

Planning and Scheduling Construction Projects using Primavera Software: A Case Study

Nidhi Raghuwanshi¹, Prof. M. C. Paliwal²

¹M Tech Scholar, ²Associate Professor,

^{1,2}National Institute of Technical Teachers Training and Research Institute, Bhopal, Madhya Pradesh, India

ABSTRACT

Planning and Scheduling are very essential in the large infrastructure projects like road and bridge construction. These projects have numerous stakeholders and large amount of money, resources are invested. Improper planning and scheduling leads to loss of resources, increase in project cost and unpleasant delays. But with computer and software evolution, it is now possible to plan these projects using software like Primavera P6 and Microsoft office project. This paper deals with presentation of AwasYojna project in New Market Bhopal comparing the two different blocks namely Block A and Block B. The project framed stated the advantage and added benefits of web based primavera P6 for planning and scheduling of structures under construction under the government scheme of "AwasYojna" framing the issues and complications faced in the time frame of construction and availability of resources.

KEYWORDS: Primavera P6 Web, Bhopal AwasYojna, Planning, Scheduling, Monitoring and Tracking

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I. INTRODUCTION

The project consumes several resources in its life to achieve the desired goal. Increase of cost due to delay in time is associated with resources. For large construction projects with a large budget; it becomes very difficult for the project team to complete tasks in time. It is therefore very important to have a tool in the hands of the project team that can be used to monitor project activities. Primavera Project Planner P6, the Oracle software, is an incredible asset owned by the Venture Group. The product helps in the efficient organization, planning, and control of activities. Construction workers in India are reluctant to use the organizational and business planning processes used around the world and currently serve as a benchmark for the timely completion of tasks. The survey includes discussions/presentations on Primavera P6, an accessible business organization, and planning device. The nature of the planning established by the product requires regular details and why the product improves the business is largely overlooked by customers in India.

Without prejudice to the disclosure of information on various tenders, their interrelation, and the conditions under which it is possible to anticipate the overall duration of the company during the preparatory phase. The planning must be comprehensive enough so that the client can understand in detail the rationale for the various planning exercises. Currently, the development industry is one of the most widespread and rapidly growing realities in our country and

in the world. It is now necessary to have specific arrangements and strategies to improve public finances, and their current situation, to cope with the degree of progress in and around metropolitan areas, and the time required to achieve this can be reduced.

II. Literature review

Alberto Cerezo-Narváez et al [1] The research report examined whether coordinating a cost allocation structure (CBS) can spark the era of stronger PSPs in development companies. In recent years, some global associations have standardized and adapted various framework conditions for cost agreement (e.g. ISO 12006-2, ISO 81346-12, Omni-Class, Co-Class, Uni-Class). These cost data records have also been integrated into Building Data Displaying (BIM) structures. We believe that in BIM terms, when these CBS are used to create Venture PSPs, some preferences are increased, for example. The results showed that the PSP contains a hierarchical structure of the project scope. It is based on services and avoids both duplication and omission of activities.

Ajesh Pilaniya [2] The research aimed to understand the difference between artificial and spring software to estimate the financial and workforce management planning of a project using e.g. References and unique monitoring and control methodology using Primavera software. The planning of various activities during the project would be

optimal and thus the management of finances and manpower can be done correctly. Primavera P6 software is a perfect and efficient tool for project management and for monitoring and control of various construction projects.

AkashRajkumarWadhwa [3] The principle of the project resource allocation research used in the present project is to optimize, condense, or avoid waste of all project materials. Resource allocation and optimization were done using project organization software similar to spring p-6. Resource allocation can be optimized without changing the project period. Resource allocation as an optimization can be done for all other resources used in the construction project and can reduce project costs. Overcrowded resources are reduced through activities.

Akshay R. Kohli et.al [4] the research paper aimed to identify the most relevant articles with the causes and effects of delays and to develop the DEC database for future critical analysis. The content of the DEC dataset was systematically analyzed using bibliographic, cluster and thematic analyzes. This article presented the DEC literature, including key findings delayed over the years. This study carefully conducted a systematic content analysis that led to four major overlooked factors and areas of deficiency that should be addressed in future studies.

III. Objectives

- To develop scheduling and planning using Primavera P6 V8.3 for Structure prepared under government program "AwasYojna".
- To prepare construction sequence and comparative analysis in between two structure blocks and identification of reasons in delay.
- To conduct Financial Risk analysis using Gantt chart in Primavera P6.
- To assign proper sequence and links between different activities for early finish.

3.1. Project case Study

Pradhan MantriAwasYojana (Urban) The mission was sent on June 25, 2015 and expects everyone in the metropolitan areas to be accommodated at all times. 2022. Under the PMAY (U) rules, the size of an economically weak zone (EWS) house can be up to 30 m². Regardless of the area of coverage, States / UT have the ability to increase the size of the homes in question and department approval.

The two blocks, block A and block B of Pradhan MantriAwasYojna Madhya Pradesh in New Market, Bhopal were studied. The state government bears all the costs of purchasing, restoring and redeveloping the land. Government banks and private banks are in charge of financing the project.

The following sub work breakdown Structure (W.B.S) were taken.

WBS is a grouping of different elements of the project with concerned to specific project and it organizes or impinges to determine the overall intent of the project.

1. Survey and Site Investigation.
2. Substructure.
3. Super Structure.
4. Finishing Work



Fig 3.1 Hierarchal Structure of Construction Project Team

3.2. Project Details



Fig 3.2: Site Picture of Block A



Fig 3.3: Site Picture of Block B

Table 3.1 Project Details

Name of Work	Pradhan MantriAwasYogna Bhopal, New Market
Name of Agency	Nirvana Consultants & Engineers
Amount of Contract	441 Cr.
Date of Start	2017
Tentative Date of Competition	2023

3.3. Methods of Project Planning

3.3.1. Gantt chart:

The strategy was developed by Henry Gantt and Fredric Taylor and can be recognized as a logical business organization technique. The policy uses flat bars that indicate how long it takes to set up a provisioning service, and task names are grouped vertically into isolated sections.

Each pole is placed in front of each company and the graph shows the start date, the duration of the exhibition time and the end date of the races.

Advantages of positioning Gantt charts: - For the most part, Gantt charts are widely accepted and ubiquitous due to their simplicity and ease of layout and understanding. Convoluted assumptions or estimates are included. Anyone can get it. Gantt charts are primarily aimed at people who don't have a particular foundation. For example, some clients and senior managers may understand better how to manage a development project by looking at a bar chart rather than looking at a rational organizational diagram. The CPM (Basic Way Technique) approach and the development of revolutionary PCs, Gantt charts, have not died or become less important. When everything was the same, they evolved into alternative support work that made them more meaningful and better known.

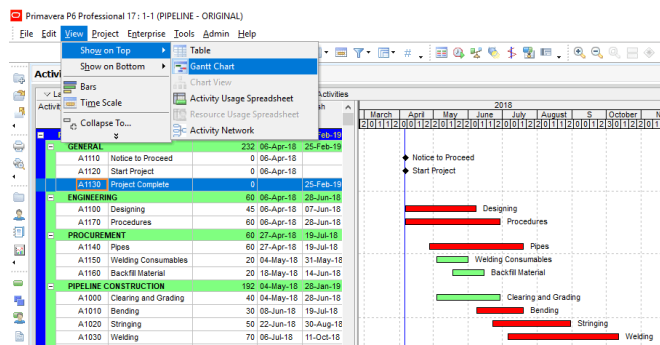


Fig 3.4 Gantt Chart

3.3.2. Network scheduling method:

One of the most important organizational planning strategies used in development is CPM (Basic Way Technician). This technique involves the use of a mathematical representation of the flowing outline which represents the priority between exercises. Central strategy (CPM) is a time-based process where the primary data sources are businesses, their duration, and relationships of trust. Movement terms are elements of resources that are required (and not accessible) to perform an action. The CPM plan accepts that resources are unlimited. The use of organizational methods and CPM by development organizations has reached a steady level since the energy blast of the mid-1960s. Software developers eliminate the need to create an organization. However, the organizational documentation provides a simple design of the revenue collected for the internship.

Points of interest of Network Scheduling Method:- When contrasting bar graphs and organizations, three preferences over bar diagrams.

- Network show logic, the relationships among the activities. Bar charts do not
- Networks can better represent large and complicated projects.
- Networks can estimate, or predict, the completion date of the project, or other dates, on the basis of mathematical calculations of the CPM

Limitation of Network Scheduling Method: -

Unlike bar charts, the network schedule is not scaled over time. Specialists should be prepared to understand CPM. The introduction of CPM is not as satisfying for people in the field as a bar chart. Also, item data cannot be stacked in the CPM. Some scheduling vendors have tried to take advantage of a time component of the bar chart and force it into the organization, what some people have called timed rational

drafts. On the other hand, there is evidence that temporary workers in highly redundant locations do not use networks because they believe that a high supply would reduce the chances of successful network planning and monitoring.

For example, organizational technology shows subtleties in companies of a redundant nature, for example, in the development of high structures. CPM-based practices have been widely condemned in writing for not showing sustained activity. The main problem is the size of the organization. In a monotonous company with n units, the organization set up for one unit must be renewed n times and linked to the others. The result is a colossal organization that is difficult to control. This can cause correspondence problems between people due to the evolution of the management team.

The problem below is that the CPM calculation is fundamentally designed to rationalize the risk margin rather than to manage the extraordinary needs of redundant assets. The CPM calculation lacks the ability to ensure a smooth parade of teams from unit to unit with no hassle and no downtime for workers and equipment. This creates employment and acquisition problems in the advancement of work and materials during development.

Another configuration was created for boring jobs, eg. B. for chipping floors in an overhead structural task or for work on areas of the underground pipeline or in the utility company. When pipelines or service lines emerged, the use of essential CPMs was relentless. The contribution to the management of an average area was twofold and monotonous. Furthermore, when the schedule reached the average surface, it was possible to anticipate a result by juggling essential numbers without using a personal computer. This recommended that there are other methods of presenting the result besides network distribution. This recognition has led to the development of some strategies to be used in direct and obscure activities. The Balance Line (LOB) policy uses a federated organization.

3.3.3. SCHEDULING:

In venture the board, a timetable is a posting of task achievements, exercises and expectations, for the most part with planned beginning and finish dates. A timetable is usually utilized in the undertaking arranging and venture portfolio the board portions of the task the executives. Components of timetable intently identify with work breakdown structure (WBS), exercises, schedule, and length.

3.3.4. RESOURCES:

Required assets are those gear and gadgets required for achieving a specific errand. No assignment or action is performed without HR, hardware, equipment's, materials and utilizing different assets. Undertakings required assets of a venture are characterized into three gatherings. One of the groupings by which assets are separated into these classes: inexhaustible assets, non-sustainable assets and assets with double imperatives. Alongside, semi sustainable assets were likewise proposed. Execution of each undertaking requires the assignment of required assets. If accessible assets are in levels that cause no postponement in the usage of those assignments which are to be cultivated in a concurrent way utilizing exceptional assets, at that point no change happens in venture timing. However, the circumstance isn't generally similar to this. Henceforth, the way and season of asset designation become significant.

Steps involves in Scheduling and Resources allocation to the station work.

1. Creating an ideal schedule

To create an ideal schedule for any project, first step is to collect data available for the project.

Subsequently the following steps can be followed in Primavera.

2. Enterprise Project Structure (EPS)

Create the structure of a company with its branches which is executing the project. This is known as Enterprise Project Structure

3. Organizational breakdown structure (OBS)

After the EPS, OBS is created which is hierarchy that reflects the persons responsible for the project in the enterprise.

4. Calendar

The work is carried out in 6 days per week. So the standard 6 day workweek calendar is made with necessary holidays in it. A break of one hour is given in the afternoon.

5. Create a new project

A project is a set of activates and associated information that constitutes a plan for creating a product or service. The project is created under the respective division in the EPS and assigned in the person charged form OBS to it. The project can be given planned start and must finish dates. The project is assigned a calendar which can be global, resource or project calendar.

6. Work breakdown structure (WBS)

WBS is a hierarchy of work that must be accomplished to complete the project. Each project has its own hierarchy with top level WBS element begin equal to that EPS nodes or project. Each WBS element may contain more detailed WBS levels, activities, or both.

7. Define activities

Activities are the fundamental work elements of a project and form and from the lowest level of a WBS and, are the smallest subdivision of a project. An activity has the following characteristics like Activity ID, name, start and finish dates, activity calendar, activity type, activity codes, constrains, expense, successor and predecessor relationships, resources, roles etc.

8. Relationship between activities

To form a network the activities should be connected to each other, which is done by assigning preceding and succeeding activities with significant relation to the activities.

- Finish to start (FS) relationship.
- Finish to finish (FF) relationship.
- Start to start (SS) relationship.
- Start to finish (SF) relationship.

9. Determining activity duration

When planning the work, the duration is entered in the original duration field. The actual duration can only be entered for the activities, which are completed.

10. Activity dates.

The following are the types of activity dates available in the primavera; actual start, actual finish, planned start, planned finish.

11. Activity cost.

The activity cost is the sum of all the cost incurred to complete the activity.

12. Creating baselines

A simple baseline plan is a complete copy of the original schedule which provides a target against which a project's performance is tracked.

13. Updating schedule

- If the project is progressing exactly as planned, then only needed to estimate progress.
- If the project is not progressing as planned many activities are starting out-of-sequence, actual resource use is exceeding planned use, and then update should be done for activities and resources individually.

Most projects contain some activities that progress as planned and some which do not. In this case, the best method is to combine the two updating methods.

14. Tracking

Taking window is used for monitoring a project's progress using different types of layouts such as labour costs, project cost, resource forecasting, resource allocation unit wise and cost wise.

15. Earned value

Earned value is a technique for measuring project performance according to both project cost and schedule. The technique compares the budgeted cost of the work to the actual cost.

16. Claim digger

The claim digger is a schedule analysis tool that enables a company to generate a report that compares selected data fields in a revised project and a corresponding baseline.

17. Project thresholds

Project thresholds consist of parameters assigned to WBS elements; they are used to monitor projects and generate issues

18. Project issues

Project issues are the problems within a schedule that must be addressed before the project can be completed. They can either be created by thresholds or manually.

IV. METHODOLOGY

4.1.1. Background

The Pradhan Mantri Awas Yojna (Urban) situated in Bhopal Madhya Pradesh is considered in this research. In this project, preparation of scheduling and planning of the two different blocks in the defined project destination are considered in Bhopal and comparing it with present scheduling which is working on the site.

4.1.2. Project Data Analysis

This undertaking was planned on 2016. Work week from Monday shall be utilized and units shall be arranged in days. The activities, ID and duration was entered. The aggregate number of exercises of the task is 41.

4.1.3. Project Planning and Scheduling

As soon as we create organization, the activity subtle elements are acquired in the bar graph. The equivalent is further visible in PERT view. The perspective demonstrates the action subtle elements which incorporates activity name, term, managing start and completion date and detailing information segment territory. After recording the initial activities with their start and end dates, one can monitor them throughout the project in the data portion of primavera screen.

Step 1: Selection of Ongoing task, for the undertaken project, considering running venture named "Pradhan Mantri Awas Yojna". Monitoring of the project is running by Nirvana Consultants & Engineers.

Step 2: Obtain point by point illustrations and rates which is fundamental for further analysis.

Step 3: With the assistance of task supervisor and site build set up the venture planning utilizing administration device Primavera P6 V 8.3.

Step 4: Detailed examination is done on asset task and levelling utilizing Primavera P6.

Step 5: Assigning Supervisor to every activity, to provide and update the running status of the work on day to day basis according to business sector rates.

Step 6: Preparing Gantt chart graph and system models.

Step 7: Prepare planning according to current side conditions.

Step 8: Comparing both planning and scheduling to counteract flaws.

4.2. Project Scheduling

For task Planning, separated the undertaking in various Work Breakdown Structure (WBS) to appoint labor and length of every activity. The work breakdown structure is depicted beneath:

Survey and Preconstruction work which contains every one of the activities and questions be assembled or taken to the site territory. Like temporary structures namely site office, testing laboratory, Store room, Inventory Room and others are to be provided to begin working at the site. Such exercises are important to begin another task to oversee the working on site easily.

Step 1- To create enterprise project of a company to execute company profile.

In this step, creation of the company profile with division in which company operates was prepared. These divisions were further subdivided into streams such as Structure Urban and Structure Rural.

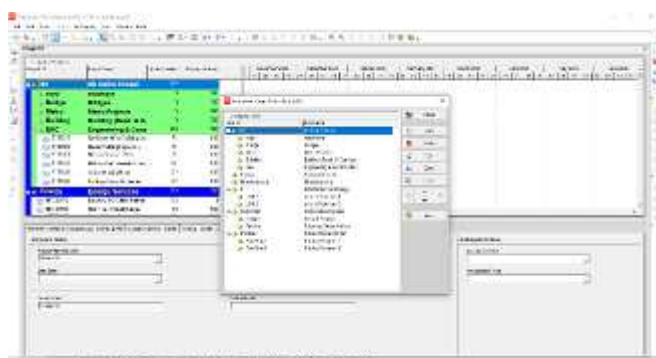


Fig 4.1 Project Structure

Step 2- Assigning roles and organization structure constituting of company management and responsible managers profile.

The job roles are assigned one the expertise of the employee and the task are assigned as per their qualifications and their experience in the similar tasks as efficient resources are responsible for completion of any project in right intervals and are important for development ventures.

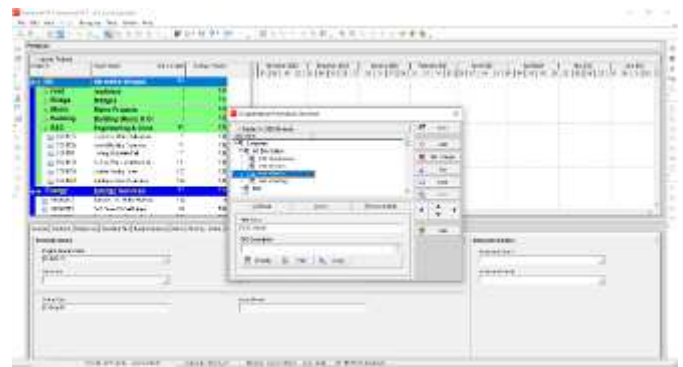


Fig 4.2 Assigning Job Roles

Step 3- Creating working calendar as per working hours and shifts to be assigned in project:

Before the start of project, the activity list is entered and the calendar are characterized and utilized to display the working time for every action in the task. Calendars are additionally used to characterize the working and occurrence design over the length of the task. These are three unique kinds of schedules namely Global, Venture and customized. The working shift is considered as 8 hours and six days working. The point to point working hours are from 08:00 AM to 05:00 PM. Meal break is of an hour from 12:00 PM to 01:00 PM.

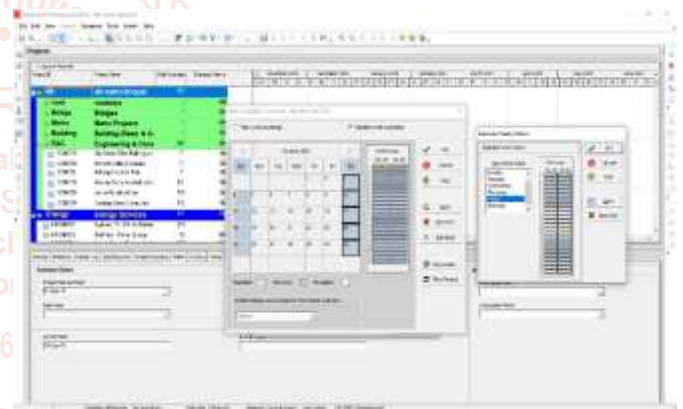


Fig: 4.3 Global Calendar

Step 4- Preparing Work Breakdown Structure

A WBS is the progression of work used to achieve the project to finish a task. WBS is organized in levels work point by point starting with final task and latter formation of different forms into identifiable work components. WBS is based on the individual sub venture and the undertaken WBS is figured beneath:

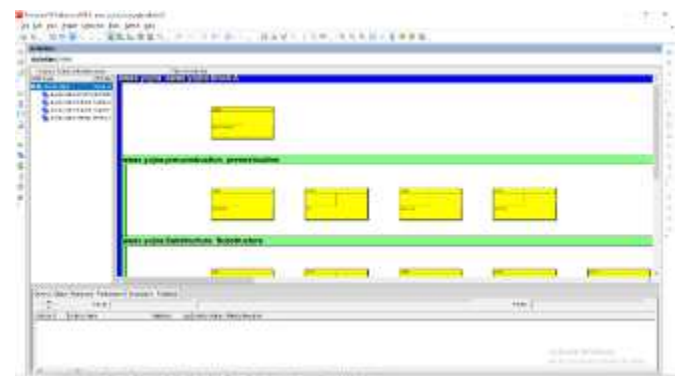


Fig 4.4 WBS Structure

Step 5- Assigning activities of each WBS as per scheduling data with links in between activities using Gantt chart.

Critical advance in the undertaking arranging is to distinguish the activities to finish the task and furthermore anticipate or value the number of days required in completion of the project. The term of exercises is evaluated based on meetings, research, estimation and strategies of costing. These lengths are relegated in every activity. As the undertaking is of tedious kind, in order to identify the approach connected by utilizing CPM as PP apparatus.

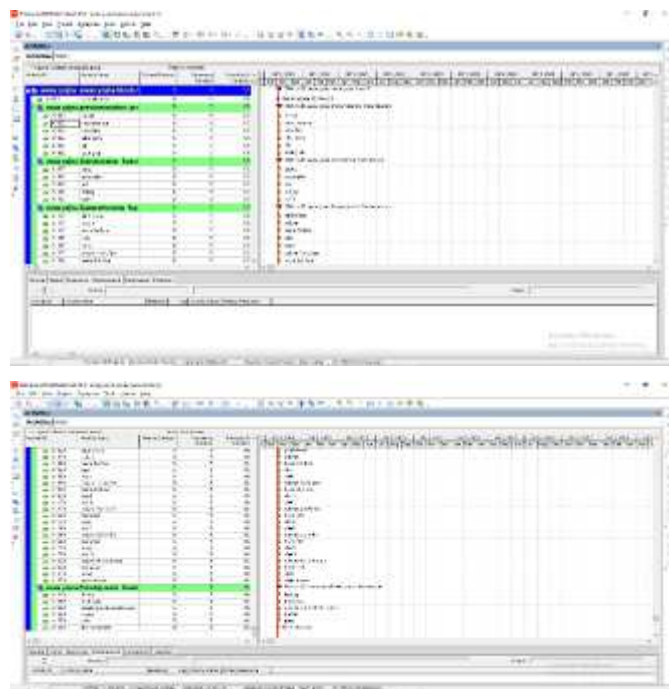


Fig 4.5 Activity Details for Block A

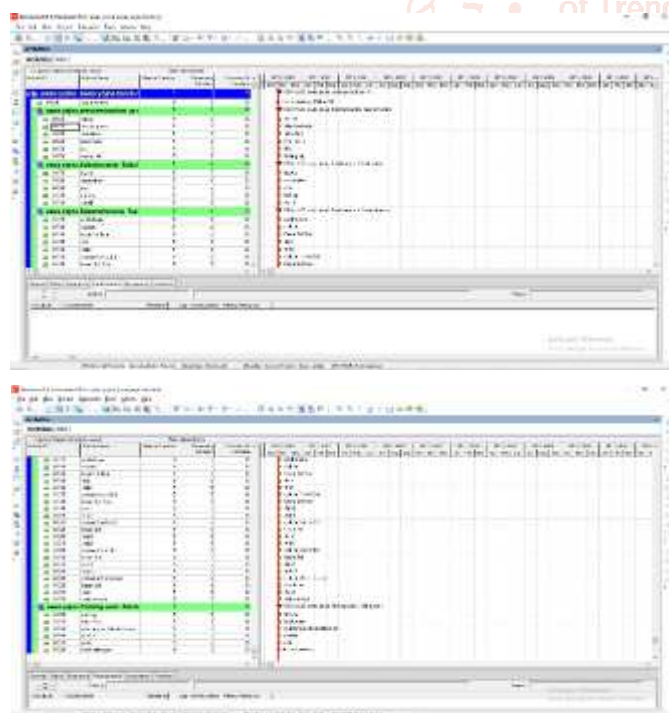


Fig 4.6 Activity Details for Block B

Step 6- Creating Resources (Manpower, Machinery and Material) The assets are prepared using big business asset, where an option is received get the choice of including new assets. Cost of assets relies on its unit as cost of work is on daily wages, material relies on their weight and machinery relies on its working hours along with its maintainance.

Resource ID	Resource Name	Resource Type	Unit of Measure	Primary Role	Default Units / Time
R-1	concrete	Material	cubic meter		0.1
R-2	job	Material			0.1
R-3	iron	Material	Tons		0.1
R-4	Welding	Labour			0.1
R-5	Field Eng	Labour		Engineer	0.1
R-6	AAC BLOCK	Material	Each		0.1
R-7	labour	Labour			0.1

Fig 4.7 Resource Analysis

Step 7- Assigning Resources in each activity as per IS. 7272

IS 7272 provide inexact necessity of labour according to the assigned activity. It provides consistent to working labour according to sort of work, this code depends on the prerequisite of work for exercises relying on the jobs required for usage.

Step 8- Comparison of scheduling proposed as per site scheduling using Primavera P6.

Primavera provides another instrument to correlation of standard versus current advancement of the task knows as Project Scheduling. It furnish with legitimate booking and checking of every last exercises managing and investigating different parameters.

4.3. Project Tracking, Monitoring and Controlling

4.3.1. Creating Target Projects

Our baseline is an entire duplicate venture plan that can be utilised to contrast with the present calendar to access advance. And before refreshing the calendar out of the blue dependable benchmark, the baseline is place as a benchmark for considering the deadlines, assets and expenses to those for the present calendar.

4.3.2. Updating the Current Projects

Prerecorded in advancement of information is recorded whenever project management to record advances on the present information date. It reconsiders a timetable dependent on the appropriate Date difference and different changes are simply recorded. There are a very few different ways to replace the timetable which includes exercises and assets which can be refreshed separately and can likewise be utilized. This will enable to conjecture the impact of unexpected conditions so as to create the most suitable restoratives milestone.

4.3.3. Tracking of the Project

Undertaking administration following the manner in which effective task general managers managing director and other ventures are considered. This is likewise where they provide details regarding how the real outcomes contrast with the first arrangement. Task administration following a certificate not in mechanical information dump where one can simply recount information. The task administration following procedure frequently decides your validity as a venture director. One should stay ready with planned remedial activities intended to settle the fluctuations to the task arrangement and calendar. Introducing those alternators will console the officials and investors responsible for the venture.

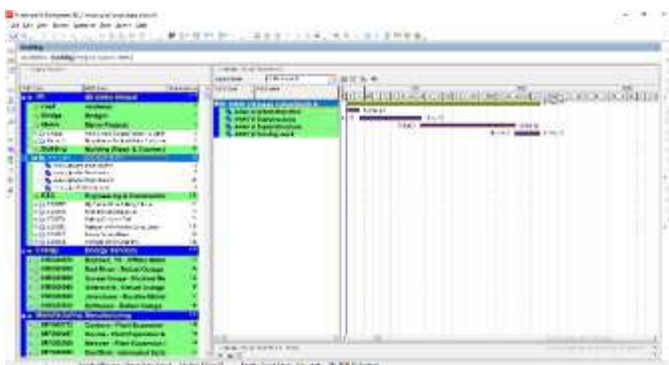


Fig 4.8 Tracking of Project

4.3.4. Project Planning

Arrangements can be characterised as illustration of strategy or planning of activity continued making out creating before the beginning of project. This is the procedure to consider various options and techniques which can readily be used to accomplish the task. Arrangement makes a deliberate succession of occasions, characters characterize the standards to be followed in conveying forward the arrangements and portray a definitive manner of the outcome. It serves the supervisor by indicating out the things which needs to be done, the schedule to be followed and to the extent which activity needs to be undertaken and assign the appropriate supervisor.

The objective of the arrangement is to limit asset consumption while acceptably finishing a given task. Arrangement task for creating a proficient utilization of gear, material and work and guaranteeing facilitated exertion. Successful venture administration requires persistent checking of assignment achievement advances. An experiment of analytical advancement to planned tasks enables the director to recognize issues early and licenses improvement of changed plans to carry the best possible course towards the target. In this manner, development of arrangements is done in the initial step of the venture administration.

4.4. Types of Plans

4.4.1. Time Plan

The time is quintessence of all the development task, and contracts frequently have provisions delineating honors for completion of any task as per the time table date. In the event that development of a venture is to continue effectively on the pre-defined rates, it is important to know precisely in advance the sorts and amount of different assets that will be required and on the correct dates on which they shall be required. An examination of the data received from the basic way study empower the task organizer to know ahead of time what assets shall be required and furthermore the correct dates on which the activities shall be discharged to be used in the venture. Such arrangements permits the appropriate utilization of all the available resources being equal and the fulfillment of the undertaking in the endorsed foreordain way.

4.4.2. Manpower Plan:

Manpower arranging is a significant part of any association, yet it is especially troublesome in an action which is liable to the same number of factors as thruway development. A cycle utilized in one District of the Washington State Department of Transportation is illustrated. It incorporates a few choices utilized by the District to level occasional varieties in labour. An overall technique to decide the correct degree of lasting

representatives to fit a few situations of conceivable financing, plan delays, and so on, is recommended.

4.4.3. Material Plan:

Effectively planning for materials that will be used on a construction site can tend to pose challenges at times. Compressed or changing schedules, lead time variation and availability of materials, poor communication, and even the weather can create disorder getting needed materials to a job site when required. However, when a well thought out plan is put into place before the job starts, dealing with these challenges becomes much easier to coordinate. When beginning material planning, one must first understand what the desired end state looks like and when one need to have the job completed, then one can effectively plan for when materials will need to be delivered. Then by working with vendors, to ensure that lead times can be considered, those items not kept in stock at local distributors or manufacturer facilities, can be accounted for. An effective plan should identify *what* material is needed, *when* it is needed, and *where* it should be delivered.

4.4.4. Construction Equipment Planning:

Equipment plays an important role in today's infrastructure projects as they are more demanding and highway projects are need to be completed in stipulated time with best quality. Proper selection and planning of equipment is very important for timely completion of project, within plant cost and for increasing profit, margin. Selection and planning needs to exercise very seriously as it is one of the factors that affect the progress of work. Planning of equipment depends upon nature and quality of work and time available for completion. Planning of equipment needs to be done by a well experienced person, who has got good exposure of execution of work and who knows the factors that affect the output of equipment. Selection is a process in which the equipment that is most suitable for a particular job is found out. And decision is made regarding the make of the equipment to be procured.

4.4.5. Finance Plan:

Financial Planning is the way toward assessing the capital required and deciding its opposition. It is the way toward outlining budgetary arrangements about acquisition, speculation and organization of assets of a venture. Money related arranging intends to set up a monetary arrangement. A money related arrangement is likewise called a capital arrangement. A budgetary arrangement is a gauge of the all-out capital necessities of the organization. It chooses the most affordable wellsprings of account. It additionally discloses to us how to utilize this money beneficially. A money related arrangement gives a complete image of things to come budgetary exercises of the organization. A cost arrangement decides the monetary possibility of activity. This is finished by setting the lifecycle financial plans and cost controls to deal with the conveyance and nature of the activity's results over a set time span. In the development business, a cost arrangement is utilized as a method of controlling the assessed costs during the plan and development periods of a venture. That implies that cost plans are living ancient rarities, much the same as a task the board plans. They should be overseen all through the lifecycle of any activity in any industry. The craftsmanship, or beside the science, of where cost assessment moves into cost arranging, depends on sound business standards. It requires the correct demonstrating instruments and a decent portion of involvement.



Fig 4.9 Financial Planning

Table 4.1 Project Classification

S. no	Project Classification Basis	Classification Breakdown
1	Nature of the Construction Facility	Residential Construction, Commercial Construction, Industrial Construction, Heavy/ Highway Construction
2	Nature of Work	Repetitive work or Non Repetitive Work
3	Mode of Execution	Department or Contractual
4	Name of Construction Contract	Cost plus, Item rate, Lump-sum, BOT
5	Completion Time	Long Duration Program (over 5 years), Medium Duration Project (3.5 years), Normal Duration Project (1-3 years), Special Short-term Projects (less than 1 year)
6	Budgeted Cost	Mega value Program (over Rs. 1000 crores), Large Value Project (Rs. 100 crores to Rs. 1000 Crores), Medium Value Project (Rs. 20 crores to Rs. 100 crores), Small Value Projects (less than 20 crores)
7	Maturity Level	Highly aimed project, Moderately Project, Low mature Project and Poor Maturity Project
8	Need based Project	Public needs project, Corporate needs project, commercial projects and re-engineered projects

Broadly dependent upon nature of construction facility, the major construction projects are grouped into residential construction, commercial construction and industrial construction.

4.5. Project Maturity Level:

The areas of project management confirm that the assurance of high level of project management maturity conditions the achievement of project's success. The higher level of maturity means the greater degree of capability to manage a construction project. Contingent on development level, the

activities can be comprehensively arranged into the accompanying four classification:

- Highly developed activities these have obviously characterized prerequisites and the settled achievements strategies and procedures, which can be characterized subjectively and quantitatively as far as outline, particular, BOQ and arranged advancement.
- Moderately developed tasks have obviously characterized prerequisites however conveyance process isn't clear.
- Low development ventures have clear necessities yet conveyance process is obscure.
- Poor development ventures these have badly characterized items and hazy conveyance process.

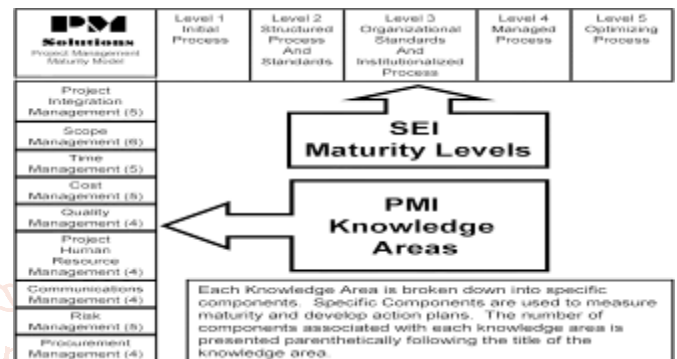


Fig 4.10 Project maturity Level

4.5.1. Construction Project Development Phases

The project management planning investment starts with plausibility examination and it is trailed by choice of proceedings. It is accomplished with prudential units prepared to play from its composed capacity. The period begins and fulfillment of the office is called Construction Project Development Cycle.

A conventional development venture advancement cycle can be partitioned into the most part consecutive stages controlled on baselines of the task. These stages are planning examination, arrangement and obtainment, usage and execution, and further authorizing the task. Four consecutive stages are proposed from the planning examination to its fulfillment stage as presented in the figure below:



Fig 4.11 Sequence of Development Phase

4.6. Constructional Resources:

The various resources being used in the construction project can be enumerated as:

4.6.1. Manpower:

Workers as specialized and administrative faculty and work constrain in different exchanges is basic to do extend exercises. Specialized and administrative work force are basic for effective utilization of Human resources and to accomplish venture fruition inside assessed time and

executing plan. Specialized work force incorporate designers, planners, project surveyors, directions, professionals and many more. The work forces comprise of

competent members. Report of working gathering on development for India's Eleventh Plan:- is stated in table below

Table 4.2 Manpower accessed in Construction Sector

S. no	Category	1995	% Total	2005	% Total	Growth % in 10 years
		No.		No.		
1	Engineers	687,000	4.7	822,000	2.65	20
2	Technician & Foreman	359,000	2.46	573,000	1.85	60
3	Secretarial	646,000	4.42	738,000	2.38	14
4	Skilled Workers	2,241,000	15.34	3,267,000	10.54	46
5	Unskilled Workers	10,670,000	73.08	25,600,000	82.58	140
	Total	14,603,000	100	31,000	100	100

Table 4.3 Indirect Cost:

S. no	Category	Pay Scale per Month (Rupees)
1	Project G.M	2,35,000
2	D.G.M	1.85,000
3	Senior Project Engineer	65,000
4	Quality Engineer	50,000
5	Billing Engineer	50,000
6	Trainee Enginner	12,000
7	Computer Operator	10,000
8	Peon	7,000

* Reference values of Pay Scale considered using IDC pay scale.

4.6.2. Materials

Materials, for example, block, stone, timber, bond, sand, aggregates, steel, lime stone, paint, water supply and petroleum ointment and so forth are named as material assets which are required for developments of undertaken projects. Material calendar demonstrating the amount, quality and appropriate time and date of its conveyance is presented on the obligations of architect for supply of different materials at the fitting time of development period.

4.6.3. Machinery:

There are different sorts of Plants/ gears and apparatus are required at various purpose pf time amid execution time of development project. It relies on sort and nature of development work, requirement of hardware on site may incorporate bunching plant, blender, vibrator, trucks, tractors, excavators, cranes, pumps, generator etc. Based on monitory examination, a development design/ contractual worker is arranged in different sites as per the project requirements.

4.6.4. Finances:

Cash or reserve is the absolute most critical asset since every single asset are specifically subjected to accessibility of cash. So the money related cases are arranged and organized with extraordinary consideration for smooth execution of the project. Finance related arranging basic for smooth stream and to maintain a strategic distance from any deferral in the exercise of task.

4.6.5. Time:

Time is considered as one of the most important aspect of any construction project, since every construction project is bounded with time limit provided for project management as per defined by authorities as per their past experience. Therefore, the primary motive of project management is to complete the project within time limit to avoid extra penalties or losses.

4.6.6. Necessity of Project Management

Numerous researches have cleared that no venture cannot perform individually. Their insight and aptitudes are investigated and analyzed in order to fit the ideal individual in the perfect place. The venture administration means to guide Human resources with a view to achieve well set destinations of the pre-arranged activity. To be effective, one should know how to gauge the expense of development extents precisely, foresee the calendar of work, control the advancement of work, uses amid development and finish venture securely on time.

V. RESULTS

5.1. Project Duration till Date

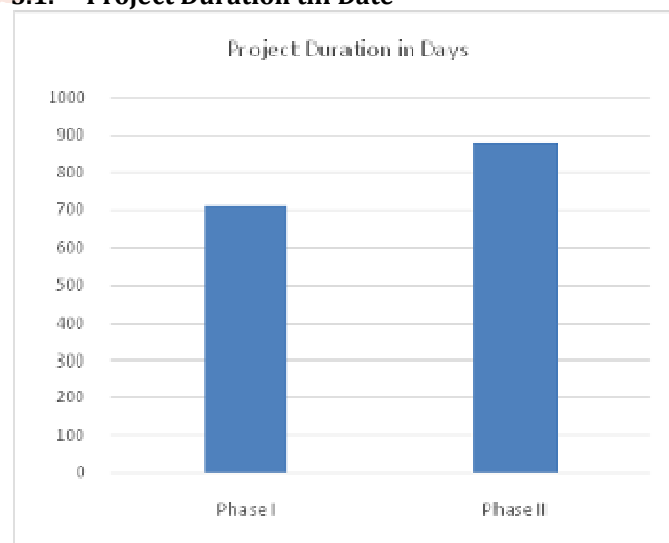


Fig 5.1 Comparison of Project Duration in Phase I and Phase II

Discussion: As observed from the project duration Phase II is running slow due to lack of availability of resources.

5.2. Gantt Chart using Primavera P6

5.2.1. PMAY Block A

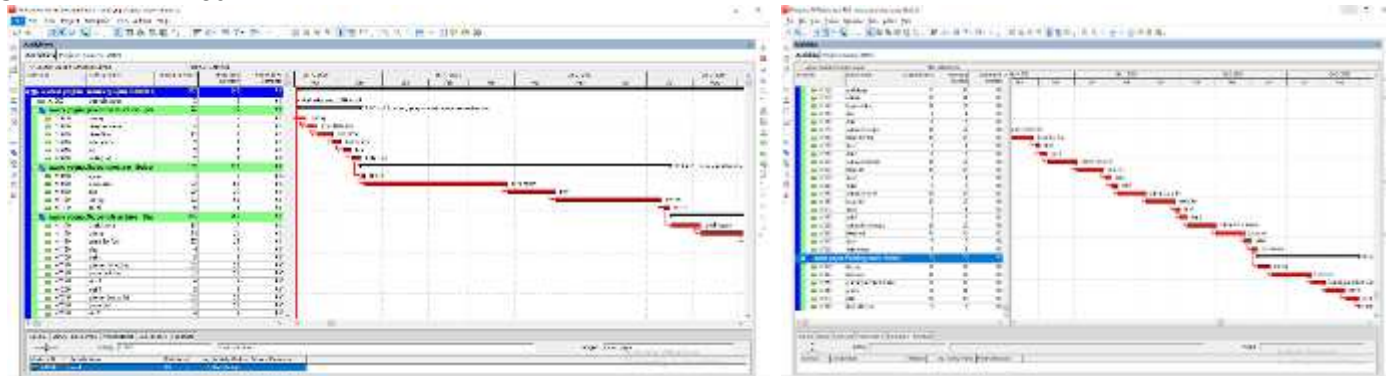


Fig 5.2 Gantt Chart of PMAY Block A

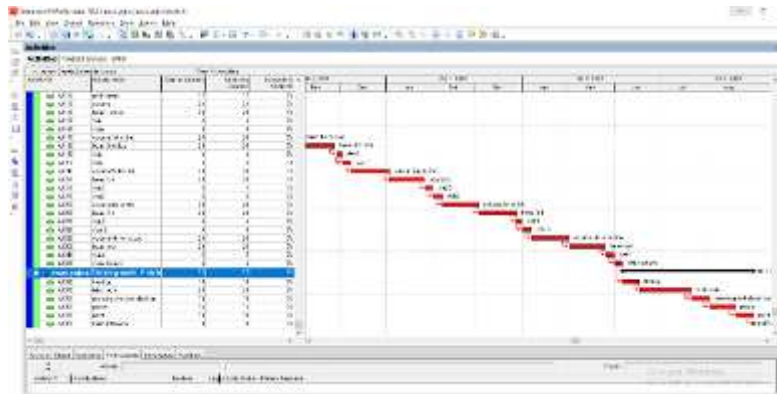


Fig 5.3 Gantt Chart on PMAY Block B

Discussion:

The Gantt chart presented the appropriate dates which define the differences in implementation of resources starting from the stage first of site investigation which includes survey till the stage finishing work.

Table 5.2 Schedule of PMAY Block A and Block B

Activity		Block A		Block B	
		Start Date		End Date	
Survey Site investigation	Soil Testing	29-Oct-20	29-Oct-20	6-Feb-21	5-Jan-21
	Boring of Strata	23-Nov-20	5-Nov-20	21-Nov-20	30-Nov-20
	Site Office	15-Jan-21	29-Dec-20	15-Jan-22	5-Jan-21
	Machinery Setup	23-Jan-21	29-Dec-20	22-Jan-22	5-Jan-21
	Labour & Material Setup	30-Jan-21	29-Dec-20	30-Jan-22	5-Jan-21
Substructure	Excavation	6-Feb-21	5-Jan-21	22-May-22	24-Aug-21
	PCC	22-May-21	31-Mar-21	16-Jun-22	29-Apr-21
	Foundation	16-Jun-21	23-Apr-21	27-Aug-22	22-Jul-21
	Abutment	27-Aug-21	22-Jul-21	6-Oct-22	3-Sep-21
Superstructure	Pier	6-Oct-21	4-Sep-21	24-Jan-22	29-Dec-21
	Slab	24-Jan-22	16-Dec-21	16-Feb-22	12-Jan-22
	Girder	17-Feb-22	12-Jan-22	8-Mar-22	3-Feb-22
	Beam Roof	8-Mar-22	28-Jan-22	14-Jun-22	5-May-22
	Staircase	14-Jun-22	5-May-22	25-Aug-22	18-Jul-22

VI. CONCLUSION

6.1. Managing Project:

The research presented to develop scheduling and planning using Primavera P6 V8.3 for Pradhan Mantri Awas Yojana Project and prepare construction sequence and comparative analysis in between two blocks and identification of reasons in delay. Conducting Financial Risk analysis using Primavera P6. Financial Risk analysis using Gantt chart in Primavera P6 and assign proper sequence and links between different activities for early finish.

The observation stated the drawbacks which ultimately becomes the reasons for delay of the project and compared the scheduled of the two blocks of PMAY Urban.

In this study, minimization of delay was done by allocating resources as per demand of activity based on availability of resources and uncertainties like lockdown due to COVID 19. The study elaborated work breakdown structure to activity level to provide proper lagging of project management as per scheduling.

Here results concluded that using project management tool Primavera P6 assigning and monitoring each activity as per running conditions the project may be completed in time and cost may be saved. Besides, further water logging was analyzed in excavation activity due to environment (rain water) which was resolved to save 5 days.

Observations stated that the process of preconstruction was managed equally by linking all such activities namely preparing site office, Labour room, and laboratory setup. By linking the activities, the time lapse reduces simultaneously.

Overall it is observed in the running project that management of all the activities and observations on their previous and next activity is necessary to run activities simultaneously, so as to optimize the time and cost.

6.2. Future Scope

This contemplates goes for labour and assets arranging and planning of venture. One can build up an arrangement and timetable for plant and machinery with their expenses or for finish development asset of task. In this examination Comparison of two blocks of PMAY Project are considered. To promote extent of the research, planner and schedule of earthwork gradation for development and basic manner is acquired and analysis be utilized using Primavera P6 and such analysis can be further conducted using different management program.

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