

Name: _____

ID: _____

AEC 258 Spring 2019

Assignment 4 (50 points) - solution

Due date: 4/14/2019

1. Explain two common methods to accomplish more work in a smaller time frame in construction. (5 points)

A common response to the need to accomplish more work in a smaller time frame is overtime. It is generally accepted that working overtime for an extended period adversely impacts productivity. Another common method is to increase workforce.

2. What is the efficiency and effective hours per week for a 10 hrs/day & 6 days/week working arrangement? (5 points)

The efficiency is 85% and effective hours per week is 51 hours.

Table 11.1
IMPACT OF SCHEDULED OVERTIME ON LABOR PRODUCTIVITY

Hours/Day	Days/Week	Hours/Week	Efficiency (based on 40 hr.)	Effective Hr./Week
8	5	40	100%	40
9	5	45	95	42.75
10	5	50	90	45
11	5	55	85	46.75
12	5	60	80	48
8	6	48	95	45.6
9	6	54	90	48.6
10	6	60	85	51
11	6	66	80	52.8
12	6	72	75	54
8	7	56	90	50.4
9	7	63	85	53.55
10	7	70	80	56
11	7	77	75	57.75
12	7	84	70	58.8

3. What is a short-interval schedule? Who might be the appropriate personnel to prepare a short-interval schedule? (5 points)

A detailed plan must be developed to bridge the gap from the overall project schedule to the tasks performed at the crew level. Such schedules for organizing crew activities are short-interval schedules, also called look-ahead, window, or "rollup" schedules. They are usually 2-week schedules with short-range plans.

A number of individuals might be appropriate to prepare a short-interval schedule. The important point is that this individual must be adequately informed about those tasks completed in one week and which tasks must be performed in the near future. This individual, possibly the superintendent, general foreman, project manager or project engineer, must be able to grasp all the tasks involved along with the various constraints that might be imposed. These should be developed with input specifically requested from the various first line supervisors, subcontractors, and key suppliers.

4. What is linear scheduling? What are the types projects suited for linear scheduling? (5 points)

Some projects involve many similar activities, occurring in succession, repeated throughout the project duration. Different activities need to happen at the same location, but cannot take place at the same time. Linear scheduling can be used to schedule this type of project. Examples of projects

with sequences of repetitive activities include large highway projects, high-rise buildings, sewer lines, and the like.

5. A tower was installed in 900 hours. The improvement rate for doubled units is expected to be 90 percent. What will be the time required to complete the fifth tower? If the improvement for doubled units is expected to be 75%, what will be the time required to complete the fifth tower? (10 points)

Use the following equation: $T_N = T_1 * N^s$, where $s = \log \phi / \log 2$, ϕ = rate of improvement

If $\phi = 90\%$, $s = \log .9 / \log 2 = -.152$

$T_1 = 900$ hrs

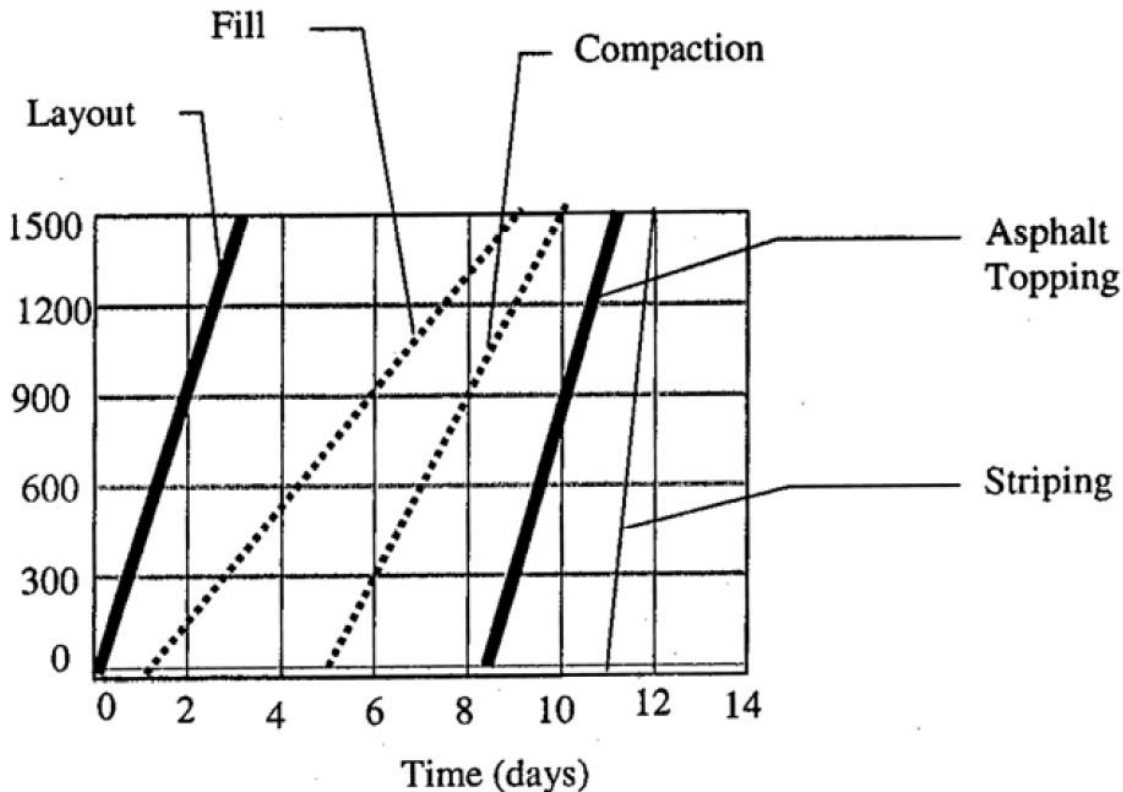
$T_5 = 900 * (5)^{-.152} = 705$ hours

If $\phi = 75\%$, $s = \log .75 / \log 2 = -.415$

$T_5 = 900 * (5)^{-.415} = 461$ hours

6. A 1,500 foot subdivision street is to be constructed. The layout will be completed in three days; the fill will be brought in over the course of eight days; the compaction/grading will be completed in five days; the asphalt topping will be done in three days; and the striping will take one day to complete. Using a minimum float guideline of one day, develop a linear schedule for this project and determine the project duration. (10 points)

The project duration is 12 days.



7. A project has critical path activities A, B, and C. A is the predecessor of B. B is the predecessor of C. The duration estimate for activity A, B and C is shown in the following table. Fill the table with mean duration, standard deviation, and variance for activities and the whole project (critical path). Determine what is the probability of completing this project within 80 days? (10 points)

Activity	Optimistic duration	Pessimistic duration	Most likely duration	Mean duration	Standard deviation	Variance
A	16	30	21	21.67	2.33	5.44
B	28	45	35	35.50	2.83	8.03
C	10	21	15	15.17	1.83	3.36
Critical path	--	--	--	72.33	4.10	16.83

$$T_e = \frac{T_o + 4T_m + T_p}{6}$$

Where:

T_e = Mean value of the activity duration (expected)

T_o = Optimistic activity duration

T_m = Most likely duration

T_p = Pessimistic activity duration

$$\text{Standard deviation} = s = \frac{T_p - T_o}{6}$$

$$V = s^2$$

Where:

V = Variance of an activity

s = Standard deviation of that same activity

$$V_{cp} = \sum_{\text{start}}^{\text{end}} s_{cp}^2 = \sum_{\text{start}}^{\text{end}} V_{cp}$$

Where:

cp = Chain of critical path activities

V_{cp} = The variance for the critical path

Compute Z-score = $(80 - 72.33)/4.10 = 1.87$

According to Table 15.1 in the textbook, the probability of completing this project within 80 days is 96.93%.