

Workshop W12

Wednesday, October 29, 1:30–3:00 p.m. and 3:30–5:00 p.m.

MITIGATING RISK WITH PRECONSTRUCTION SERVICES

Presented by



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A successful project begins not at the onset of construction but on day one of project development and design. The roots of a troubled project can often be traced back to inaccurate budgets, unrealistic schedules, unfavorable bidding strategies, and the failure to properly allocate and define risks. This workshop demonstrates how to get a project started off on the right foot and avoid the negative outcomes of a project that has gone bad.

- Describes how to avoid cost overruns and delay and disruption claims by developing a realistic budget and schedule.
- Addresses the growing interest in “design to budget” and the challenges and risks it presents.
- Provides strategies for avoiding disputes by assigning responsibility for resolving problems during the contract phase.



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Mr. Wallwork is presenting Workshop W12, "Mitigating Risk with Preconstruction Services," on Wednesday afternoon. He is vice president at Strategy, LLC. He is a licensed professional-engineer, a certified cost engineer, a certified forensic claims consultant, and a planning and scheduling professional with 30 years of experience in all aspects of design and construction. He has served as director of project controls/chief estimator for a national construction/program management and consulting firm; manager/estimator for a national engineering, design, and construction management firm; and project manager/estimator for a national public works contractor. Mr. Wallwork has extensive experience in preparing estimates and schedules and managing projects through completion. Mr. Wallwork has also testified in trial and participated in ADR hearings.

Notes

This file is set up for duplexed printing. Therefore, there are pages that are intentionally left blank. If you print this file, we suggest that you set your printer to duplex.

Mitigating Risk with Preconstruction Services

Joseph W. Wallwork, PE, CCE, PSP, CFCC

Who Am I and What I do

- Estimating
- Scheduling
- Claims
- Assist E&O Insurers

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Preconstruction Services What we are going to talk about

- Estimating/Budgets
- Realistic budgets
- Benefits of preconstruction estimates
- Scheduling/Benefits of scheduling
- Setting the table
- What we want to avoid
- E&O issues
- Design to budget

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Estimating

- First let's talk about estimating
- A few definitions

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COST ESTIMATING

- **Cost estimating—A compilation of the costs of all the elements of a project within an agreed-upon scope.**

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COST ESTIMATING

- **The purpose of a cost estimate varies depending on the stage of a project and who is doing it.**

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Costing

- ***Costing***—The determination of the material, labor, and equipment charges for any specific item of the project. Costing does not reflect business concerns.

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Pricing

- ***Pricing***—The amount of money that a contractor seeks to charge for any specific item of the project. Pricing does reflect business concerns.
- We'll talk about risk—contingency—profit later.

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Why a Contractor Does an Estimate

- Usually a contractor performs a cost estimate only on bid documents. It is a definitive estimate that should have a clear scope and be based on hard costs. A contractor would also estimate change order work.

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Why an Owner Does an Estimate

- May do a number of cost estimates at various stages of the work. The owner may actually perform the estimate or have an architect, construction manager, or an outside consultant perform the work on their behalf.

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Initial Program Budget

- Land acquisition
- Legal and insurance
- Design fee
- Construction management
- Procurements FF&E (furniture, computers, etc.)
- Utilities (power, phone, etc.)
- Construction cost

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Mechanics of Estimating

- Labor
- Material
- Construction equipment
- General conditions
- Special conditions
- OH&P
- Escalation

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Types of Estimates

- **Conceptual (Go/No go, scope)**
- **Design development**
- **Final (bid)**
- **Change orders**

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Conceptual Estimate

- **Feasibility**
- **Scope**
- **Planning**
- **Financing**

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Basis for Initial Conceptual Cost Estimate

- **Conceptual plans**
- **Costs per square foot**
- **Similar facilities**
 - Location
 - Escalation
 - Scale (cost capacity factor)
- **Typical details**

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Design Phase—Design Development Estimate(s)

- **Verify conceptual estimate and project plan**
- **Fine-tune the cost**
 - Estimate based on evolving design
- **Quality control of contract documents**
- **Constructibility**
- **Value analysis**

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Bid Stage—Final/Bid Estimate

- Final “fine-tune”
 - Estimate based on bid documents
- Final scope review
- Bid evaluation
- Review of contractor’s bid breakdown

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Construction Phase

- Change order evaluation and negotiation
- Unforeseen events
 - Evaluate the costs
 - Evaluate the schedule implications
 - Evaluate alternatives

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What Is the Role of the Estimator?

Why do you need a professional estimator early in the program?

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The Estimate Helps the Program

- Assists the owner in making decisions
- Assists the architect in making decisions
- Develops realistic labor requirements to use with the CPM schedule

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Estimating ↔ Scheduling

- Can you do the work in the time allowed?
- Can you physically perform all the work?
 - Crowding
 - Congestion

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Estimating ↔ Scheduling

- Implied warranty
- The documents essentially represent that the work can be performed as shown in the time allowed
- It's not the contractor's problem if it can't be done

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Role of the Estimator Conceptual Phase

- Establish the initial budget
- Scope identification
- Preparation of public relations items
- Bond issue/Financing

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Design Development Phase

Preconstruction

- Document quality control
- Value analysis
- Life cycle cost
- Constructibility
- Bring the job in on budget
- Bid strategies

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Quality Control of the Contract Documents

- Work with the architect
- Second set of eyes
- Find potential problems
- Clarify and coordination
- Identify and solve issues during preconstruction instead of construction

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***A good estimator turns
the project into three
dimensions
using the architect's
two-dimensional plans***

Simply, an estimator builds
the job on paper

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Value Engineering/Analysis

- **Value engineering (@30%)**
 - Applies to the project to be developed
 - Noun - verb
- **Value analysis**
 - Study of what is already designed
 - Estimate comparative costs
 - Other impacts

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Life Cycle Costs

- **The sum of every cost incurred for a particular item over its lifetime.**
- **Use with VE/VA and constructibility**

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Constructibility Reviews

- Form of VEVA that targets the construction
- Begins at conceptual stage
- Use standard products and practices
- Clarity of documents/requirements
- Realistic specifications
- Sequence work for efficiency

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Bringing the Job in on Budget

- Quality control of contract documents
- “Bid”-able documents
- Quantification of scope
- Bid strategy
- Owner confidence
- Attractive to bidders

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***Problematic Contract Documents
What we want to avoid!***

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Incomplete Drawings

- First, you hope the estimator finds the problem.
- The Contractor doesn't owe what's not shown, maybe the owner was going to provide it.
- What about an obvious element that's missing? The contractor owes the minimum.

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Ambiguities

- From a contractor's view
 - Why couldn't they get it right?
 - How do I bid this?
 - I'll bid it reasonable.

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Contractor's Responsibilities

- Bid what is shown
- They don't check the design
- Ask about an obvious problem—but what is obvious
- Site visit
 - Access to site
 - Interferences
 - Staging
 - Not dimensions or details

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Bidder vs. Contractor

- The bidder is not the contractor
- He may become the contractor
- A contractor's responsibility is not a bidder's responsibility
- A bidder cannot be made responsible for every contractor verification, coordination requirement, etc., prior to bid. He's not the contractor yet.

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Bid Strategies

- Multi-contract scopes
- Fast track
- Lump-sum
- Alternatives
- Allowances
- Unit prices
- Make it easy to bid

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Unit Prices

- You know the task exists
- You know what needs to be done
- You just don't know the quantity
- Use unit prices

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Allowances

- You know there is a task to get done
- But you're not sure what to do
- Or how to do it
- Use an allowance

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Contingency

- What is contingency?
- Contingency in the preconstruction phase (design)
- Bid contingency (contractor)
- Construction contingency (owner)

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Contingency in the Preconstruction Phase

- To account for the expected but unidentified

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Bid Contingency

- What is contingency in a contractor's bid?
- What are the elements of a bid?
- Can you virtually eliminate contingency from the contractor's bid?

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The Contractor's Bid

- Labor + material + construction equipment + general requirements + overhead + profit (risk - contingency) = Price
- Remember the definition of pricing

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What Affects Contractor Contingency

- Perceived and actual risk
- Quality of documents
- Clarity of scope
- Owner
- Market conditions

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Construction Phase Contingency

- Owners budget for
 - Owner initiated changes
 - Scope additions
 - Fund for change orders

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Facts about Change Orders

- Change order is procurement without competitive bid
- Why shouldn't owners be able to change their minds?
- Unforeseen conditions
- Can be limited by proper steps in the preconstruction phase
- Remember, change is good if it is managed properly

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Negatives about Changes/Change Orders

- Increased costs
- Disruption
- Missed schedule milestones
- Poor quality
- Less efficiency
- Loss of economies of scale
- No competitive bids
- Claims

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What the Architect Should Expect from the Estimator

- Realistic costs for the work
- Value analysis
- Constructibility
- Life cycle costs
- Quality control

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What the Owner Should Be Looking for?

- Realistic budgets
- Bid strategies
- “Bid”-able documents
- A constructible job
- Ongoing support

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Budgets

- **The budget is set!**
- **The bids come in—over the budget**
- **Why are those ruthless contractors bidding so far over the budget?**
- **Everyone is upset!**
- **The problem is probably the budget!**

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Scheduling

Getting it right from the start

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In General...

- **Successful project management is the process of planning, organizing, directing, and controlling to meet the project needs.**
- **Poor scheduling and estimating are two of the root causes of project failures.**

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Planning/Scheduling Overview

- **Identify tasks**
 - When tasks have to or will be performed
 - Determine sequence
 - Assign costs
 - Assign resources
- **Monitor progress**
- **Project the future**
- **Analyze the past**

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What is CPM Scheduling?

- **Critical Path Method**
- **Planned activities in a logical order**
- **A network with proper relationships**
- **A tool to identify and monitor the critical path**
 - the longest chain of sequential activities to complete the project

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What Do You Get by Having a CPM Schedule?

- A record of the designers and contractors plan
- A tool for analyzing time-related issues
- A record of project progress
- A map of interrelationships
- A technique accepted in courts to defend against and/or pursue delay claim

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What's in a Schedule

- Scope of Work (Work Activities)
- Work Breakdown Structure
- Constraints and Milestones
- Durations
- Sequencing
- Resource and Cost Loading
- Updating

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Types of Schedules

- Master/Program
- Predesign
- Design
- Preconstruction
- Bid schedule
- Construction

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Master Schedule

- Also called program schedule
- Encompasses all elements of the program
- Effective for executive/summary level presentations
- Keeps all data together
- Includes design (predesign?), precon, and construction

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Predesign ????

- **Owner activities prior to the beginning of design. Could be**
 - Land purchase
 - Zoning issue
 - Financing
 - Hiring/Selecting the architect

- **Done by owner or program manager**

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Design Schedule

- **Tracks milestone activities for design elements (e.g., regulatory approvals)**
- **Design deliverables—conceptual design, 30% design development, etc.**
- **Permit applications (building)**
- **Design implications for regulatory permits such as land use, water, wetlands**
- **Assists in project planning**

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Preconstruction Schedule

- Includes design schedule and milestones
- Prebid and procurement activities
- Land acquisition (if necessary)
- Legal issues (if necessary)
- Final permitting
- State approvals
- Contract bid, award, and NTP

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Owner's Schedule with the Bid

- Issued with CDs
- Sometimes referred to as prebid schedule
- Provides the owner with early and summarized view of project timetable
- Forces designer to review staging, general design concepts, and potential trouble spots
- Helps the contractor to visualize the designers intent and expectations
- Not for construction
- Careful, do not mislead contractor, you may warrant that certain work can be done in a sequence and time

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- Everything to here has been preconstruction services

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Construction Schedule

- A plan (the contractor's) to complete the work
- Updated regulatory to reflect project status and anticipated completion
- Milestone dates
- Current & projected cost information
- Identification of critical and near-critical work

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Construction Schedule

- A construction schedule may be done by an owner for planning and impact purposes
- Usually associated with large projects
- Predict peak manpower, volume of cars, delivery trucks, construction equipment
- Can it all fit on the site?
- Can you get it there and what impact on neighbors?

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Baseline Schedule Creation

Getting started with a plan

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Baseline Schedule

- **The schedule consists of individual work activities linked together in a logical way with durations, resources, and the coding information needed to provide a useful output**
- **You develop a plan**

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Scheduling Mechanics

- 1. Work activities—coded**
- 2. Project calendars**
- 3. Schedule logic**
- 4. Schedule calculations**
- 5. Target schedules**
- 6. Checking the schedule**

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Proper Setup Avoids Problems

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Project Calendars

- Hourly, ***Daily***, Weekly, or Monthly
- Multiple Project Calendars
 - 5-day workweek
 - 6-day workweek
 - 7-day workweek
- Include Holidays!!!!
- Account for Scheduled Nonwork Time

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Project Calendars

Multiple Project Calendars

Applications

Example: 2-day concrete pour with 3 days of cure time.



The scheduling of the activities above may be misrepresented depending on what day of the week they occur.

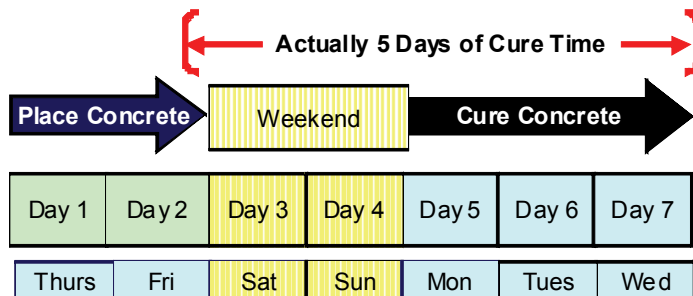
70

Project Calendars

Multiple Project Calendars

Example: 2-day concrete pour with 3 days of cure time.

Using a 5-day calendar

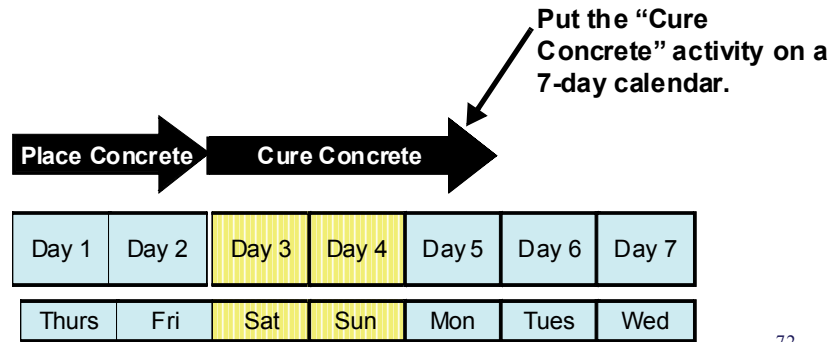


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Project Calendars

Multiple Project Calendars

Example: 2-day concrete pour with
3 days of cure time.



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• Include Appropriate Holidays!!!!

<ul style="list-style-type: none"> New Year's Day Martin Luther King Jr. Day National Freedom Day Groundhog Day Lincoln's Birthday Valentine's Day Presidents Day Washington's Birthday St. Patrick's Day April Fool's Day <i>Daylight Saving Time begins</i> <i>Federal Income Taxes are due</i> Earth Day Administrative Professionals' Day Arbor Day Mothers Day Armed Forces Day Memorial Day 	<ul style="list-style-type: none"> Flag Day Fathers Day Canada Day Independence Day Parents Day Labor Day Grandparents Day Citizenship Day Columbus Day (Traditional) Columbus Day (Observed) United Nations Day <i>Daylight Saving Time ends</i> Halloween Election Day Veterans Day Thanksgiving Day Bill of Rights Day Christmas Day
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Project Calendars

Example: Account for Nonwork Time!!!!

Assume 2 weather workdays/month for 8 months

Assume 1 week off during winter holiday season

Assume 9 days for other holidays

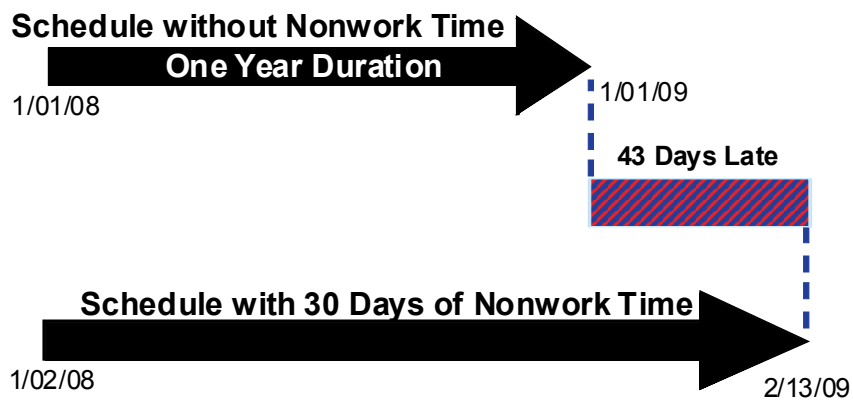
Total Nonwork time: $16+5+9 = 30$ days

How Does this Affect the Completion Date???

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Project Calendars

- Account for Nonwork Time!!!



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Why a Schedule Benefits the Project

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CPM Benefits the Owner

- Cash flows can be accurately predicted
- Time extension requests can be evaluated
- Owner-supplied equipment can be coordinated with contractor installation
- Monitor progress and project move-in
- Coordinate move-in activities well in advance
- Predict and avoid late finish—mitigate delay
- Provide a level of protection should litigation become necessary

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CPM Benefits the Designer

- Knows consequence of time-sensitive reviews of RFIs
- Can plan submittals
- Can understand impact of changes
- Can help manage the design effort in terms of manpower and accountability

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CPM Benefits for the Contractor

- Owner satisfaction
- Coordination of suppliers and subcontractors
- Cost integration and control
- Time extensions
- Checklist

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Notice to Owner/ Architect-Engineer

- A good schedule tracks the owner's responsibilities
- A good schedule tracks the A/E's responsibilities
- The schedule should point to who has to take an action no matter whether it is owner, designer, contractor, or subcontractor

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Cost Integration/Control

- Cost load the schedule for cash flow and/or payments
- Keep track of subs progress vs. payment requests
- Demonstrate contractors entitlement to monthly partial payment
- Track progress vs. budget

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Management Structures

- Project Participants
- Communications

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Project Participants

- Owner
- Owner's Representative
- Construction Manager
- Architect/Engineer
- Contractors

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Project Participants

- Define responsibilities?
- Who approves changes in scope?
- Who is the final say on change orders?
- Who approves payments?
- Who provides the answers?

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Project Participants

- Owner “sets the table”
- Owner has to define roles

- Define scope
- Define budget

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Communication

- Claims can occur when the 2 sides don't see each other's position
- There has to be a reasonableness
- Project records sometimes reveal personal conflicts
- Involve others (upper management) to assess situations

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Errors and Omissions Damage Claims

Targeted against the designer on the premise that the designer failed to fulfill its obligation to provide the owner a design that complies with the owner's expectations, is constructible, biddable, and meets all applicable standards and codes

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What Are Errors and Omissions?

An omission is an element that is necessary for the function of the project but was not included in the scope

- The steel beam is missing**
- The drain line is not included in the scope**
- ... something that is necessary is missing from the scope of work**

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What Are Errors and Omissions?

■ An error is an element incorporated into the design that does not serve the function it is intended to perform.

- An undersized steel beam**
- A drainage line that is too small**

Errors are generally considered to be the more serious deficiency

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What Is the Issue?

- **Who pays for the work???**
 - The omission
 - The error (and consequences???)
 - Delays, lost productivity, etc.

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If It's Not Right, It's an Error

- **Some owners do not see a difference between an error and an omission**
- **If it's not completely right—it's an error**
- **A very strict interpretation**

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What Is Not an Error or Omission

- Changes to accommodate field/changed conditions
- Value engineering cost reductions
- Changes that result in an improvement or betterment as long as the original design would have provided the intended function
- An expensive design is not an error

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What Is Not an Error or Omission

An exception would be if a prudent designer properly discharging his responsibilities should have discovered the condition

- Was it in the A/E contract?
- Were they obligated by contract to investigate?
- Was it the responsibility of others?
- Did the owner warrant and take responsibilities for the site conditions?⁹³

The Questions That Always Arise

- What is the A/E's responsibility for the owner's or contractor's damages relating to the error or omission?
- Is there a premium for corrective work when performed through a change order?
- Is it reasonable to expect a perfect design?

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Determining the Designer's (A/E's) Responsibilities

- Examine the contract between the owner and A/E. Is it addressed????
- Some omissions should be expected and this should come with the owner expectation to absorb some of the cost.
- Without a defined method to determine and measure what is an acceptable amount of E&O, the issue becomes one of standard of care.

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Determining the Designer's (A/E's) Responsibilities

An owner cannot expect the A/E to be responsible for all Errors and Omissions

- The A/E may become responsible for omissions or errors whose value exceeds a specific fixed percentage of the bid price when defined in the contract.
- The owner's tolerance, and thus point where the A/E becomes responsible for the cost, is generally less for errors.

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The Questions That Always Arise ... and the Answers

Calculating the responsibilities for an **omission**

The premium cost of an omission

The A/E would be responsible for:

The cost of removing any work necessary for access (if any)

The cost of replacing/re-installing the work removed for access (if any)

Protection of installed work (if any)

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The Questions That Always Arise ... and the Answers

Calculating the responsibilities for an **omission** (cont.)

The Owner would be responsible for the correct work that would have been installed had it been included in the original bid (see note below)

The owner may absorb the full cost up to a predetermined limit (contract) or the standard of care

The Questions That Always Arise ... and the Answers

Calculating the responsibilities for an **error**

The A/E would be responsible for:

- The cost of removing the deficient work
- The cost of removing any work necessary for access to the error (if any)
- The cost of replacing/reinstalling the work removed for access (if any)

The Questions That Always Arise ... and the Answers

- Protection of installed work (if any)
- The cost of the deficient installed work

The Owner would be responsible for the correct work that would have been installed had it been included in the original bid (see note below)

The owner may absorb the full cost up to a predetermined limit (contract) or the standard of care

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Differing Standard for Errors and Omissions

Are errors and omissions treated differently?

The very strict interpretation of some owners is that if it wasn't in the original bid document it's an error regardless of the fact that they get the benefit of the installed work.

101

Converting an Error to an Omission

- A designer will often in reviewing shop drawings or working with the contractor realize that there is a problem
- Some owners allow an error to become an omission if it is found before it is installed
- Essentially they give some credit to the designer for fixing the problem before it's installed—the designer has mitigated the costs

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Converting an Error to an Omission

Essentially they omitted doing it right the first time

- May seem like a stretch of logic. It is a different situation from one where a design error causes work to be removed (even worse if there is a damage or failure due to the error)
- Remember errors are generally treated more severely (\$'s) by the owner against the designer (A/E)

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The Questions That Always Arise ... and the Answers

- Is there a premium for corrective work when performed through a change order?

Yes, there are two (2) forms of premium

- 1) The specific costs described above for removing, reinstalling, and protecting work other than the work that is the subject of the error or omission

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The Questions That Always Arise....and the Answers

- 2) The premium for any change order since it is a noncompetitive procurement

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The Questions That Always Arise....and the Answers

There is much discussion over this topic

No formal data, no study

Expert opinion

General range is 10% to 20%

**** The owner generally absorbs some of these A/E cost responsibilities*****

Why, because.....

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The Questions That Always Arise ... and the Answers

It is unreasonable to expect a perfect design.

- Not the standard anywhere.
- Unreasonable expectation.
- Consult a legal opinion on the definition of standard of care where you are but it's not perfection.
- All the checking in the world will not eliminate all errors and omissions. It will just add design cost.

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The Questions that Always Arise....and the Answers

It is unreasonable to expect a perfect design

A standard of care or an agreed upon threshold of responsibility based on a fixed percentage of the bid price should determine cost responsibility

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Budget Issues

Often an owner will claim that had it known the full cost of the project including the omissions they would not have proceeded. This becomes a real issue when there is a design to budget or a cost limitation.

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Design to Budget

Complications

If the cost of the omitted work when added to a contract causes the budget to exceed the cap, other contract remedies may apply. Define in advance.

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Design to Budget

- Design to budget or construction cost limitation or guarantee
- Need to define the measurement of compliance
- Need to define the cure
- In order to hold a designer to a budget, there needs to be a well-defined scope of work that is to be included in the project

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Design to Budget

- Scope additions by the owner during design will affect the budget (so would regulatory or code changes, etc.)
- A methodology must be in place to evaluate the design change cost impact to the budget and cause a corresponding increase in the project budget
- A/E needs to notify owner, keep track, and request change orders—similar to a contractor providing notice of extra work and seeking change orders

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■ The End

■ Questions
????

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