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Full Length Article

Sustainable Project Monitoring And Control Using Primavera P6 For Smart Infrastructure Development

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Abstract: *Project monitoring and control is the process of collecting, recording, and reporting information concerning project performance. Project controlling uses the data from monitor activity to bring actual performance to planned performance. The present study deals with the project monitoring process of "Standard Design Factory", a four storeyed (G+3) factory building whose construction is in progress at Hyderabad, Telangana. A comparison between the planned progress of construction work and actual progress is performed in this study using project management software Primavera P6. Despite well-established principles and policies of project monitoring the process itself may not be efficiently accomplished in a project, because of those practical problems existing or arising in the project Such an attempt in realizing the practical problems in implementation of project monitoring and control will contribute to proper recognition of the problem areas and putting in place the control process to rectify the deviations.*
Keywords: *Project Monitoring, Project Control, Construction Management, Primavera P6, Planned vs Actual Progress, Schedule Performance, Construction Delay Analysis.*

1. INTRODUCTION

Construction industry is an integral component of a nation's infrastructure and industrial growth. Even though construction industry is the second largest industry in India, the growth of this industry has been differential across the nation. The rural regions need tools for economic development, land use and environment planning to cope with the status of development in urban areas. The time available to achieve this goal is shrinking. Here arises the need for effective project management. Many issues are being faced by construction industry that must be taken care of. They include time and cost overruns due to inadequate project formulation, poor planning for implementation, lack of proper contract planning and management and lack of proper management during execution. It has been estimated by analysts that average cost of a project goes up by 30 percentage compared to the budgeted cost. Observations show that proper skilful management is imperative for the timely completion of the project within estimated budget and with allocated resources. Projects with good planning, adequate organizational machinery and sufficient flow of resources cannot automatically achieve the desired result. There must be some warning mechanism, which can alert the organization about its possible success and failures, off and on. Project monitoring is the process of collecting, recording, and reporting information concerning project performance that project manager and others wish to know. Monitoring involves watching the progress of the project against time, resources and performance schedule during execution of the project and identifying lagging areas requiring timely attention and action whereas project controlling uses data from monitor activity to bring actual performance to planned performance.

Objectives:

The main objectives of this study are

- To suggest the importance and purpose of monitoring the construction work.
- To suggest guidelines to contractors for updating the project.
- To present an ideal schedule for the factory construction process.
- To suggest a layout for updating the schedule.
- Earned value analysis and tracking for the Standard design factory construction work.

This study is mainly done using Primavera P6, project management software. All activities and their sequence of occurrence, duration, and resources required and costs involved are studied. The organizational breakdown structure of company and work breakdown structure of the project are noted. Tacking of the completed activities and earned value analysis are done. This gives an idea about the

resources involved and financial aspect of the completed work. "Project management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements" (PMBOK, 2008). K KChithkara (1998) has defined project management as an art and science of mobilizing and managing people, materials, equipment and money to complete the assigned project work on time within budgeted costs and specified technical performance standards. Mainly project management process comprises five process groups (PMBOK, 2008). They are initiating, planning, executing, monitoring and controlling, and closing. Monitor and control of project works the process of tracking, reviewing and regulating the progress to meet the performance objectives defined in project management plan. Monitoring is an aspect of project management performed throughout the project.

2. Literature Review

Project monitoring and control play a crucial role in the successful completion of construction projects. According to Harold Kerzner, project control involves measuring actual performance, comparing it with planned performance, and taking corrective action to ensure project objectives are achieved. Effective monitoring helps in identifying deviations early and implementing timely corrective measures.

K. K. Chitkara emphasized that construction projects often face delays due to poor planning, lack of coordination, and ineffective monitoring systems. His work highlights that proper scheduling and continuous tracking of activities are essential to avoid time and cost overruns.

The use of advanced project management software such as Primavera P6 has significantly improved project planning and monitoring efficiency. Studies show that Primavera P6 enables project managers to develop detailed schedules, allocate resources, and track project progress in real-time. It also facilitates comparison between planned and actual performance through tools like Earned Value Analysis.

Research by K. K. Chitkara and K. Nagarajan indicates that improper implementation of monitoring systems can lead to inaccurate reporting and delayed decision-making. These issues often arise due to lack of skilled personnel, inadequate data collection methods, and resistance to adopting new technologies. According to Clifford F. Gray and Erik W. Larson, project control systems must integrate scope, time, and cost parameters to ensure comprehensive performance evaluation. They stress that continuous monitoring using tools and techniques like scheduling software, progress reports, and performance indices enhances project success rates.

3. METHODOLOGY OF MONITORING THE PROJECT WITH PRIMAVERA

The construction projects have become so vast and complex that the application of information technology has become inevitable. Companies started developing software's for project management such as Primavera P6, P3, Sure track, Microsoft project, etc.

This study involves monitoring and controlling the project using Primavera P6. The progress at site must be incorporated in the Primavera schedule and updated. These updates needs to be thoroughly monitored using Primavera. Tools and techniques involved in this process are:

Earned value management (EVM)

Earned value management is a commonly used method of performance measurement. It integrates scope, cost, and schedule measures to help the project management team assess and measure project performance and progress. This technique requires the formation of an integrated baseline against which performance is measured for the duration of the project. This can be effectively done in Primavera.

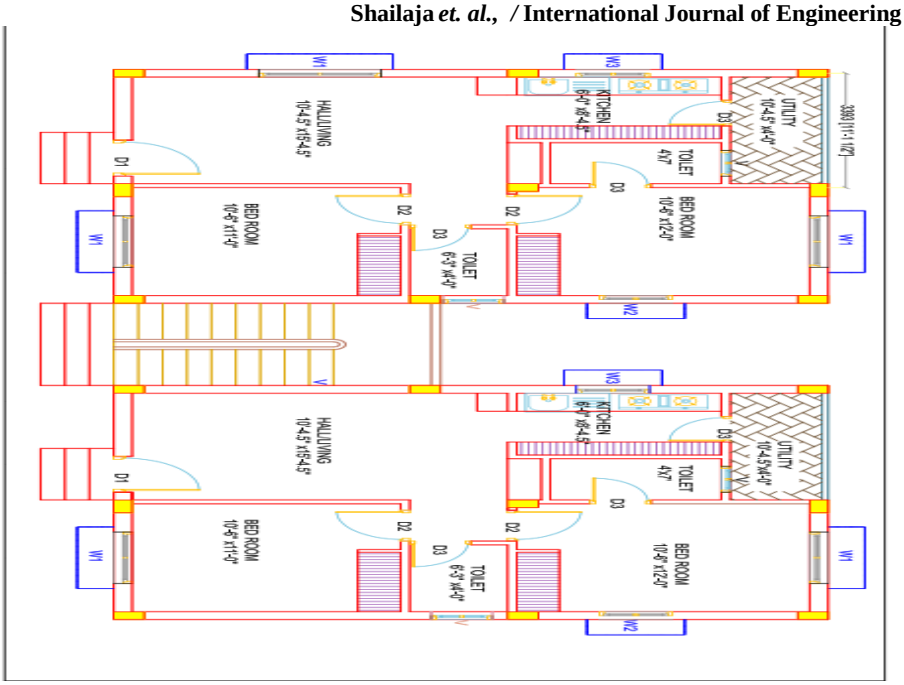
Cost performance baseline

The project performance baseline is used to measure, monitor, and control overall cost performance on the project.

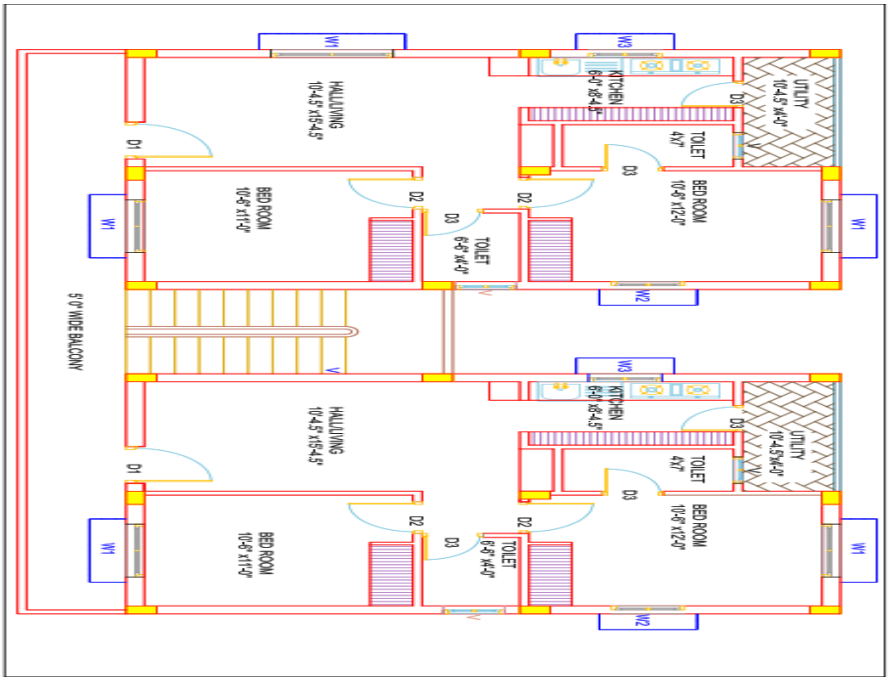
Work performance measurements

The calculated cost variance, schedule variance, CPI, values for WBS components, in particular the work packages and control accounts, needs to be documented and communicated to stakeholders.

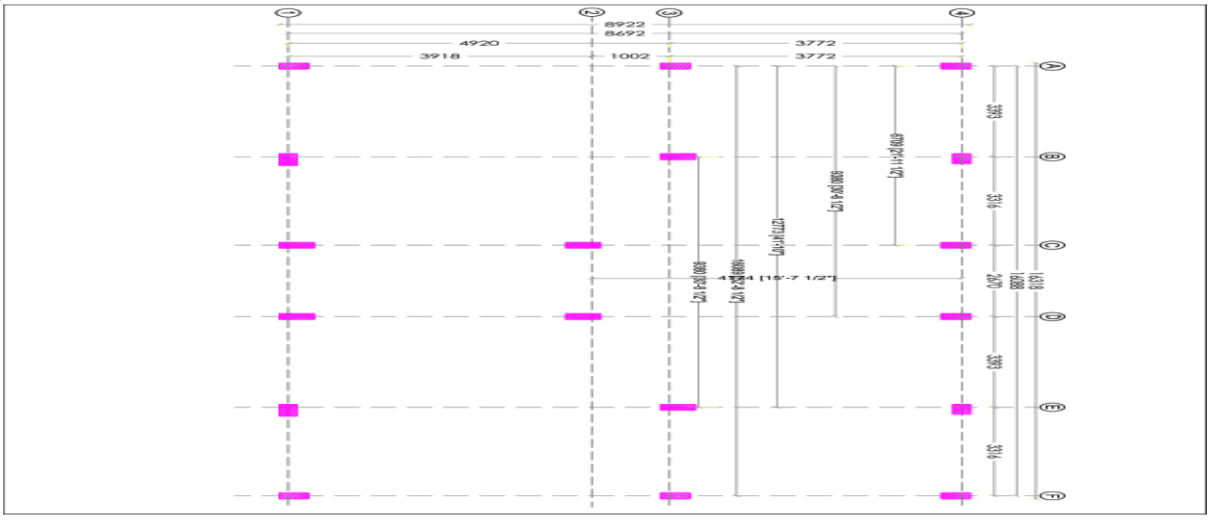
DRAWINGS



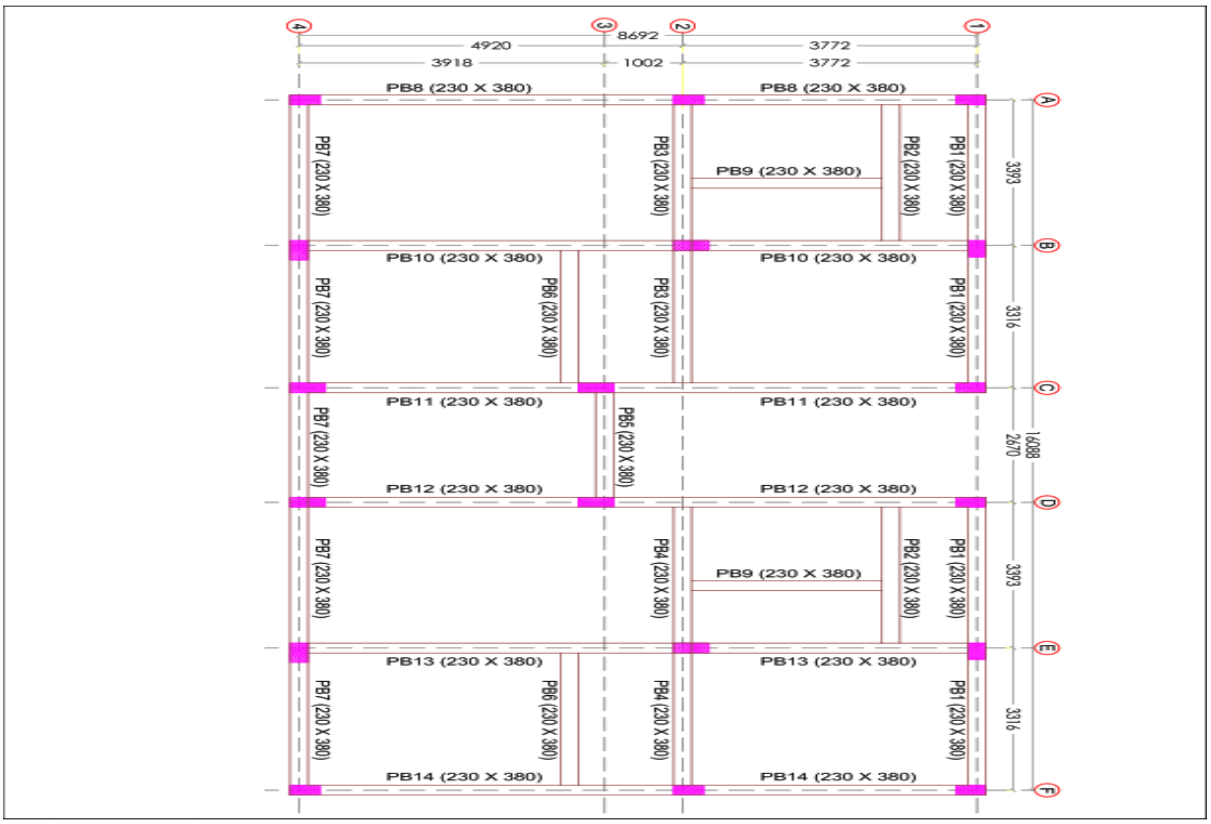
GROUND FLOOR PLAN



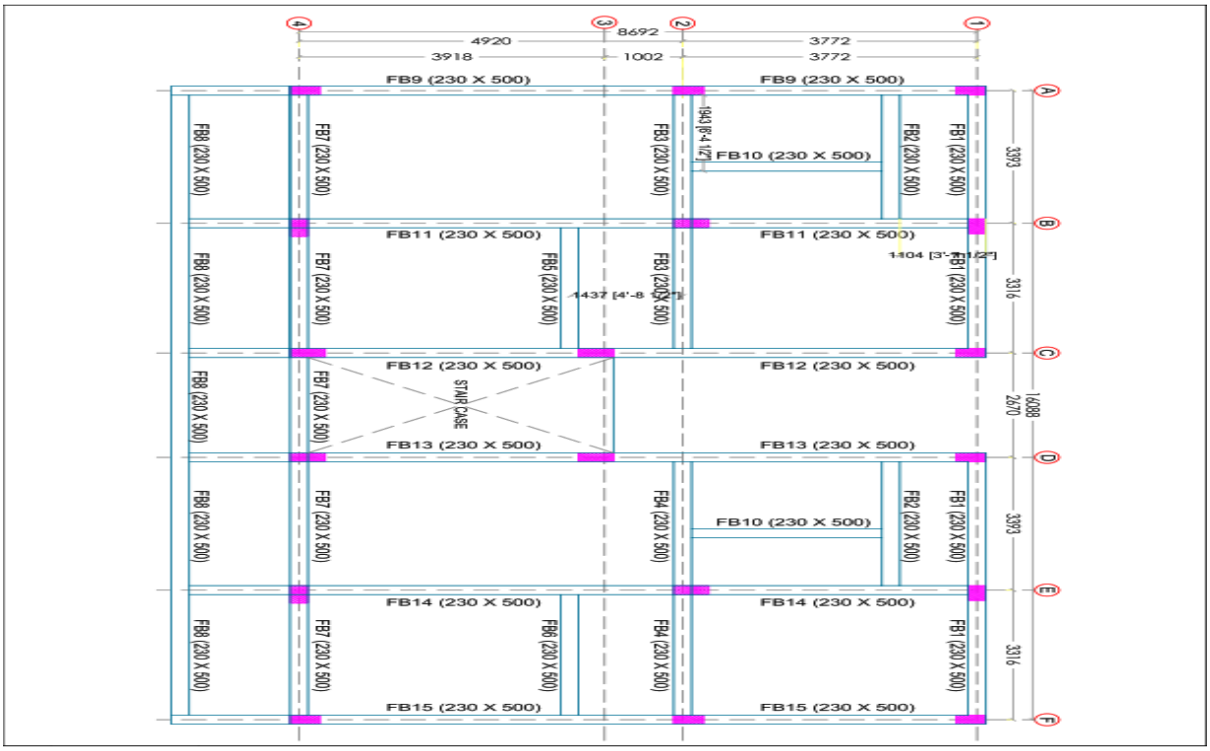
FLOOR PLAN



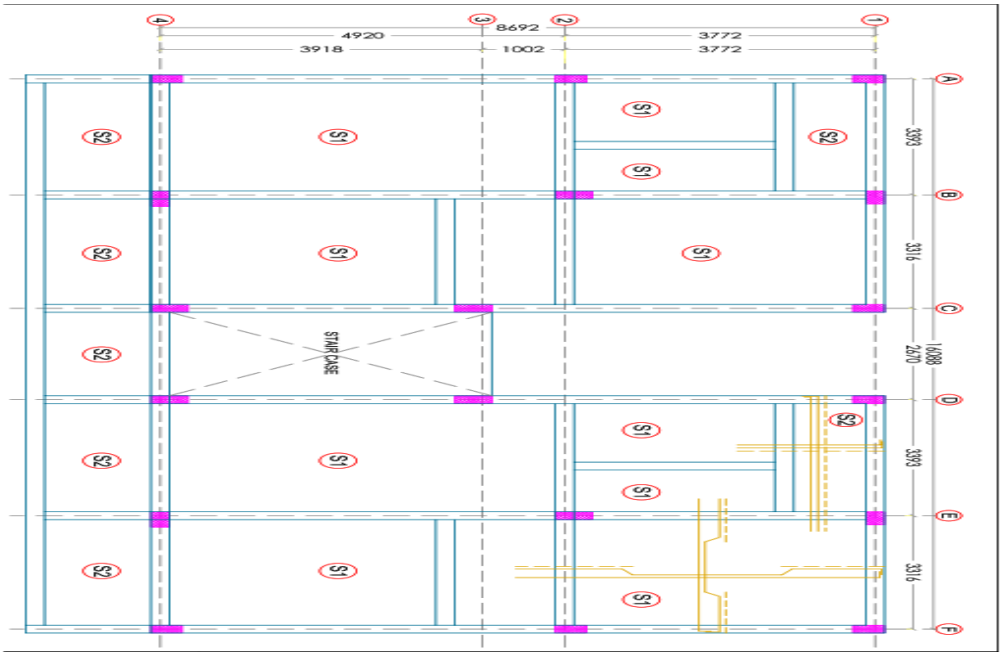
COLUMN CENTRELINE PLAN



PLINTH BEAM FRAMING



FLOOR BEAM FRAMING



SLAB FRAMING

PROJECT CALENDAR:

- The 5 days a week calendar has been considered while preparing the
- Detailed Work Programmed
- The 5 days a week calendar has been considered for Authority Approvals
- Working hours considered as Eight hours per day
- The project week begins on Monday
- The unit of duration has been taken as day.

ASSUMPTIONS CONSIDERED FOR WORK PROGRAMME

Sr.No	ASSUMPTION CONSIDERED IN WORK PROGRAMME
1	Access to the site is available from the employer for initial survey
2	Affection Plan, DM Bench Mark & Building Permit will be received on time
3	Work will be taken up in sequence concurrently at multiple fronts
4	Design of wall will be done in sequence
5	Total BOQ cost of wall items are proportionally considered for each walls. Further the cost of each wall is broken down to activities as under: Design - 10% Excavation - 40% Filling - 20% Material - 25% Wall Installation - 5%

4. Baseline Schedule

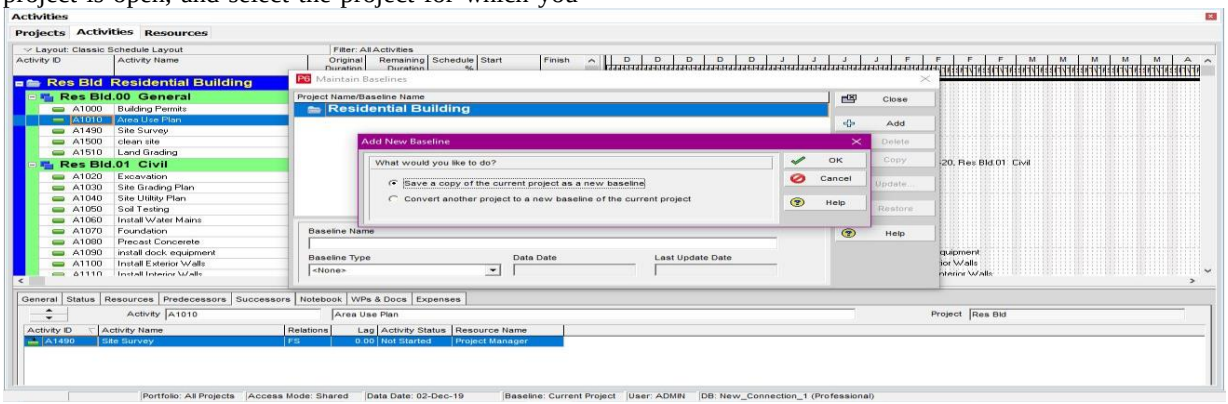
A Baseline is a complete copy of a project plan that you can compare to the current schedule to evaluate progress. Before updating a schedule for the first time create a baseline. It provides a target against which one can track a project's cost, schedule and performance. Up to three baselines can be compared at once. Baseline projects do not exist as separate project to access.

Open the projects for which you want to create a baseline.

Choose Project, maintain baselines, if more than one project is open, and select the project for which you want to create a baseline. If you want to copy the current project as a new baseline, you can select multiple projects; a baseline will be created for all selected projects. If you want to convert another project to a baseline, you can select only one project.

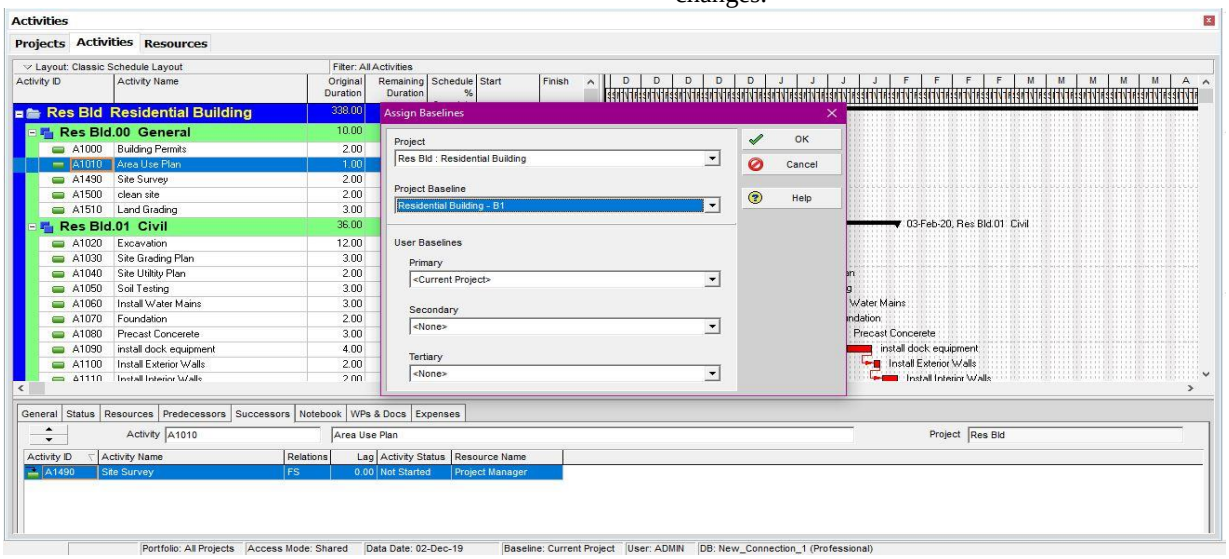
Click Add and choose to save a copy of the current project as a new baseline or convert another project into a baseline of the current project, then click OK.

If you choose to convert another project, select the project in the Select Project dialog box, then click the Select button.

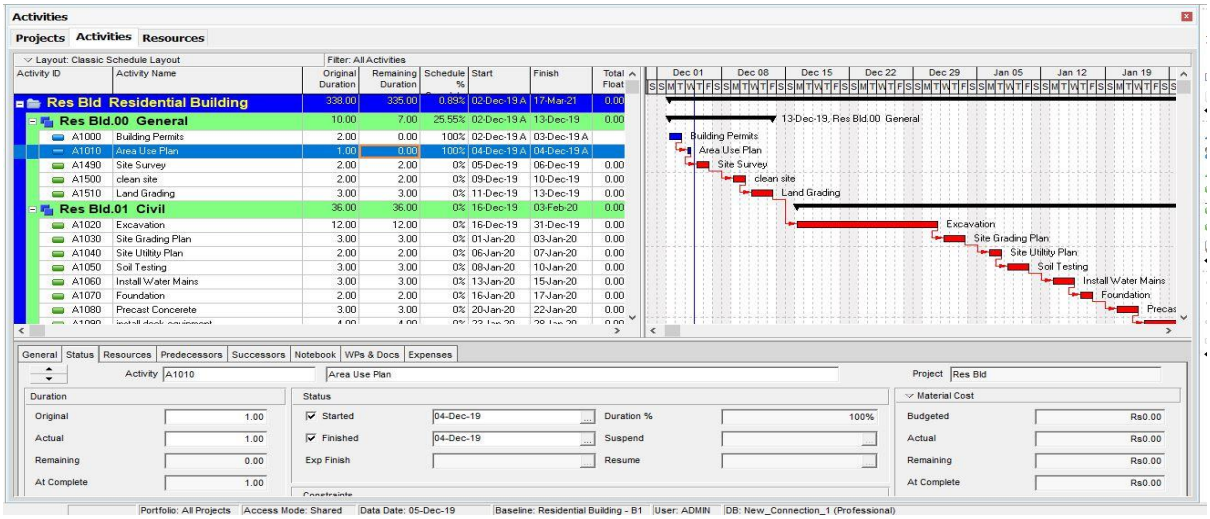


Assigning a baseline:-

Use the Assign Baselines dialog to assign project, primary, secondary, and tertiary baselines to a project from Project/Assign Baseline.
Project: Lists all open projects. Select the project to which you want to assign baselines.
Project Baseline: Lists the available baselines for the selected project. Select the baseline to use as the project baseline. If a baseline does not exist, the current project is the default value.
User Baselines
Primary: Select the primary baseline from the list of available baselines. If a baseline does not exist, the current project is the default value.
Secondary: Select the second baseline from the list of available baselines. A second baseline is not required.
Tertiary: Select the tertiary baseline from the list of available baselines. A tertiary baseline is not required.
OK: Click to assign the selected baselines to the selected project.
Cancel: Closes the dialog without saving your changes.



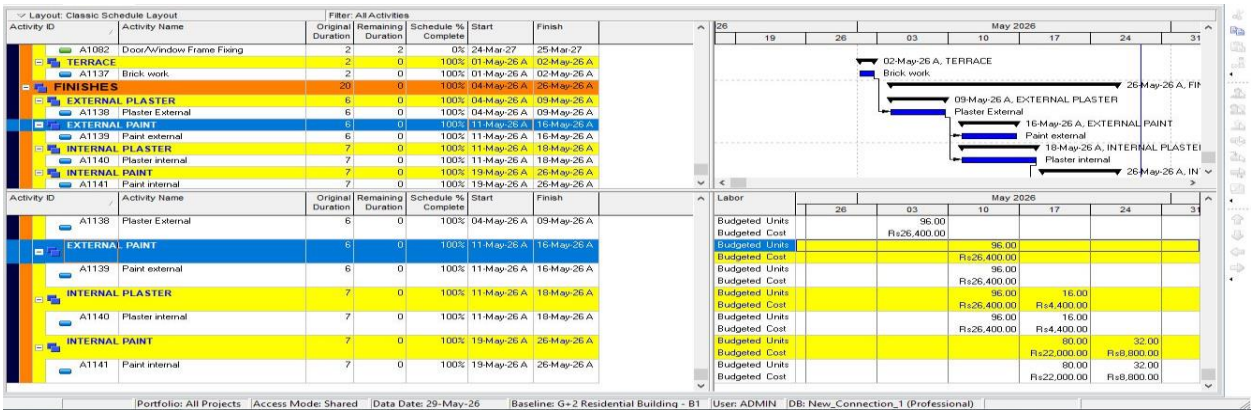
Manually Applying Actual



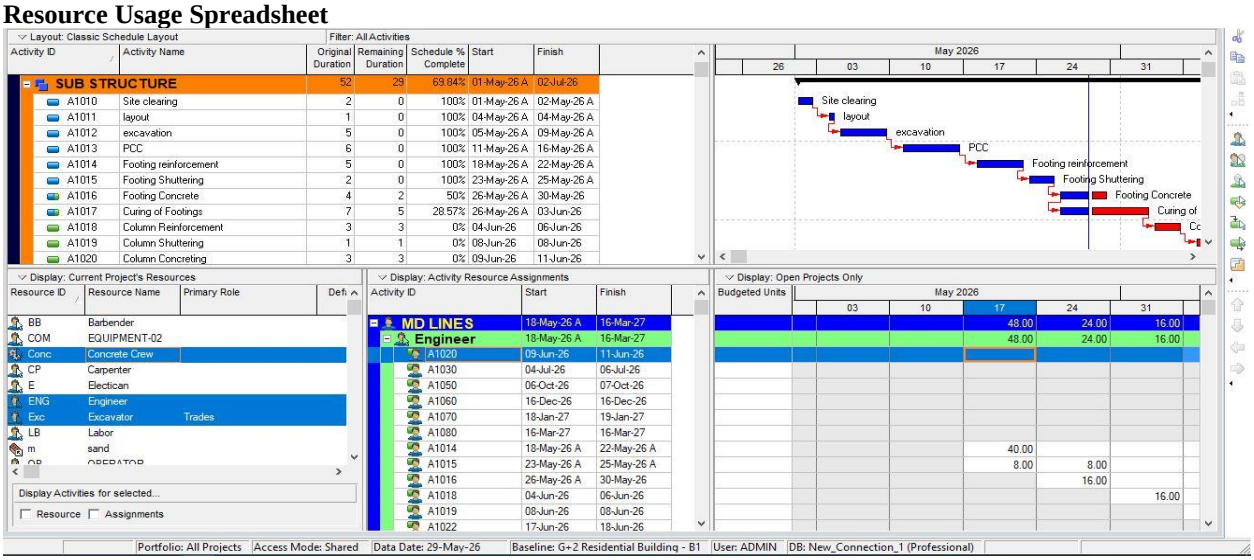
Activities, which are not progressing as per plan, can be status separately from Activity Details. Select the activity to be status and activate activity details from Display options.

Activate Status tab from activity detail and give Start Date and Finish Date if activity is 1% complete.

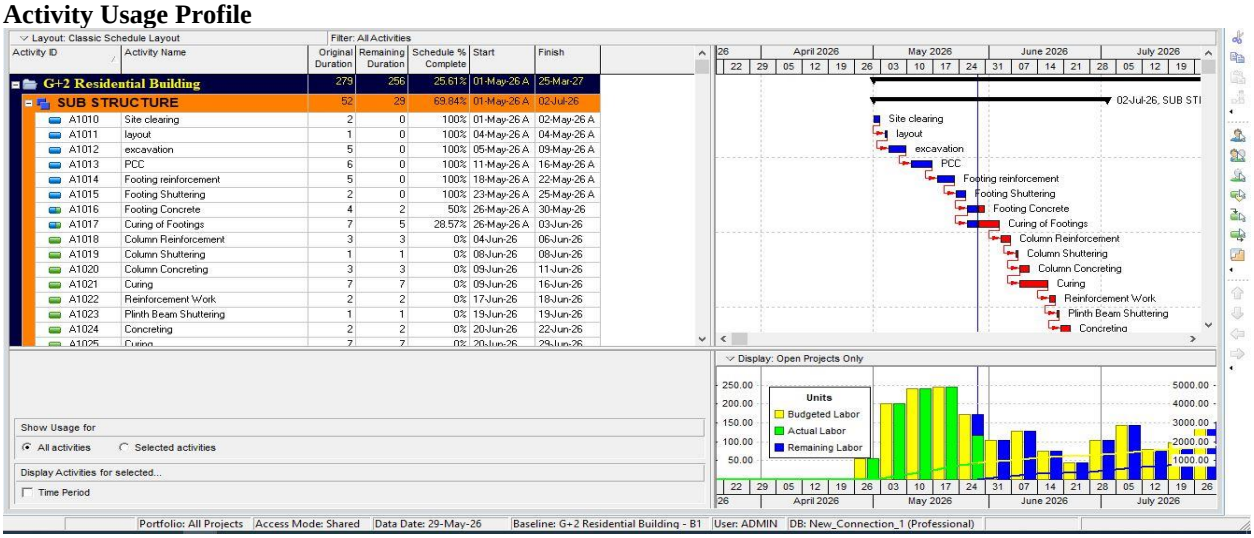
Activity Usage Spreadsheet



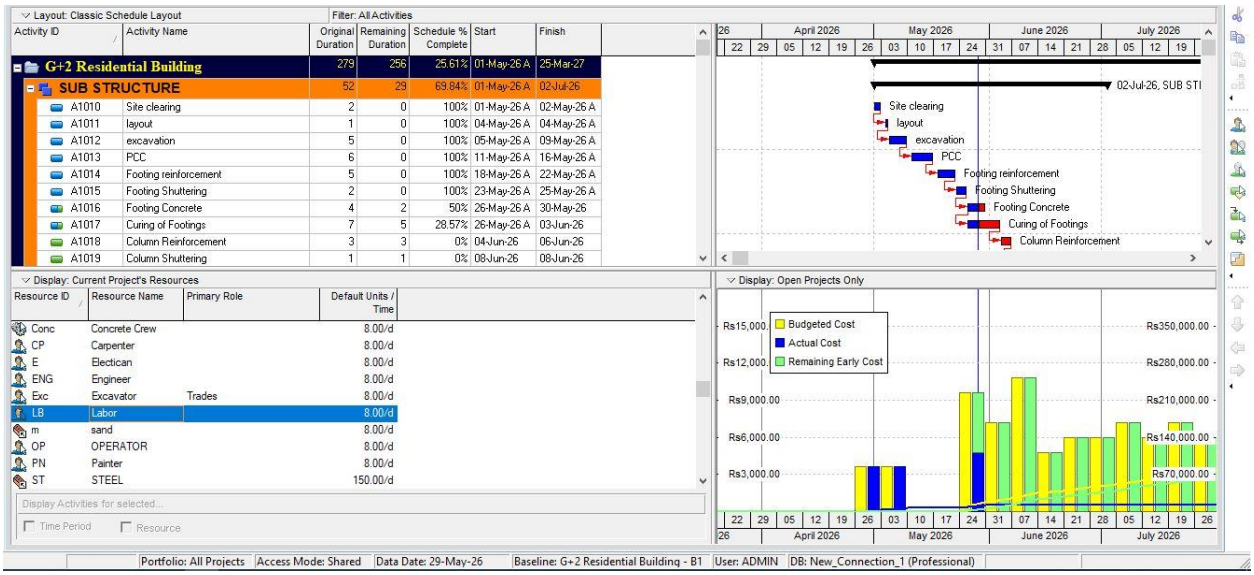
Resource Usage Spreadsheet



Activity Usage Profile



Resource Usage Profile



5. CONCLUSIONS

The main objective of this study was to understand the role of monitoring and control in the progress and timely completion of a construction project. This objective was achieved through revision of literatures and methodologies involved in monitoring and control. The case study proved to be a guideline in understanding the progress of Standard design factory construction work and also to identify the specific problems arising during the process. Results of this study show the drawbacks of the present project management system in SDF project and the importance efficient planning, monitoring and controlling, as well as the need and effectiveness of a project management software like Primavera P6 in a construction project.

Future Scope of the Study

The present study on project monitoring and control using Primavera P6 can be further expanded in several meaningful directions to enhance its practical relevance and academic contribution.

In the future, the study can be extended by integrating advanced technologies such as Building Information Modeling (BIM) with Primavera P6. This integration would enable real-time visualization of project progress along with scheduling, improving coordination and decision-making in construction projects.

Another important area of scope lies in incorporating data analytics and artificial intelligence techniques for predictive project monitoring. By analyzing historical project data, future studies can develop models to forecast delays, cost overruns, and risks, allowing project managers to take proactive corrective actions.

The study can also be expanded to include multiple construction projects instead of a single G+3 building. A comparative analysis across different types of projects—such as residential, commercial, and infrastructure—would provide broader insights into the effectiveness of monitoring and control systems.

Further research can focus on the integration of Earned Value Management (EVM) techniques with Primavera P6 to enhance performance measurement. This would allow a more detailed evaluation of cost and schedule performance indices in real-time.

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