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Comparative analysis of construction of flyovers by Application of model generated from planning tools and management software

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Abstract - *Model will be prepared which can be used in planning, tracking, optimizing & managing flyover projects. Comparative statements of all the three (3) case studies showing delay, cost overrun, improper utilization of resources (Manpower, Material Machine), utilization, lack of application of planning tools etc. Microsoft Project is a software application sold by Microsoft that provides project management tools to manage projects. The program, which has many different versions, allows users to: Understand and control project schedules and finances. Communicate and present project information. Organize work and people to make sure that projects are completed on schedule.*

Keywords – *Planning, Schedule, EVA, Baseline, Predecessor, Successor, Cost overruns.*

I.   INTRODUCTION

Infrastructure sector is a key driver for the Indian economy. The sector is highly responsible for propelling India's overall development and enjoys intense focus from Government for initiating policies that would ensure time-bound creation of world class infrastructure in the country. Mr. Nitin Gadkari, Minister of Road Transport and Highways, and Shipping, has announced the government's target of Rs 25 trillion (US$ 376.53 billion) investment in infrastructure over a period of three years, which will include Rs 1trillion for developing flyover bridges.

India needs Rs 31 trillion (US$ 454.83 billion) to be spent on infrastructure development over the next five years, with 70 per cent of funds needed for Bridges, roads and urban infrastructure segments.

The Indian Infrastructure sector itself has an investment potential of US$ 250 billion in the next 4-5 years, providing immense opportunities in Road and Bridges. The Indian construction equipment industry is reviving after a gap of four years and is expected to grow to US$ 5 billion by FY2019-20 from current size of US$ 2.8 billion, according to a report released by the Indian Construction Equipment Manufacturers' Association (ICEMA). Foreign Direct Investment (FDI) received in construction development sector from April 2000 to March 2016 stood at US$ 24.19 billion, according to the Department of Industrial Policy and Promotion (DIPP).

II.   LITERATURE REVIEW

Literature review will be based on various research papers in areas of construction of flyovers, planning and tracking tools, & MS project etc. presented in national & international journals like JEM, ASCE and NICMAR; standard books & codes.Shanmuganathan N, Dr. G. Baskar (2010) coveys to Effective cost and time management play an important role to achieve the project success in the construction industry. Various cost and time management techniques which help to control cost and time overrun in the construction project. The most important software is used to control and monitoring process are Microsoft excel, Microsoft project and primavera.

Kuldip. B. Patel 1, Anand D. Sapariya2, Pradeep (2015) covered to its paper displays a study to create Technocrats associated with the Indian construction industry need to employ innovative technologies and skilled project handling strategies to overcome these challenges [Performance Measurement Baseline (PMB) & EVM-EAC Technique to Evaluate Contract Performance Report (CPR)]. The outstanding performance under demanding situations in the past CPR will stand in good stead and give confidence to the Indian construction industry to bring about an overall development in the infrastructure of the nation.

III. METHODOLOGY

Data will be collected from three different flyovers bridges like: RANIP ROB, Income Tax Flyover Bridge (ITFOB), Dinesh chamber flyover bridge (DCFOB). A model will be prepared using various Planning tools incorporation with MSP. Collected data will be analysis by applying this model.

In construction of bridge, schedule is very necessary to control and monitor the progress at every stage of bridge work to avoid cost and time overruns of the bridge project. This can be achieved by management software (MSP. Microsoft project (MSP) is used for planning and scheduling of the bridge project. Project management increases the productivity of the human resource and materials. Earn value management (EVM) is adapted for the project management application assessment techniques. This technology helps in comparing the actual cost and budgeted cost of the project. This study relates to scheduling and project monitoring process, also discuss along with the important parameters involved in calculation of EV analysis in the cost management of bridge projects. Microsoft project software is used in present study to plan and schedule the project activities and to carry out earn value management (EVM) analysis. These results are represented in the form of graphs to explain schedule performance index, cost performance index, cost variance, and schedule variance.

IV. DATA COLLECTION

In present study of, income tax flyover bridge (ITFOB), Dinesh chamber flyover bridge (DCFOB), Ranip Railway over bridge (ROB) is taken as a case study. Microsoft project (MSP) is used for planning and scheduling of the bridge project.

Case study -01 (ITFOB), Scheduling is the fitting of the final work plan to a time scale. It shows the duration and order of various construction activities. It deals with the aspect of 'when to do it. 'Technical details of bridges are: Total cost of bridge is Rs 65, 51, 75,642.99/-, Ranjit Buildcon Limited (RBL) is contractor, HCP is a PMC, CASAD is a Design Consultant. Following is the basic schedule of the project.

Table1. Basic Schedule of ITFOB
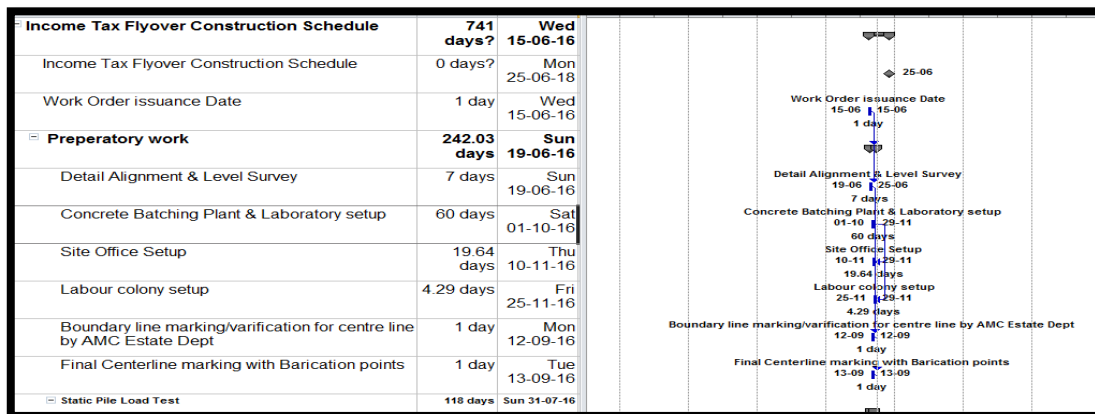
Case study -02 (DCFOB), the resources are first made and their cost per shift is specified, then these are allocated to the listed activities. The resource can be men, material, and money. Whenever the project is updated by reviewing the work on the site, a baseline has to be created to as to update the progress of the work up to the given date. 'Technical details of bridges are: Total cost of bridge is Rs 45, 21, 75,654. 99/-, Ajay Infracon is contractor, HCP is a PMC, AARVEE is a Design Consultant. Following is the basic schedule of DCFOB.

Case study -03 (RANIP ROB) Scheduling basically means determining the inter-relationship of various activity of project. The activities are first list out and then their duration is estimated on the basis of past experiences. Here 'Technical details of bridges are: Total cost of bridge is Rs 45, 21, 75,654. 99/-, Ajay Infracon is contractor, HCP is a PMC, AARVEE is a Design Consultant. Following is the Basic Schedule of Ranip ROB project.
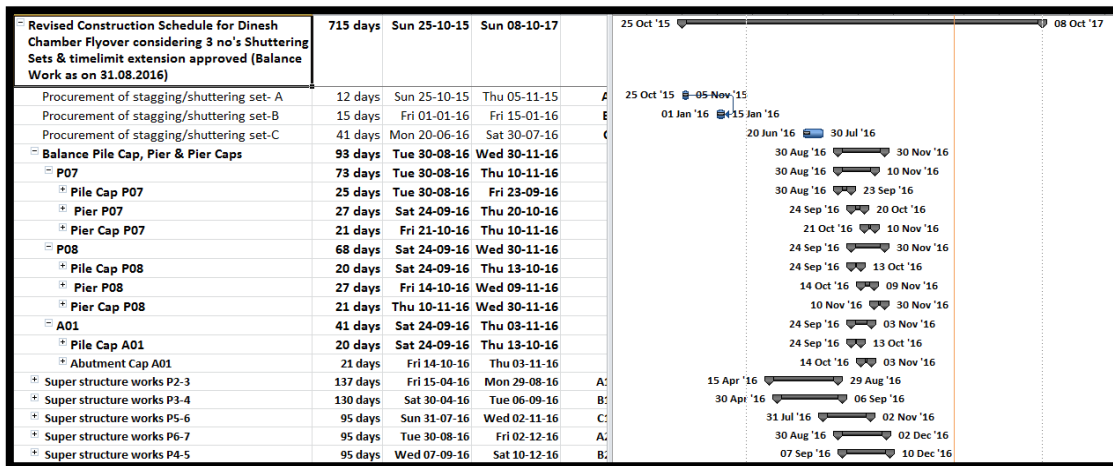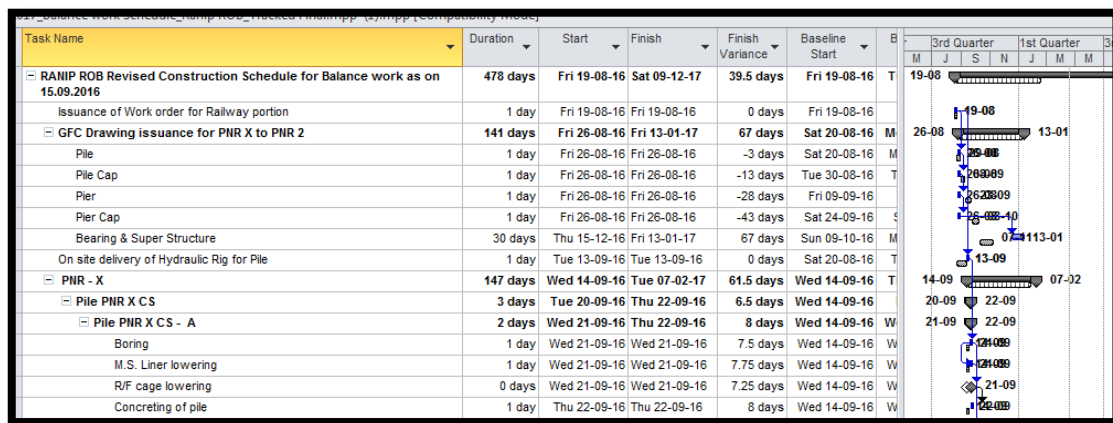
Table2. Basic Schedule of DCFOB

Table3. Basic Schedule of Ranip Railway Over Bridge (ROB)


V. DATA ANALYSIS

Three projects schedule of bridge construction considered for data analysis are: **i.** Ranip Railway over bridge (ROB) **ii.** Income tax flyover bridge (ITFOB) and **iii.** Dinesh chamber flyover bridge (DCFOB). In schedule, we generally add the project start time, project finish time, predecessor, successor and resources against all activities. Project cost, actual cost, EVA and different baseline can be prepared. Here project is tracked as on **28-02-2017**, based on that we prepared various types of S-curve Likes, Duration versus time S-curve, resource versus time S-curve, cost of the project versus time S-curve and also generated the projects Dashboard and quality report.

S-curves are an important project management tool. They allow the progress of a project to be tracked visually over time, and form a historical record of what has happened to date. Analyses of S-curves allow project managers to quickly identify project growth, slippage, and potential problems that could adversely impact the project if no remedial action is taken.

Case study-01 ITFOB

Cost VS Time S-curve- This type of analysis is suitable for projects that require both labor and non-labor intensive elements. The main concern here is the cumulative costs at a specific stage of the project and its effect on the cash flow as well as the potential risks of exceeding the allotted costs."
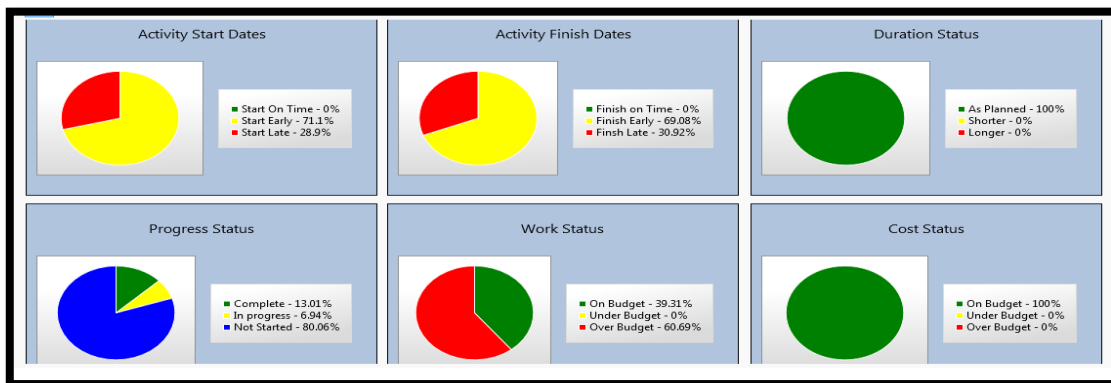
Table 4.Cost VS Time S-curve (ITFOB)
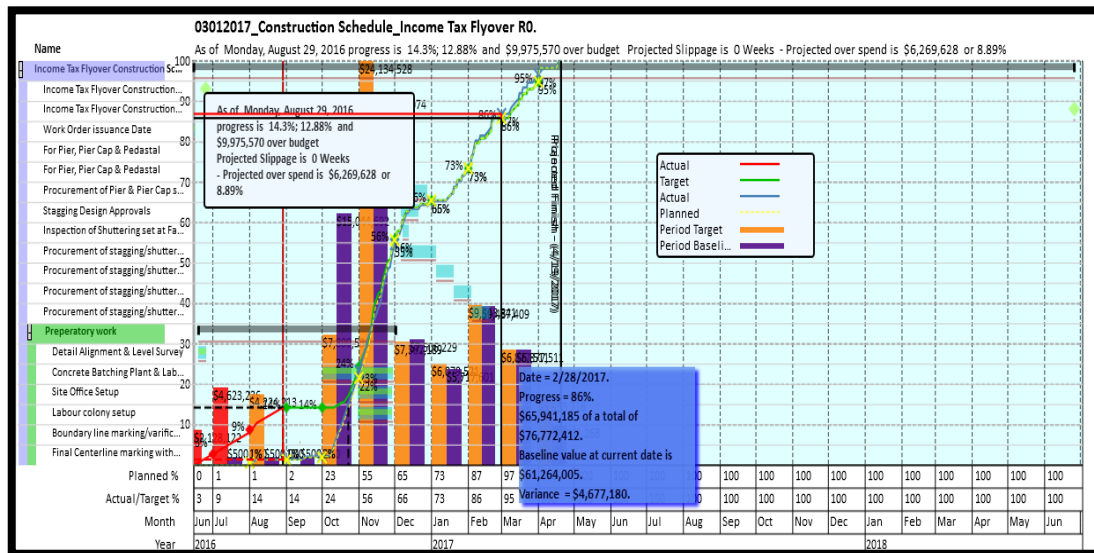
Dashboard: -

Digital dashboards allow managers to monitor the contribution of the various departments in their organization. To gauge exactly how well projects is performing overall, digital Dashboards allow you to capture and report specific data points from each department within the projects.
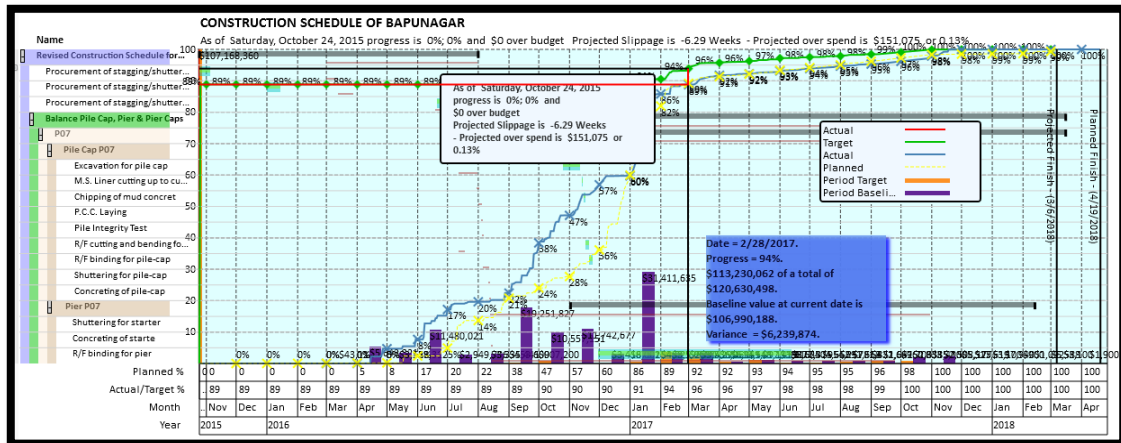
Table 5.Dashboard of ITFOB

Case study-02 DCFOB –

"This type of analysis is suitable for projects that require both labor and non-labor intensive elements. The main concern here is the cumulative costs at a specific stage of the project and its effect on the cash flow as well as the potential risks of exceeding the allotted costs."

Table 6.Cost VS Time S-curve (DCFOB)

Case Study-03 RANIP ROB –

Use the actual cumulative amount of expenditures incurred from baseline start date to cut-off date of progress stage and compare the S-curve created against the Baseline S curve for total cost allotment for the same cut-off date. As on 28-02-2017 total progress of the project is 43 % and cost variance as on tracking date is Rs 5,139,150,279.

Table 7.Cost VS Time S-curve (RANIP ROB)
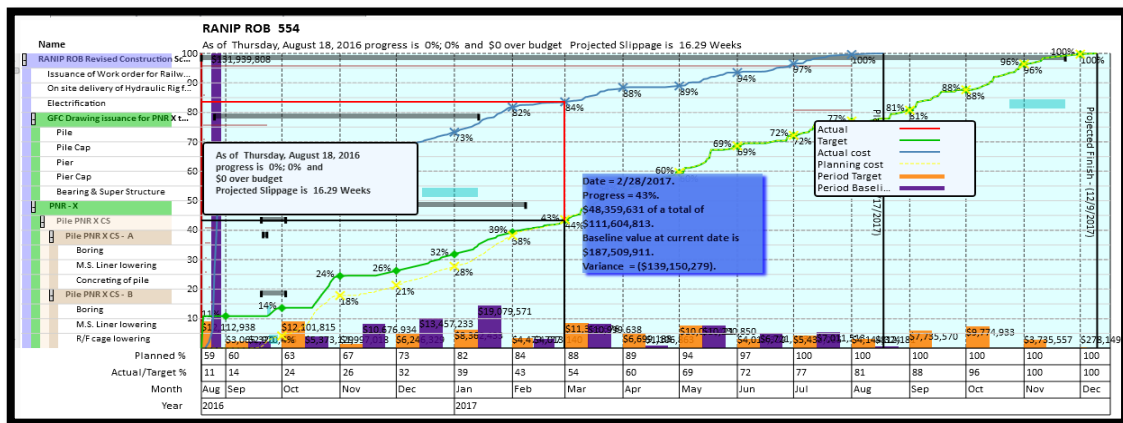
VI. CONCLUSION

The results revealed that the contractors and subcontractors plays vital role in completion of project as scheduled. Major of the reasons are related with the contractor's performance such as lack of manpower, site management, equipment management and lack of supervision during execution. The model described in this paper may serve a tool to predict the performance of the contractors in such markets. Application of the model in case study bridge construction to the case of the India is discussed and results obtained are presented. Global software tool Microsoft project help in bridge project industry to evaluate contract performance report for decision making.

Final results are come after comparing the three case studies in terms of its planning details, tracking cost to its completion of projects. We analysis the model for three different case studies; RANIP ROB, DCFOB and

ITFOB rating are 27, 34 and 39 respectively. Hence, Income tax flyover bridge has its schedule, planning, duration status (is it completion on time or not) and its cost status (is it on budget or not) are comparing very well for all three case studies.

Table 8.Overall Assessment of Model

SR.NO	ACTIVITY	RATING	RANIP ROB	DCFOB	ITFOB
1	Project slippage Days	10	118 days	-17 days	9 days
			2	5	3
2	Cost variance (Rs.)	10	1,39,15020	62,39,874	46,77,480
			2	3	5
3	Hour variance (Hr.)	10	-161	698	16
			5	2	3
4	High duration	10	2.43 %	5.81 %	0.33 %
			3	2	5
5	Invalid dates	10	22.38 %	46.72 %	14.99 %
			3	2	5
6	Missing predecessor	10	0.27 %	0.00 %	1.99 %
			3	5	2
7	Start early or on time	10	1.03 %	32.78 %	71.1 %
			2	3	5
8	Duration status	10	60.68 %	98.9 %	100 %
			2	3	5
9	Cost status (on budget)	10	74.75 %	100 %	100 %
			2	4	4
10	Missing successor	10	12.67 %	9.68 %	13.95%
			3	5	2
		100	27	34	39

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