

Issues During Construction Phase

BY

Dr. Ibrahim Assakkaf

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Introduction

- One the major sources of unplanned cost growth on construction project include Rework and field rework.
- When a contractor does not comply with or meet the required specifications of the owner, rework must be done.
- Field rework is not caused solely by construction site activities in isolation.

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Introduction

- In order for the field rework to be reduced, a substantial effort must be made to improve the effectiveness of the prior project phases with view to preventing all to frequent “catch-up” work during the site construction and commissioning phases.
- Several computer-based tools have been developed to combat project-wide rework.

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Chapter-Opener (p. 47)

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Acceptance Period/Withdrawal

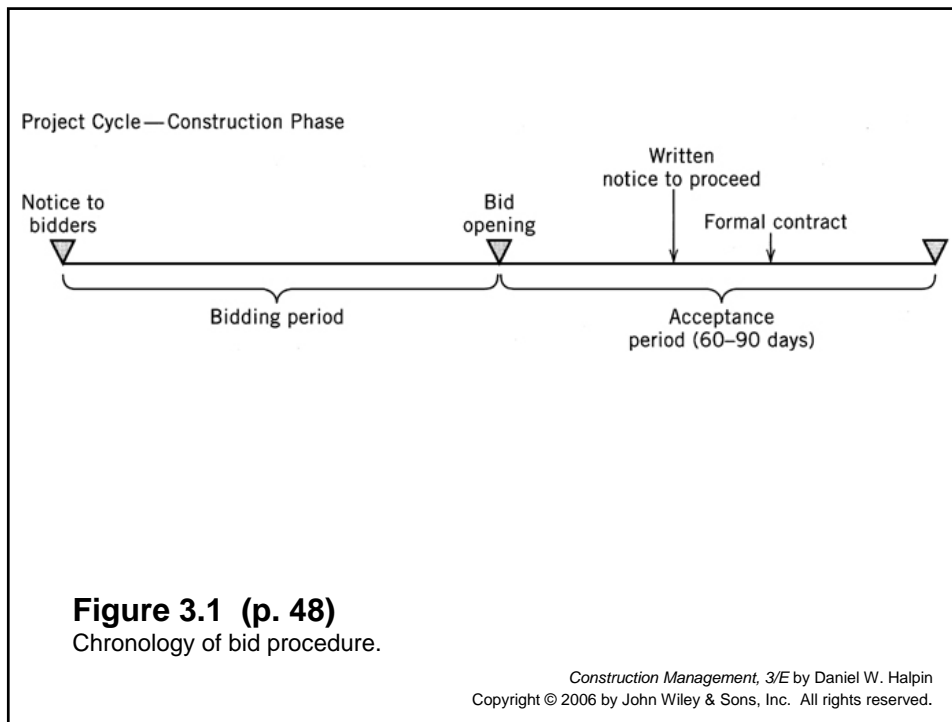
- Bidding period is opened by bidders based on the issuance of the notice to bidders. The date and time at which the bid opening is to take place mark the formal end of the bidding period.
- Bids that come late are usually disqualified.
- If contractor wants to withdraw his bid before the bid opening, he may do so.

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Acceptance Period/Withdrawal

- If mistakes are discovered by the bidders in the bid documents, the contractor can make a correction before the bid opening.
- If mathematical error found in the bid after opening, the owner usually rejects the bid.
- In some cases, if there are little mathematical mistakes that can be corrected, the owner usually will not reject the bid.
- The chronology of the bid procedure is shown in the following figure (next viewgraph):

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Acceptance Period/Withdrawal

- Bid Security
 - It protects the owner from failure by the contractor to enter into formal construction agreement.
 - The contractor is protected by the acceptance period.
- Withdrawal of Bids
 - *No submitted bid may be withdrawn for a period of 60 days after the scheduled closing time for the receipt of bid.*

Acceptance Period/Withdrawal

- Withdrawal of Bids (cont'd)
 - The statement above is designed to protect the bidder, since otherwise the owner could hold the contractors to their bids for an unspecified period.
 - For example, the owner could say to the contractor “wait until next year, and I will enter into contract with you at this price.”

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Award of Contract/Notice to Proceed

- Notification of award of contract is normally accomplished by a letter indicating selection and directing the contractor to proceed with the work.
- This is of course is a contractual relationship from a legal viewpoint,
- The proposal or offer acceptance protocol of contractual law is satisfied by the issuance of this letter.

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Award of Contract/Notice to Proceed

- Provisions or changes of the contract usually direct the selected bidders commence work on the site within a specified period of time, such as 10 days.
- Notice to Proceed
 - Additional significance can be noticed.
 - The date of the notice to proceed establishes the reference date from which the beginning of the project is calculated.

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Award of Contract/Notice to Proceed

- Notice to Proceed (cont'd)
 - The projected end of the project can also be established by this notice.
 - Legal terms in the contract like the following can be specified:

Work shall be completed not later than thousand fifty (1050) calendar days after the date of receipt by the Contractor of Notice to Proceed.

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Contract Agreement

- Although the issuance of the notice to proceed establishes the elements of a contract, this is formalized by signing of a *contract agreement*.
- The formal contract agreement is the single document that binds the parties and by reference describes the work to be performed.

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Contract Agreement

- One Document can include:
 1. The drawings
 2. The general conditions
 3. The supplementary conditions
 4. The technical specifications, and
 5. Any addenda describing changes published to these original contract document.

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Time Extensions

- Sometimes, circumstances beyond the contractor's control, which could not reasonably anticipated at the time of bidding, lead to delays.
- These delays make it difficult or impossible to meet the project completion date.
- In this cases, the contractor may request an extension of the project.

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Time Extensions

- However, under these circumstances, the duration of the project will be increased.
- There are procedures that deals with time extensions, which can be found in the contract itself.
- Claims for extensions time must be based on delays that are caused by owner or the owner's agents or on delays due to acts of Allah.

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Time Extensions

- Delays that result from design errors or changes are typical of owner-assignable delays and are not uncommon.
- A study of delay sources on government contracts indicated that a large percent of all delays can be traced to the reconciliation of design-related problems as shown in the following slide:

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Time Extensions

- Weather delays are typical of the so-called act of God type delay.
- Normal weather, however, is not justification for the granting of a time extensions.
- This means that a contractor working in Minnesota in January who request a 15-day time extension due to frozen ground that could not be excavated will probably not be granted a time extension.
- Since frozen ground is typical of Minnesota in January, the contractor should have anticipated that.

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Time Extensions

- An indication of the amounts of time extensions granted for various reasons on some typical government projects is given in the following viewgraph (next slide):
- The types of delay sources categorized were due to
 1. Design problems
 2. Owner modification

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Table 3.1 Average Percent Extension by Extension Type

Facility	Design problem	Owner modification	Weather	Strike	Late delivery	Other
Airfield paving/lighting	7.2	1.3	2.3	0.0	10.5	4.9
Airfield buildings	12.1	2.3	3.7	3.2	0.8	29.9
Training facilities	6.2	20.8	2.9	0.0	0.6	4.6
Aircraft maintenance facilities	12.0	2.0	8.4	1.0	2.2	0.2
Automotive maintenance facilities	12.9	2.3	3.4	1.4	0.7	0.4
Hospital buildings	16.0	3.4	2.6	0.6	0.6	0.9
Community facilities	6.7	5.4	2.3	1.7	1.5	0.3

Source: From D. W. Halpin and R. D. Neathammer, "Construction Time Overruns," Technical Report P-16, Construction Engineering Research Laboratory, Champaign, IL, August 1973.

Table 3.1 (p. 49)

Average Percent Extension by Extension Type

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Time Extensions

3. Weather
 4. Strike
 5. Late delivery, and
 6. Other.
- The percentages presented were calculated as % extension = (no. of days of time extension granted ÷ originally specified project duration) × 100.

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Change Orders

- All aspects of the contract documentation are legally binding.
- Any alteration or changes of these documents constitutes an alteration of the contract.
- Certain contractual formats such as the unit-price contract have a degree of flexibility.

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Change Orders

- However, the stipulated or lump-sum contract has virtually no leeway for change or interpretation.
- At the time it is presented to the bidders for consideration.
- Changes that are dictated, for any reason, during construction represent an alteration of a legal arrangement and, therefore, must be formally handled as a modification to the contract.
- These are called “**change orders**”

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Change Orders

- Generally, there are procedures for implementing change orders in the general conditions of the contract.
- Since change orders are minicontracts, their implementation has many of the elements of the original contract bid cycle.
- The major difference is that there is no competition, since the contractor has already been selected.

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Changed Condition

- Engineering designs are based on the project site conditions as they are perceived by the A/E or designer.
- For structural and finish items as well as mechanical and electrical systems above ground, the conditions are and easily determined.
- Variation in wind patterns leading to deviation from original design criteria may pose a problem.

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Changed Condition

- Subsurface and site Topographical portions of the project are different in a way that the designer's ability to look below the surface of the site is limited., he/she relies on approximations that indicate the general nature of the soil and rock conditions below grade.
- This usually comes from geotechnical engineer who uses a series of bore holes.

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Changed Condition

- The information or data that comes from the subsurface investigation is also a contractor's basis for making the estimate of the excavation and foundation work to be accomplished.
- Example:
 - Based on the boring logs, a reasonable estimate may indicate 2000 cu yd of soil excavation and 500 cu yd of rock.

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Changed Condition

- After work starts, the site may be found to contain 1500 cu yd of rock and only 1000 cu yd of soil.
- This obviously, substantially affects the price of excavation and would be the basis for claiming a **changed condition**.

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Value Engineering

- Value engineering (VE) was developed during World War II in the U.S.A.
- It began as search for alternative product components due shortage of critical items. During the war.
- **Function Analysis**
 - This method produced low-cost products without impacting functional characteristics or reducing quality.

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Value Engineering

- In early 1960s, this method of value was introduced in the construction industry through directives from the Navy and Army Corps of Engineers relating to facility procurement.
- *“The Contractor is encouraged to develop, prepare and submit value engineering change proposals (VECP’s). The Contractor shall share in any net acquisition savings realized from accepted VECP’s, in accordance with the incentive sharing rates specified in the contract.*

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Value Engineering

- VE can also be implemented during the design phase of project development.
- This aspect of VE uses various procedures such as brainstorming, prioritization, research matrix analysis, and scoring systems to evaluate design alternatives.
- A weighted analysis is used to do the final analysis.

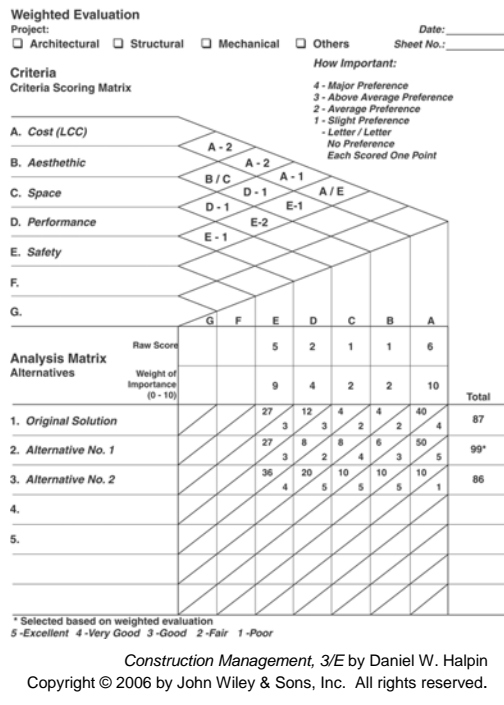
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Value Engineering

- In the weighted process, a criteria matrix such as that shown in the slide of the next viewgraph is used,
- All criteria to be considered are listed and compared.
- In comparing two criteria, preference for one over the other is scored as follows
 - 1 = slight preference 3 = above average preference
 - 2 = average preference 4 = major preference

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Figure 3.2 (p. 53)
Criteria Evaluation matrix.



Value Engineering

- In the previous figure, five criteria are listed as A through E. In triangular portion of the matrix Cost (A) is compared with Aesthetic (B).
- Cost has an “average preference” so A-2 is placed in the diamond linking these two criteria.

Suspension, Delay, or Interruption

- The general condition used for many government contracts provide that

The contracting officer may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as he may determine to be appropriate the convenience of the government

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Suspension, Delay, or Interruption

- This of course can be costly to the contractor especially for longer period of time.
- However, in this case, the owner (i.e., the government) is required to pay an adjustment for “unreasonable” suspensions as follows:

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Suspension, Delay, or Interruption

An adjustment shall be made for any increase in cost of performance of this contract (excluding profit) necessarily caused by such unreasonable suspension, delay, or interruption and the contract modified in writing accordingly

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Liquidation Damages

- In case of failure on the part of the contractor to complete the work within the time fixed in the contract or any extensions therefore, the contractor shall pay the owner as liquidated damages the sum of \$3000 for each calendar day of the delay until the work is completed or accepted.

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Progress payment and Retainage

- Contractors are reimbursed on a periodic basis.
- Normally at the end of each month as work progresses.
- Retainage:
 - Is considered in greater detail in Ch. 9 in discussion cash flow.
 - The owner typically retains or holds back a portion of the monies due the contractor as an incentive for the contractor to properly complete the project.
 - By withholding a certain portion of the monies due the contractor, the owner has the carrot used at the end of the project.

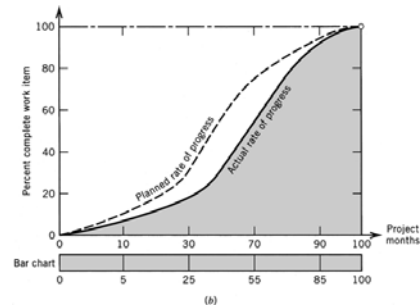
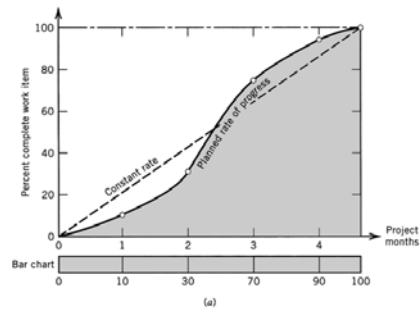
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Progress Reporting

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Figure 3.3 (p. 57)

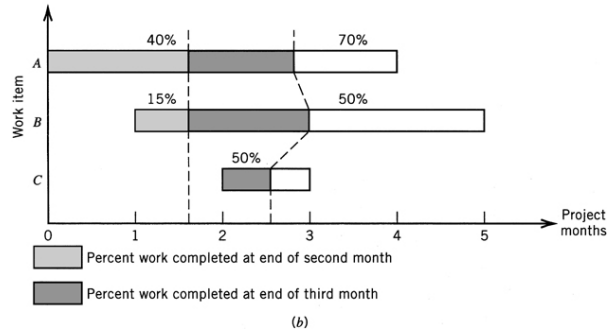
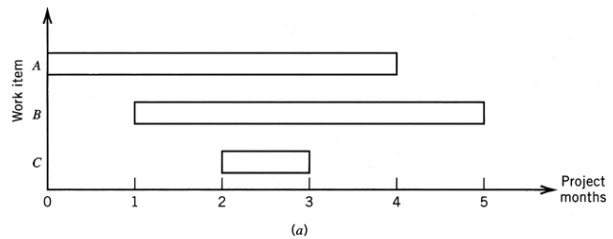
Bar chart planning and control models: (a) planned rate of progress and (b) actual rate of progress.



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Figure 3.4 (p. 58)

Bar chart progress models: (a) bar chart schedule (plan focus) and (b) bar chart updating (control focus).



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May 20,2XXX
Punch List Items Acme Plastering Co.
Barfield-400 Project

Larger Building

1. Caulking required between stucco and brick on the ~~over~~ level.
2. Streaks and cracking on stucco must be remedied.

Smaller Building

1. Very noticeable line of stucco in rear of building.
2. Streaks and cracking on stucco must be repaired.
3. Exterior bridge entrances: patch stucco must be made ~~unifor~~
4. Areas of ~~access~~ spalling must be ~~ected~~.

Figure 3.5 (p. 59)

Typical punch list.

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