

CE 4990 - Construction Scheduling

Spring Fling

Due March 15th, 2012

February 27, 2012

Week 7 Problems

Please submit the 2 resource management problems handed out in class on 02/24.

The Warehouse Problem¹

Table 1 shows the activity duration, precedence information and resource requirements data. The resource requirements and duration are fixed. Activities 10 and 27 are “subbed” out and hence do not require the contractor’s resources. Activity 12 requires resources for the first day only. Do the following:

- Develop the network schedule for the project.
- Use the series method to allocate resources, assuming that you have available 4 *Carpenters (C)*, 4 *Ironworkers (IW)* and 4 *Laborers (L)*.
- Ensure that the resources have been leveled as well as possible (apply the Minimum Moment Algorithm).

The Change-Order Problem²

Assume that you are the contractor who was the successful bidder on the Warehouse Project. The specifications for the project provided completion 28 working days following Notice to Proceed and also provided for liquidated damages of \$1,000 per day for late completion. The specifications also contain a clause identical with Clause SP-13 of the U.S. Postal Service Specification (see attachment). Following contract award, you have submitted your master schedule which shows completion in 28 working days.

At the time of Notice to Proceed, owner informs you that he has redesigned the Int. Parts. (Act 3), the Ext. Wall Panels (Act. 8), and the Ext. Doors (Act. 7). After looking over the new design, you estimate that the additional complexity will:

- Require 6 additional days of work on the Int. Parts.,
- Require 9 additional days on the Ext. Wall Panels,
- Require 5 additional days on the Ext. Doors, and
- Erection of the Int. Parts. (Act 29) will take 4 days instead of 1 because of the design change.

¹Problem sourced from “Seabea Planners & Estimators Handbook.”

²Problem developed by Dr. John Fondahl for his Construction Planning and Scheduling class, Stanford University, 1962.

The owner agrees to pay the additional cost but denies you any time extension. All the changes effect the activity durations as stated but do not change the resource requirements as originally estimated.

Should you be concerned because of possible resource restraints? Should you accept the Change Order under protest, indicating that you do not agree with the owners denial of time extension. How much time extension should you claim? Document your claim by a schedule subject to your resource restraints and including the new Activity duration estimates. Develop the shortest schedule that you find will accomplish the job within your resource restraints.

Table 1: Warehouse Problem

No.	Activity Description	Time Req'd	Must Follow Act. No.	Resource Requirement
1	Site Survey & Material List	1	-	-
2	Matls & Equip to site	3	1	-
3	Fab Interior Wall Partition	2	2	4C
4	Fasten Wood Strips to Purlins	2	2	2C
5	Fab Timber Trusses	4	2	4C
6	Excavate	1	2	4L
7	Fabricate Exterior Doors	2	2	2C
8	Coost Plywood Ext Wall Panels	3	2	4C
9	Forms, Rebar & Bolts for Col Ftgs	1	6	4C, 2I, 2L
10	Place Drain Pipe	1	6	Sub.
11	Pour Footings	1	9	1C, 2L
12	Cure & Strip Footings	4	11	1C, 1L (1st day only)
13	Erect Steel Cols & Vert Brace	1	12	4I
14	Backfill, compact & grade slab	2	10 & 12	2L
15	Erect Trusses	1	5 & 13	4I
16	Forms, Rebar & Drains Floor Slab	1	14	4C, 2I
17	Fab & Erect Frames at Truss Pans	1	15	2C, 2I
18	Pour Slab	1	13 & 16	1C, 2L
19	Erect Steel Purlins	1	4 & 17	4I
20	Cure Slab	6	18	-
21	Place Rod Bridging & Weld	1	19	4I
22	Erect Ext Wall Panels	2	8 & 20	4C
23	Mail Planks to Purlins	2	21	2C
24	Erect Doors	1	7 & 22	2C
25	Waterproof & Insulate Joints	1	22	2L
26	Lay Tar Paper on Planks	1	23	2L
27	Paint Ext Walls	2	24 & 25	Sub.
28	Erect Corrugated Roofing	2	26	2C
29	Erect Interior Wall Partitions	1	3, 20 & 26	4C
30	Clean Up	2	27, 28 & 29	4L