PR 8 – Posted by Dr. Tarek Hegazy, University of Waterloo, tarek@uwaterloo.ca

A General Contractor has the following resources stored in the company's resource list.

Labor:

Code	Basic $ / hr
L1	25
L2	25
L3	25
L4	25
L5	25

Equipment:

Code	Basic $ / hr
E1	50
E2	50
E3	50
E4	50
E5	50

Crews:

Code	Composition
CR1	L1+L2
CR2	L3+E1
CR3	L4+2L2+E2
CR4	L4+3L2+E3
CR5	L5+2L2
CR6	L3+E4+L2
CR7	L4+E4+L2
CR8	E5+3L2
CR9	L4+2L2+E2
CR11	E4+2L3
CR12	4L2+E3

Subcontractors:

Code	Basic Cost
As Needed	

New Bid:

The contractor is preparing a bid for the installation of a mobile house. Activities and estimates are:

No.	Activity	Depend on	Estimate 1	Estimate 2	Estimate 3
1	**Site Layout**	-----	CR1, 8 hrs Q= 1, Prod.= 0.5 *	CR1, 12 hrs Q= 1, Prod.= 0.5	Subcontractor S1 1 day, $1,200
2	**Excavation**	1	CR2, 8 hrs Q= 600, Prod.= 100	CR2, 12 hrs Q= 600, Prod.= 100	Subcontractor S2 3 days, $5,350
3	**Forms**	2	CR3, 8 hrs Q= 300, Prod.= 100	CR3, 12 hrs Q= 300, Prod.= 100	Subcontractor S3 1 day, $4,500
4	**Concrete**	3	CR1, 8 hrs Q= 300, Prod.= 150	CR1, 12 hrs Q= 300, Prod.= 150	Subcontractor S4 1 day, $3,500
5	**Rough Plumbing**	1	CR5, 8 hrs Q=3000, Prod.= 1000	CR5, 12 hrs Q=3000, Prod.= 1000	Subcontractor S5 2 days, $3,000
6	**Place Blocks**	5	CR6, 8 hrs Q= 200, Prod.= 50	CR6, 12 hrs Q= 200, Prod.= 50	Subcontractor S6 2 days, $5,000
7	**Rough Elec.**	5	CR7, 8 hrs Q= 300, Prod.= 75	CR7, 12 hrs Q= 300, Prod.= 75	Subcontractor S7 2 days, $5,200
8	**Place Home**	6	CR8, 8 hrs Q= 1, Prod.= 0.5	CR8, 12 hrs Q= 1, Prod.= 0.5	Subcontractor S8 1 day, $2,800
9	**Remove forms**	4	CR9, 8 hrs Q= 300, Prod.= 75	CR9, 12 hrs Q= 300, Prod.= 75	Subcontractor S9 2 days, $6,909
10	**Cure Concrete**	4	Subcontractor S10: 7 days and $1400		
11	**Hookup finish**	7, 8	CR11, 8 hrs Q= 30, Prod.= 10	CR11, 12 hrs Q= 30, Prod.= 10	
12	**Cleanup**	9, 10, 11	CR12, 8 hrs Q= 1, Prod.= 0.25	CR12, 12 hrs Q= 1, Prod.= 0.25	Subcontractor S12 2 days, $7,000

Notes: * Q = Quantity of work; Prod. = Regular production rate in an 8-hr day.
- Seasonal productivity factors for all activities are: Winter (0.7), Spring (1.0), & Fall (0.85).

Project Constraints:

Start date = June 1, 04
Resource Limit is 4 L2
Markup = 5%
Retainage = 10%
Reporting period = every 7 days
Interest/period = 1%
Mobilization = 0%
Indirect costs = $300/day
Suppliers' credit = 20%
Penalty =$10,000/day
Incentive =$2,000/day
Deadline = 90% of project duration when all activities use their first estimate (round up to nearest day).

Requirements:

Enter the resources data into EasyPlan's resource bank. Then, enter the project activities and use the "**Auto-Estimate**" option in the activities sheet to estimate activities' costs.

Determine an optimum plan that meets the contractor's constraints. **Check your solution.**

Compare project cost and time for three project start-date possibilities: Feb. 1, 2004, June 1, 2004, or Oct. 1, 2004. Comment on the results.