

PR 7 -- Posted by Dr. Tarek Hegazy, University of Waterloo, tarek@uwaterloo.ca
Same as the example project in the Tutorial Manual

Description: The activities of a small project are shown in the following table.

Activity	Dependents	Description	Estimate no. 1		Estimate no. 2		Estimate no. 3	
			Dur. (d)	Cost (\$)	Dur. (d)	Cost (\$)	Dur. (d)	Cost (\$)
1	---	Excavation	2	2,000	----	----	1	3,000
2	1	Foundation	2	2,000	----	----	1	3,000
3	2	Joining Wall	1	1,000	----	----	----	----
4	3	House Walls	4	4,000	3	3,000	2	5,000
5	4	House Roof	3	3,000	2	5,000	----	----
6	---	Select Finishes	1	1,000	----	----	----	----
7	5, 6	Interior Finishes	3	3,000	2	4,000	----	----
8	7, 12	Clean Up	1	1,000	----	----	----	----
9	---	Fab. Garage Doors	6	6,000	4	10,000	2	12,000
10	3	Garage Walls	3	3,000	2	5,000	----	----
11	10	Garage Roof	2	2,000	1	3,000	----	----
12	9, 11	Garage Doors	2	2,000	----	----	----	----

Project Constraints:

- Deadline is 14 days; Indirect cost = \$300/day; Penalty = \$5,000/day; and Bonus = \$1000/day.
- Each activity uses 2 labors (L5) daily; and Resource limit is 4 L5 resources per day.
- A reporting period is 3 days and interest rate is 1% per period; Markup is 10% and owner retention is 5%.

Requirements:

Determine the optimum execution plan. **Check your solution.**

During actual progress, the following events were encountered during **the first 12 days** of the project:

- Day 1: excavation progressed 50% and no other work was done.
- Day 2: the contractor encountered unexpected rock (an owner-related problem). Accordingly, Excavation was stopped until a new machine is procured. No other work was done on day 2.
- Days 3 and 4: the new excavation equipment did not arrive yet. No other work was done.
- Day 5: the new excavation equipment started working and all remaining excavation work was completed that day. No other work done.
- Days 6 and 7: Foundation work was started and completed.
- Day 8: work on the Joining Wall was started and completed.
- On each of days 9 and 10: 25% of the House Walls and 25% of the Garage Walls were completed.
- Day 11: both the owner and contractor caused the House Walls activity to stop. Also, the contractor did not have resources to work on the Garage Walls.
- Day 12: the problem due to both the owner and the contractor still caused the House Walls activity to stop. The contractor also still had a resource problem and could not proceed on the Garage Walls. On the same day, the owner wanted to take some time to change his selection of the interior finishes. In addition, the Fabrication of the Garage Doors activity is 17% done.
- Actual costs until day 12 are assumed to be \$5,000 for each of the started activities.

- What is your optimum corrective action plan? Plot the project S-Curve and Earned-Value curve.
- Print the payment schedule, Cash Flow chart, resource histograms, and the final as-built schedule.
- Experiment with contractor versus owner acceleration on delay analysis results.