EPS, OBS, Project Activities for Pune Metro Phase-1 in Primavera P6

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Abstract – Primavera is crucial tool for major construction projects where scheduling is required. This paper lists the activities of Pune metro rail bridge work for a 10km stretch of bridge work and highlights the enterprise project structure, organizational breakdown structure, the work breakdown structure and its activities and thus highlight the impact of Primavera P6 in the planning of projects of greater magnitude.

Keywords-EPS, OBS, Metro Rail; Primavera; Scheduling;

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1. INTRODUCTION

As we all know, the development and improvements in mass rapid transit systems is very important in this era of global urbanization, the Pune metro's move to kick of the project was much needed. Large scale projects require a huge amount of understanding and planning to be done for achieving timely goals and thus a proper break down structure of work is important. My paper tries to sum up the relevant information regarding EPS of Metro rail in India and stick to the Pune metro line work for understanding scheduling of project. This paper also shows the organizational structure of the Pune metro cell and the methodology of scheduling using oracle's Primavera P6.

It is a learning step towards preparing a report of the project and the scheduling in Primavera. In Scheduling, the EPS is the hierarchical structure of the projects in the organization. It can be classified and sorted into many levels as required to represent the works in an organization. The project represents lowest node of hierarchy.

2. REVIEW OF LITERATURE

A few journals and review papers published which are related to this study helped me to explore ideas about the topic and how to use the Primavera P6 software in efficient way.Many journals and papers are published depicting the use of primavera in assorted industries but here in this study, I have considered a few papers which are relevant and which are based on the use of Primavera in Construction Projects.

Vishal Annappa Nimbal (2017): explains the importance of Primavera P6 software in the construction industry and applies it to planning and scheduling of a multistoried structure, he finds out the estimated completion time for the project and plans it along with resource allocation and helps us to understand the concept of primavera in a precise manner giving an example of works done in primavera P6. He concludes that the main goal of his study was to know the role of planning, scheduling, monitoring of the project with timely accomplishment of any construction project. His project was fulfilled with the help of literature references and unique methodologies in control and monitoring usin Primavera project management application.

T. Siva Nagaraju (2016): The goal of this work was to understand the importance of scheduling and proper use of resources for completion of a construction project within the timeframe. Now a days Metro Rail plays vital role in India. Construction industry is an integral component of a nation's infrastructure and industrial growth. Construction industry is the second largest industry in India and still, it's growth has been differential across the nation. This paper explains that there is a major difference of development in the urban and rural areas that there is a need for an effective project management. Construction industry faces many issues like overruns of time and cost reason being

the inadequate project planning, poor planning in implementation and improper management during execution. The average cost of the projects goes up by 30 percent of the estimated cost due to lack of planning and scheduling. Observations show that skillful management is the key for a project to complete within an allotted time frame in an estimated budget and with the allocated resources. Providing good planning, a proper organization and a sufficient flow of resources to projects can automatically achieve the desired result. Primavera is specially designed to manage all small or large projects. With sufficient functions to help the user plan for the time, cost and other resources and then later monitor them. It is used for handling large and complex projects, precisely in construction sector.

S. M. Subhash (2013): explains a case study on Metro Transport of Madurai and describes the pollution, changes in the land use patterns and its effect on the urban ecosystems. It elaborates the need of transport and emphasizes on the need of appropriate mix of alternate modes of transport systems so as to ease the traffic flow and reduce pollution. The target of this report was to implement a modern transport system of metro rail facility to the Madurai city. The paper is a description about benefits of a metro network and it recommends a MRT system in a fast growing city. Cost-benefit analysis for this project for was performed in this paper. The planning was done in Primavera and is suitable for commissioning of the work planned for 2021. The financial IRR was estimated in the paper.

Akshay M. Ramteke (2015): Implementation of modern transport system like Metro Rail facility to Nagpur city was the main concern of this research work, the objectives of the research was alignment of metro rail and its terminal study.

As cities grow in size, the number of vehicular trips on road system goes up. This necessitates a policy change to discourage private vehicles for conveyance and encourage public transport when the level of traffic along a travel corridor in one direction overcomes the 8000 persons per hour mark, the rail based (MRTS) Mass Rapid Transit System is called for. These systems are capital intensive. It is noticed that in developed countries, the planning for mass transit system begins when city population exceeds 1 million; the system is efficient until the city population reaches a 2 to 3 million mark.

3. PROBLEM STATEMENT AND METHODOLOGY

a. Problem Statement

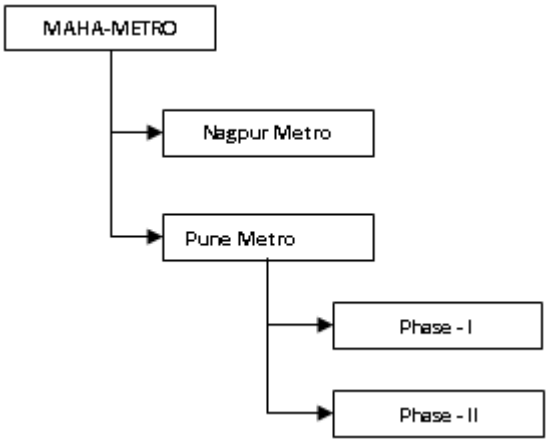
The Metro Rail is a complex network of more than 300 piers for one line depending upon the length in kilometers of the route. Thus it is very necessary to be prepared before-hand knowing about the approach we are going to take for the betterment of works. It is a challenging task to be completed on time depending upon the vast areas of utilities and delay elements on site starting from the cleaning of site till the completion of site many obstacles can be met. Therefore it is easier to manage if we prepare for the projected difficulties well in advance. Moreover for the planning of this project we have to prepare a work breakdown structure and do the works in small parts, sequence them in order of achievement and represent hierarchically.

b. Methodology

Knowing the EPS, the OBS and the WBS related to Pune Metro. Work on primavera for PMC to Range hills portion of approximate 10.8 km bridge work up to Substructure in Primavera P6. Along with the activities related with it.

b.1. Enterprise Project Structure:

The enterprise project structure (EPS) represents hierarchical structure of all projects. EPS can be divided into many levels or nodes to represent work at any organization. Projects always represent the lowest level of the hierarchy. Every project is included in an EPS node. The MAHA-METRO is the Governing body of Metro Rails in the region consisting of the Nagpur Metro and the Pune Metro Rail. Again, in Pune Metro rail network there are stages of work i.e. the phase-I of work and Phase-II of work. This project comes under Phase-I of work. Hence, this forms the Enterprise project structure of the MAHA-METRO body which can be represented as shown in the diagram below.

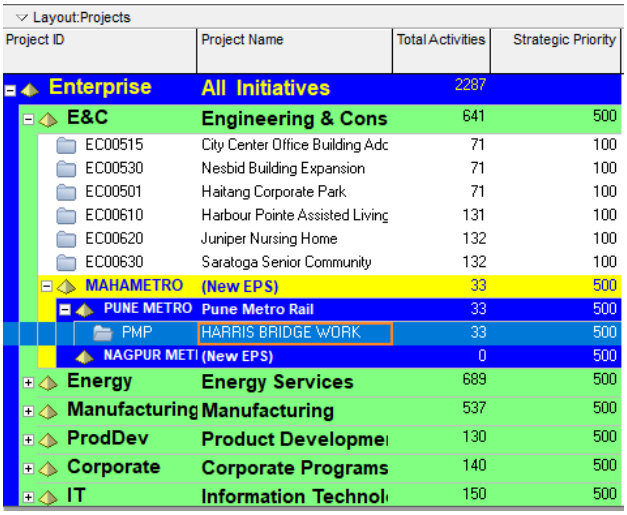


1. *Enterprise Project Structure (EPS)* - MAHA-METRO

The phases of metro alignment work is as shown in the table below which is the project under phase –I and II there are projects as shown below. The line-1,2,3,4 are the projects under the two phases of metro work.

Phase	Project	Terminal		Length
Phase-I	Line-1	Pimpri	Swargate	16.59
	Line-2	Vanaz	Ramwadi	14.665
Phase-II	line -3	Deccan Gymkhana	Bund Garden	11
	Line-4	ASI	Hinjewadi	18

2. *Corridors of Pune metro rail - MAHA-METRO*



3. *Enterprise Project Structure (EPS)- Primavera P6*

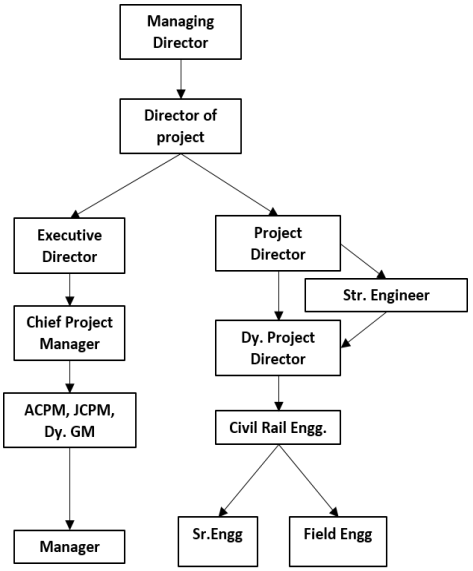
This enterprise project structure is represented in primavera in the engineering and construction department under which we enlist the proper EPS pattern of MAHA-METRO. The yellow ribbon shows the new Enterprise project structure whereas the blue ones shows the Pune metro and Nagpur metro and our end node which is the project titled 'Harris bridge work.'

b.2. Organizational Breakdown Structure

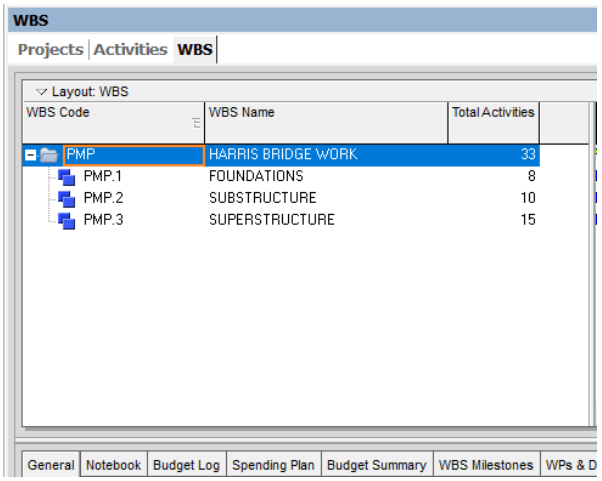
Organization Breakdown Structure or OBS is hierarchical model which describes the established organizational framework for time and expense tracking, resource management, project planning, and work management. The Organization Breakdown Structure groups similar activities of project or "work packages" and it relates them to the organization's structure. OBS is used to specify the responsibilities for management of project. The OBS provides an organizational perspective of the project. When project responsibilities are defined properly and work is assigned, the OBS and WBS are connected providing the possibility for powerful analytics to measure the work force and the project performance at a very high level as well as to the very details of project.

This project contract is given to NCC Constructions Pvt. Ltd. So here we will only deal with the Governments' Organizational Breakdown Structure for Pune Metro. The hierarchy of resources come under the organizational breakdown structure. The OBS when enquired about the Pune Metro site was as follows. To develop an Organization Breakdown Structure I have drawn the organization as a hierarchy and defined departments and project teams.

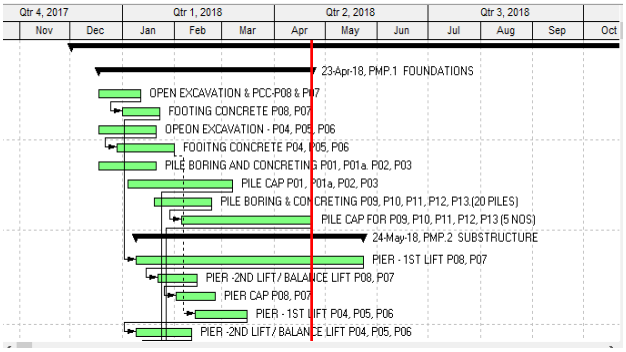
The following is an OBS in the Pune metro department of the PCMC. The Project is the least node in an Enterprise Project Structure and contains the WBS and the activities for the project up till the substructure level. The picture shows the Project of Pune Metro and its activities along with the work breakdown structure and with the general durations required to complete the activities.



4. *Organizational Breakdown Structure (OBS) - Pune Metro Project*



The work breakdown structure consist of nature of works over here, these are divided into the foundations, substructure and the super structure. The work for foundations is all done under one work breakdown where in the works will be done till foundation level only i.e. consisting of the excavation, PCC bed laying, the mesh for foundation and the concreting of the foundation. This included footings. Then the substructure work will be seen and after the completions of foundations the substructure work will start i.e. the substructure works are dependent upon the foundation works. These activities will start only after the foundation works are completed.



5. *Gantt Chart of activities -Primavera P6*

4. BACKGROUND

a. Primavera

Primavera is project management tool, efficient planning software which can be used to generate the planning of major projects, deciding the resources and properly sequencing and scheduling the activities of any project so that it is well planned and with optimum outcomes. Oracle Primavera P6 is very comprehensive and multi-project planning software based on Oracle or Microsoft SQL databases. Managing the project portfolios in an efficient way is possible in Primavera P6. Primavera contains three main windows which are the Input window, Gantt chart section, and a details window section.

Gantt chart can be prepared with inputs and every rod in the chart is placed and in front of every activity the chart shows the start and end dates of activities, project completion times along with the relationships and interdependencies of the activities and the finishing dates of the projects as well.

b. Network scheduling method

One of the network scheduling methods that can be used in the construction industry is (critical path method). This method is a duration driven technique in which inputs are the activities with intended start and finish dates.

In proper management of any project a proper plan and schedule, it is a listing of project milestones, activities and deliverables, usually the project planning and the project portfolio management are the parts of project management. The organizational breakdown structure and enterprise project structure along with proper workweek assigned calendar is set up and the schedule for working and nonworking hours can be set up first in the calendar. And the project is defined and the activities are listed in the project and the activities are connected to each other thus forming a successor and predecessor activity wise relation. By this, the project plan is being done in Oracle Primavera p6.

5. CONCLUSION

The route from the Pimpri chinchwad to the Range hill section was planned in Primavera in this paper which is based on tentative times of activities depending upon their working times required for each activity to finish. This is an estimated time required to complete the project not considering the other major causes of delay which can include political obstacles, non-cooperation of other departments on site utility obstacles etc. I tried to demonstrate the planning for a stretch of 10.8 km of metro rail bridge from the PCMC to range hills up to the substructure level activities. The various practices of getting formalities done for superstructure works have also being taken into account. This scheduling has future scope of updating and monitoring the scheduled work.

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