OF THE CONSTRUCTION DIVISION

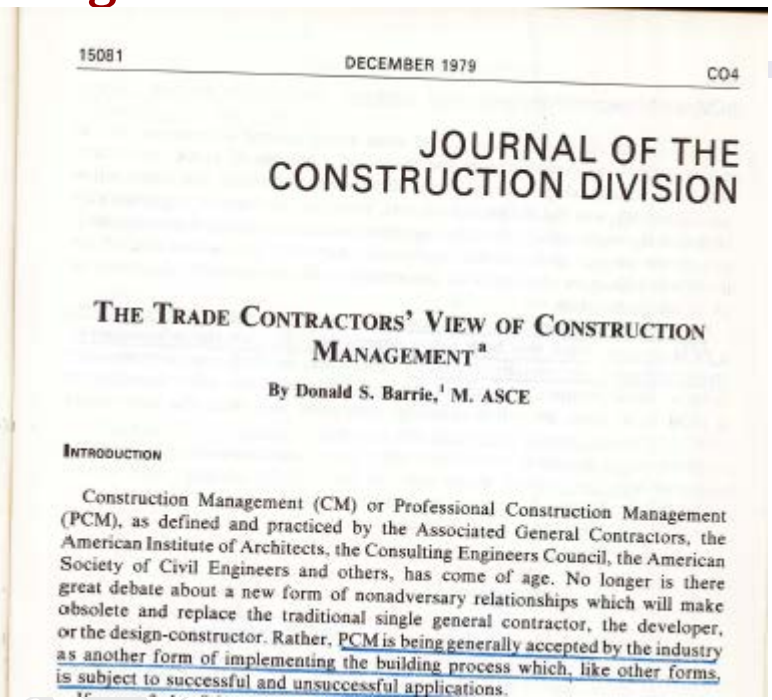
Evaluating PCM Firm Potential and Performance[a]

By Clyde B. Tatum,[1] M. ASCE

Introduction

In the spring of 1975 the Executive Committee of the ASCE Construction Division formed the Committee on Professional Construction Management (PCM). Structured in two subcommittees, this group has worked toward definition of PCM organization and methods of evaluation as one charge and suggestion of PCM methodologies and administration as the second. The results of first-phase efforts in each of these areas were presented at a PCM session during the 1978 Chicago ASCE convention.

PCM is one of many available approaches to contracting for construction. These approaches, also called project delivery systems (3), define the relations



15081 DECEMBER 1979 CO4

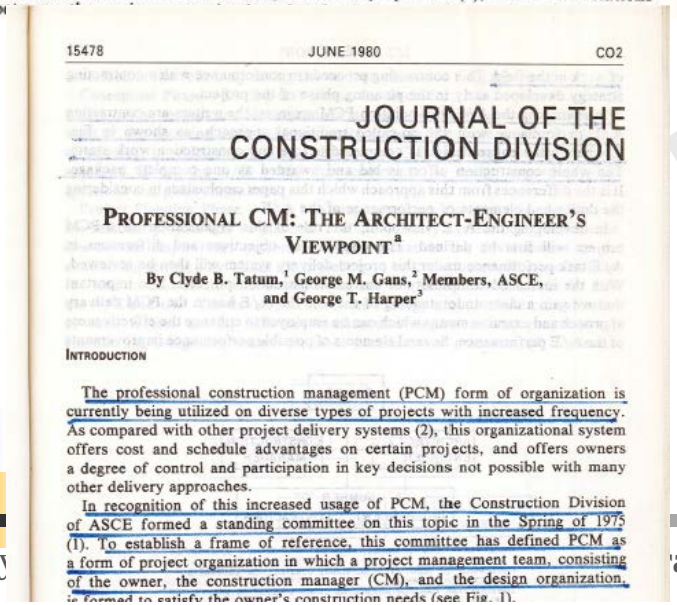
JOURNAL OF THE CONSTRUCTION DIVISION

The Trade Contractors' View of Construction Management[a]

By Donald S. Barrie,[1] M. ASCE

Introduction

Construction Management (CM) or Professional Construction Management (PCM), as defined and practiced by the Associated General Contractors, the American Institute of Architects, the Consulting Engineers Council, the American Society of Civil Engineers and others, has come of age. No longer is there great debate about a new form of nonadversary relationships which will make obsolete and replace the traditional single general contractor, the developer, or the design-constructor. Rather, PCM is being generally accepted by the industry as another form of implementing the building process which, like other forms, is subject to successful and unsuccessful applications.



15478 JUNE 1980 CO2

JOURNAL OF THE CONSTRUCTION DIVISION

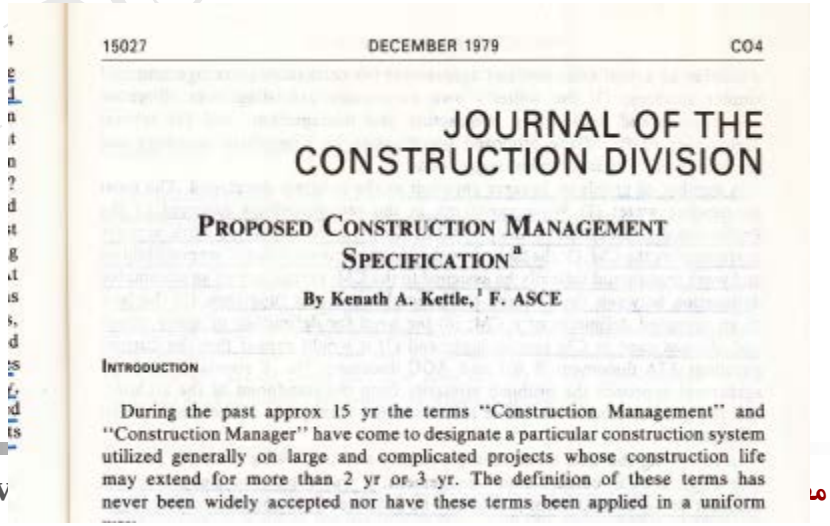
Professional CM: The Architect-Engineer's Viewpoint[a]

By Clyde B. Tatum,[1] George M. Gans,[2] Members, ASCE, and George T. Harper[3]

Introduction

The professional construction management (PCM) form of organization is currently being utilized on diverse types of projects with increased frequency. As compared with other project delivery systems (2), this organizational system offers cost and schedule advantages on certain projects, and offers owners a degree of control and participation in key decisions not possible with many other delivery approaches.

In recognition of this increased usage of PCM, the Construction Division of ASCE formed a standing committee on this topic in the Spring of 1975 (1). To establish a frame of reference, this committee has defined PCM as a form of project organization in which a project management team, consisting of the owner, the construction manager (CM), and the design organization,



15027 DECEMBER 1979 CO4

JOURNAL OF THE CONSTRUCTION DIVISION

Proposed Construction Management Specification[a]

By Kenath A. Kettle,[1] F. ASCE

Introduction

During the past approx 15 yr the terms "Construction Management" and "Construction Manager" have come to designate a particular construction system utilized generally on large and complicated projects whose construction life may extend for more than 2 yr or 3 yr. The definition of these terms has never been widely accepted nor have these terms been applied in a uniform

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)**

These are just a few…

TWO OF WELL-KNOWN CONSTRUCTION ORGANIZATIONS

Construction Management Association of America (CMAA)

What is Construction Management Association of America (CMAA)?

- Construction management is ***rooted*** in **traditional project management practices** and **requires** a **unique** body of **skills** and **professional knowledge** to perform successfully.

- **CMAA** was formed in **1982** to:
  - Provide **standards**
  - Provide **unique identity** of construction managers
  - **Qualify** construction managers
  - Help **owners** to use **certified construction managers** in their projects to **improve project results**

Construction Management Association of America (CMAA)

CMAA's Vision: CMAA is the voice of the program and construction management industry and the premier resource for professionals working in the built environment.

Our Mission: To promote, support, educate, and develop professionals who lead the delivery of programs and projects within the built environment.

CMAA was formed in 1982 to establish standards for managing construction projects. Construction management is rooted in traditional project management practices and also requires a unique body of skills and professional knowledge to perform successfully. CMAA is delivery method neutral; seeking to ensure that all professionals are prepared to succeed regardless of the scope, scale, or complexity of any project or program.

Construction Management Association of America (CMAA)

CMAA

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.

Construction Management Association of America (CMAA)

The Power of A.

CMAA is one of more than 63,000 association in the United States. Associations leverage their unique resources to solve problems, advance industry/professional performance, and kickstart innovation. Each year, associations like CMAA provide 17% of the formal, work-related education or training taken by Americans making them the largest provider of workforce development education in the U.S. They account for more than 315,000 meetings annually with 59.5 million in attendance.

Construction Management Association of America (CMAA)

About Us

The Construction Management Association of America is an industry association dedicated to the practice of professional construction management. CMAA represents more than 16,000 members including federal/state/local government and private sector owners, construction consultants, technology suppliers, academia, and legal organizations all with a common goal: to improve our nation's infrastructure.

CMAA is the lead society for accreditation of professional degree programs in construction management by ABET. Working through ABET, CMAA is able to make a significant contribution to developing a qualified, professional workforce.

Construction Management Association of America (CMAA)

ACEMI

Construction Industry Institute

About CII

CII, based at The University of Texas at Austin, is a consortium of more than 140 leading owner, engineering-contractor, and supplier firms from both the public and private arenas.

These organizations have joined together to enhance the business effectiveness and sustainability of the capital facility life cycle through CII research, related initiatives, and industry alliances.

Changing How the World Builds

ACEMI

Construction Industry Institute

CII History

CII was established in October 1983 with the purpose of improving the competitive position of U.S. business in the global market. Its 28 charter members were responding to the recommendations from a study by The Business Roundtable entitled the *Construction Industry Cost Effectiveness (CICE) Project*. That five-year study of the industry and its problems specifically recommended that an organization be created to take a leadership role in construction research. The CICE participants – including more than 250 industry leaders, practitioners, and academicians – recognized this particular recommendation as an opportunity for companies and academia to work together for the improvement of the industry. Since its establishment at The University of Texas at Austin in 1983, CII has pursued a research agenda defined by its Board of Advisors, which is composed of one representative and an alternate from each member company. Volunteers from member companies are the core of the effort by CII in all of its activities.

CII was conceived as a three-way partnership among owners, contractors, and academia. This partnership was based on the premise that each party would contribute from its experience and competence to the overall work of the Institute. The academic community could play a major role in CII by bringing its knowledge of the research process and by providing a credible, neutral voice in the CII process. For practical experience, owners and contractors would provide the knowledge that comes from first-hand and in-the-field experience. Together, the three would form an owner–contractor–academia triad that would lend itself to conducting world-class research whose findings could be applied immediately.

See Video 3

Construction Industry Institute

Owners	Contractors	Service Providers
AdvanSix	AECOM	Accenture
Albemarle Corporation	Alfred Miller Contracting	Alvarez & Marsal
American Transmission Company LLC	APTIM	Atlas RFID Solutions
Anheuser-Busch InBev	Arcadis U.S., Inc	Autodesk, Inc.
Aramco Services Company	Baker Concrete Construction Inc.	AVEVA Solutions Ltd.
Architect of the Capitol	Barton Malow Company	Bentley Systems Inc.
Ascend Performance Materials	Bechtel Group, Inc.	Command Alkon Inc.
AstraZeneca	Black & Veatch	Construct-X, LLC
BHP Billiton	Brown & Root Industrial Services	Continuum Advisory Group
Cargill, Inc.	Burns & McDonnell	Dassault Systèmes SE
Chevron	Chiyoda Corporation	Deloitte
ConocoPhillips	Clough USA Inc.	Design + Construction Strategies
Consolidated Edison Company of New York	CRB	DyCat Solutions
Covestro LLC	Day & Zimmermann	ePM
DTE Energy	Digital Construction Works	Group ASI
Eastman Chemical Company	Emerson	Hexagon Process Power & Marine
Entergy Corporation	Fluor Corporation	Hilti Corporation
ExxonMobil Corporation	H+M Industrial EPC	I.M.P.A.C.T.

Construction Industry Institute

Eastman Chemical Company	Hargrove Engineers + Constructors	O3 Solutions
ExxonMobil Corporation	Hatch	Oracle USA, Inc.
General Electric Company	JGC Corporation	Pathfinder, LLC
GlaxoSmithKline	KBR	PTAG, Inc.
Global Infrastructure Partners	Kiewit Corporation	SkyCam Aviation, Inc.
Honeywell International Inc.	Larsen & Toubro Limited	T. A. Cook Consultants Inc
INEOS Group Holdings S. A.	MasTec Power Corporation	Trillium Advisory Group Ltd
Johnson & Johnson	Matrix Service Company	Valency Inc.
Koch Industries, Inc.	McCarthy Building Companies, Inc.	Verum Partners
Los Alamos National Laboratory	McDermott International, Inc.	Zurich
LyondellBasell	PCL Constructors, Inc.	
National Aeronautics & Space Administration	PLH Group	
Naval Facilities Engineering Command	POWER Engineers, Inc.	
New York Power Authority	Richard Industrial Group	
NOVA Chemicals Corporation	Samsung C&T	
Nuclear Decommissioning Authority	Techint Engineering & Construction	
Nutrien	Technip Energies	

Construction Industry Institute

Petronas	Wanzek Construction, Inc.
Phillips 66	Wood
Public Service Electric & Gas Company	Worley
Reliance Industries Limited (RIL)	Zachry Group
SABIC - Saudi Basic Industries Corporation	
Shell Global Solutions US Inc.	
Smithsonian Institution	
Southern Company	
TC Energy	
Tennessee Valley Authority	
The Dow Chemical Company	
The Procter & Gamble Company	
The Williams Companies, Inc.	
U.S. Army Corps of Engineers	
U.S. Department of Commerce/NIST/EL	
U.S. Department of Energy	
U.S. Department of State	
U.S. Department of Veterans Affairs	
U.S. General Services Administration	

CONSTRUCTION EDUCATIONAL OFFERINGS

Degree and experience

- The ideal construction management candidate is typically an individual who has a **bachelor's degree or higher** in
  1. Construction management,
  2. Construction engineering, or
  3. Construction science,

  as well as **practical experience** working in construction.

Degree and experience

- The work experience and hands-on knowledge of construction are as **valuable as the degree.**
  - For this reason,

    many **construction management students**

    combine their **formal university educations**

    with **paid internships while attending school**.
    - It is also **not uncommon** to

      find **experienced field personnel** pursuing their degrees in construction management as nontraditional older students.

Bachelor and two-year colleges

- Opportunities for **education and training** in construction management are numerous.

- As previously mentioned, the **Associated Schools of Construction (ASC)** lists about 160+ colleges and universities offering **four-year accredited degree programs** in construction management or construction science, in the United States and abroad.

- There are also a number of **two-year colleges** that offer construction management or construction technology courses.

Master and PhD

- For **graduate studies**,

  there are dozens of universities that offer a **master's degree**, and

  at least a **half-dozen universities** that offer a PhD in Construction Management.

  - In addition,

    several of the construction, engineering, and architecture trade and professional associations regularly host

    educational seminars on various construction management topics.

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Courses

- **Typical course offerings** in construction management include
  - Construction methods and materials,
  - Contract administration and construction documents,
  - Value analysis,
  - Lean construction
  - Cost estimating,
  - Scheduling,
  - Safety,
  - Risk,
  - Cost controls and accounting,
  - Business and financial management,
  - Building codes and standards,
  - Quality and inspection procedures,
  - Engineering and architectural sciences,
  - Mathematics, statistics, computer applications, and
  - Information technology
  - Sustainability

Several of these topics will be discussed throughout this course.

CONSTRUCTION MANAGEMENT CERTIFICATIONS

Professional affiliation and certification

One of the easiest ways to get acquainted with the construction management profession is to become familiar with the various professional organizations affiliated with the industry. At least 250 organizations are associated with construction and its practitioners. Two of these organizations offer voluntary certification programs for construction managers. Requirements combine a written examination with verification of professional experience.

AIC American Institute of Constructors

CMAA Construction Management Association of America

American institute of constructors

The American Institute of Constructors (AIC) helps individual contractors who meet the requirements to achieve professional status through an examination and certification program. AIC is the certifying body for the designation of Certified Professional Constructor (CPC) and Associate Constructor (AC). The organization was formed in 1971 and serves the industry in a professional capacity similar to the professional organizations for architecture and engineering. You can learn more about the AIC at www.aicnet.org.

CAC Certified Associate Constructor

CPC Certified Professional Constructor

- CAC (Level I) Certification (formerly AC) for aspiring construction professionals.
- CPC (Level II) Certification for experienced professionals seeking management roles.
- Recertification to maintain certification through continuing professional development.

ANAB ANSI National Accreditation Board

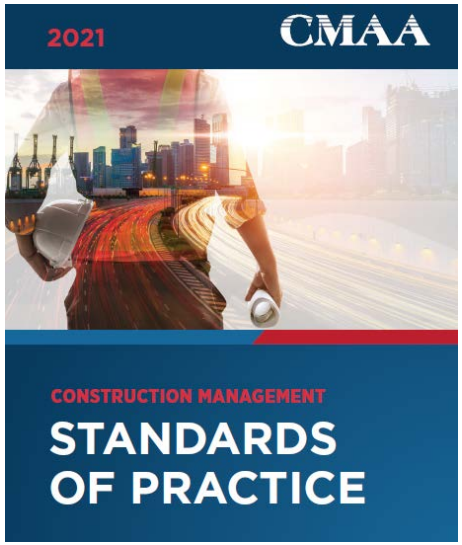
ACEMI

Construction Management Association of America (CMAA)

The Construction Management Association of America (CMAA) is dedicated to promoting the professional practice of construction management. The organization welcomes members from all construction and design disciplines as well as owners and various service providers to the industry. The CMAA offers professional designations through its Certified Construction Manager (CCM) program for individuals who complete its self-study course, pass the certification exam, and meet other requirements set forth by the organization. To learn more about the CMAA, go to its website at http://cmaanet.org.

Construction Management Association of America (CMAA)

The CM's scope of services encompasses a broad range of professional skills, management knowledge, and experience. That a CM is certified or licensed in any other profession does not necessarily establish that person as a *qualified* CM. Individuals and firms that provide construction management services should be knowledgeable and experienced in the technical disciplines and management areas described in this manual. CMAA's Certified Construction Manager® (CCM®) certification program represents an industry consensus for the qualifications and experience that identify a professional CM.



Construction Management Association of America (CMAA)

Construction Manager Certification Institute

- The Institute is responsible for administering the Construction Manager Certification Program.
- The Institute is managed by the Board of Governors, made up of volunteer peers, who:
  - Set policies and procedures
  - Strategic goals
  - Audit applications

CMCI

Construction Management Association of America (CMAA)

In 2006, the CCM achieved the American National Standards Institute (ANSI) accreditation in accordance with the 17024 standard under the International Organization for Standardization (ISO).

- CM Certification provides:
  - ✓ A respected career path for CM professionals.
  - ✓ Sets open, tested, and clear industry standards by which owners can evaluate staff and service providers.
  - ✓ Establishes reliable professional development and continuing education.

Construction Management Association of America (CMAA)

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."*

Construction Industry Institute®

Society of SAME American Military Engineers

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."*

Construction Management Association of America (CMAA)

"CCMs reduce risks on construction projects and reducing risk is what makes us successful. By reducing cost and reducing time on projects, we find we are far more successful with CCMs leading our effort."

Stephan T. Ayers, CCM, LEED AP, FAIA
Architect of the Capitol

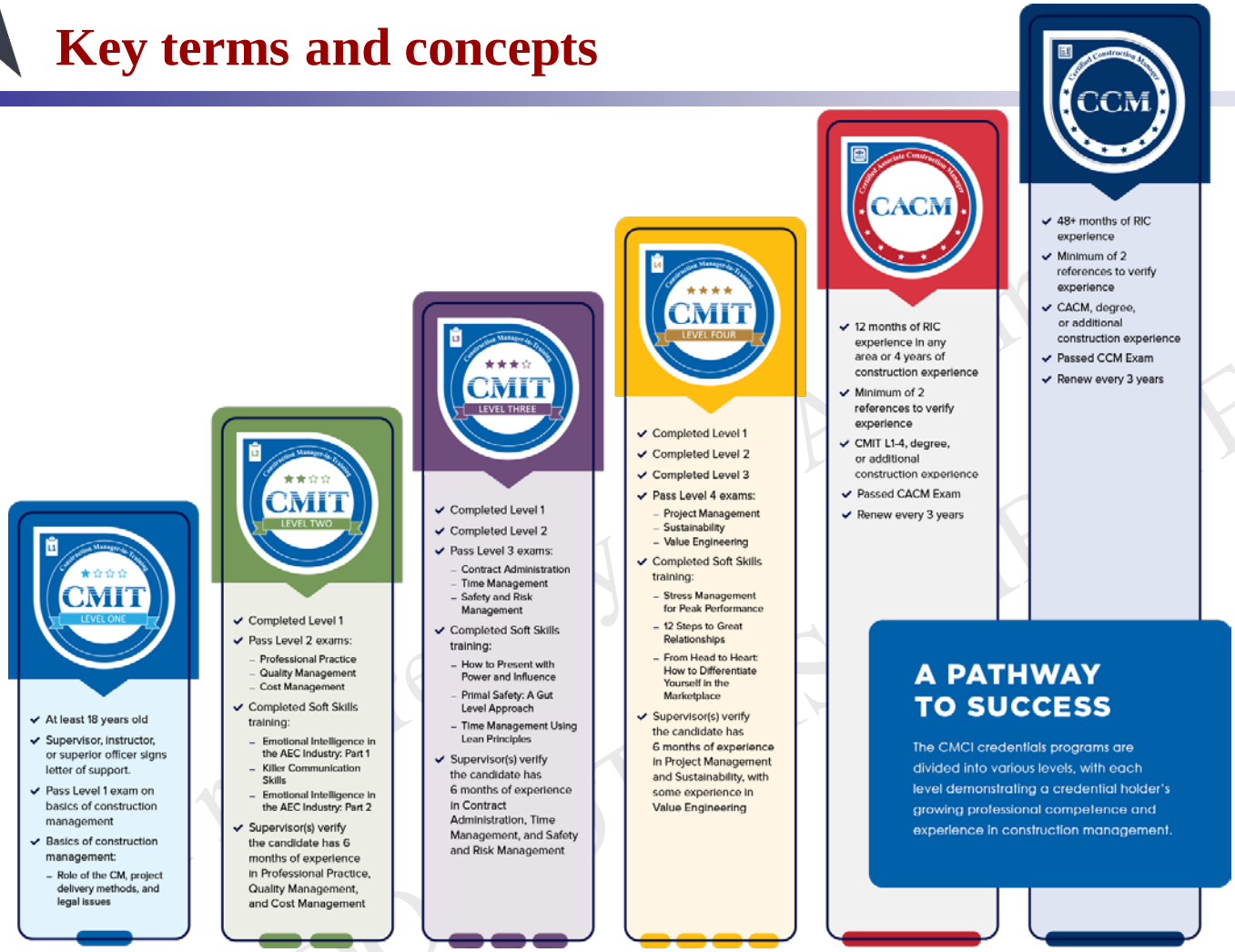
"CCMs have brought tremendous insight and real project experience to our facilities capital planning and modernization programs. **We have found that because CCMs have dealt with the "real" construction of buildings, they are in great position to better understand costs and risks when developing initial project plans.** Getting initial budgets and risks right are the most important part of ensuring a successful project!"

Michael Germinario, PE, CCM
Director, Facilities Planning and Finance
US Customs and Border Protection

"At a time when there is a shortage of construction talent in the industry, its critical to define experience through credentials that are needed by our professionals so that we can more efficiently deliver on our capital projects. **The CCM establishes the combined skills and breathe of knowledge required lead and manage projects. When I have a CCM on my project I know that they are able to look at the whole picture of the job, not just one specific detail."**

Christine Flaherty, CCM
Associate Commissioner
New York City Department of Design and Construction

Key terms and concepts



https://www.youtube.com/watch?v=HxeS0EkVQlQ

CONSTRUCTION MANAGEMENT STANDARDS & BEST PRACTICES

AIA

Best practices

Business intelligence

Leadership education

Architectural research

Firm ownership resources

Project delivery resources

Workplace culture resources

Business development resources

Salary calculator

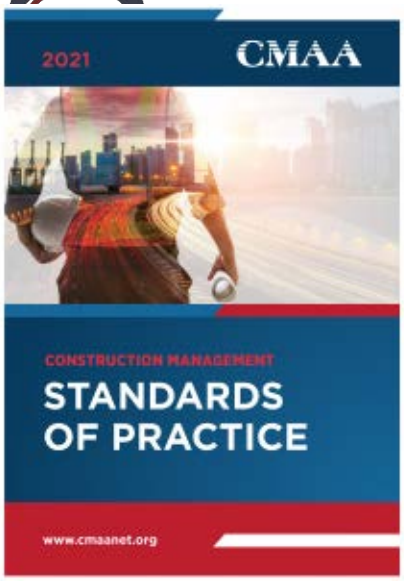
Contract Documents

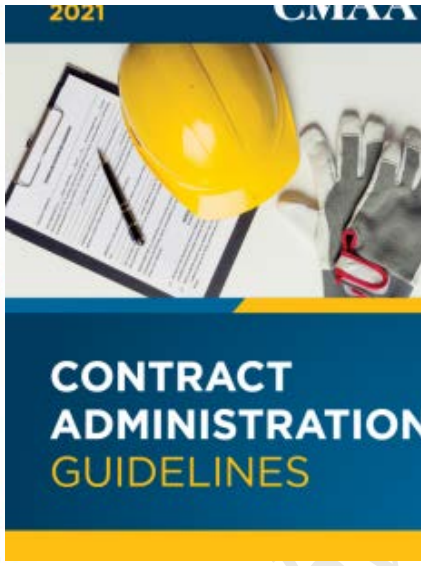
MasterSpec

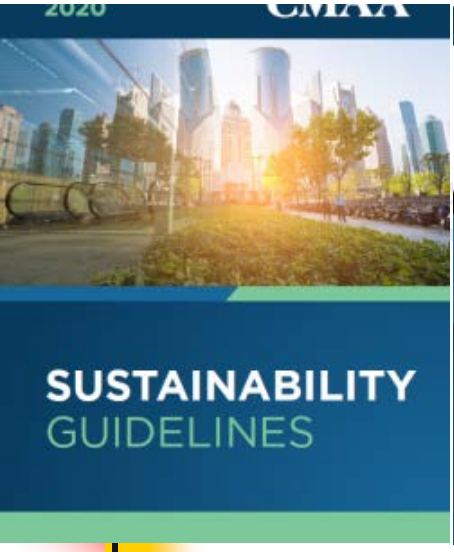
Practice Management

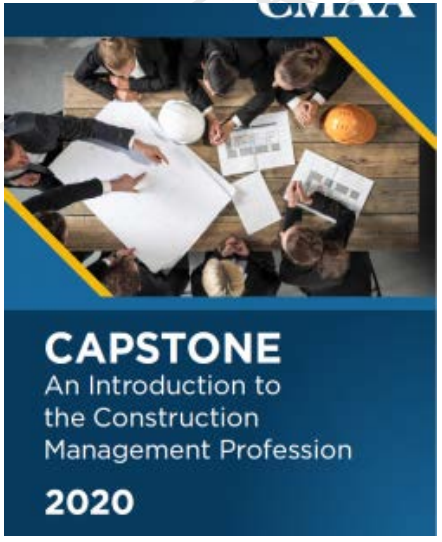
ذکر مطالب فوق تنها در

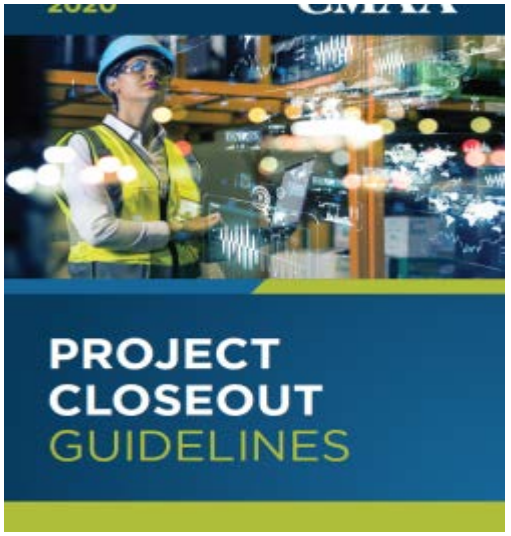
CMAA











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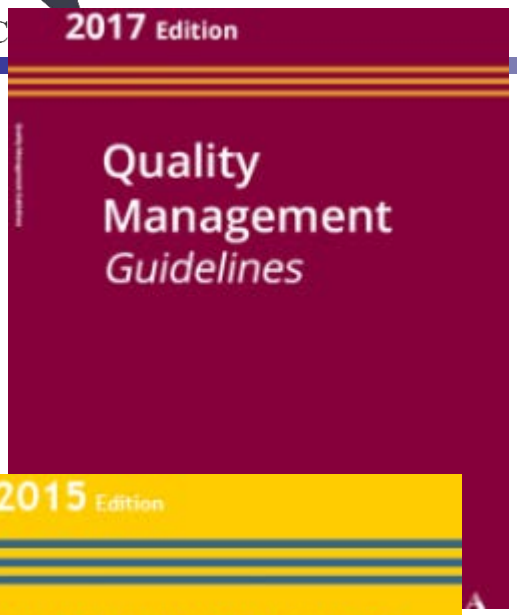
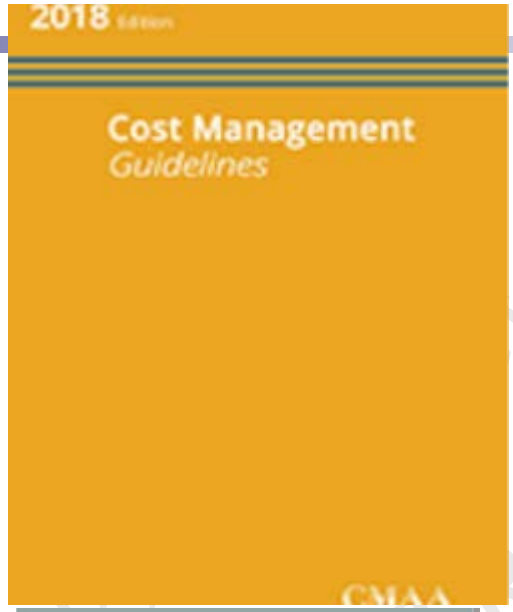
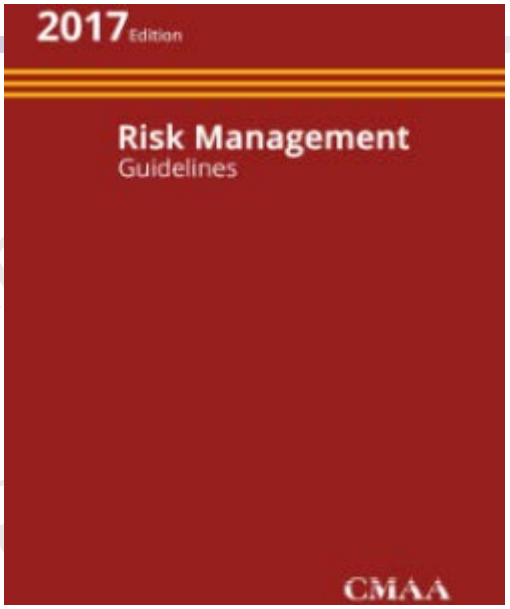
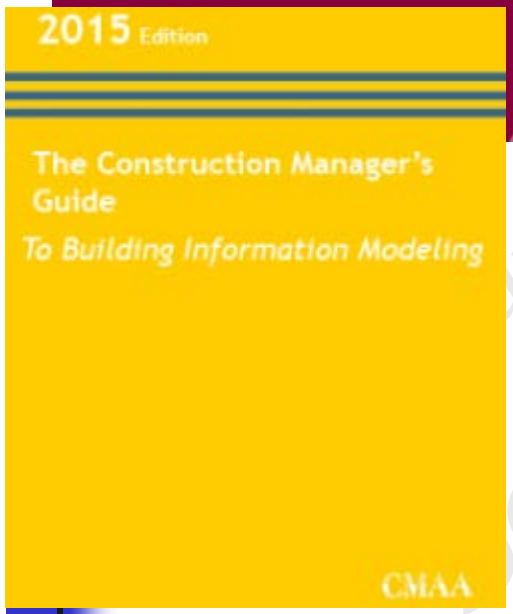
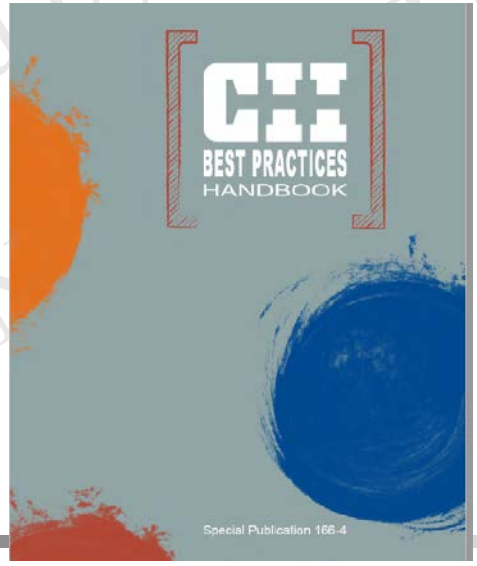

2017 Edition
Quality Management
Guidelines


2018 Edition
Cost Management
Guidelines
CMAA

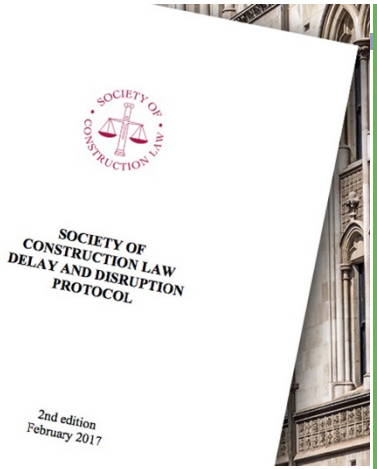

2017 Edition
Risk Management
Guidelines
CMAA

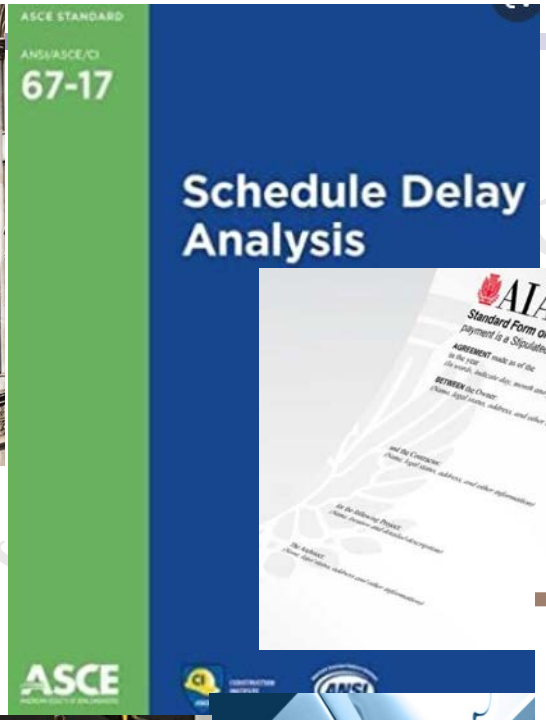

2015 Edition
The Construction Manager's Guide
To Building Information Modeling
CMAA

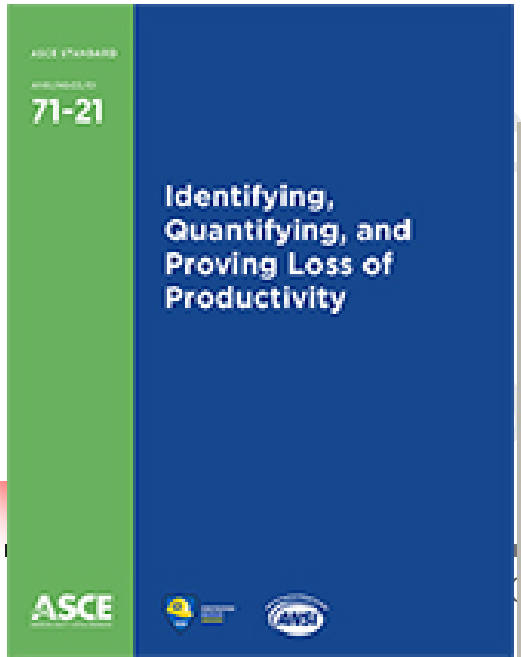

CII
BEST PRACTICES
HANDBOOK
Special Publication 166-4

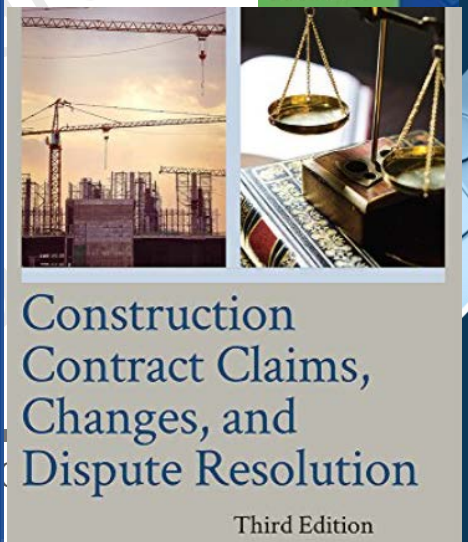

PROGRAM MANAGEMENT 2.0
Concepts and Strategies for Managing Building Programs (Revised)

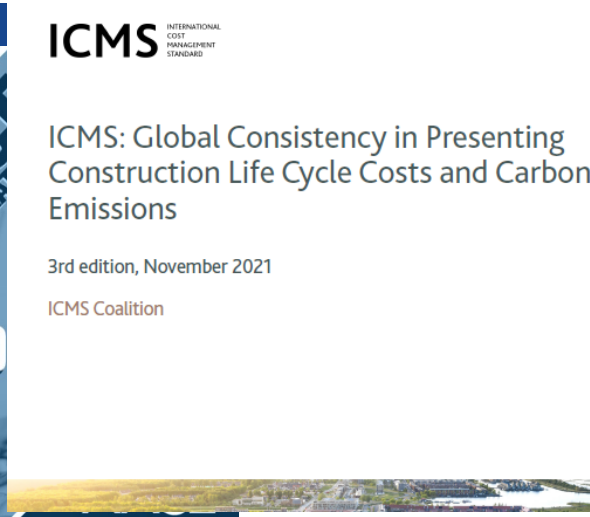
Others











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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**

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Portal 4

Best Practices

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
Home

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
About the Best Practices Portal
Best Practices Definitions
Glossary

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Value of the CII Best Practices

MATERIALS MANAGEMENT

16%

The benefits of a materials management program results in 16% schedule improvement.

DESIGN PLANNING & OPTIMIZATION

6.1%

High use of constructability results in 6.1% cost improvement versus low usage and reduces project schedule by 7.5%.

PROJECT PLANNING

$25

Each $1 spent on the PDRI process can save $25 in return.

FRONT END PLANNING

$3-$10 payback

Front End Planning has a $3-$10 payback on every dollar spent.

CONSTRUCTION TECHNOLOGY

30-45%

Adoption of proven technology can improve construction industry productivity by 30-45%, as well as improve material predictability and reliability.

CHANGE MANAGEMENT

11.4%

The CII Knowledge Base adds value to Change Management Practices through a 11.4% cost growth improvement.

CII

نعتی)

Intro | Project Information | Proj Info Responses | PM Questions | Save | Reset this section

Section 2 - Project Information

Project Manager: Fill in the following descriptive information about your project.

P1. What is the name of this project?

P2. What type of facility is being constructed (e.g., process, power, civil, comm

P3. How would you primarily characterize this project?
Grass roots | Modernization | A

P4. Is this a joint venture project?
Yes | No | D

P5. Are there multiple engineering execution locations for this project?
Yes | No | D

P6. Where is this project located (city, state, country)?

P7. What is the total installed cost of this project (in millions)?
In millions

P8. Under what type of contract is this project being executed (e.g., lump sum,
Lump Sum | Cost Reimbursable | Cost plus Pe

P9. What services has your company contracted or been tasked to provide on

P10. Does your company have previous experience with this client/owner?
Yes | No | D

P11. Do you personally have previous experience with this client/owner?
Yes | No

P12. What is the scheduled duration of this project in months?
months | D

P13. Are either partnering or alliances being used on this project?
Yes | No | D

P14. Is there or will there be formalized team building on this project?
Yes | No | D

Introduction | User's Guide | Project

Intro | Engineer. Questions | Review Answers | Report

Section 3 - Engineering Questions

Your responses are important to the accurate assessment of the proje
therefore please answer all questions possible. The questionnaire will
and you MUST COMPLETE THE ENTIRE QUESTIONNAIRE PRIOR TO

Project Name:

What is your name?

1. How well do you understand what information your SUPE
2. How well do you understand what information OTHER G
from you?
3. How often do you receive conflicting instructions from m
4. How often does poor communication or lack of coordinati
5. Does the project have written procedures/practices for yo
Execution Plan or similar document)?
6. How effective are these procedures?
7. Is a Project Execution Plan (or similar document) being
8. How often are you kept current with DESIGN CHANGES
9. How often are you kept current with SCHEDULE CHANG
10. Do you feel you have ADEQUATE ACCESS to the peopl
for you to perform your job?
11. How often do you receive less information than you need
experience information underload)?
12. Overall, how effective do you think communication is on
13. In what phase is your project currently?

Intro | Project Information | PM Questions | Engineer. Questions | Construct. Questions | Save | Print Report | Reset all sections

Construction Industry Institute

Communications Effectiveness Report

IR 105-2 Version 2.1

	Project Management			Engineering			Construction		
Project Name	No Response								
Survey Participan									

Communications Effectiveness Score

Overall	Not Enough Data

By Stakeholder

	Project Management	Engineering	Construction
Com. Eff. Score	Not Enough Data	Not Enough Data	Not Enough Data

By Category

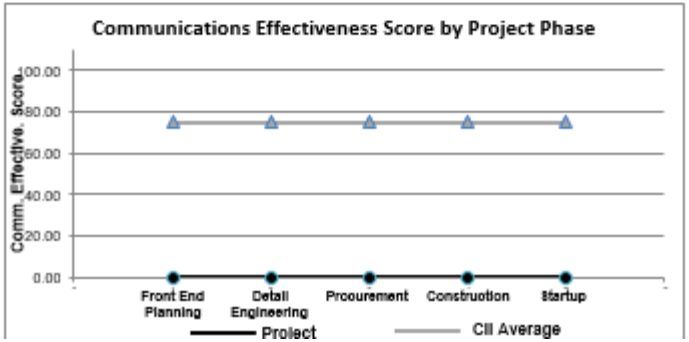
Accuracy	Not Enough Data
Timeliness	Not Enough Data
Completeness	Not Enough Data
Understanding	Not Enough Data
Barriers	Not Enough Data
Procedures	Not Enough Data

By Role

	Project Management	Engineering	Construction
Accuracy	Not Enough Data	Not Enough Data	Not Enough Data
Timeliness	Not Enough Data	Not Enough Data	Not Enough Data
Completeness	Not Enough Data	Not Enough Data	Not Enough Data
Understanding	Not Enough Data	Not Enough Data	Not Enough Data
Barriers	Not Enough Data	Not Enough Data	Not Enough Data
Procedures	Not Enough Data	Not Enough Data	Not Enough Data

By Project Phase

Front End Planning	Not Enough Data
Detail Engineering	Not Enough Data
Procurement	Not Enough Data
Construction	Not Enough Data
Startup	Not Enough Data



Oracle and CII

Oracle Construction and Engineering Smart Construction Platform

While we often focus on project execution ("do the project right"), capital efficiency demands excellence in capital planning and allocation ("do the right projects") at the portfolio level. Oracle Construction and Engineering's Smart Construction Platform supports this full lifecycle model for capital efficiency.

Oracle Construction and Engineering has worked with leaders across industries to help them achieve capital efficiency, using CII best practices and Oracle's suite of offerings—including portfolio management, planning and scheduling, capital program management, and payment solutions.

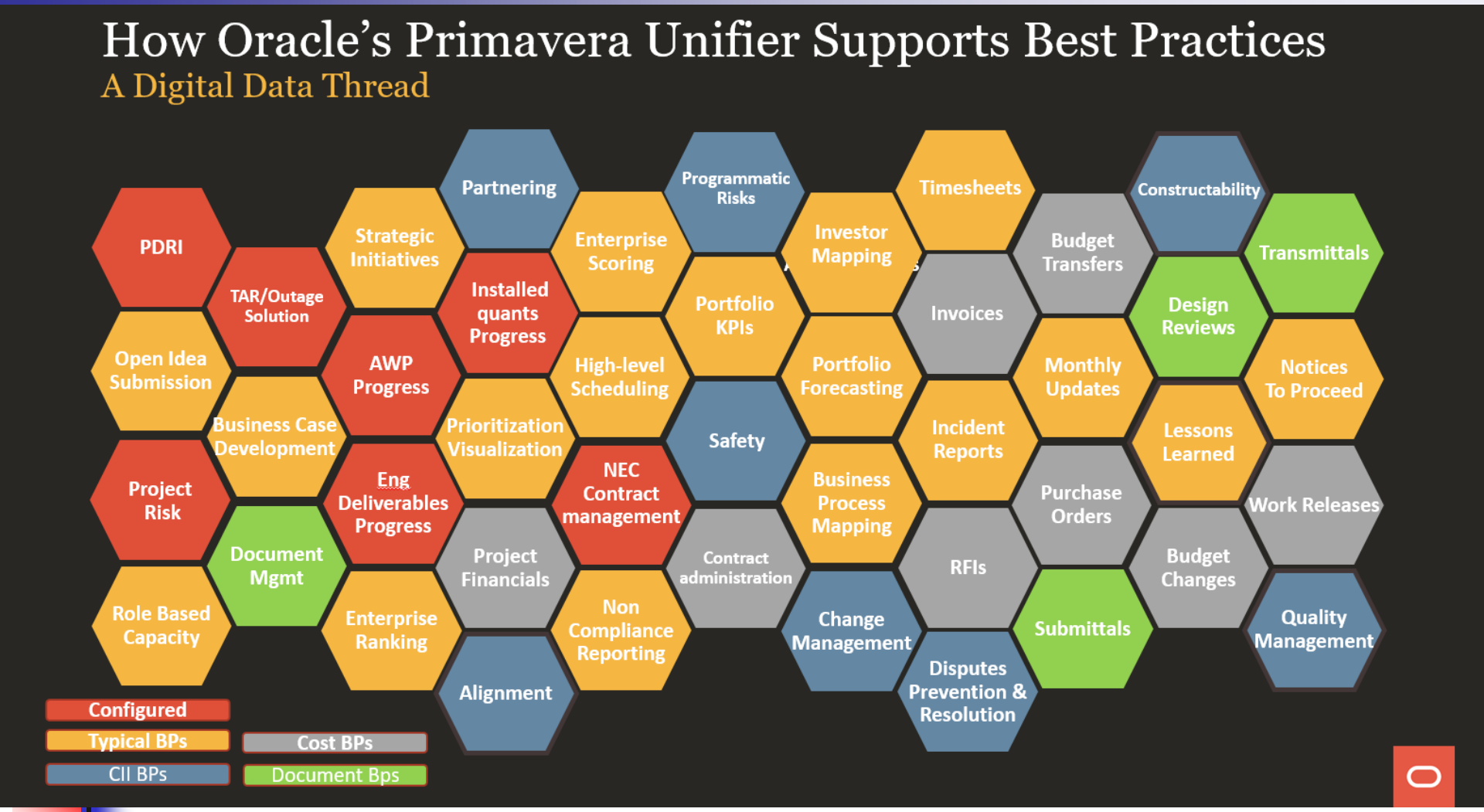
Oracle and CII

The Construction Industry Institute

In addition, Oracle now has an agreement with the Construction Industry Institute (CII). We're working to deliver CII best practices methodologies into configured packages.

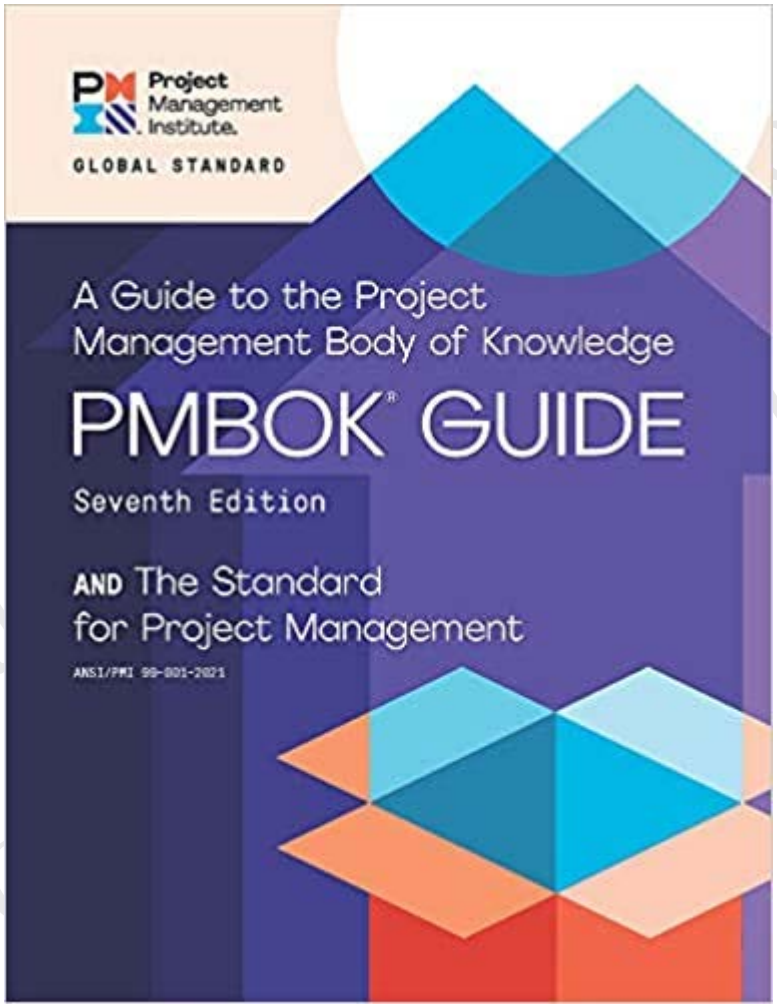
Over time, we'll provide capabilities that support all 17 best practices where appropriate, allowing organizations to enhance company-wide adoption of these best practices. Packages to-date include project definition rating index (PDRI), project risk, and advanced work packaging (AWP) progress.

Oracle and CII



PROJECT MANAGEMENT DEFINITION

Key terms and concepts of project management



Key terms and concepts of project management

Portfolio

- ✓ Projects, programs, subsidiary portfolios, and operations managed as a group to achieve **strategic objectives**.

Program

- ✓ Related projects, subsidiary programs, and program activities that are managed in a coordinated manner to **obtain benefits not available** from managing them **individually**.

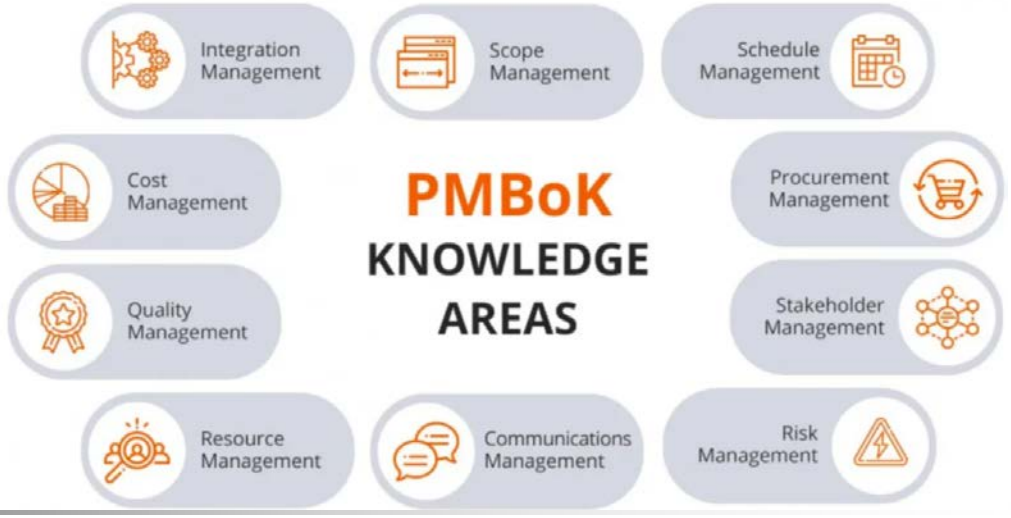
Project

- ✓ A **temporary endeavor** undertaken to create a **unique** product, service, or result.
- ✓ The temporary nature of projects indicates a **beginning** and an **end** to the project work or a **phase of the project** work.
- ✓ **Projects** can stand alone or be part of a program or portfolio.

Key terms and concepts of project management

▶ Project management

- ✓ The **application** of knowledge, skills, tools, and techniques to project activities to **meet project requirements**.
- ✓ Project management refers to **guiding the project work** to deliver the **intended outcomes**.
- ✓ Project teams can achieve the **outcomes** using a **broad range of approaches** (e.g., predictive, hybrid, and adaptive).



Key terms and concepts of project management

▶ Project manager

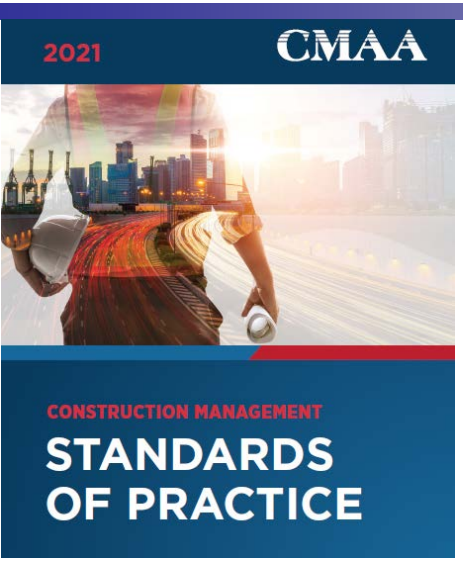
- ✓ The **person assigned** by the performing organization to **lead the project team** that is responsible for achieving the **project objectives**.
- ✓ **Project managers** perform a variety of **functions**, such as
  1. **Facilitating** the project **team work** to achieve the **outcomes**
  2. **Managing** the **processes** to deliver **intended outcomes**

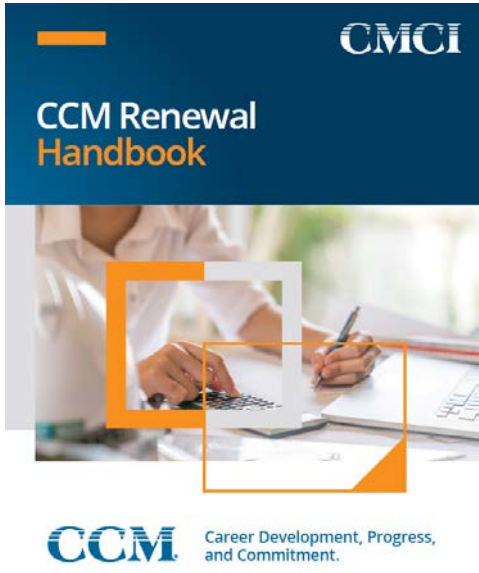
▶ Project team

- ✓ A **set of individuals** performing the work of the project to achieve **its objectives**.

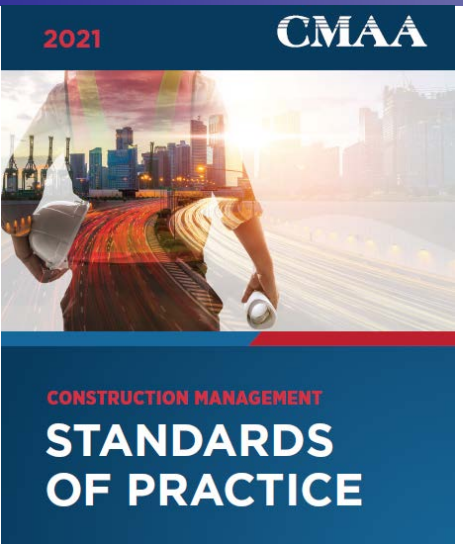
CONSTRUCTION MANAGEMENT DEFINITION

Key terms and concepts of construction management



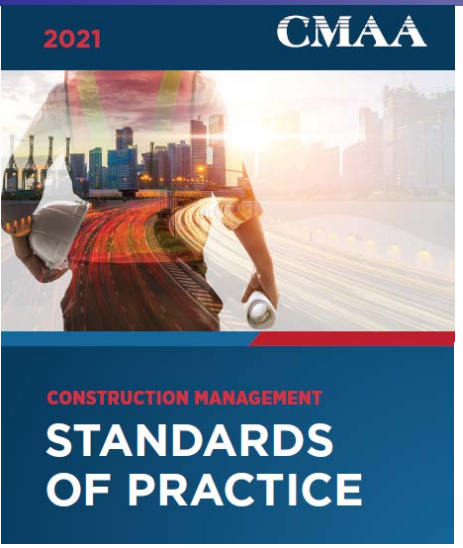


Key terms and concepts of construction management



The *Construction Management Standards of Practice* defines the range of services that constitute professional construction management and serves as an indispensable guide for owners and service providers. This document describes construction management services without limiting the methods and procedures by which a professional construction manager (CM) may provide those services for a particular project or program.

Key terms and concepts of construction management



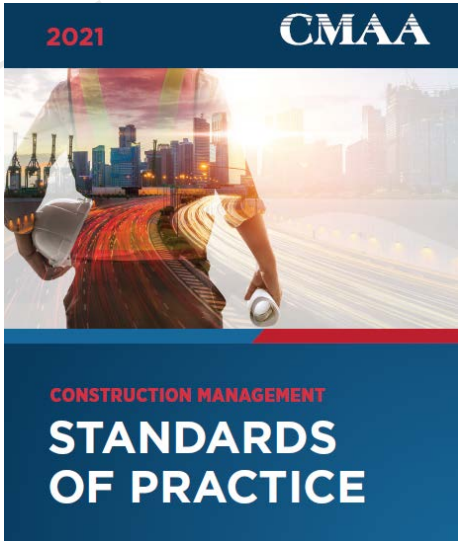
The scope and types of services a CM provides to a specific project or program may vary from those described in this document. This document is intended to provide a menu of services. Not every project/program will require every service, and a particular project/program may require unique services not listed in this document. Whatever service is provided, this document prescribes an industry standard of practice, which the CM will meet or exceed.

More details about specific activities and procedures can be found in CMAA's related guidelines, including: *CMAA Claims Management Guidelines*, *CMAA Contract Administration Guidelines*, *CMAA Cost Management Guidelines*, *CMAA Project Closeout Guidelines*, *CMAA Quality Management Guidelines*, *CMAA Risk Management Guidelines*, *CMAA Sustainability Guidelines*, and *CMAA Time Management Guidelines*.

Key terms and concepts of construction management

Project

The total effort required in all phases from conception through design and construction completion to accomplish the owner's objectives. Also, defined as all work to be furnished or provided in accordance with the contract documents prepared by the designer.



Project Team

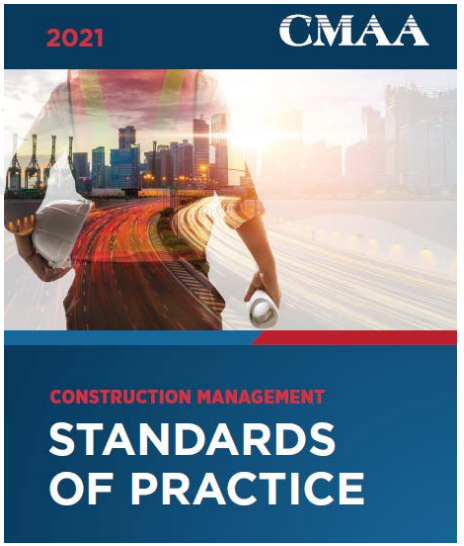
All project stakeholders engaged in completing the project and consisting of the owner, designer, CM, and prime contractors engaged in the design and construction.

Key terms and concepts of construction management

Construction Management

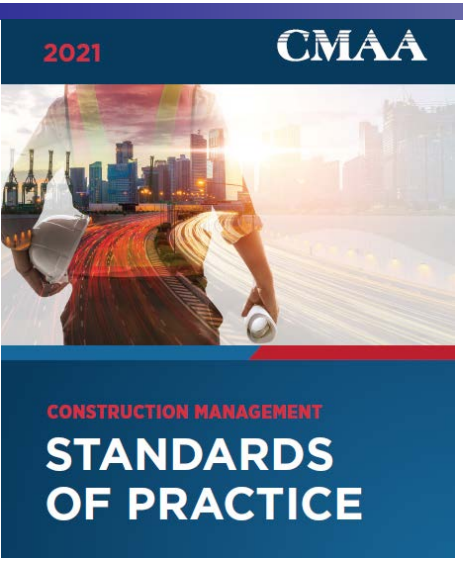
A professional management practice applied to construction projects from project inception to completion for the purpose of controlling time, cost, scope, and quality.

CMAA defines construction management as a professional service that applies effective management techniques to the planning, design, and construction of a project from inception to completion for the purpose of controlling time, cost, and quality.



Comprehensive construction management services are used to integrate the different facets of the construction process - planning, design, procurement, construction, and activation - for the purpose of providing standardized technical and management expertise on each project.

Key terms and concepts of construction management



Construction Management Plan (CMP)

The CMP is a written, project-specific plan that outlines the project's scope, budget, schedule, organizational roles, quality standards, and specific methods and procedures that the CM will undertake to accomplish the various management tasks for the project.

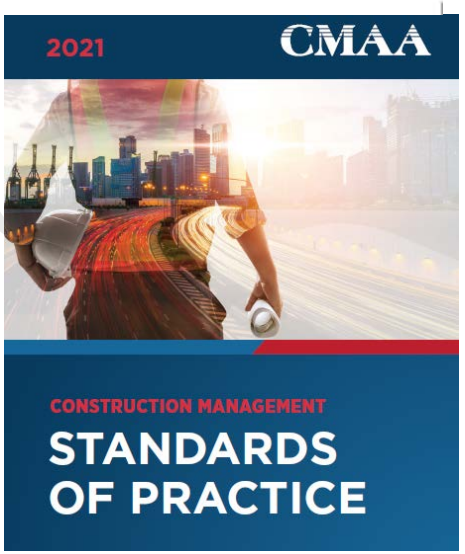
Construction Manager (CM)

An organization or individual with the expertise and resources to provide construction management services.

Key terms and concepts of construction management

Project Procedures Manual (PPM)

A written, project-specific plan that outlines the project's scope, organization, and the specific approach to be undertaken to accomplish the various management tasks for the project.



Project Management Plan (PMP)

A document prepared by the CM, and approved by the owner, which defines the owner's goals and expectations including scope, budget, schedule, and quality and the strategies to be used to fulfill the requirements of the project.

Key terms and concepts of construction management

CMAA defines project management as the use of integrated systems and procedures by a team of professionals during project design and construction. This chapter focuses on the key components and development of a project management plan (PMP) throughout the various project phases. In general, it outlines key goals and elements of managing a project under the construction management format. Later chapters expand upon the approach addressed here.

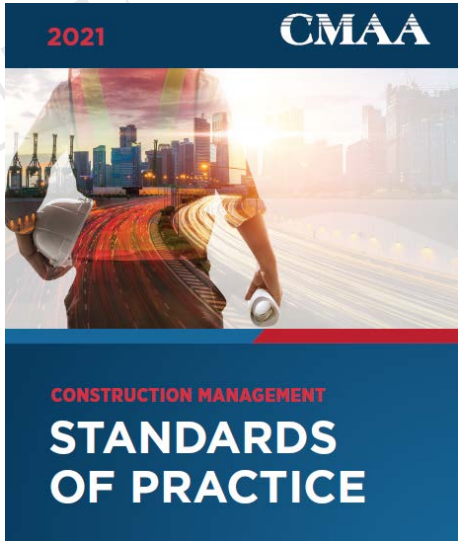
PMP has a procedure and many things related to this has been outlined in CMAA

The PMP typically establishes the project's:

- Scope
- Budget
- Schedule
- Environmental conditions
- Basic systems
- Methods and procedures
- Basis for claims avoidance

Key terms and concepts of construction management

Program management is the practice of professional construction management applied to a capital improvement program of one or more projects from the program's inception to completion.



Key terms and concepts of construction management

A professional construction manager manages the entire project and program with pre-planning, design, construction, close out, and management expertise that can assure the best possible project outcome no matter what type of project delivery method is used.

Key terms and concepts of construction management

I will hold some courses regarding
Construction Management Dictionaries
in
General
Contract
Cost
Time
Claim
BIM
….

EVALUATING CONSTRUCTION PROJECT SUCCESS

Sustainable project

- The **built environment** and its underlying social, economic, and natural environments are related.

- The term sustainable project is used

  to define the ability of the **facility or infrastructure**

  to strike a **balanced fit** with its underlying social, economic, and natural environments.

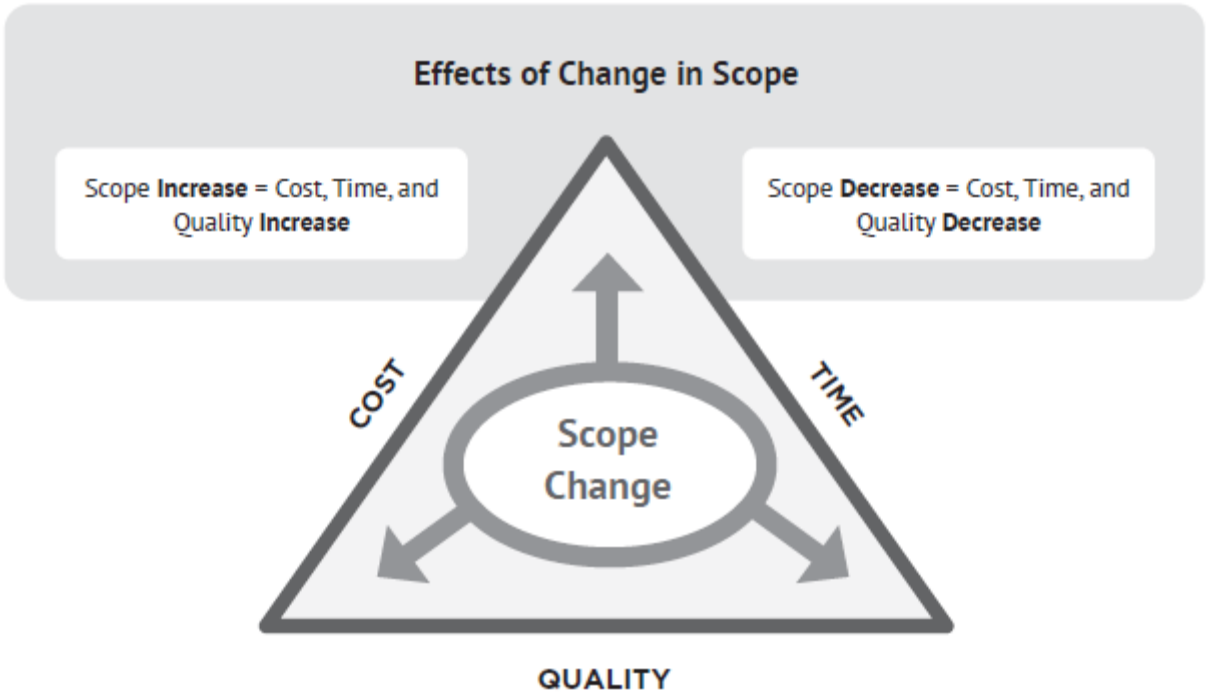
Example

Example

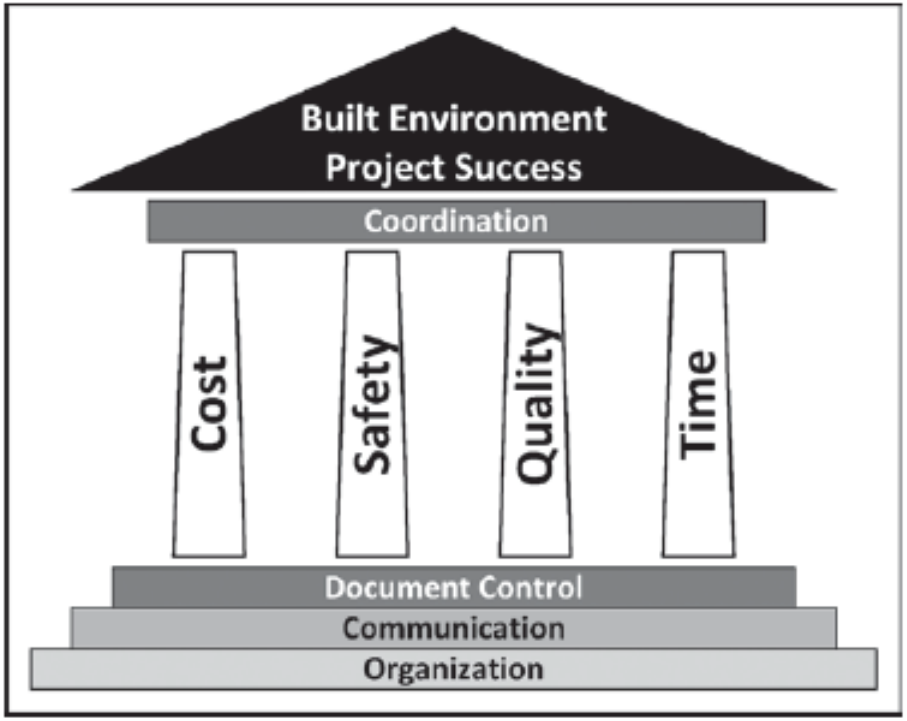
A road project may be initiated by a city to address an increase in traffic due to population growth in a suburban area. This project will need to produce an infrastructure that fits within its underlying social, natural, and economic environments:

- *Social environment*: Studies will be performed to evaluate how the new road will benefit the public, and outreach activities will be conducted to involve and/or inform the public during the design and construction process;
- *Natural environment*: Environmental studies will be performed to evaluate if the impact on the natural environment is overriding the expected advantages of the new road. These studies will also suggest mitigation measures that would be necessary to reduce or nullify these impacts during construction; and
- *Economic environment*: The impact of the project on the local economy will be evaluated, including the impact of the cost of this project on the city economy at completion. Also, the impact of construction activities on existing businesses will be evaluated, and mitigation measures may be needed during construction to minimize this impact.

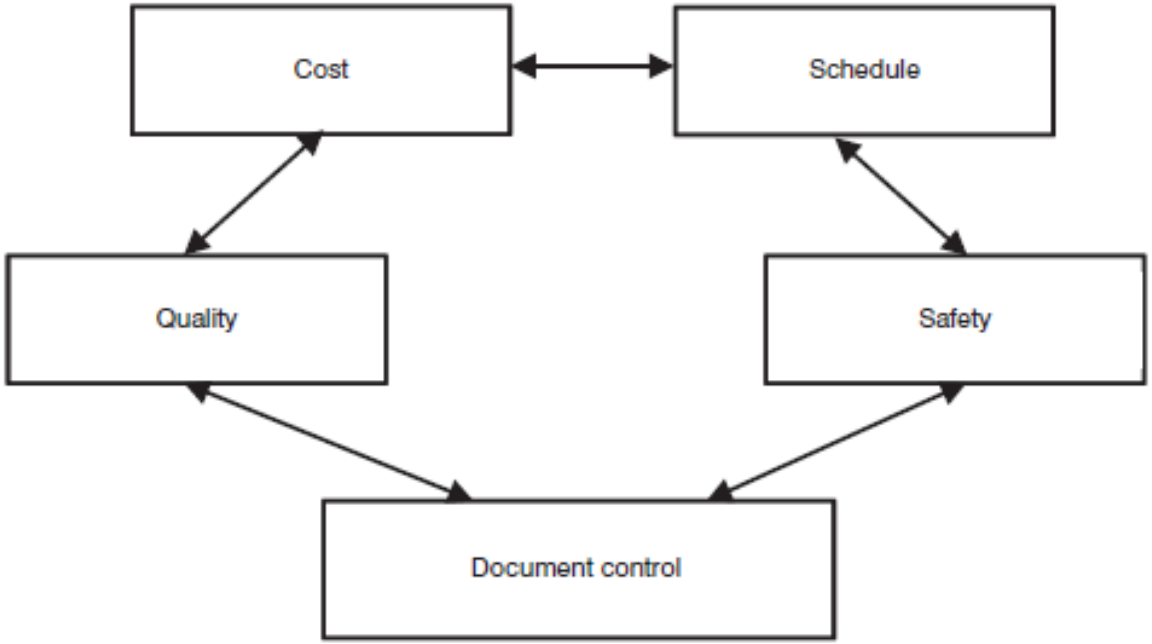
Project success



Project success



Project success

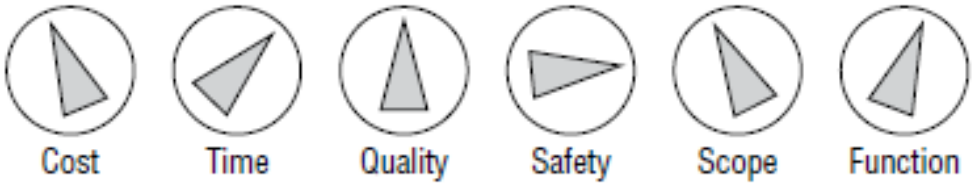


Critical project attributes

Project success

In 1996, a group of owners, architects, contractors, and engineers gathered in San Francisco to discuss common goals and opportunities for collaboration in the building industry. This group formally organized themselves as the Collaborative Process Institute (CPI). During their discussions, they came up with what I think are the best descriptors of the factors that need to be managed and controlled on a construction project in order to produce a successful outcome for the owner and all parties involved. They referred to these factors as the *six dials of project value*: cost, time, quality, safety, scope, and function.

The Six Dials of Project Value

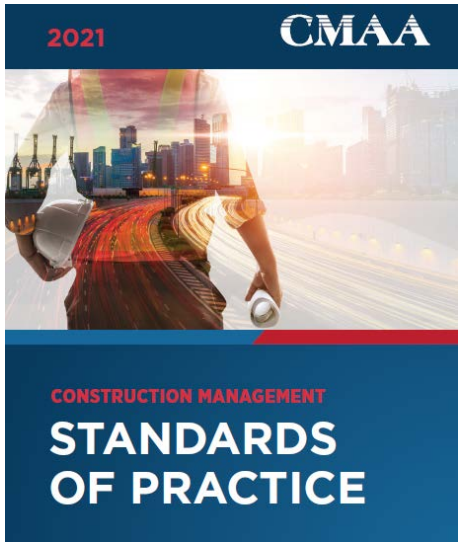


CONSTRUCTION PROJECT PHASES

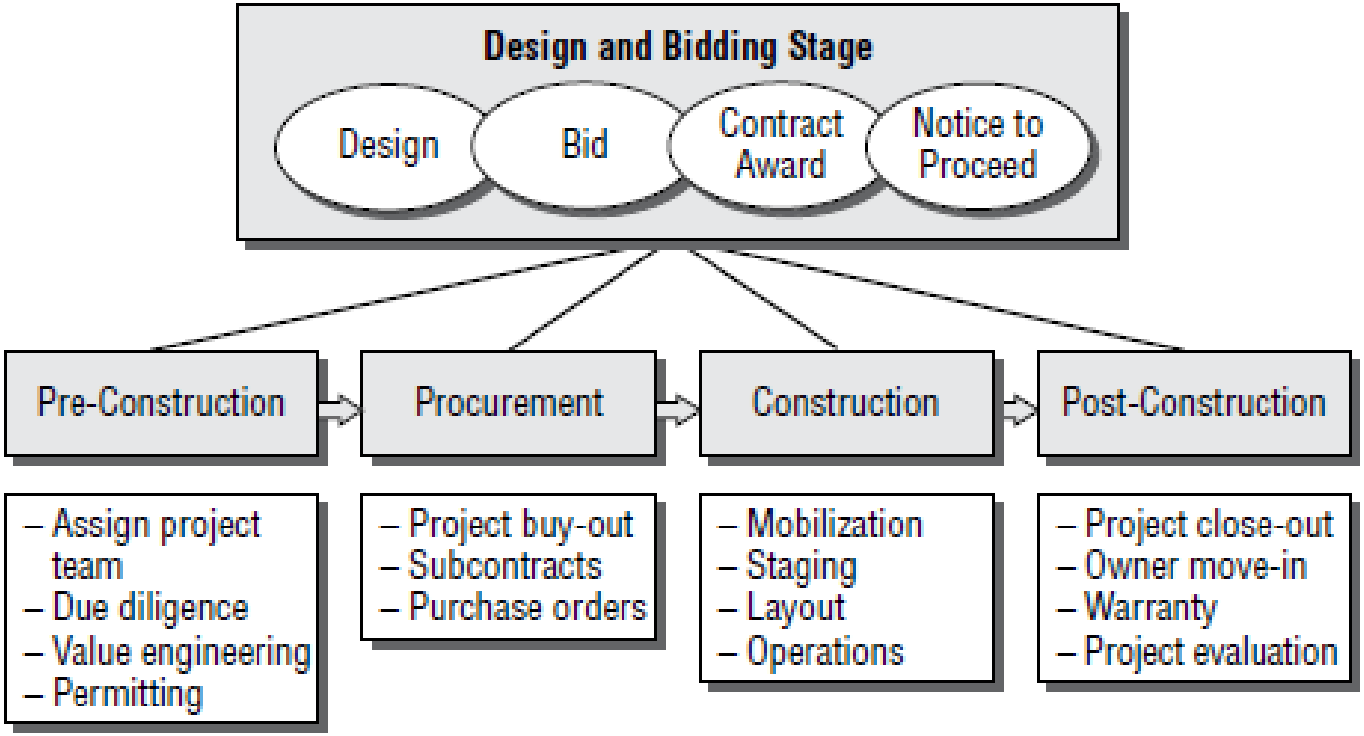
Phases

These functions are not mutually exclusive. They are related and integral components of the construction management process. For ease of reference, functions are presented in the following phases:

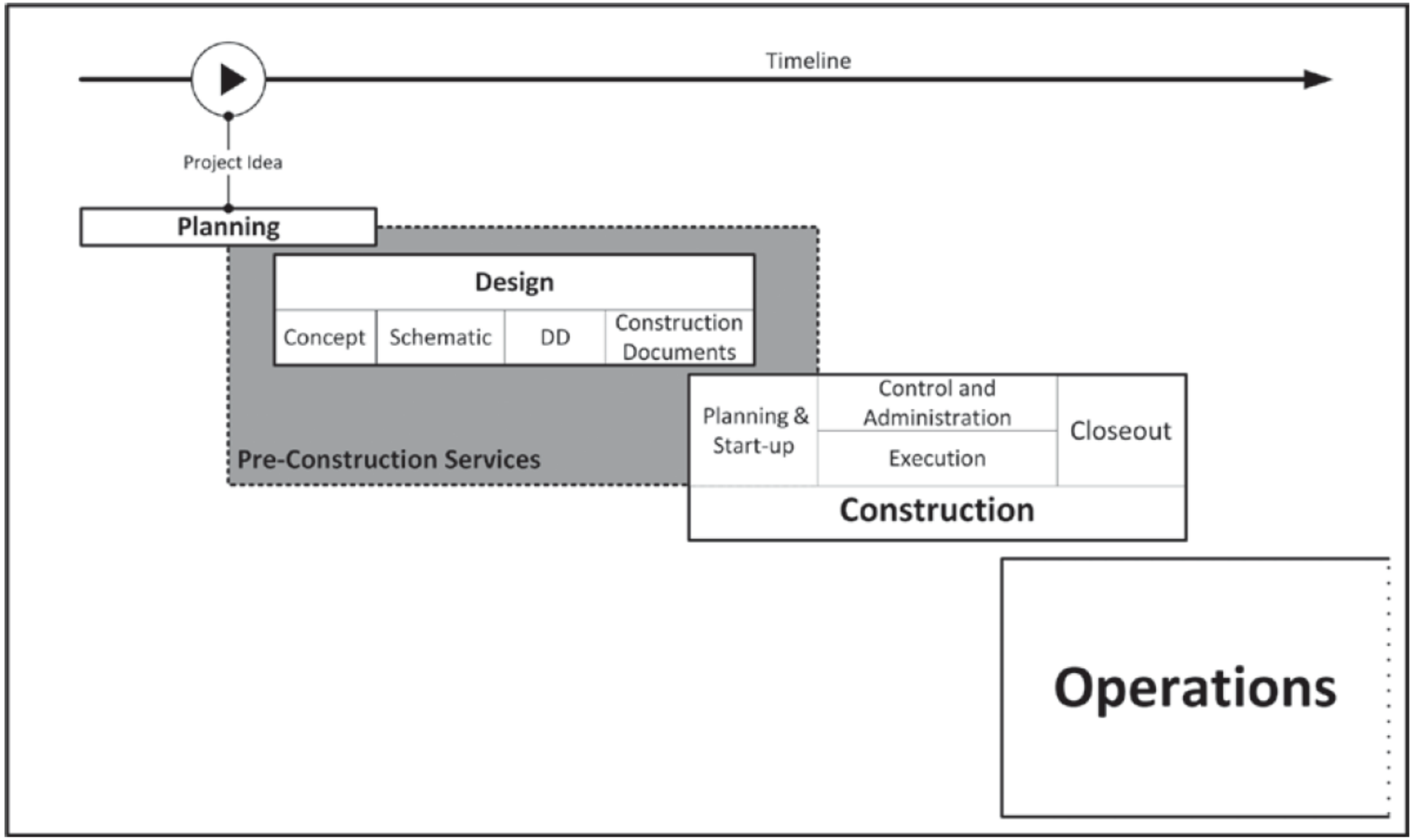
- Pre-design
- Design
- Procurement
- Construction
- Post-construction



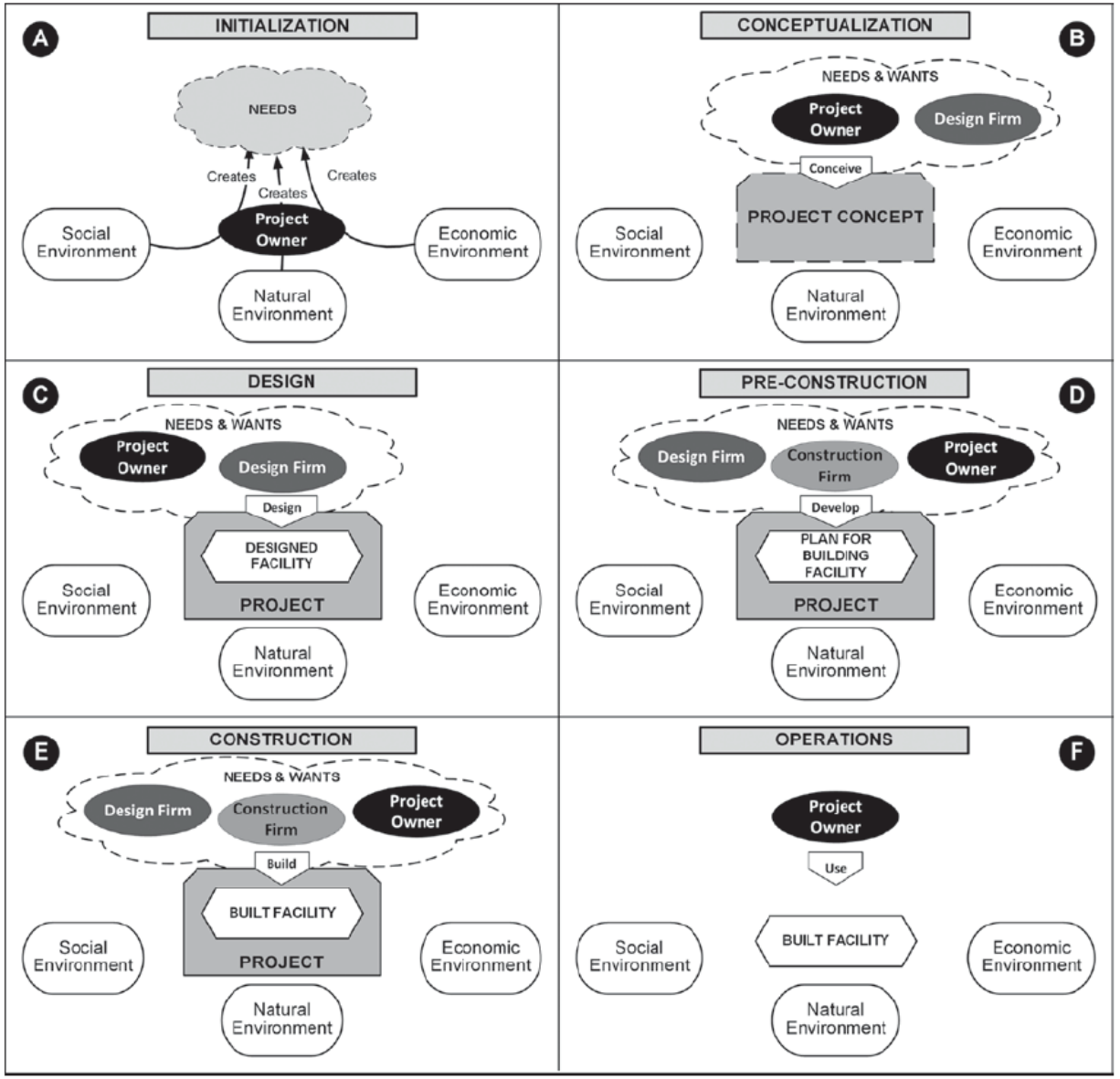
Phases



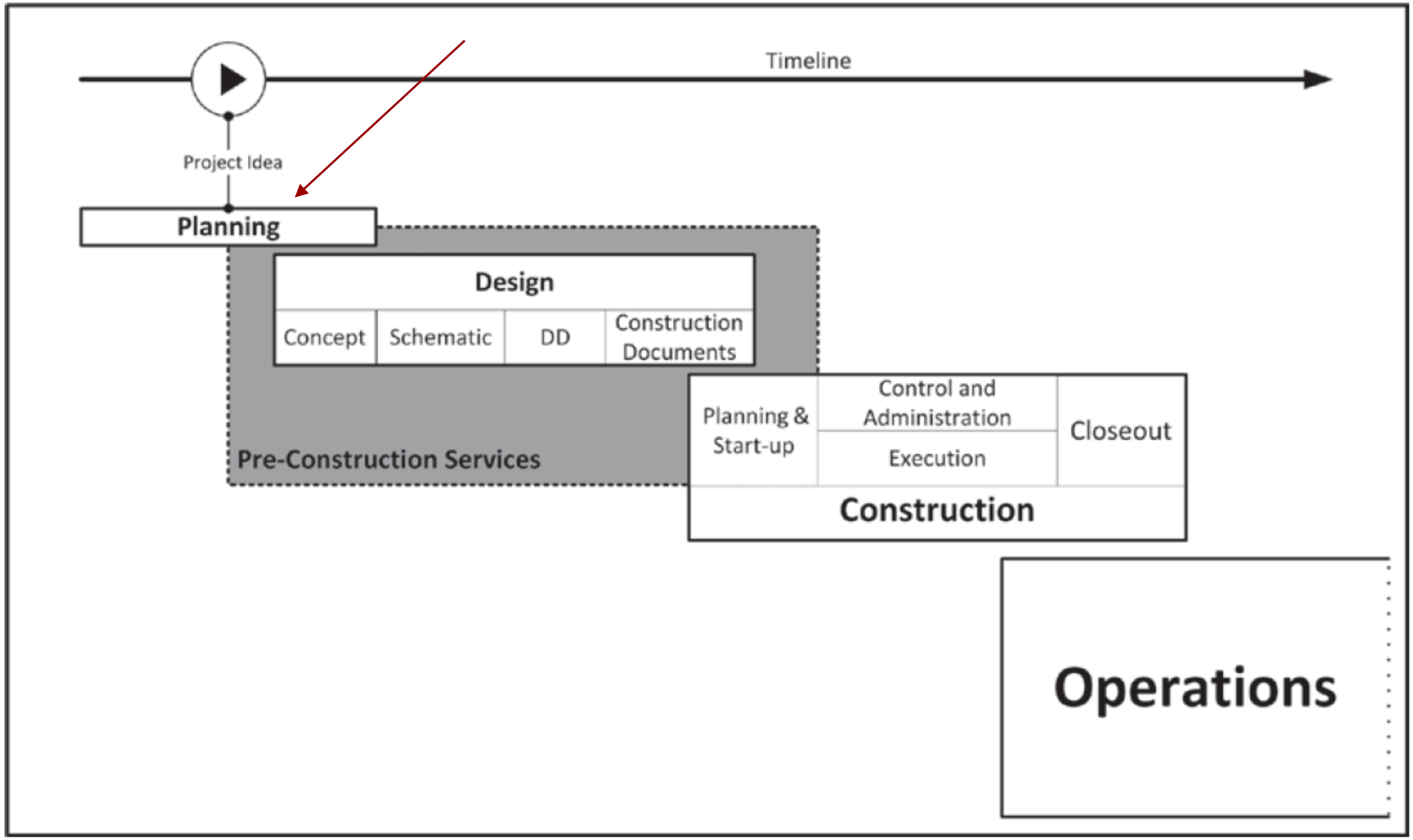
Major phases



Project participants in project phases



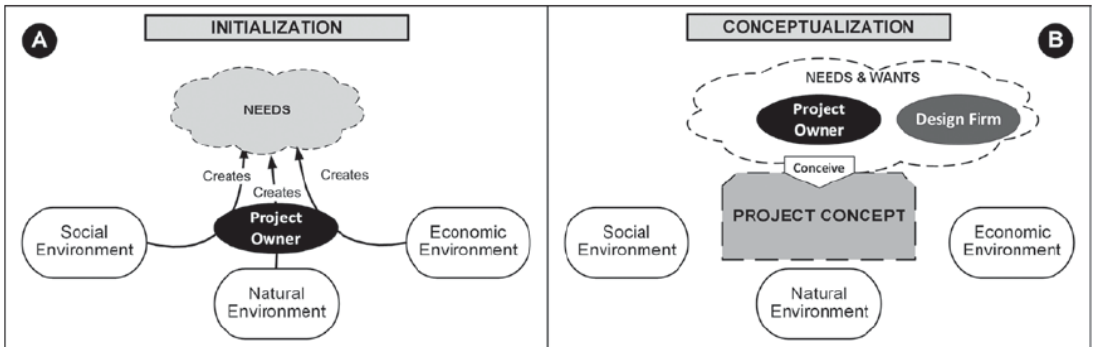
Major phases



Planning

- This phase **occurs** once
  1. A project **owner** realizes some needs or wants,
  2. Evaluates **alternative approaches** to **achieve these needs**,

     including approaches that would require the **initiation of a new built environment project**, and
  3. Generates a **project concept**.



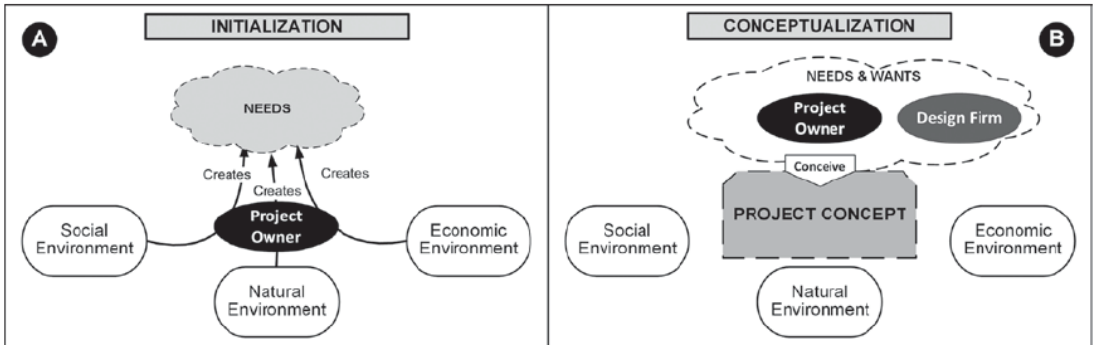
Planning

- **Depending on the industry sector** and the **project owner**,

  other known names for this phase are programming, pre-design, front-end planning, and pre-project planning.

- This phase is **performed** by the owner/CM and

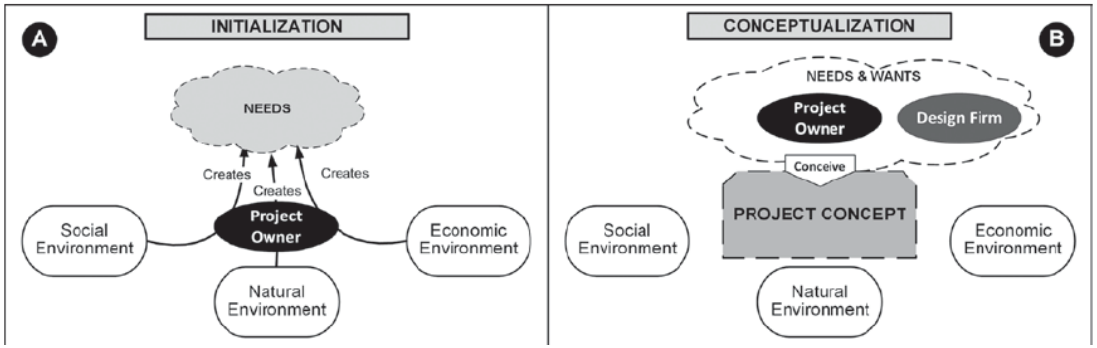
  should not be confused with the pre-construction planning and start-up phase that is performed by a **general contractor**.



Planning – Example of private sector

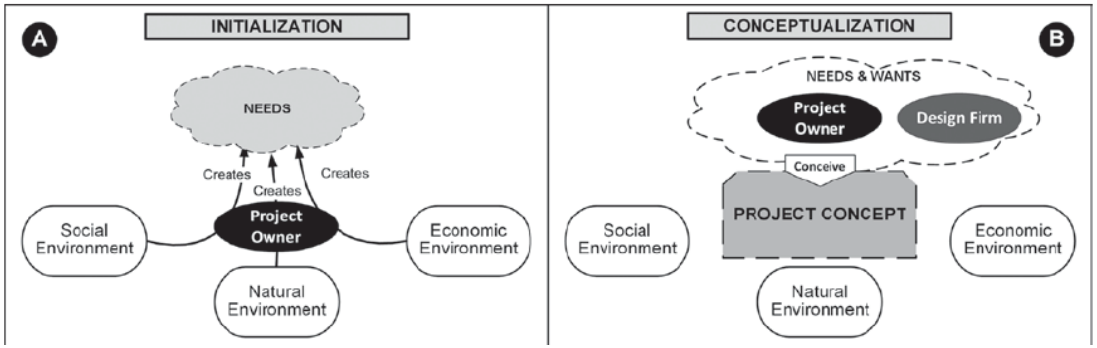
- In the **private sector**, this phase is part of the project owner's business planning process.
  - For instance, while performing its business planning, a **private industrial company** may **realize the need**

    to **increase production** of its goods to fulfill an **increase in market demand** in a remote region.



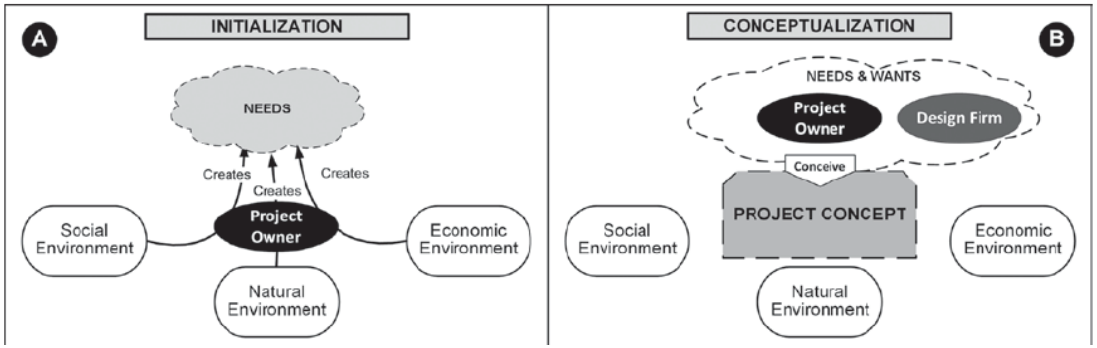
Planning – Example of private sector

- The **company may increase production** at an existing industrial facility by increasing work shifts or build a new facility to fulfill the increase in demand.
  - To **compare these options**, the company needs to develop a **rough concept of the new facility** to be used to estimate its costs.



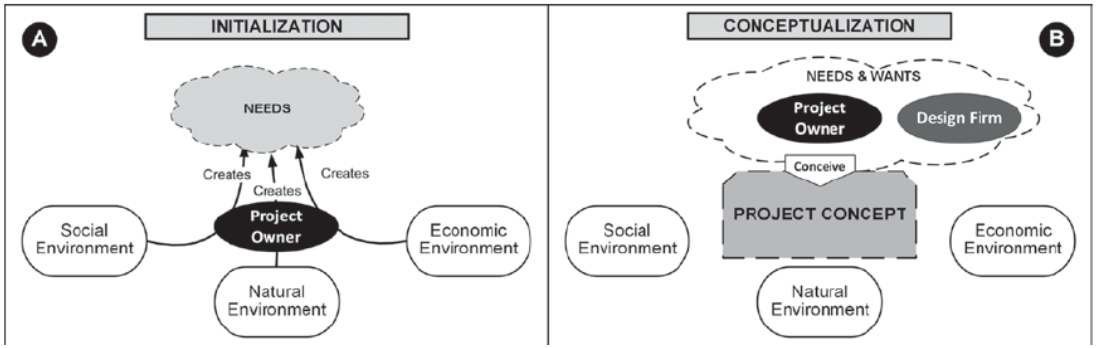
Planning – Example of public sector

- In the **public sector**, this phase is part of the community or regional planning process.
  - For instance, while performing its **community planning process**, a city may realize the need to reduce its fire department response time in a certain neighborhood.
    - ✓ The city may
      1. Add fire trucks at a fire station in a nearby neighborhood or
      2. Build a new fire station in the given neighborhood.



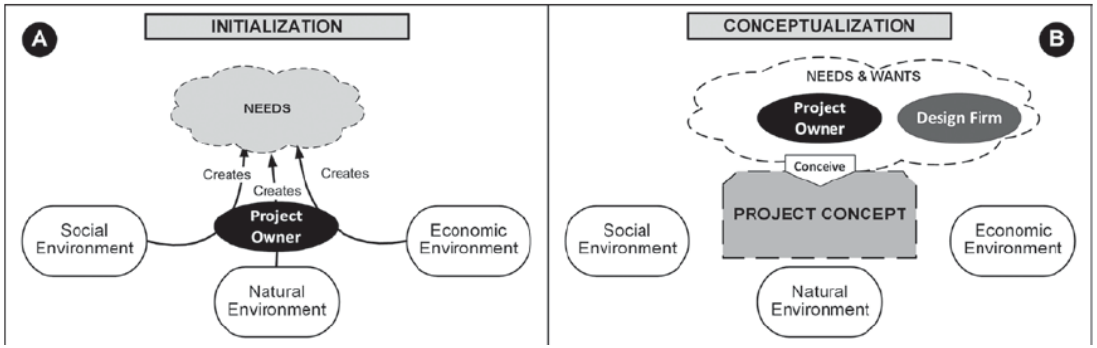
Planning – Example of public sector

- To **compare these options**, the city needs to develop a rough concept of the new fire station to be used to **estimate its costs**.

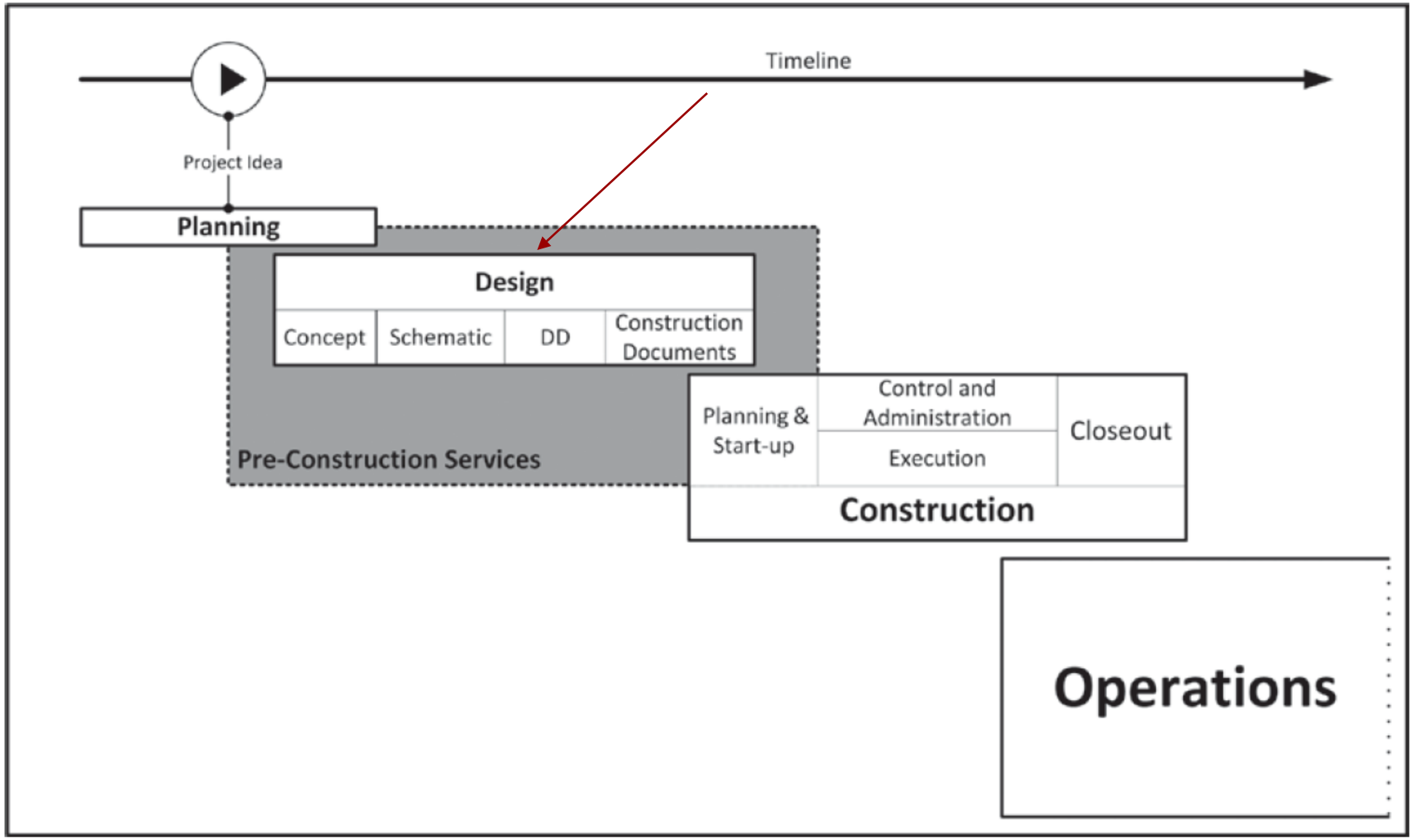


Planning

- One of the **most common types of analysis** performed at this stage is the feasibility analysis (or Study), which evaluates
  1. **Proposed** project's **ability** to fulfill the **needs**,
  2. **Technical** feasibility of the project concept
  3. **Economic** feasibility of the project concept

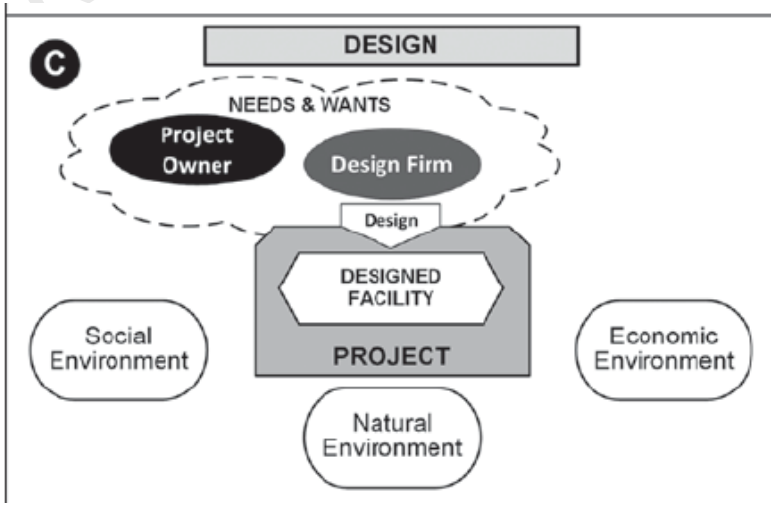


Major phases



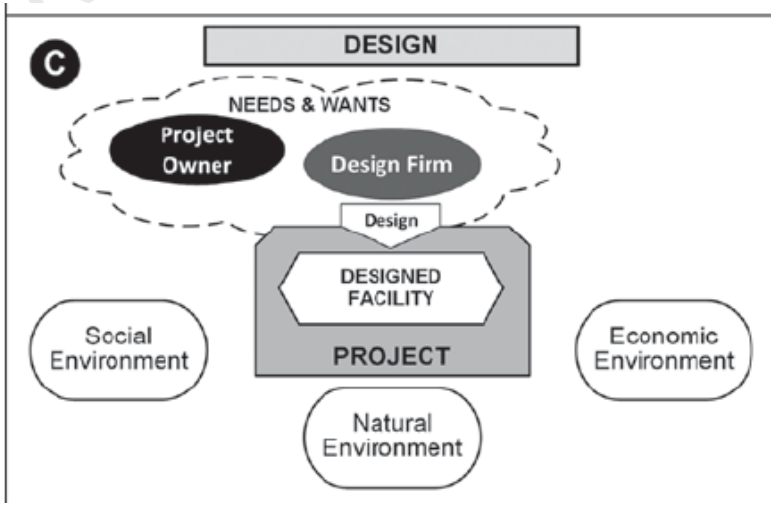
Design

- The design phase, shown, can be divided into **four sub-phases**, namely,
  1. Conceptual design,
  2. Schematic design,
  3. Design development, and
  4. Construction documents
     - They are often part of the **phase-gate model** used to **authorize expenditures**.



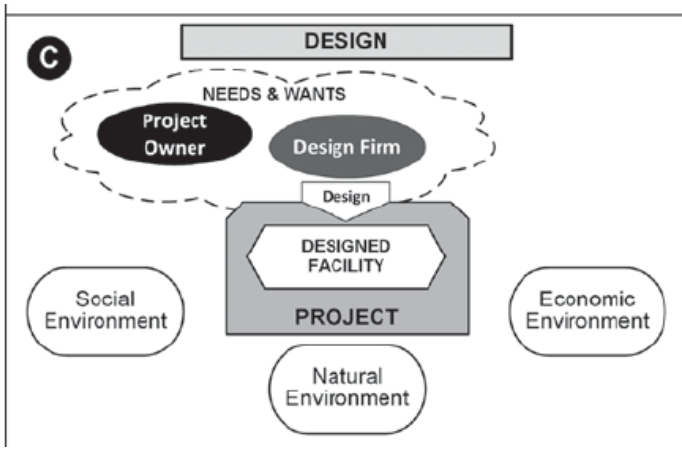
Design – Conceptual design

- An **initial conceptual design** (i.e., project concept) is actually developed during the planning phase as part of the **conceptualization** of the project idea.
- Conceptual design may be **led** by the project owner with their own personnel (CM), but a **design consultant** is usually hired to help develop a concept based on sound design principles.
- Based on the project concept, a **preliminary cost estimate** is usually performed at this time with the use of **order of magnitude**.



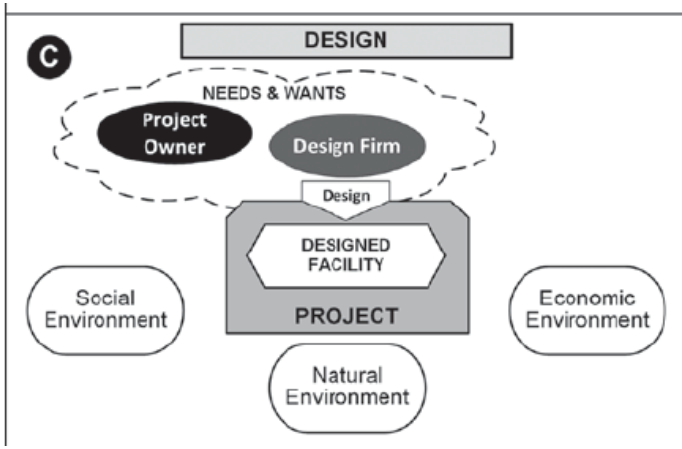
Design – Schematic design

- Once a **project idea** is formed around a project concept, the next step is to develop a **schematic design** that expands the project scope, which can be used as the **basis** for later design development.



Design – Schematic design

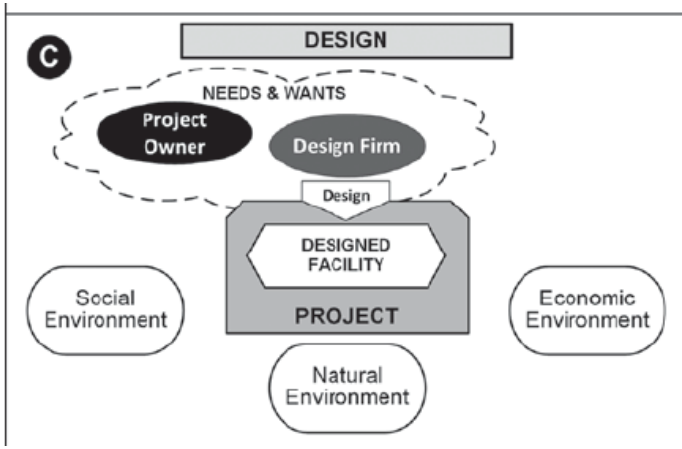
- It is common for project owners to **assemble an early design team** that will develop a set of graphical documents that add **detail to the initial concept**.
- As part of this sub-phase, it should be **verified that the facility concept** can be built on the available site, and if not, the **conceptual** design should be **revised**.



Design – Schematic design

- At the **end of this phase**, the owner will be provided with a
  1. Schematic design package and
  2. Cost estimate

  for review and approval.
- **Schematic design** usually results in a designed facility with dimensions only at the **macro level**.

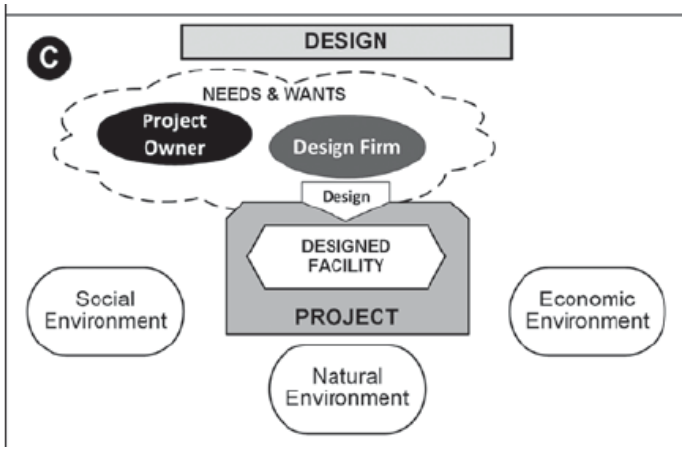


Design – Schematic design

- Although it is becoming **more frequent** for designers to develop three-dimensional building models by using computer-aided design (CAD) or building information modeling (BIM) software,

  the design is usually provided to the owner in the **form of drawings**,

  including a site plan, floor plans, sections and elevations, and printed renderings.



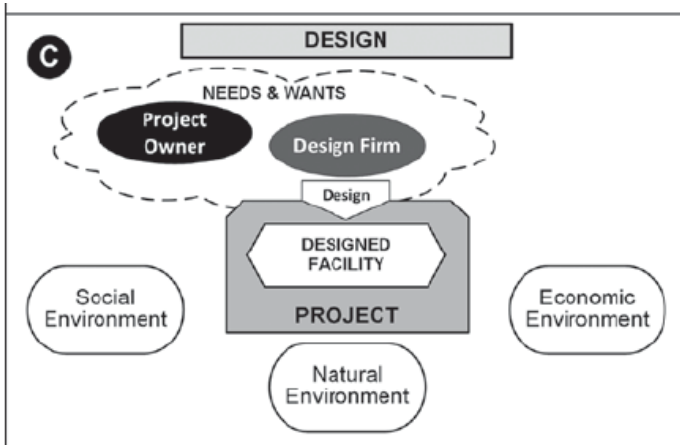
Design – Design development

- Once the **schematic design** has been approved by the owner, the design firm will proceed with the design development (DD) sub-phase.
- As part of this phase, the **design firm** will work toward the production of a design package

that will outline **the specifications** and

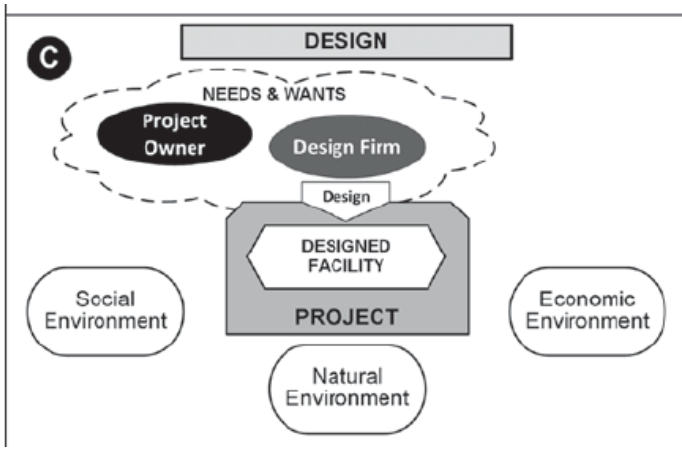
include architectural information, such as floor plans, sections, and elevations, as well as layouts of

1. Structural,
2. Mechanical,
3. Electrical, and
4. Plumbing systems.



Design – Design development

- **These drawings** will be produced at a higher scale than those with the **schematic design**.
- They will include full dimensions and provide door and window details, as well as information on materials.
- The **design package** will be **submitted** for review and approval to the **owner/CM**.

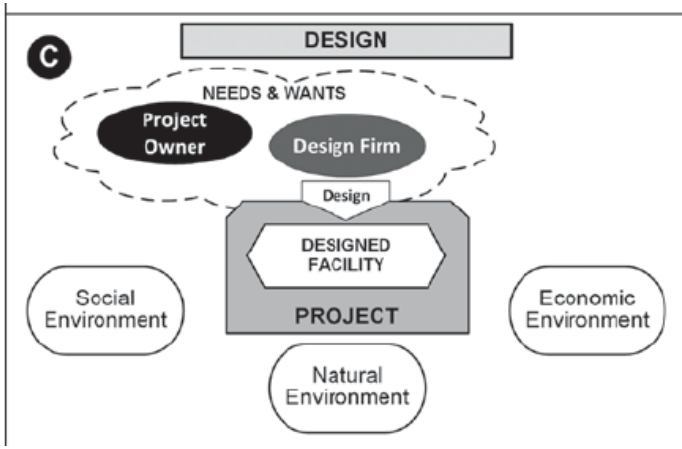


Design – Design development

- Often, the **design firm** would also provide a presentation to the **owner/CM** in which **additional content** can be provided,

  including

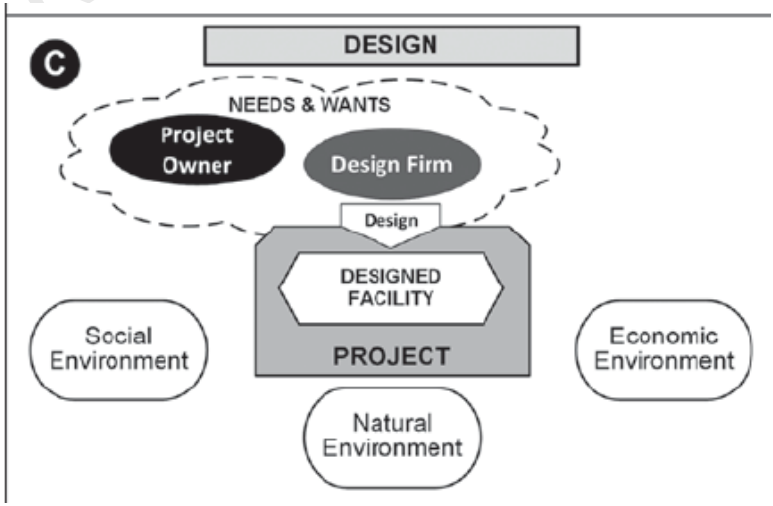
  1. Updated cost estimates,
  2. A initial construction schedule,
  3. Three-dimensional renderings, and
  4. Results of analysis on the owner/CM's "hot button" issues.



Design – Construction documents

- Once the **owner/CM and design** firm complete the review and revision of the design development package,

  the **design team** proceeds with the **final stage of design** to produce the construction documents.



Design – Construction documents

- **Construction documents** take the design to a **greater level of detail**

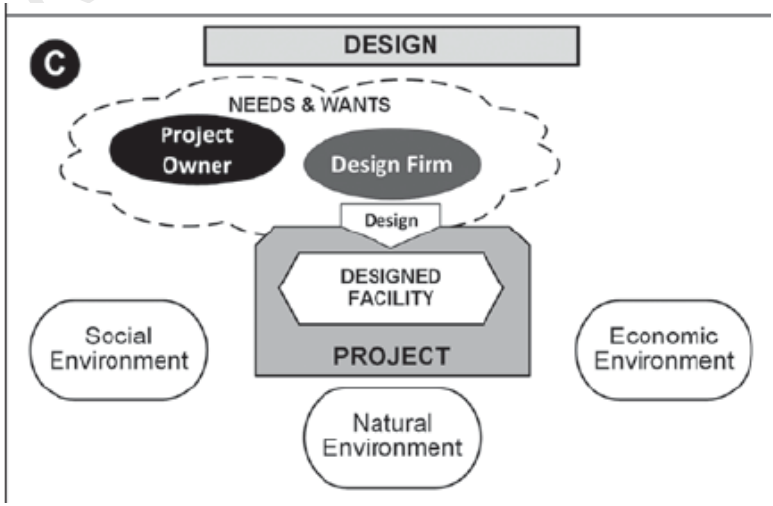
  to include construction details and specifications for materials;

  they are **used** to **finalize the price** of construction.

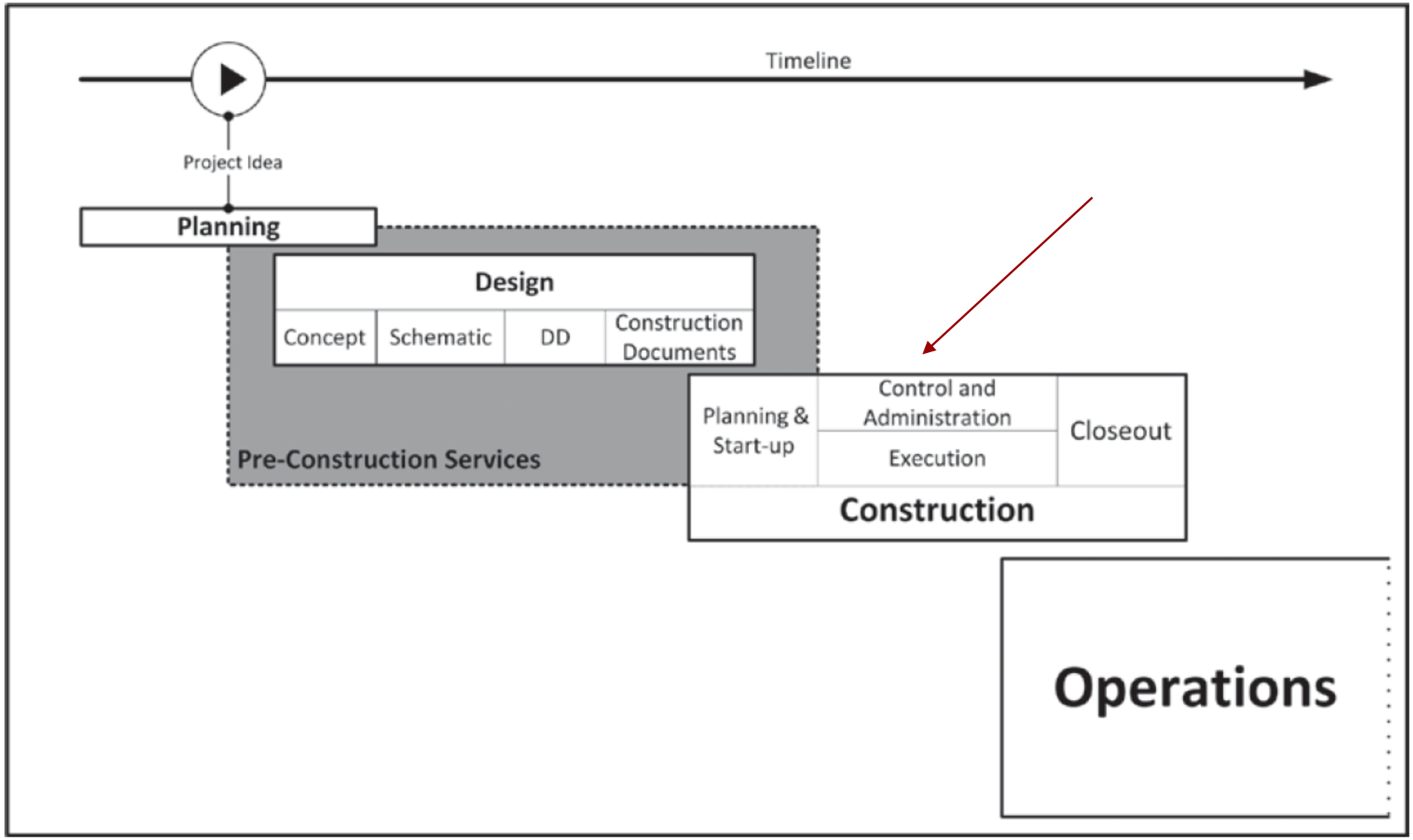
- The level of detail achieved in the contractual document set is decided by the owner/CM and

  may **vary greatly** with different project types and project delivery methods.

construction documents
The final detailed drawings used to build the project. They're also called working drawings. These final drawings, along with the full project manual, specifications, and agreement forms are together referred to as the contract documents.



Major phases

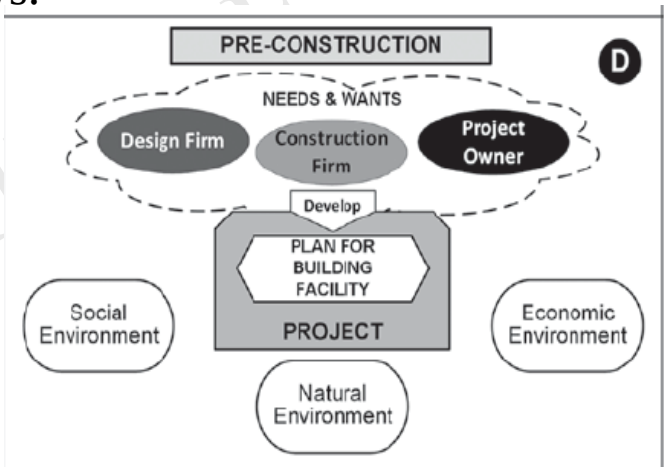


Construction

- **Project owners** rely on the **construction team** to lead the construction phase.
- During this phase, the construction team members **first plan and prepare** for the construction process.
- **Later**, they **perform and/ or oversee** field activities and carry the responsibility for the outcome.
- **Traditionally** this phase can be **subdivided** into four sub-phases:
  1. Construction planning and start-up (also known as traditional pre-construction),
  2. Construction execution,
  3. Construction control and administration, and
  4. Construction close-out.

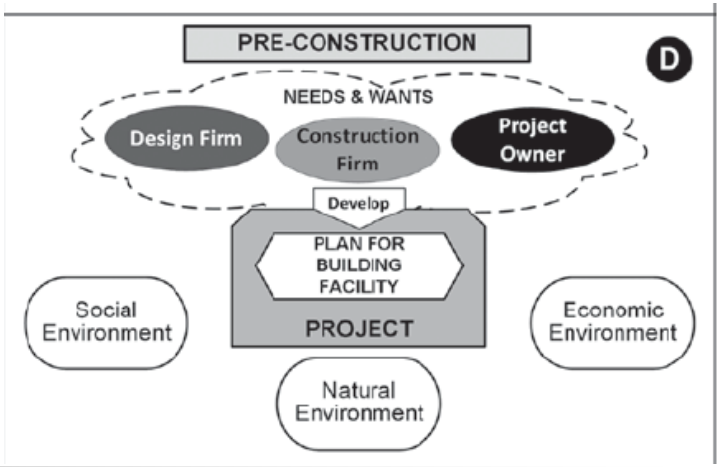
Construction: Pre-Construction

- The **main goal** of the construction planning and start-up sub-phase is to **plan and prepare** for construction, as shown in Figure D.
- On projects delivered with a design–bid–build delivery, this sub-phase also incorporates some **pre-construction activities** as follows:
  - pricing,
  - project scheduling, including logistics and phasing,
  - pre-qualification of subcontractors and suppliers,
  - solicitation and selection of specialty contractors,
  - analysis and purchasing of materials and products,
  - review of construction documents, including constructability analysis, and
  - assistance with obtaining sustainability certification.



Construction: Pre-Construction

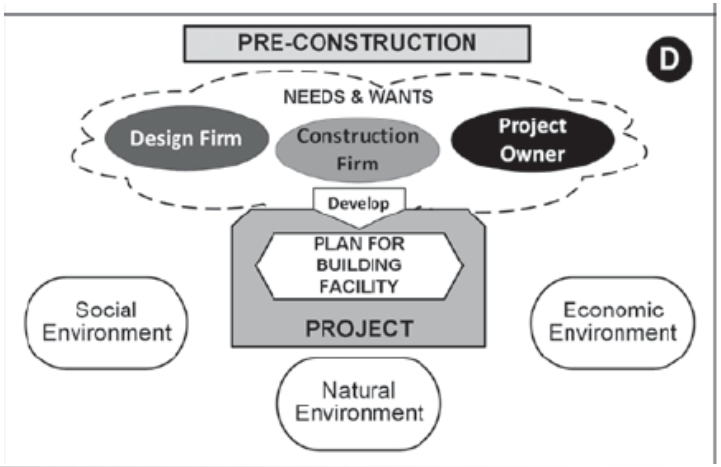
- Recently, the term **pre-construction services** has grown in popularity to identify a set of activities broader than simple construction planning and start- up.
- These **additional activities** are allocated to the **construction team** when it is **brought on board early** on a project.



Construction: Pre-Construction

- Under these circumstances, activities that were **traditionally self-performed** by the project owner staff or by the design team

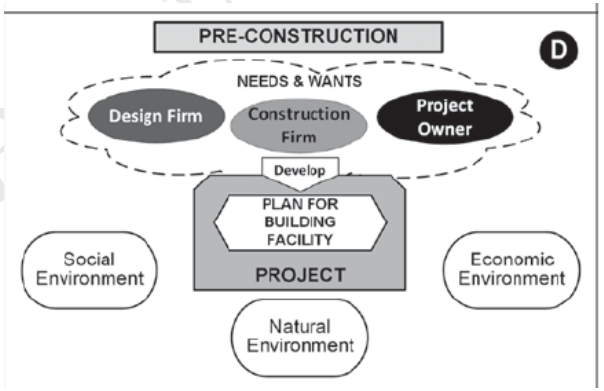
  will be **totally or partially** performed by the construction firm.



Construction: Pre-Construction

- **Examples** of pre-construction services provided during various phases may include:
  - **Planning** (the contractor is not involved in this phase except in rare circumstances and project types):

• scope definition,
• selection of design team and responsibility to coordinate design and construction team members, and
• selection of project delivery method.



  - **Design:**

• site analysis and evaluation,
• investigation into local codes and zoning rules,
• value engineering analyses,
• design phasing and coordination,
• constructability analysis at all stages of design and for all systems,
• early procurement,
• safety planning,
• quality management planning,
• life-cycle cost analyses, and
• scheduling, estimating, and pricing at all stages of design.

Construction: Pre-Construction

The key to good project planning is the ability to anticipate potential problems before they become actual problems. It is very important that project managers take the time to completely familiarize themselves with the project goals and come up with a plan that will ultimately meet the owner's expectations for time, cost, and quality, while still realizing a fair and equitable profit for the construction firm.

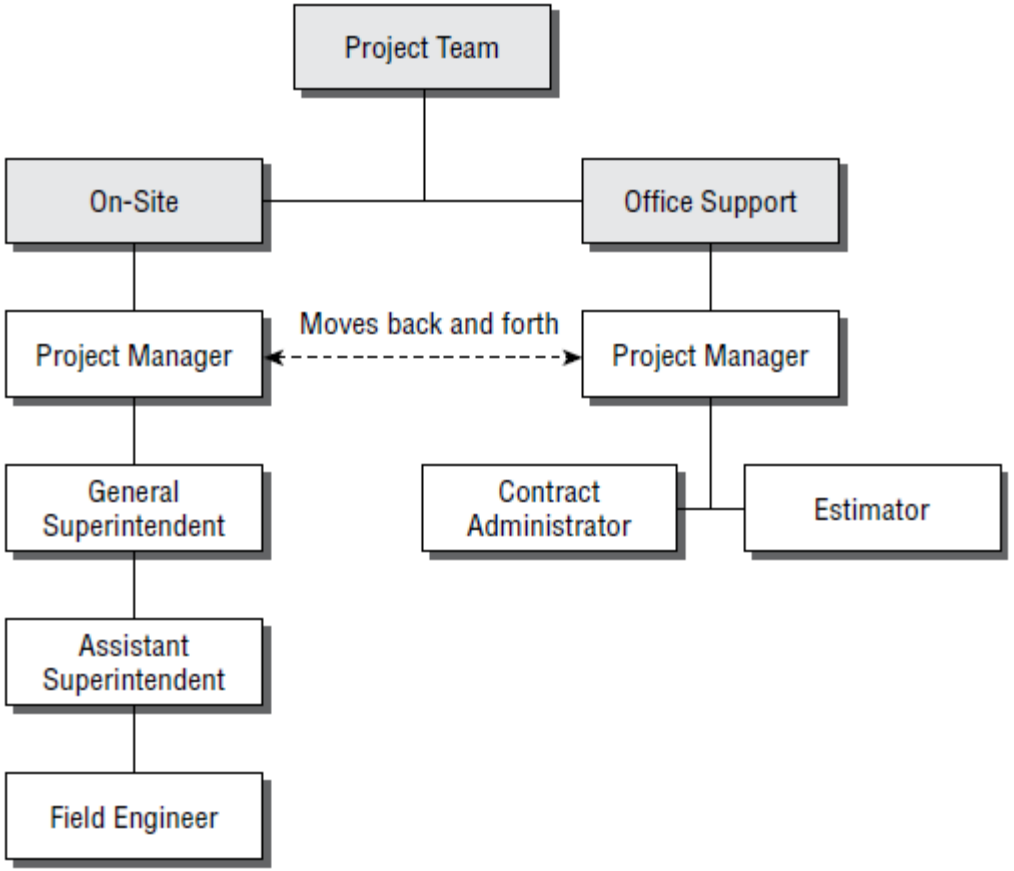
NOTE

Construction: Pre-Construction

NOTE

Construction project managers are often accountable for more than one job at a time. It is not uncommon for them to be running two or three projects simultaneously, visiting each one at appropriate intervals. Superintendents and field engineers are assigned to only one job at a time and typically remain on-site for the duration of the project. Once the project is complete, the team will disband, and individual members will be assigned to various other sites as needed.

Construction: Pre-Construction



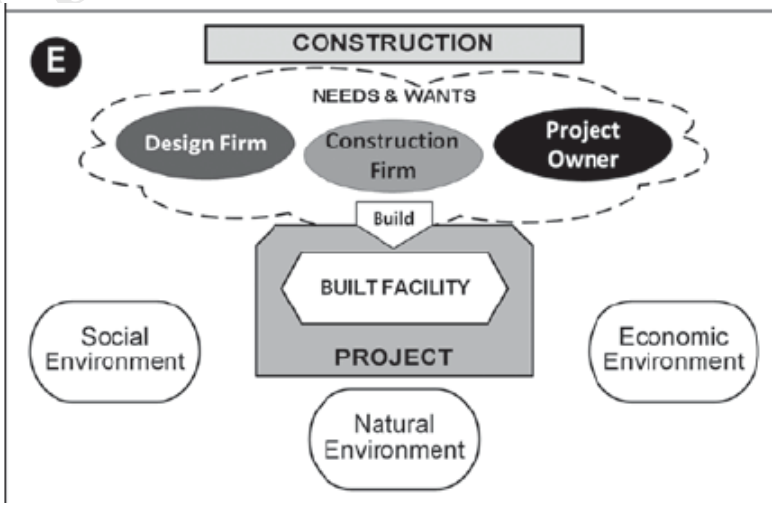
Construction: Pre-Construction

NOTE

The superintendent's role is a critical one. In years past, the supers came up from the ranks, first working in the field as a laborer or craftsperson. Today a superintendent is more likely to be a college graduate with a degree in civil engineering or construction management who has a particular bent toward the construction operations side. Good superintendents are worth their weight in gold, and supers actually are often among the highest paid members of the team.

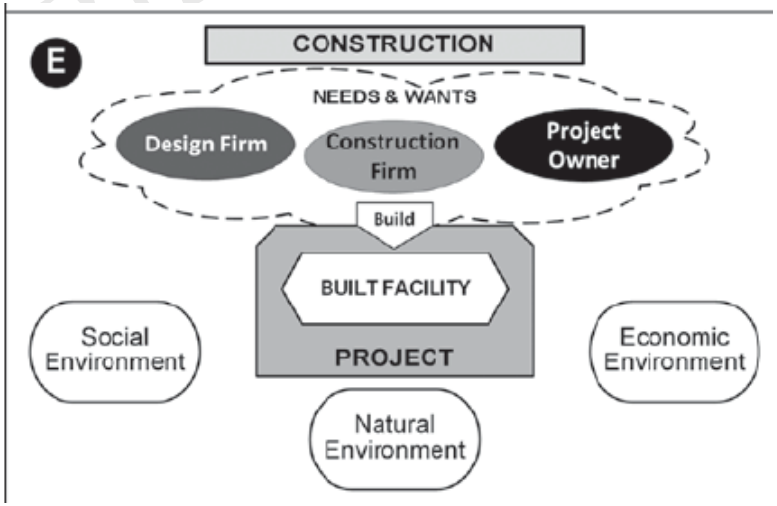
Construction: Construction execution

- The **construction execution** phase will deliver the facility or infrastructure as it was designed, as shown in Figure E.



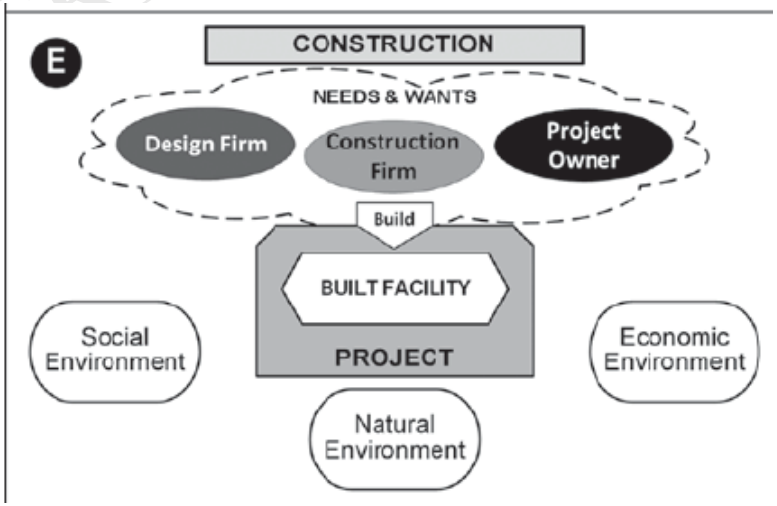
Construction: Construction control and administration

- The **main goal** of the construction control and administration sub-phase is to **oversee** the construction execution and to enforce coordination among the project parties.
- This phase is focused on **jobsite office activities.**



Construction: Construction close-out

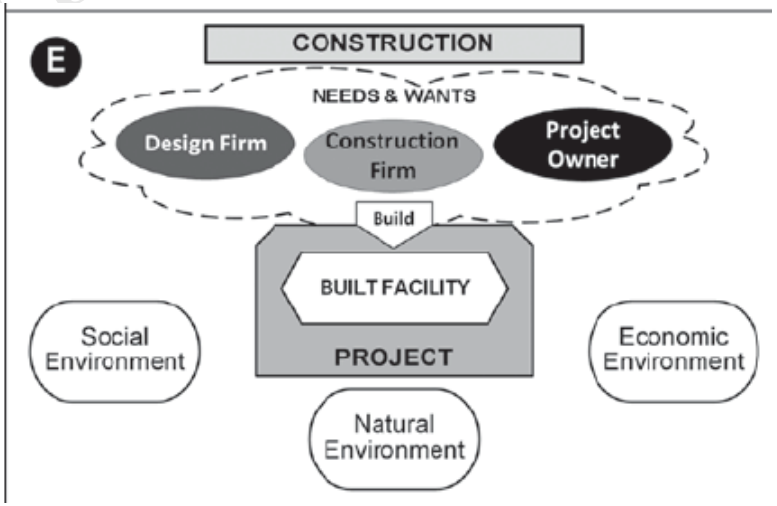
- The construction **close-out sub-phase** will
  1. Complete all of the construction tasks and
  2. Gather all documentation required to **close out the construction contract** and
  3. Complete the project.



Construction: Construction close-out

- This process may

1. **Take up to a year** after the **certificate of occupancy** is issued and
2. Incorporates **four concurrent processes**:
   - Field close-out,
   - Contractual close-out,
   - Financial close-out, and
   - In-house close-out analysis.

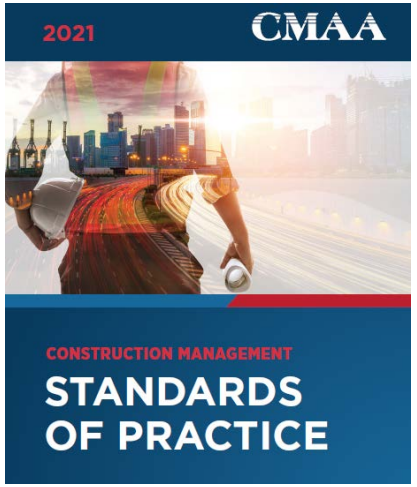


Construction: Construction close-out

- Final inspection and punchlists

After a written request from the contractor, the inspection staff will consider if the contract work is substantially complete and will conduct a final inspection with the contractor, design team, project staff, and owner's representatives.

During the final inspection, the CM develops the project punchlist of the remaining contract work. If the designer and CM recommend that the remaining items are not critical to occupancy or use, the owner declares the contract substantially complete. The CM must monitor the completion of the remaining punchlist items, which the contractor should complete in the time frame specified in the bid documents. Upon the punchlist completion, the CM will issue a final inspection report.



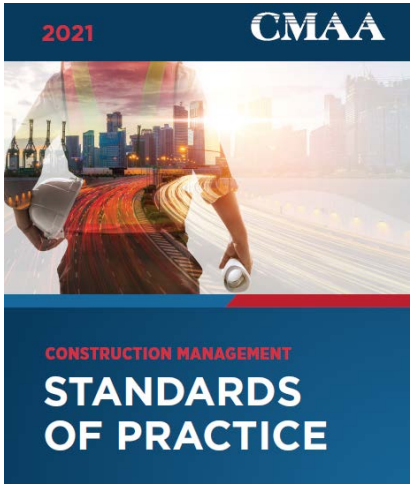
Construction: Construction close-out

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.

Post-Construction Phase

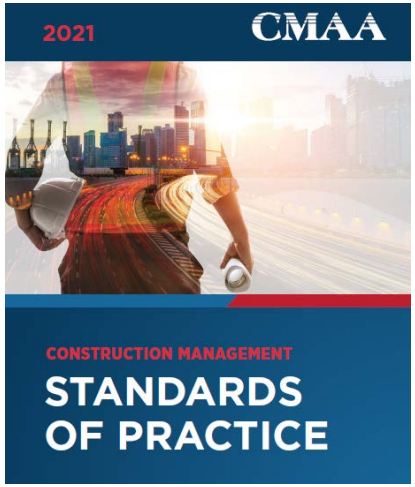
The period following substantial completion.



Post-Construction

- Owner occupancy (partial acceptance/beneficial occupancy)

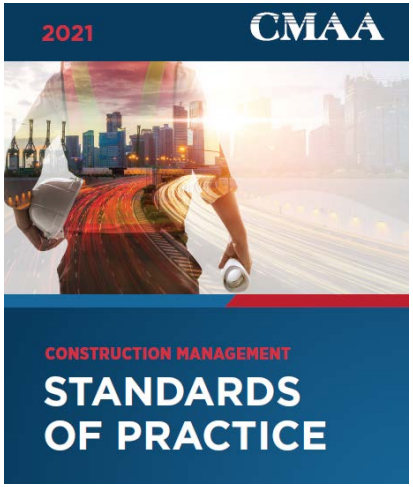
After the owner declares the contract substantially complete and receives a Certificate of Occupancy (CO) from permit inspections, the CM helps the owner take beneficial occupancy of the project. This may occur in phases for larger projects and include filing the appropriate reports and approvals before governing boards or other owner representatives. In certain circumstances, partial acceptance can be taken for project elements that are substantially complete.



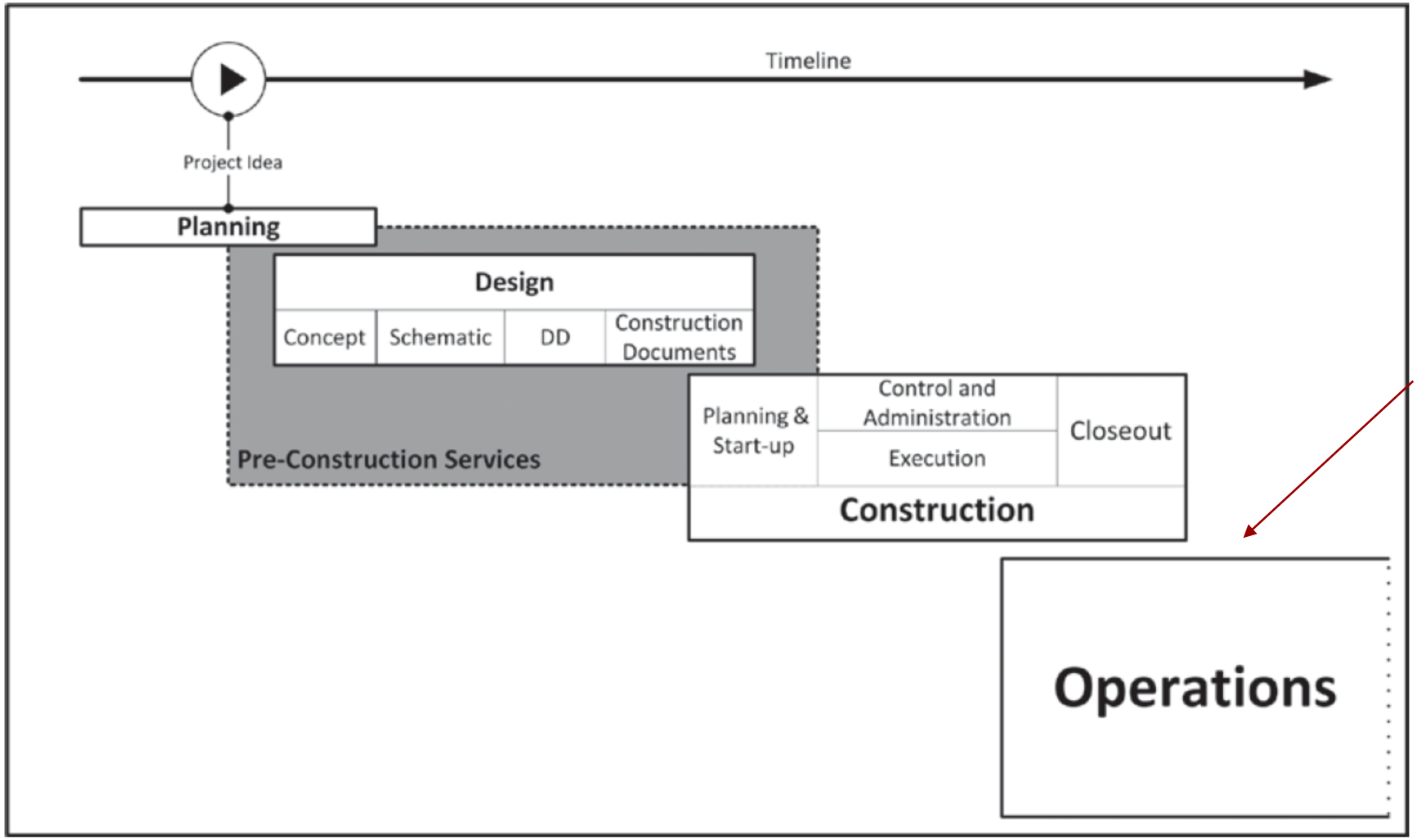
Post-Construction

Project closeout must be quick and effective for a successful project. Depending on the contract, the CM's responsibility in the post-construction phase may include the following:

- Obtaining sustainability certification, if applicable
- Completion of punchlist items not required for substantial completion
- Facilitating owner occupancy
- Assembling record drawings for as-built documentation
- Warranty, guarantee, and operation and maintenance manuals
- Pursuing resolution of warranty items
- Documentation of final pay quantities and costs
- Preparing contract files for transfer to the owner
- Final payment and contract acceptance
- Auditing or full audit report
- Release of liens
- Final deductive/additive change orders



Major phases



Operation

- Once **construction is complete**,

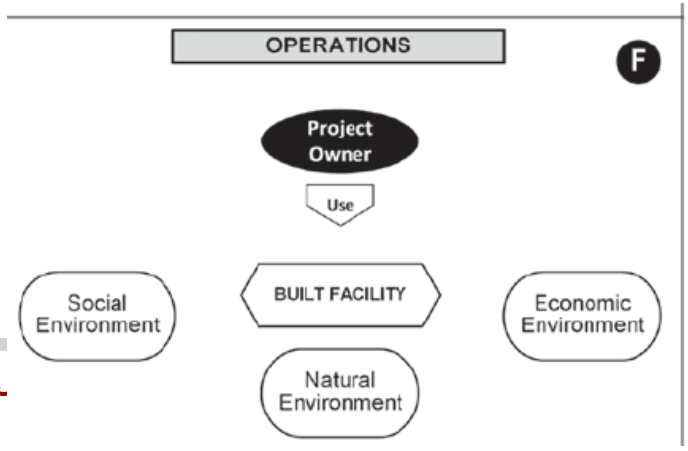
  the **facility or infrastructure** is ready to be put into operations,

  which means the **project owner can start using it**, as shown in Figure F.

- For many projects and most of the participants, the **project objectives are fulfilled** at construction close-out,

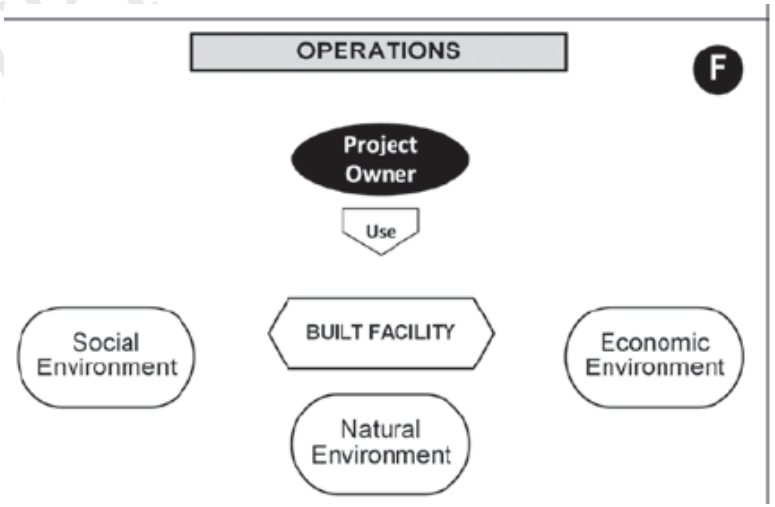
  so the **operations phase** is not part of the project,

  although operations is the **next phase of any facility** or **infrastructure life cycle**.

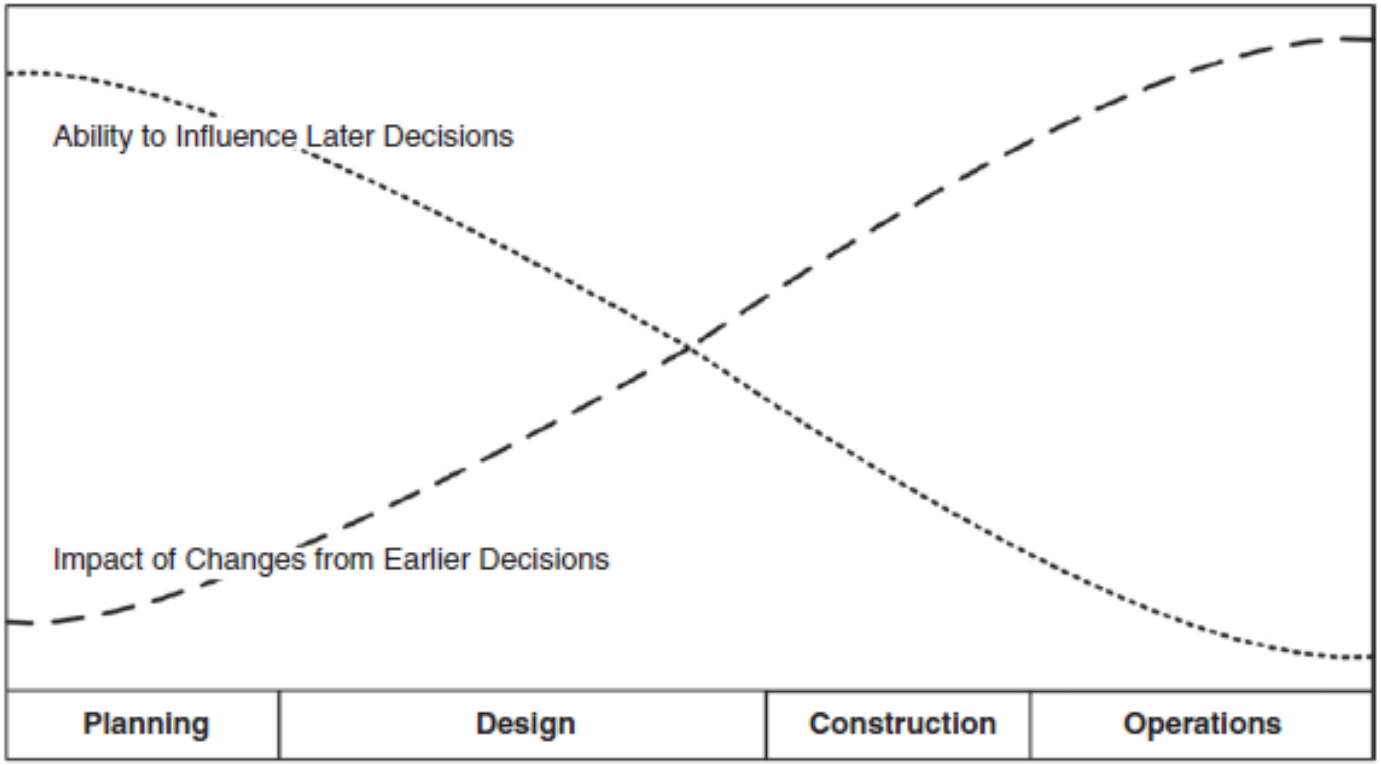


Operation

- **However**, a facility or infrastructure may be the object of several other projects during its lifetime, after its initial execution.



Impact of early decisions on later expenditures



PROJECT DELIVERY

موسسه مهندسی و مدیریت ساخت علوی پور (ACEMI)

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