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Management operation system techniques (MOST) replaces PERT and CPM in construction scheduling

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Abstract: *The Management Operation System Technique (MOST) invented in 1961, replaces PERT and CPM on construction projects and in program management. Since its inception, MOST has gained popularity and is now widely used in both large and small construction projects. Its use has been equally effective on projects ranging from several thousand dollars to $193 million so far. It is a combination of several traditional and modern planning techniques like bar chart, Gantt chart, CPM and PERT. The advantages of these have been extracted and disadvantages have been eliminated. Few of the advantages are: it is very helpful for repetitive works in both real and infrastructure projects and uses backward integration which helps in knowing the ground realities very easily. It gives the project manager visibility and identifies potential trouble areas requiring management action. This paper deals with application of MOST for construction activities of a 25 Kms Road project and drawing of MOST schedules. In the end the limitations of MOST are mentioned.*

Keywords*: (PERT, CPM, MOST, Bar chart, Gantt chart, MPS)*

I. Introduction

Intelligent planning, scheduling and control are absolutely essential to the success of any project: research and development, construction, manufacturing, bids, proposal etc. The Management Operation System Technique (MOST) invented in 1961, replaces PERT and CPM on construction projects and in program management. Since its inception, MOST has gained popularity and is now widely used in both large and small construction projects. Its use has been equally effective on projects ranging from several thousand dollars to $193 million so far. Elements of several traditional and modern planning techniques (bar chart, Gantt chart, PERT, CPM etc.) are combined in this newest management tool, MOST. The advantages of each of these methods have been extracted and the disadvantages of each have been eliminated .MOST not only contributes to single project R & D, construction, bids, and proposals, but also to Multi-Project Scheduling (MPS) either in production short runs or R & D. MOST's contribution to MPS has added another management tool to help satisfy the ever increasing need for better multi-project scheduling methods .MOST has been developed to give the project manager visibility; presenting all information necessary for good project control simply and clearly, and in time to allow effective management action. Its early warning system identifies potential trouble areas requiring management action and pin-points long-lead-time tasks. It also provides well-organized data for timely and comprehensive reporting. MOST can be particularly useful in monitoring programs that cross company, division or department lines, making it an extremely helpful tool for the general manager. MOST has the added advantage of presenting a graphic picture of a project status, manpower loading, costs and any related weak spots in an easily read schedule

II. What Is Management Operation System Techniques?

When planning a project of any size, CPM can be used, if desired, to establish milestones and float (or slack) time become apparent as the MOST schedule begins to take shape. Float in MOST will be determined without any calculation, such as the forward and backward passes which are needed in CPM.

If one prefers to use an existing CPM or other computer scheduling method to supply the schedule logic and dependencies, they may continue to do so. In that case, they will be simply converting the network diagram into MOST to provide all the benefits to be gained by MOST's unique graphic monitoring capabilities in a schedule that never needs to be redrawn. MOST converts CPM paths into bars keyed to working days, so that progress against scheduled deadlines can be checked easily by project supervisors.

In any case, once MOST is mastered, the planner can go directly to MOST without the use of either CPM or anything else

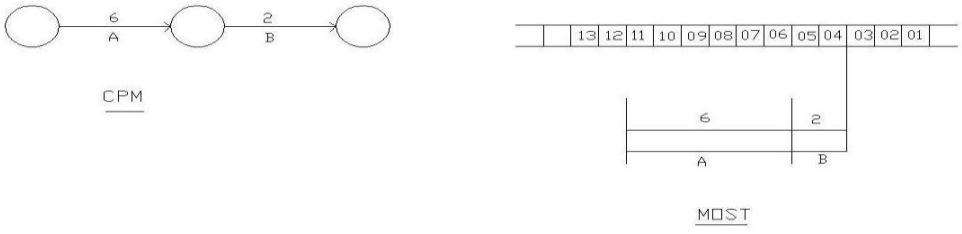


FIGURE 1

A MOST schedule is divided vertically into calendar periods. Programmed activities are displayed as segments of hollow bars, with events appearing as flags at the appropriate time bar continues along the chart. An arrow is drawn vertically from the tail-end of each discontinued bar to the surviving path, to show the relationship between them.Thus, a MOST user can see at a glance when a job-and-path is scheduled to begin and end, and what other jobs hinge on its completion. In addition to displaying deadlines, a MOST chart also shows how far a job has actually gone. This is done by a unique method of blocking in the hollow bars. To check progress, a vertical reporting line is placed on the schedule from the calendar scale periodically, to highlight all the activities scheduled to progress as of the reporting date. Bars filled in right up to the reporting lines are on schedule; those filled in short of the line are behind schedule; and those blocked in solidly to a point beyond the reporting line are behind of schedule.

The MOST schedules differs from PERT and CPM in that when the critical sequence(s) of activities is (are) established, MOST completes the schedule by working backwards from the contract completion date. But before constructing a MOST schedule, we must first decide on the level of detail required to monitor the program. This will vary, depending upon the size and type of projects being monitored.

Since the schedule is time-oriented, there is less initial effort in preparing the first MOST draft (diagram). After the MOST is drawn and coordinated with management and department supervision, actual reporting begins. MOST clearly shows a project's day-to-day status. Critical paths and float times are shown at a glance. The MOST is laid out to show the latest date that a job can start without jeopardizing the schedule. All the updating is done manually, although the system can feed a computer, should the, need arise. But in any case, manually updating MOST will take one hour or less, regardless of project size or complexity. This is because reporting centers around those activities to be monitored during the reporting period bar continues along the chart. An arrow is drawn vertically from the tail-end of each discontinued bar to the surviving path, to show the relationship between them.

III. How To Use Management Operation System Technique

MOST schedules are generally drawn on 22X34 inch or 24X36 inch paper for standardisation. The paper should be reproducible in order to convert to blue prints for normal distribution. The Vellum paper will become the schedule master which can be updated weekly, reproduced and stored. The following figures will illustrate the technique in preparing a MOST schedule.

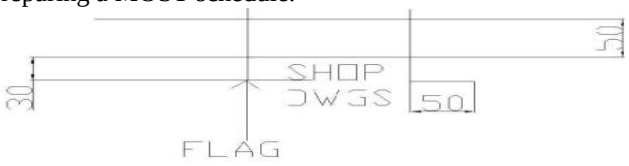


FIGURE 2

The time estimate for shop drawing 20 days is entered immediately above the bar and to the right of the starting flag (sees Figure 3).

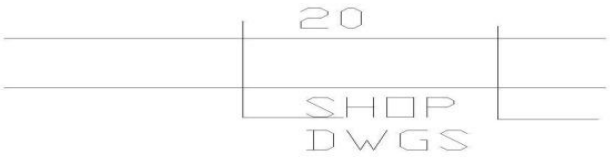


FIGURE 3

In construction schedules, the time estimates are shown in days, not weeks, because that is the language generally used. When applying the calendar to the top of the schedule, the normal calendar (4-1/3 weeks to a month) is used. All of the construction holidays are deleted in order to reflect the normal 40-hour work week. (see Figure 4).

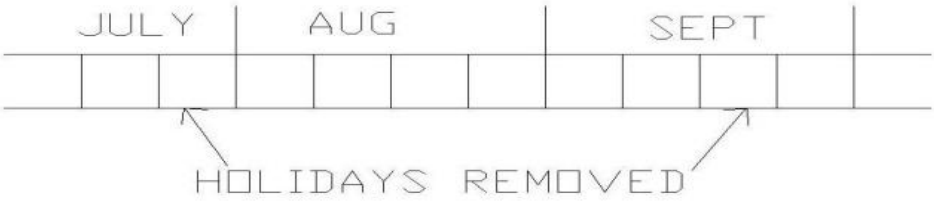


FIGURE 4

Figure 5 illustrates the designation of time, and the duration in days. As shown in Figure 6, jobs can occur in a series, overlap, or but parallel, depending upon their time and project relationships.

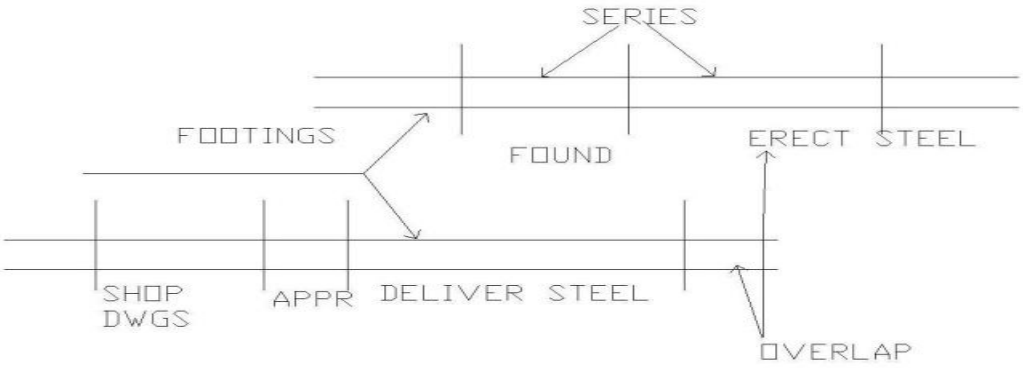


FIGURE 6

The basic MOST schedules (Figure 7) include jobs, delay notes, title block, and trend analysis.

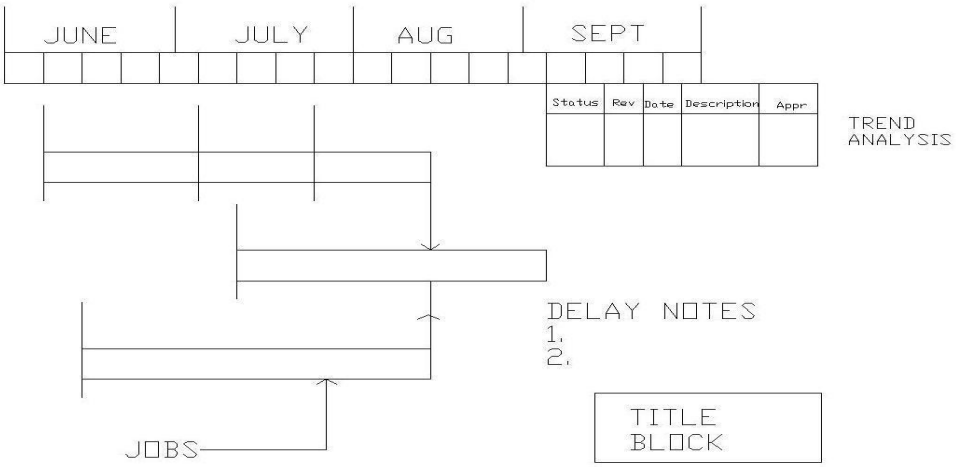


FIGURE 7

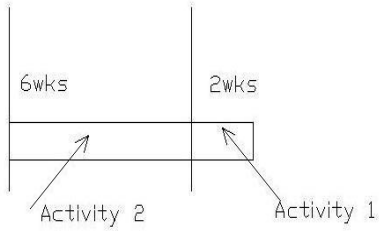
IV. Case Study

Construction Activities of the a road Project considered for a Length of 25 Km

Activity	Duration (weeks)
Possession of Obstruction Free Site	2
Stump Removal	6
Clearing & Grubbing	7
Taking OGL	3
Submission & Approval of Cross section	5
Excavation	9
Embankment Filling	3
Sub Grade	13
Drainage Layer	14
Wet Mix Macadam (WMM)	15
Dense Graded Bituminous Macadam (DBM)	8
Bituminous Concrete (BC)	4.8

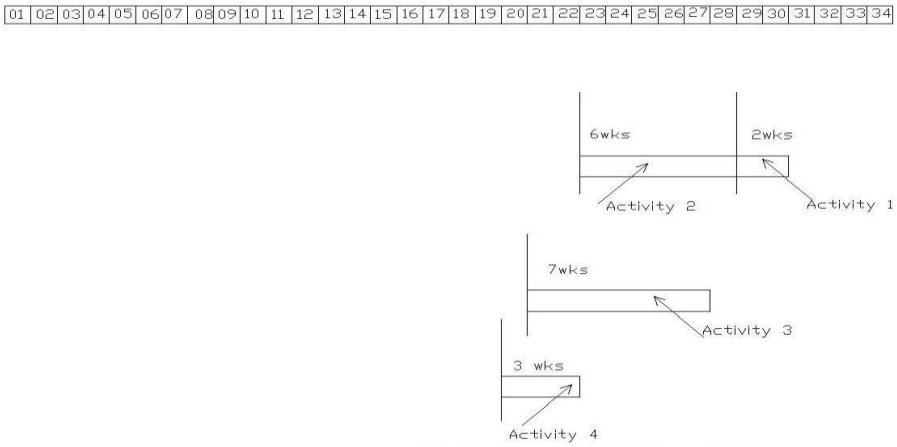
Typical Job Listing

Beginning the scheduling the first few activities in figure 18. In this example Activity 1 includes getting clearances from Forest department and other necessary NOC from other departments.



LISTING OF ACTIVITY IN MOST
FIGURE 18

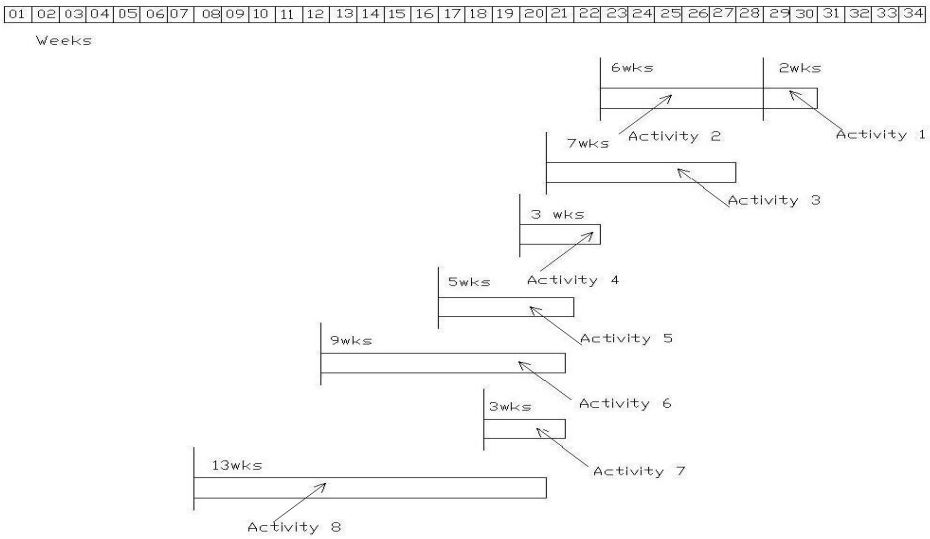
In the following figure 19 the clearing grubbing includes the shifting of pipe line of water and sewerage if any, and any other building that exists in the Right of Way. Since the Activity 3 i.e. Clearing and Grubbing can be started after removal of stumps that are there after cutting of trees. So the Clearing and Grubbing can be done with a lag of one week from the start of Activity 2.



CONTINUE OF ACTIVITY LISTING

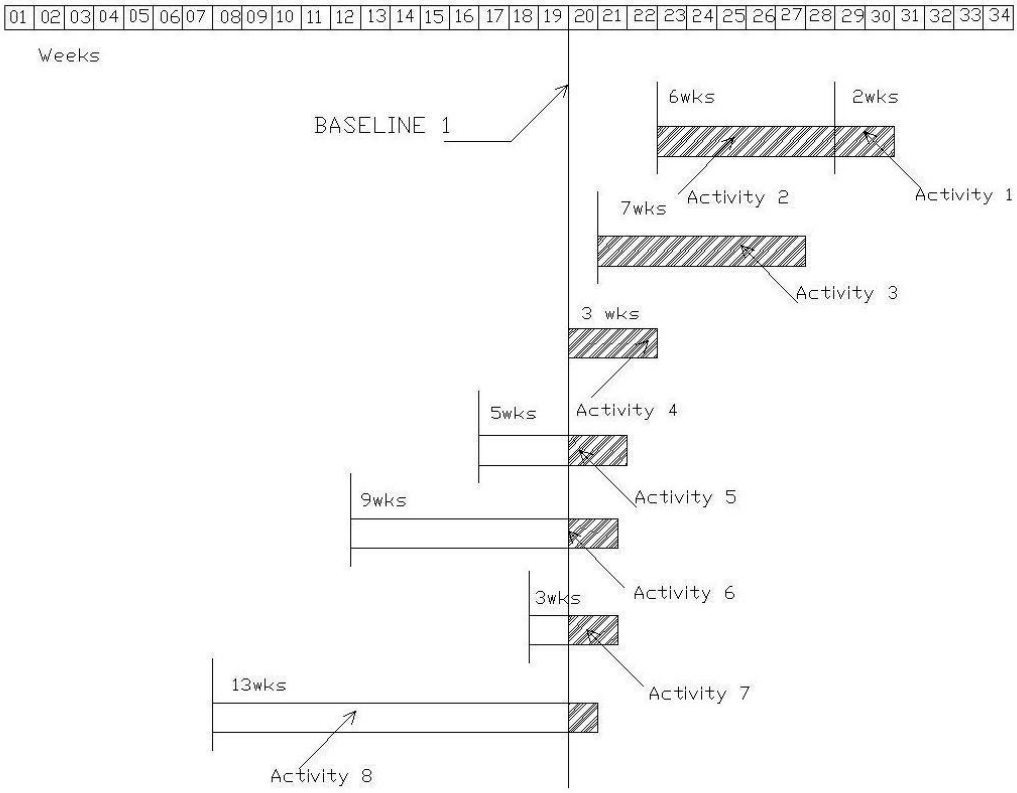
FIGURE 19

In the above figure it might be seen that the all the activities are starting after the start of first activity. If there are any activities which can be started before the start of the project then it creates a dilemma in finalization of critical path.In construction scheduling with MOST for a conventional road project proceeds from Possession of Obstruction Free site to getting the clearances from all the authorities like forest and environment ministry, any land acquisition that is to be made, demolishing of existing buildings coming in the way of Right of way, and the most important rehabilitation and resettlement of the Project affected People.By using the MOST system as described above the scheduler will develop a realistic schedule. It will not only show what jobs are necessary to construct a road to satisfy easy and comfortable journey, but it will also illustrate the latest start of all constraint jobs so as not to jeopardize the schedule or the contract date.Figure 20, illustrates a road construction being done till the level of Wet Mix Macadam (WMM). In this figure we can see the activities having a relationship between the activities and their constraints. All other jobs will be shown in their respective schedule positions to clearly display the relationship of parallel and overlapping jobs. If the start up of jobs illustrates too many of the same type of jobs or trades in parallel, the MOST visibility will highlight this potential problem. Figure 20 shows a "success-oriented" schedule. In other words, all jobs must be completed on the time frame against the calendar; there is no room for error. There is also no free time to allow for down time or inclement weather. Since construction is most often depending upon the weather, it is advisable to allow for at least two days per month during the winter months for contingencies or downtime. During the spring or summer months allow one day per month for rain. In many instances, some schedulers may allow two to three weeks per years for inclement weather. It's important to allow for these contingencies when preparing the Baseline Schedule.



MOST MODEL TILL SUBGRADE

FIGURE 20



MOST MODEL – UPDATED

FIGURE 21

Figure 21 then, shows an update. The update figure can be seen the activities 1, 2, 3 and 4 completed and rest of the activities in different stages. From this figure it can seen whether the activity is on schedule/ behind schedule/ahead of schedule. From this we can know the criticality of the activity and in turn of the project. It is important to display all the slippages and delays completely and honestly to avoid suffering the consequences behind it too late to correct.

Now to figure 22 and add the remaining jobs which will complete the MOST schedule for this road project and activities such as laying of top layer and additional activities. Figure 21 shows a could be kept on baseline schedule we can now commence tracking progress weekly. A copy of all revisions should be kept on file until the project is completed, all payments have been received and made, and all required waivers and releases obtained. It's also recommended the original reproducible vellum be stored in the event a similar project is bid at a later date. This schedule will then be of some use if a bid schedule is required

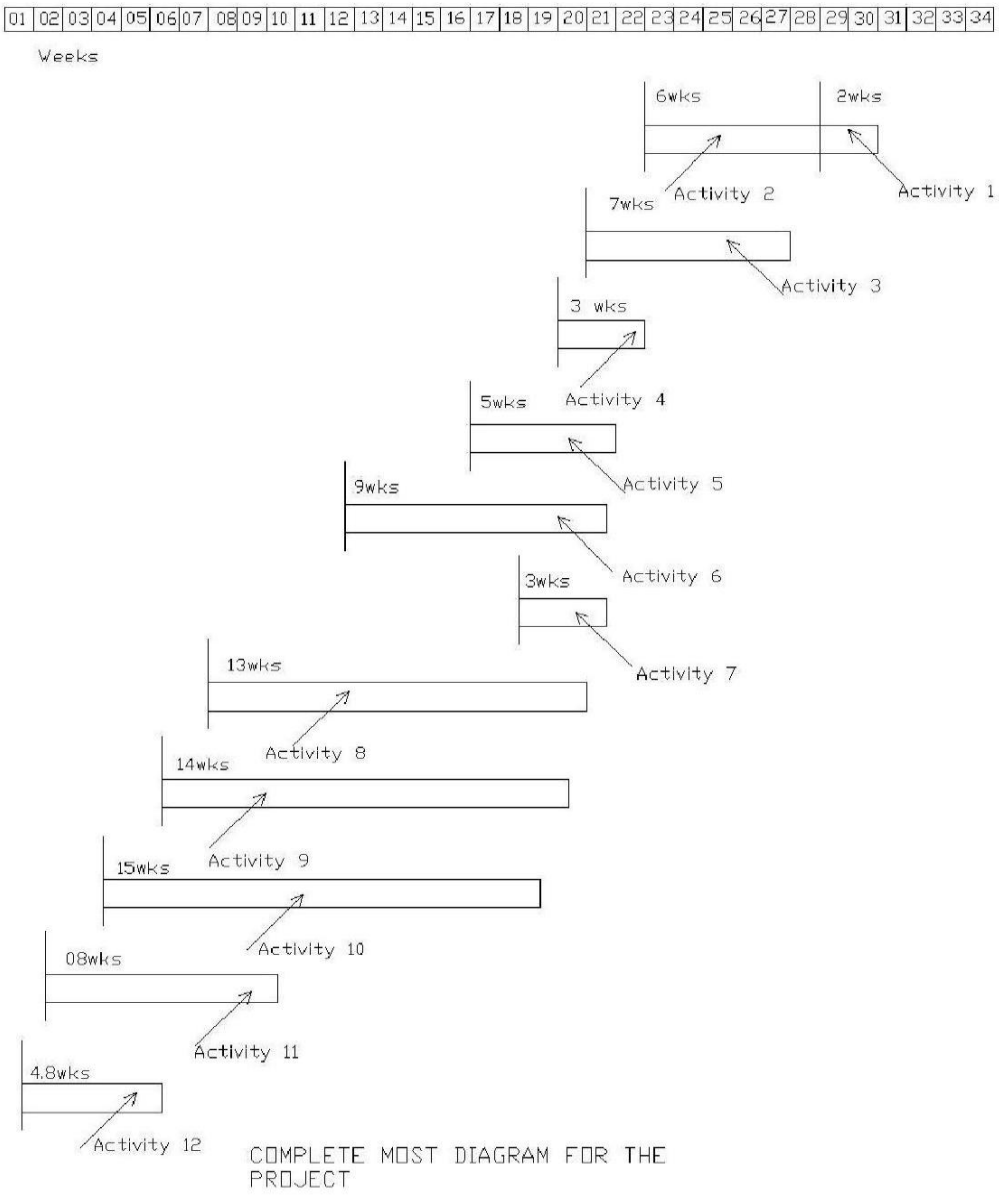


FIGURE 22

V. Conclusion

The Management Operation System Technique (MOST) replaces PERT and CPM on construction projects and in program management. Since its inception, MOST has gained popularity and is now widely used in both large and small construction projects. It is very helpful for repetitive works in both real and infrastructure projects. The use of percentage completion makes the monitoring of progress very easy. MOST uses backward integration which helps in knowing the ground realities very easily. The redrawing without rescheduling of activities is done in a simple manner. It is easy to update and is useful in cases of arbitration. The monitoring task by weekly updating is very easy. No forward and backward pass are required since MOST diagram describes it in detail. In-numerous baselines can be used for monitoring, which is very helpful in tracking of progress with tight control. Elements of many traditional and new planning techniques have been incorporated in MOST. MOST's contributes to MPS as an added management tool. It identifies potential trouble areas requiring management action

VI. Limitations

MOST becomes complicated when the number of activities is more. It is convenient for macro level planning.

VII. Recommendations

The breaking of project into activities should be done cautiously to prevent confusion and complexity. The use of weeks instead of days as calendar duration is easier to work with. The updating becomes less tedious.

REFERENCES

[1]. Anthony L. Lannone, And M Civitello, Jr.- Prentice-Hall ,1989. Construction Scheduling Simplified.
[2]. Project planning and control with PERT & CPM Dr. B.C.Punammia
[3]. www.springer.cou/cda/content
[4]. www.mindtoul.com
[5]. www.edu.twfurang/cho5.ppt