

Turn off your cell phone!

Turn in your homework!
**Construction Planning
and Scheduling**

CIEG125 - Introduction to Civil
Engineering

Lecture 11
Fall 2005

10/22/05

- Ethics presentations – groups 16, 17, 18 and 19.
- Construction
 - The construction industry
 - Estimating
 - Scheduling
- Project 3
- Homework 8

Outline

- The Construction Industry
- Major Types of Construction
- The Project Life Cycle
- Professional Services Available to Owner
- Construction Contractors
- What does a Construction Manager (CM) do?

Construction Industry

- A conglomeration of diverse fields and participants
- A sector of the economy (~9% of GNP)
- Products provide foundation for industry
 - office buildings and manufacturing facilities
 - infrastructure (highways, bridges, dams etc)
 - power plants

Construction Activity

- 85% is contract construction (i.e., done by one firm for another under contract)
- 1 million US construction contractors
- 60% of contracting by top 400 contractors, such as:
 - Brown and Root
 - M. W. Kellogg
 - Bechtel

Major Types of Construction

- Residential Housing
- Institutional and Commercial Buildings
 - high-rise office buildings and hotels
 - sports stadiums, hospitals, shopping centers
- Specialized Industrial Construction
 - coal-fired or nuclear power plants
 - oil refineries, steel mills, chemical processing plants
- Infrastructure and Heavy Construction
 - highways, tunnels, bridges, dams
 - pipelines, sewage treatment plants

Project Life Cycle

- **Market Demands or Perceived Needs**
 - definition of project objectives and scope
 - e.g., 500,000 sq. ft. of office space
- **Conceptual Planning/Feasibility Studies**
 - Preliminary design
 - Economic feasibility
- **Design and Engineering**
 - Construction Plans and Specifications

Project Life Cycle

- **Procurement and Construction**
 - Constructed Facility
- **Startup for Occupancy**
 - Occupancy Permit Issued
 - Acceptance of Facility
- **Operation and Maintenance**
 - Facility is used and maintained
 - Facility is renovated
- **Disposal of Facility**
 - Facility is demolished and possibly recycled

Professional Services Available to Owner

- **Financial Planning Consultants (CPAs)**
- **Investment Bankers**
- **Architectural/Engineering (A/E) Firm**
 - develop preliminary design
 - owner gets contractor bids on design
 - A/E firm completes detailed design & inspects
 - A/E firm acts on behalf of owner (changing)
- **Design/Construct Firms**
 - integrates design & construction processes

Professional Services Available to Owner

- **Professional Construction Managers**
 - manage the entire construction process for an owner
 - offer professional services (e.g., design, inspection, management) from inception to completion of the construction project
- **Operation and Maintenance Managers**
- **Facility Managers**
 - compile computer records of building plans
 - maintain space inventories and conditions
 - maintain furniture and equipment inventories

Construction Contractors

- **General Contractors (GC)**
 - coordinates all tasks in a construction project
 - contracts with subcontractors
 - could be replaced by construction management firm
 - knowledgeable about local labor force
- **Specialty Contractors ("Subs")**
 - mechanical, electrical, foundation, excavation
- **Material and Equipment Suppliers**
 - steel fabrication and erection
 - ready-mixed concrete delivery
 - roofing and glazing

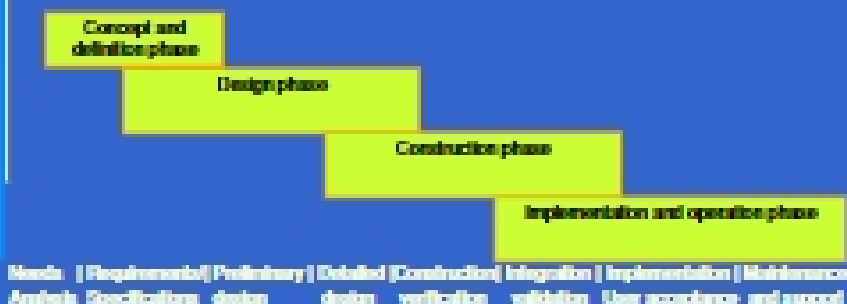
What does a CM do?

- **A CM manages a construction project**
- **Strive for efficient utilization of labor, material and equipment**
- **Some of the activities of CM**
 - break down work into work packages
 - estimate durations and costs of work packages
 - create schedule when work packages are to be done and when needed materials are to be procured
 - contract the work to subs
 - monitor schedule and costs of work packages

The Importance of Construction Management

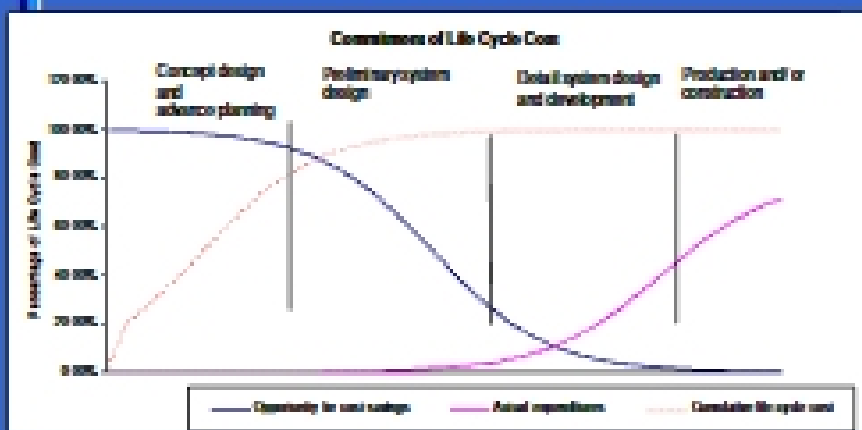
- Construction is a critical building block in the project life cycle
- Construction represents a commitment to life cycle cost
- Construction represents the largest part of visible costs

Construction as the building block.....



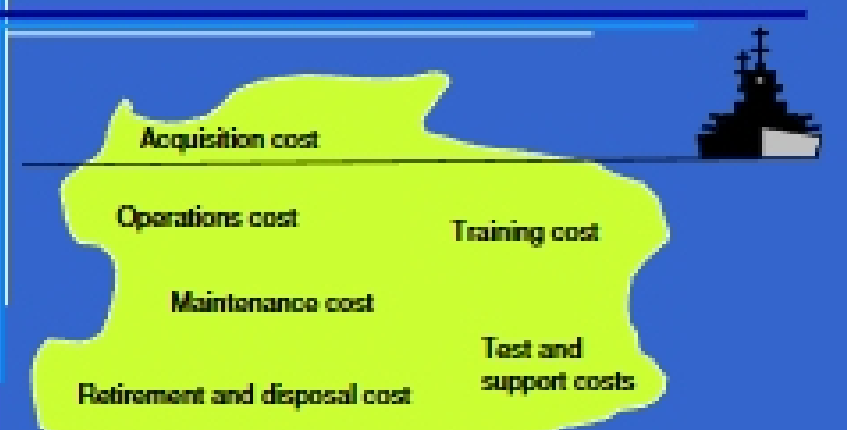
Source: Engineering Economy, Blank, Tarquin, McGraw Hill, 1999.

Commitment to life-cycle cost



Source: Blanchard, Fabrycky, Systems Engineering and Analysis, Prentice Hall, 1981

Visible costs...



Types of contracts

- Lump sum
- Unit price
- Guaranteed maximum fixed price
- Cost reimbursable
- Construction management
- Design construct
-BOT, DBOT....

Contract provisions

- Bonding
- Insurance and indemnification
- Changed conditions
- Change orders
- Schedules, delays, liquidated damages, bonuses and penalties
- Payment terms and retainage
- Subcontracting
- Alternate dispute resolution
- Partnering