1.133 M.Eng. Concepts of Engineering Practice
Fall 2007

PROJECT MANAGEMENT
Assignment 5
Network Scheduling

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Part A due: 10am October 10, 2007
Part B due: Group presentation slides to Aaron by 9pm Tuesday October 16, 2007
Group excel sheet by 10am Wednesday October 17, 2007

Network scheduling is a dynamic process. There may be variations to the duration that
you have estimated for each activity, some activities may have been completed earlier or
later than expected. There may be other activities that had not been foreseen at the onset
of the project that has to be included in the network. The number of teams assigned to
work on an activity may be increased or reduced. There may be disruptions to supplies of
materials that prevent an activity from being carried out. There may be issues of labor
problems and accidents on site that caused injury to workers. There may be power
outages, etc, etc. Constant adjustments have to be made to the activity network to keep it
updated and relevant. The purpose of this assignment is to let you discover the various
scenarios that may arise as a result of changes to the original plan of action, and come up
with a solution that would still meet your obligation.

Part A: Activity Network Exercise (15% of Assignment 5)

This is an individual assignment. You are required to set up the activity network diagram
and answer all the questions asked. Hand in your solution individually. Indicate your name
on the first page of your answer sheets.

PART A

Activity network exercise

Activity code	Duration (weeks)	Predecessor	Type of Relationship	Total Float
A	7	-		
B	9	-		
C	12	-		
D	14	A	FF = 7	
		B	FS = 2	
		C	SS = 8	
E	11	D	FS = 0	
F	17	D	SS = 11	
G	13	E	FS = 0	0
H	6	E	FS = 3	
		F	FS = 0	
I	?	F	SS = 12	0

Task

1. Sketch the activity network and calculate ES and EF for every activity
2. Identify the critical path
3. Calculate the LS and LF for every activity
4. Complete TF and FF for every activity
5. How did you find the duration of activity I ?
6. Can you shorten the project by shortening activity D ?explain.
7. What will be the project duration if activity D takes 18 weeks to complete instead of 14 weeks ?
8. Will the critical path change ?

Part B: Bridge Construction (85% of Assignment 5)

This is a team assignment. The class will be divided into 11 groups shown below. Each group will work together to find solutions for constructing the bridge. Each group will be required to submit all alternative network diagrams that you have considered and your final solution in a summary report, outlining the factors/constraints considered and the reasons for your choice of the selected solution. Note: please submit paper copies of the network diagrams and report (one report per group). Make sure you identify all members of your group on the first page of your report. All groups are required bring their report to class on October 17, and email a copy of the presentation slides to Aaron by 9 pm the night before. Five groups will be selected to present. The selected groups will be given 7 minutes each to present their report and 3 minutes to take any questions from the class.

Exercises are adapted from assignments previously given by Prof. Rosenfeld.

Groups:
1-Ali, Christina, Matt S
2-Sergio, Navid, Andrew
3-Pierre G, Shaun, Tricie
4-Liz, Renard, Austin
5-Sameer, Kenneth, Dave
6-Siddarth, Serge, Ariane
7-Izumi, Percy, Tom
8-Matt H, Ray, Sanusi
9-Anne, Cash, Kat
10-Alex, Mary, Phil
11-Ankur, Navid, Vanessa, Pierre F

PART B

Material covered:

1. Composition of a basic project network
2. Analysis of technological constraints
3. Analysis of organizational constraints
4. Optimization with limited resources

The figure and table below simplify the construction sequence of a highway bridge. The process is described using "Activities" and "Sectors".
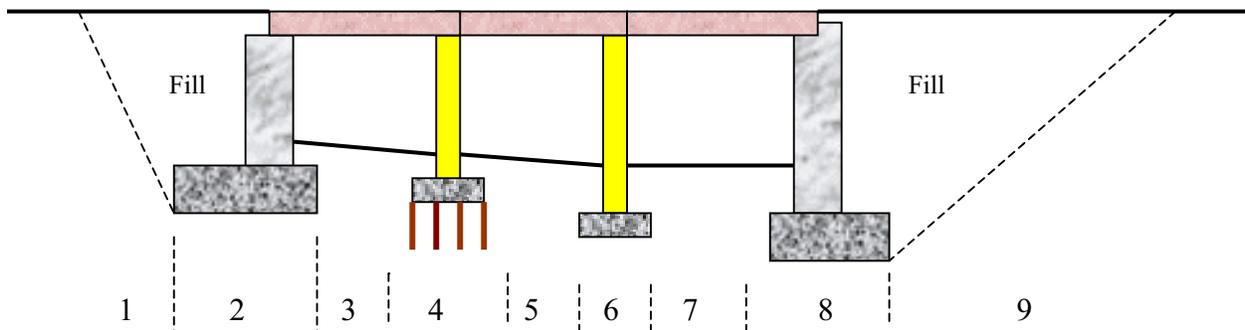
Description	Activity Type	Sector	Activity code	Activity duration (days)
Excavation for foundations	1	2	12	6
		4	14	2
		6	16	2
		8	18	4
Piles	2	4	24	12
Concrete foundations	3	2	32	8
		4	34	4
		6	36	4
		8	38	10
Retaining walls	4	2	42	16
		8	48	25
Columns (Reinforced concrete)	5	4	54	8
		6	56	10
Slabs (prefabricated)	6	3	63	12
		5	65	12
		7	67	12
Fill behind retaining walls	7	1	71	6
		9	79	40

Additional Technological Constraints

1. Prefabricated concrete slabs must be placed on concrete columns at least two days after they are cast, and on retaining walls at least three days after they are cast.

2. Fill in sector (1) must start at least three days after completion of retaining wall in sector (2).

3. Fill in sector (9) must finish at least eight days after completion of retaining wall in sector (8).

Assignments

1. Prepare a full precedence network for this project, taking into account only technological considerations (both obvious dependencies and the above three additional constraints)

2. Present this basic schedule in a bar chart form (Assign a separate line for each crew)

3. Assume that only one crew is available for each of the seven activity types (i.e. the same crew must proceed sequentially from one sector to another). With this new crew constraint, the project schedule must be changed from the original, but there are a number of ways to achieve this. Prepare 3 – 4 revised precedence networks incorporating this new organizational constraint. When trying different sequences, you do not have to solve the entire network, but the earliest times only.

4. Explain briefly the main considerations and logic for your choices

5. Draw a full precedence network for your selected plan

6. Present your selected schedule in a bar chart form

7. Prepare slides for presentation in class, and email a copy to Aaron by 9pm the night before class (Tuesday 16 October).