Chapter 8 – Calculating Start and Finish Dates

ARC 226 Construction Scheduling

Introduction

- Network diagram is complete
- Durations have been added
- Calculations can now be done to determine the start and finish dates
  - Often done by computer
- May be done longhand
  - Gives an understanding of where the dates come from

ES and EF- The Forward Pass

- Start at the beginning of the project and move to the end, left to right
  - ES day is typically in upper right hand corner
  - 0 for first day, add the activity duration to get the EF day
- The second activity starts as soon as the first activity ends
  - EF of the 1st activity goes to the ES of the 2nd
  - Start the 1st activity with a 0
    - All activities start and end at the end of the day

Forward Pass, cont.

- If two activities are predecessors to a single activity, choose the one with the larges EF for the successor activity
- Calculate the ES and EF dates for figure 8.7 on page 79

LS and LF- The Backward Pass

- Same concept as the forward pass
  - Calculations begin at the end of the project and proceed to the start
    - Work right to left
  - LS day is lower left corner, LF is lower right corner of the activity box
- Start at the last activity
  - EF day becomes the LF day
    - Subtract the Duration from the LF to get the LS

Backward Pass, cont.

- Move from the last activity to its predecessor(s)
  - Copy the LS day of the successor to the LF of the predecessor
    - Subtract the duration from the LF to get the LS
    - Repeat as necessary
- If there are two successor activities to a predecessor, choose the earliest LS date of the successor (smaller number) for the LF of the predecessor
- Complete the LS and LF for the practice problem on page 79

Total Float

- Total float = LS – ES or LF –EF
  - May also be referred to a slack
  - Entered into the bottom middle of the activity box
- Compute the float values for practice problem 1 on pg 79

Determining the Critical Path

- Critical Activity- float is equal to 0
  - These activities must start and finish on the listed dates
- Critical Path- path of activities with zero float
  - May also be defined as the longest route through the network of activities
- The critical activities must be carefully managed to prevent delays to the project

Effects of Changes or Delays

- When a project is changed, the work sequence may need to be changed as well
  - The schedule must then be altered
- Does the change affect the critical activities?
  - If yes, where can the time be made up?
- Three methods for accelerating a project:
  - Decrease durations (more manpower or equipment)
  - Schedule overtime, weekends, multiple shifts
  - Change the logic to have 2 or more critical activities working at the same time

Change Effects, cont.

- Which activities will best facilitate acceleration?
- If the change is not on a critical activity, there will be no delay if the change < the total float
- The analysis of changes to the schedule can determine if a contract time extension is warranted
- Examples pg. 84-85

Work Days to Calendar Days

- The calendar day is the important designation for the workers
  - The work day is given on the activity box
- A computer will automatically convert the work days to calendar days
- If scheduling by hand use a conversion table
  - Work days are consecutive, calendar days take into consideration weekends and holidays

Summary

- Forward pass establishes ES and EF days
- Backward pass establishes LS and LF days
- Total float = LS-ES or LF-EF
- Critical activity- zero float
- CPM allows the effects of change orders to be quantified
  - The logic diagram must be accurate for the schedule to be valid