# Chapter 1
# Project Planning and Management

## 1. Project Planning and Management

### 1.1. General Information:

This chapter deals with the Planning that is necessary both prior and during the actual construction on an engineering project. Such planning is necessary in order to construct the project **within cost and on time**. Items need to be planned are:

1. Identification of specific activities of work required and the relationship between them (precedence relationships).
2. The proper sequencing of the specific activities of work so as to complete the project in optimum amount of time.
3. The time of delivery of materials and installed equipment.
4. The types, quantities and duration of construction equipment used.
5. The classification and number of workers needed and periods of time they'll be needed.
6. The amount and timing of financial assistance needed.

### 1.2. Construction Activities:

Most construction projects are divided into specific activities of work, each with specific objective and length of time to accomplish. Each activity has a specific beginning and ending point and may require a specific piece of equipment or a specific trade classification, for example, the construction of a reinforced concrete retaining wall might be divided into the following activities:

1. Lay out site.
2. Excavate earth (machine).
3. Excavate earth (hand).
4. Build and erect forms.

5. Placing reinforcing steel.
6. Place concrete.
7. Cure concrete.
8. Remove forms.
9. Finish concrete surface.
10. Clean-up site.

Once the specific activities of work are defined, the project planner should determine the quantity of work involved in each activity using easily measured quantities, for example the placement of concrete could involve the total number of cubic meters of concrete involved in the activity. The building of forms would normally be measured by the square meter of concrete surface area.

Then the project planner should estimate the probable rate at which the work will be performed. From this information the probable time to complete each activity can be calculated, resource allocation (men and machines), as well as any requirements for installing equipment can be assigned to each activity.

Then he must sequence these activities properly (for example, concrete cannot be placed until after forms have been erected).

From this information the possible time to estimate the time necessary to complete the project and the amount of resources required.

At this point the planner might not consider factors such as delays due to weather and the like, so the plan conceived may not be entirely realistic, but the plan was done before bidding on the project to see how it might affect:

- The ability of the contractor to accomplish the project.
- The resulting costs of the project.

## 1.3. Construction Project Cash Flow:

A construction schedule may be used to estimate the amount of funds that a contractor must provide in financing a project during construction. Most construction contracts specify that the owner will pay to the contractor a stated

percent of the value of work completed during each month. The payment for work completed during a month is usually made by the tenth of the following month. Upon completing the project, the retained funds, often 10% of the contract value of the work is paid to the contractor. An analysis of the construction schedule will indicate the approximate expenditures and receipts through any desired date. The estimated expenditures are determined as illustrated in table 1-1. The amounts shown are the costs of materials, equipment, labor and general overhead.

Table (1-1) – Form for Estimating Expenditure during Construction

| Weeks after Starting | Activities under Construction | Expenditure per Week ($) | Cumulative Expenditure ($) |
|---|---|---|---|
| 1 | A | 5680 | 5680 |
| 2 | B | 1540 | 7220 |
| 3 | B | 1540 | 8760 |
| 4 | B | 1540 | 10300 |
| 5 | C, D | 4780 | 15080 |
| 6 | C, D | 4780 | 19860 |
| 7 | C, D | 4780 | 24640 |
| 8 | C, D | 4780 | 29420 |
| 9 | C, D | 4780 | 34200 |
| 10 | D | 3240 | 37440 |

## 1.4. Job Layout:

One of the first duties of a superintendent when he assumes the responsibility of starting construction is to prepare a job layout for the project. On this layout he will draw to scale the area available for offices, warehouses, storage of materials, equipment, construction forms and fabricating reinforcing steel. In preparing the job layout, the superintendent should arrange all areas to reduce

the time consumed in carrying materials from storage areas to the project. The general office and warehouse should be located near the main entrance in order that persons visiting the project for business purposes will not have to travel around the construction areas to reach the office, and this may reduce the danger of injuries to visitors.

## 1.5. Project Control during Construction:

At specified intervals, usually weekly or monthly, reports should be submitted by the project superintendent to the headquarters office showing the actual progress on each activity during the appropriate time interval or through the effective date of report. If the progress on one or more activities or on the entire project is behind schedule, such information will be known early enough to take corrective steps.