An Introduction to Project Scheduling

Controlling Time and Resources = Project Success

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Presented by

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The Presentation Covers

- What is Project Scheduling?
- Scheduling Definitions and Basics
- Scheduling techniques & CPM
- Basics of schedule review and analysis
- Questions

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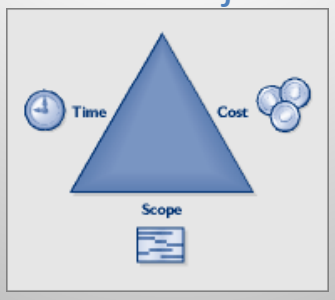
An Introduction to Project Scheduling



Project Scheduling covers Time, Resource and Cost Management. Includes the Processes Required to Manage Timely Completion of the Job!

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What is Project Scheduling ?

Most often delivering projects on time is the biggest challenge for Construction Managers.

Time has the least amount of flexibility; it passes no matter what

One of the main reasons for conflict on projects are Schedule issues

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Importance of Project Scheduling (1)

Good preliminary schedule development and its continued ongoing upkeep is of the utmost importance to:

- More Control of Time, Resources and Budget
- Avoiding claims
- Providing a solid basis for quantifying extension of time impacts

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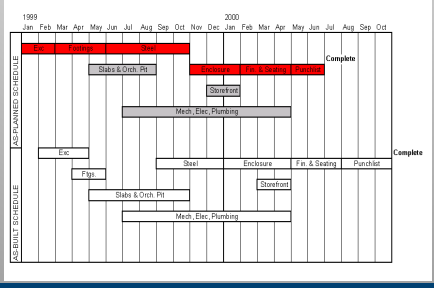
Importance of Project Scheduling (2)

- Serves as a plan to complete the project.
- Communicates the plan to the project team.
- Measures progress against the plan.
- Proves the contract completion date.



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Scheduling Definitions & Basics

- **CPM Scheduling:**

  A Management Technique by which a project can be broken down into a number of identifiable tasks (activities) and assigned various resources (i.e. time/duration, cost, etc.) The tasks are then sequentially interconnected based on interdependence. The result of this process is a critical path.

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Terminologies: i.e. The jargon!

- Activity
- Constraints
- Milestone
- Critical Activity
- Critical Path
- Early Start Date
- Late Start Date
- Early Finish Date
- Late Finish Date
- Total Float
- Logic (Relations)
- Predecessor
- Successor

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Activity

Is the basic element of work, task or measurable amount of work that must be accomplished in order to complete a project.

An activity occurs over a given period of time, utilizes resources and produces a deliverable for the project.

Pour Concrete 2d

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Milestone

An activity that represents a significant point in time but has no duration. Milestones can indicate the start or the end of a series of related activities or an accomplishment in the course of a project.

Concrete Pouring Completed– 0D

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Constraints

- Imposed restrictions (such as dates) used to reflect project requirements that cannot be built into the logic.
- Aid in building a schedule that more accurately reflects the real world aspects of your project.
- Provide added control in the schedule.

Start No Later Than…..

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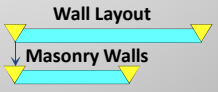
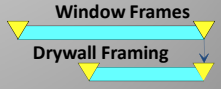
Logic (Relationships)

◆Start-to-Finish

◆Start-to-Start



◆Finish-to-Finish



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Start & Finish

- Early Start (ES): **The earliest time that one activity can start without affecting the successors.**
- Early Finish (EF): **The earliest time that one activity can finish without affecting the successors.**
- Late Start (LS): **The earliest time that one activity can finish without affecting the successors.**
- Late Finish (LF): **The latest time that one activity can finish without affecting the successors.**
- Free Float (FF): **Delay allowance for one activity without causing any delay on the immediate successors.**
- Total Float (TF): **Delay allowance for one activity without causing any delay on the project completion date.**

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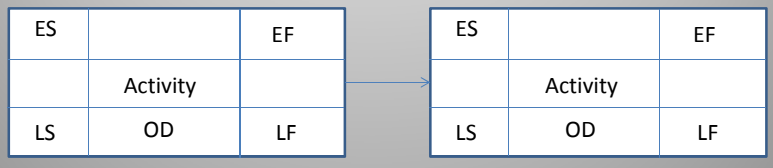
Network Diagram

Shows how the project tasks are connected and will flow from beginning to end.



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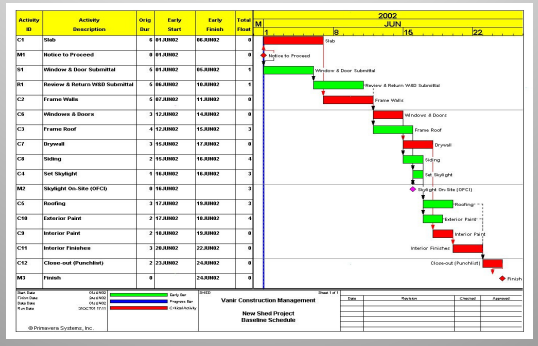
Critical Path

It is the longest continuous path (in terms of duration) in the network from start to finish of the project and determines the shortest time to complete the project.



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Total Float

The number of work periods the start or finish of an activity can be delayed without affecting the project finish date.

(Total) Float is measured in hours, days, weeks, or months depending on the project's planning unit, and can have negative, zero, or positive values.

(TF=LS-ES or TF=LF-EF)

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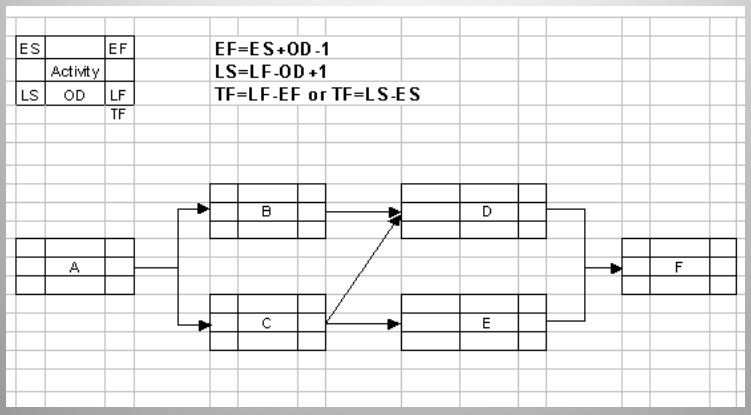
Network Diagram Calculations



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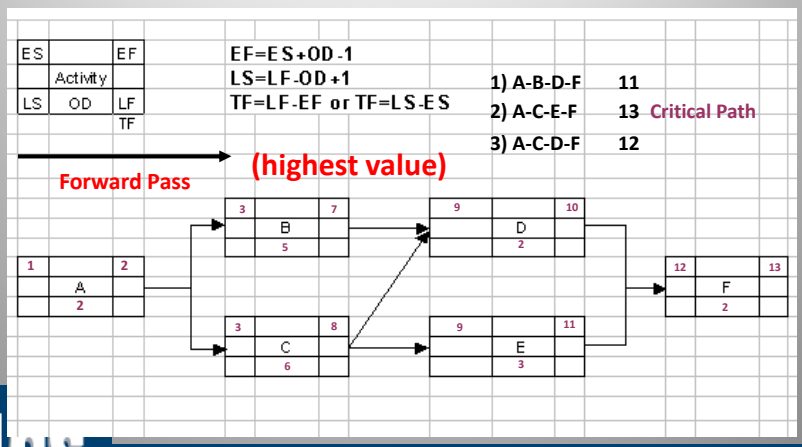

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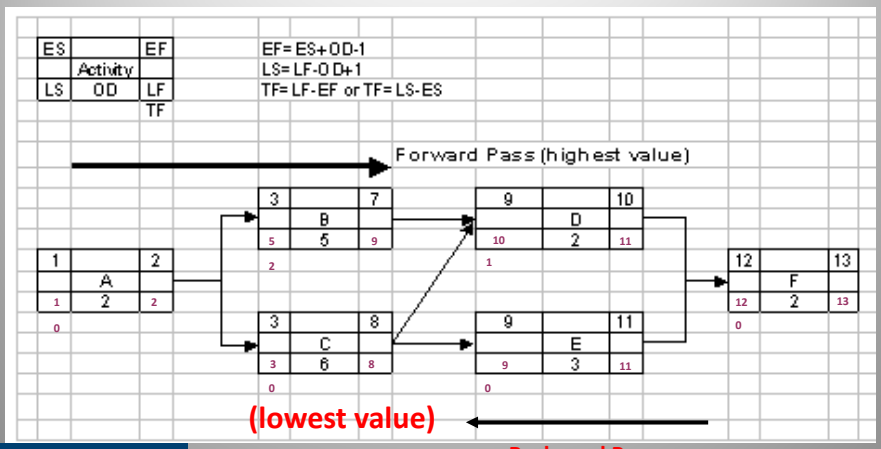

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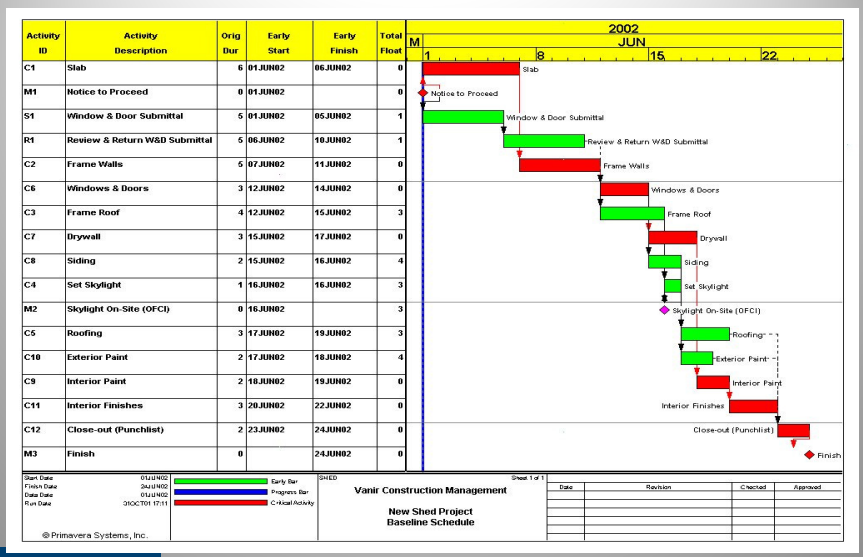

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Types of Schedule

- Master Schedule
- Preliminary Schedule/Initial Contract Schedule (90 day)
- Contract Baseline Schedule
- Contract Update Schedule
- Short Interval Schedule
- As- Built Schedule

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Scheduling Specifications

- Establishing appropriate Scheduling Requirements in the Project Specifications is necessary to be able to manage the project and contractor with respect to time.

You must specify exactly what you want and need!

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Scheduling Specifications

Understand

- Software requirements
- Acceptance of contractor's schedule
- Early completion
- Float ownership
- Weather Clauses: appropriate for location and type of work.
- Liquidated damages clause
- Extensions of Time Claims

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Scheduling Specifications

Understand

- Short Interval Schedules
- Cost & Resource Loading
- Number & Length (10 days max.) of Activities
- Submittals/Rev/App/Procurement Included in schedule
- 15-25% of the Activities Critical or Near Critical
- Owner Furnished Equipment Identified

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Schedule Review

- Compliance with the CONTRACT !
- Compliance with specification requirements.
- Do milestone dates and contract completion dates comply with contract?
- Is there any negative float?
- Are all work items included ?
- Does the overall sequencing and logic make sense?
- Are durations reasonable? Limited to 15 days?
- Is the critical path reasonable? 15-25% of tasks?

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Schedule Review

- Is Float accurate (inflated durations, forced finish dates, unnecessary logic, …)?
- Regulatory requirements
- Is schedule Cost & Resource Loaded (if required)?
- Are Owner items identified (equipment, materials)?
- Is Weather addressed per specification requirements?
- Are the Punch List and other close-out items included?
- Are Submittals, Reviews, and Procurement identified?

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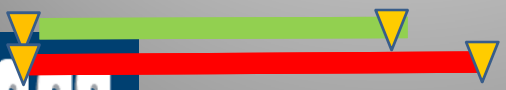
Baseline Vs. Update

What do you look for?

- Update Accuracy (Duration and Logic)
- Negative float
- Critical and Near Critical Paths
- Ways of making up any negative float.
  - Concurrent activity
  - Reduced durations / Additional resources
  - Accelerated submittal/review or procurement activities



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Delays and Extensions Evaluation

Client Responsibility
- Errors and Omissions
- Changed and Unforeseen Conditions
- Owner added work

Contractor Responsibility
- Mismanagement by contractor
- Defective workmanship
- Non compliance with contract provisions

Other
- Force Majeure – Weather, etc. (Force beyond control)

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Delays and Extensions Evaluation

Three Types of Delay:

1. Critical – Impacts milestones or completion dates.
2. Non-Critical – Impacts activities without impacting milestones or completion dates.
3. Concurrent – Separate and simultaneous delays.

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Delays and Extensions Evaluation

The 3 "KEY Questions:

1. Was the "event" a **Delay**? Did it impact an activity on the critical path such that the project completion date was delayed?
2. Is the delay **Excusable**? Was it caused by the Client or was it outside of the control of the contractor?
3. Is the delay **Compensable**? Was it within the control of the Client?

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Questions?

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