

COMPARISON BETWEEN CONVENTIONAL AND PREFABRICATED BUILDING USING PRIMAVERA

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Abstract – Primavera is a project-Management Software. It includes project management, scheduling, risk analysis, opportunity management, resource management, collaboration and control capabilities and integrates with other enterprises software such as oracle and SAP's ERP systems.

The project is based on the comparison between conventional and prefabricated building using primavera P6 software considering G+4 building

Key Words: Risk analysis, Resource management, Cost, Time

1. INTRODUCTION

ABOUT PRIMAVERA SOFTWARE

The original company's name was primavera system and established in 1993 by Joel Kopple- men and Dick Faris in Philadelphia, USA. In 1988 software system started to develop in a server-based approach that allows primavera to act as a portfolio system. This is split into two version of software one is stand-alone version used for small projects, the second is enterprise portfolio system this allows primavera to use throughout organizations to manage the projects. In 2008, Oracle brought primavera and turned into primavera Global Business unit. Primavera P6's is the world's largest Pharmaceutical, oil and gas, refinery infrastructure clients and engineering suppliers.

ABOUT CONVENTIONAL BUILDING

Conventional construction method is an ordinary or a standard construction. It involves utility of traditional materials, and remains with a specific-parameters. Most of the conventional buildings are based on plans and measurements, as well as floor plans. While prefabricated construction needs less time same dependability as convectional construction. The advantage of conventional construction is that causes no two building to be same each building is constructed individually designed from the ground up. Conventional

buildings have more durability than a prefabricated building.

ABOUT PREFABRICATED BUILDING

Prefabricated building is a prefab building that is manufactured and constructed using prefabrication. It is factory made components that will be transported and assembled on site for a building. Buildings are built and in one place and can be reassembled in another place this was true for mobile activities. Elimina Castle the first slave from west Africa was the first European to build first prefabricated building. The world's first prefabricated, precast panelled apartment blocks were pioneered in live pool.

1.1 OBJECTIVES

The main objectives of this study are as follows

- To study the difference between conventional and preconventional buildings using primavera

1.2 LITERATURE REVIEW

The main purpose is to study and determine constraints in adopting prefabrication in construction industry. To find the different methodology in both construction and to conclude which construction is best. Conventional construction is old method and prefabricated construction is new one. We can find many buildings are prefabricated.

In this paper they have considered G+7 to estimate the quantities of conventional building and prefabricated building. Estimation of quantities is done to find requirement of materials for both conventional and prefabricated. Hear both are considered and estimated how much quantity of materials needed for the construction. Project duration is also main important for completion of the project. Conventional building needs more time compare to prefabricated buildings. Cost analysis is determined by considering the resource, materials, labour and machineries. By considering these factors we can come to cost factor of both constructions. Data collection is also most important in project. From this

paper we can come to know the difference between conventional building and prefabricated building.

2. RESEARCH METHODOLOGY

The steps start with creating a project in primavera and creating a sequence of activities. After creating the project, the important thing is to add the dates, project planning start and must finish by. These dates will be given during the start of the project, we give these dates according to planning it may change during construction if date changes, we can change in software (fig 2)

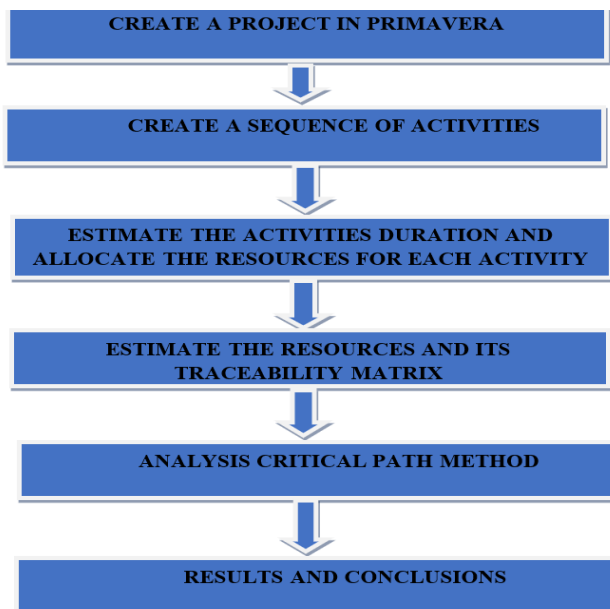


Fig-1: Methodology

Selecting the EPS in these eps we will select in which project our document is added, we can select according to us and we can give names which will be convenient to us. After selecting all the factors then our project will be created. After creating the project, we can proceed to add activities



Fig-2: Entering start and end dates

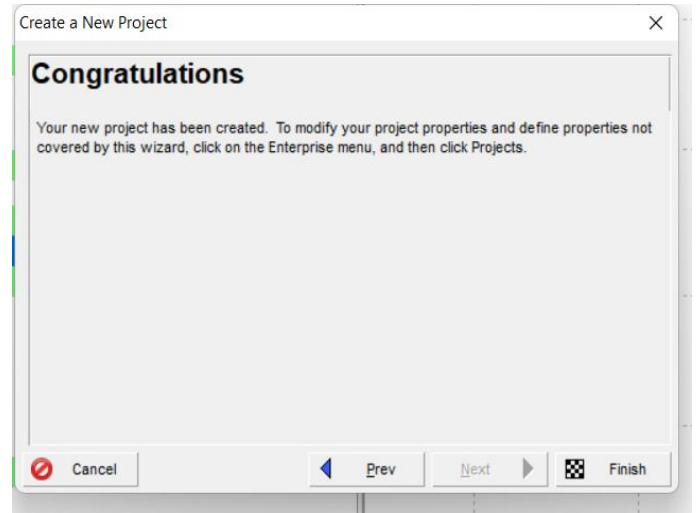


Fig-3: Completion of creating project

2.1. WORK BREAKDOWN

Work breakdown structure in primavera, in work breakdown structure works are divided into smaller parts or components. Work breakdown structure is key project that is deliverable to team's work to the manageable section. In work breakdown structure it provides the brief information about the project, by seeing the work breakdown structure can understand the project. Breaking down the work and making them in parts and allotting to the different department to proceed the work. By breaking down the work load it will be easy to do the work.

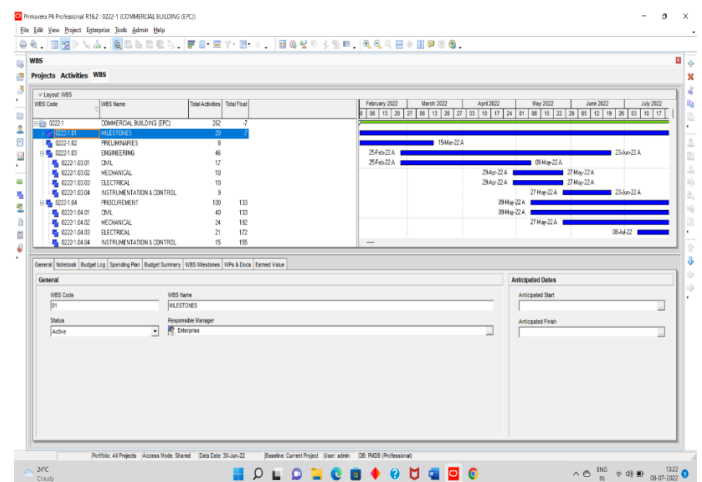


Fig-4: Work breakdown of conventional building

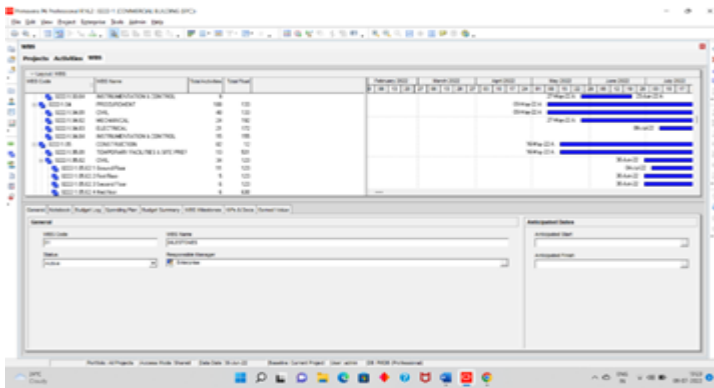


Fig-5: Work breakdown of prefabricated building

2.1. Project Calendar

Calendars are used to make our work easy; calendar defines the workdays and workhours available in a day. In calendars we can add holidays like government holidays, festivals, if works are not present on those particular days in calendar. We can establish our own calendar according to our company's work, we can assign resources and activity on calendars.

According to us and our work. Based on calendar resource will come to site before we should order the items so that it delivers on the day which we mentioned on the calendar.

If the work is not completed in time or it is delayed from certain reasons then we can change the dates in primavera. This calendar may change if the resource and labours are not available or due to climatic effect. Before planning of the project, we consider the dates according to our planning but it may vary during the construction time.

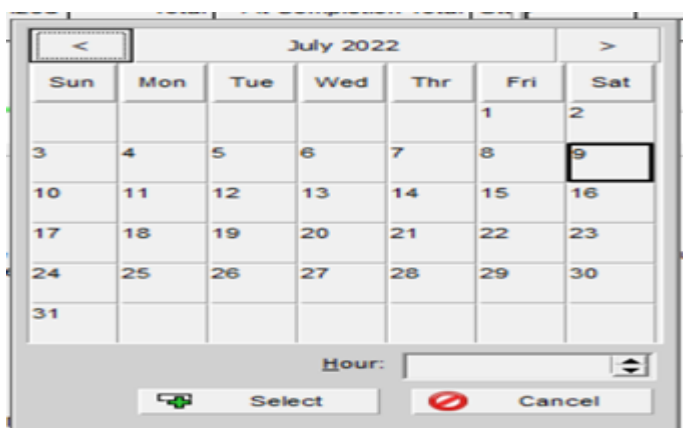


Fig-6: Project Calendar

2.11. ADDING ACTIVITIES:

The clay accessed from location location proven to achieve different geotechnical features. The result is produced in the table 1. Different geotechnical features

like grain magnitude distribution, specific gravity, consistency limit, compaction traits, shear substance components etc. are tabulated.

Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start
0222-2	COMMERCIAL BUILDIP	895	779	9.49%	02-Feb-22 A
0222-2.01	MILESTONES	895	749	0%	02-Feb-22 A
A1000	Project award /start	0	0	100%	02-Feb-22 A
A1010	Site visit	0	0	100%	02-Feb-22 A
A1020	Construction permission	0	0	100%	02-Feb-22 A
A1030	Engineering start	0	0	100%	01-Mar-22 A
A1040	BOQ start	0	0	100%	04-May-22 A
A1050	BOQ finish	0	0	100%	04-May-22 A
A1060	Engineering finish	0	0	100%	04-May-22 A
A1070	Procurement start	0	0	100%	09-May-22 A
A1080	Procurement finish	0	0	0%	09-May-22 A
A1095	Site mobilization	0	0	100%	16-May-22 A
A1090	Construction start	0	0	0%	11-Aug-22 A
A1100	Foundation completion	0	0	0%	11-Aug-22 A
A1110	First floor slab	0	0	0%	11-Aug-22 A
A1120	Second floor slab	0	0	0%	11-Aug-22 A
A1130	Facade installation	0	0	0%	11-Aug-22 A

Fig-6: Activities of the project

Network diagram shows the activities of the task, when we add activities, it shows the network diagram. Network diagram shows the connectivity of the activities which is linked to which activity it will be shown in network diagram, shows the sequence of the activity. The network diagram shows the relationship between activities.

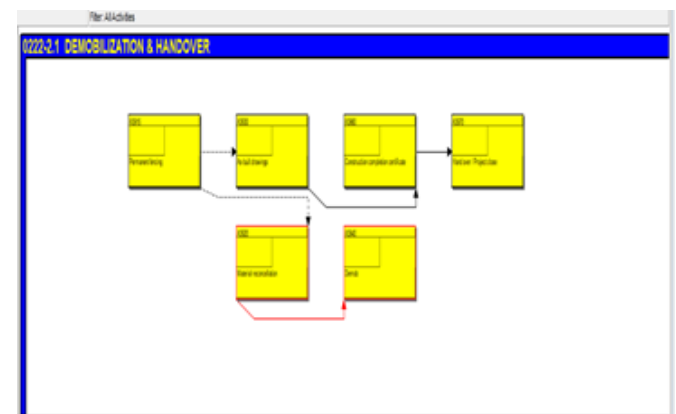


Fig-7: Network Diagram

2.3. RESOURCE ALLOCATION

In primavera resource allocation of resource is important, for each activity which are the resource needed and which type of engineers needed to complete that particular task. Resource includes equipment, labours that are used for construction, these resources are based on the time and they are used in between activities. Creation of resource will be use full in the project and it makes work easy while construction. In primavera we can add the resources if they are not there in the list, we can add units of the resource and we can add price of the resource which will be used for the construction.

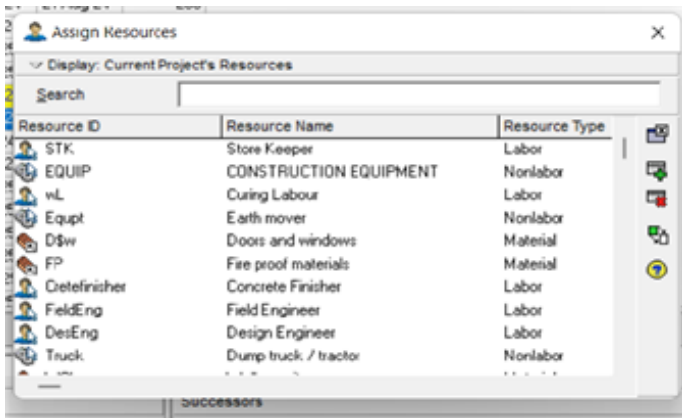


Fig-8: Resource allocation

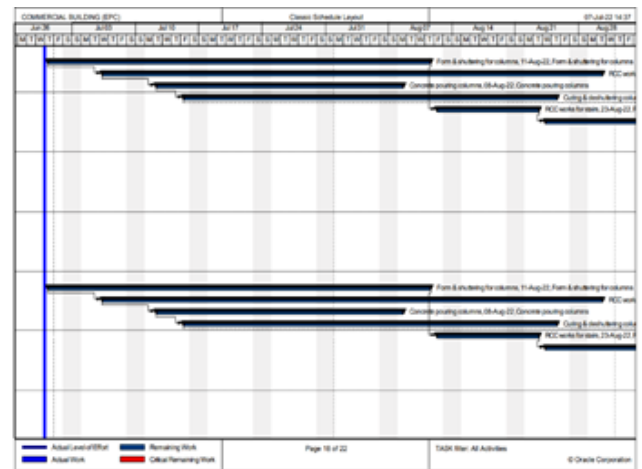


Fig-9: Gantt Chart

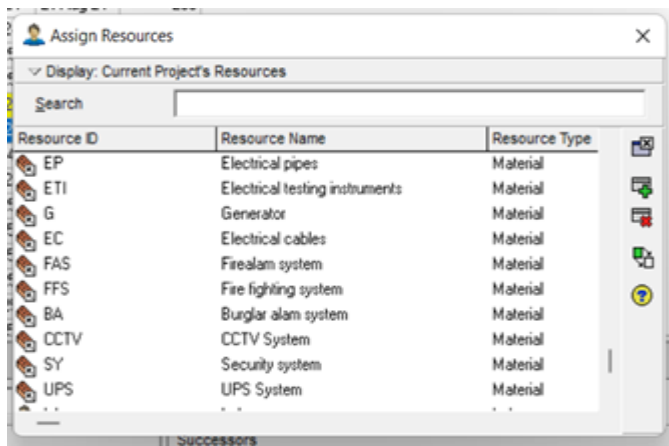


Fig-9: Material Resource allocation

3. ESTIMATION OF THE PROJECT

Cost of the conventional building is taken from the commercial building mentioned in the case study. Which helps us to discover cost of the building, the substructure cost relatively equal in two constructions. The superstructure cost will vary the cost of prefabricated structure will be more as compared to conventional building.

NO	DESCRIPTION	COST
1	Sub structure (Earthwork, soil filling and consolidation, basement, site clearance)	19,16000
2	Super structure (roofing, slab, framing, walls)	8,988,000
3	Finishing works (painting works, electrical works, tiling work and doors and windows)	13,950,000
4	Total cost	24.854,000

Table-1: Conventional Building

NO	DESCRIPTION	COST
1	Sub structure (Earthwork, soil filling and consolidation, basement, site clearance)	1,472,000
2	Super structure (roofing, slab, framing, walls)	1,5516,000
3	Finishing works (painting works, electrical works, tiling work and doors and windows)	1,3112,000
4	Total cost	30,100,000

Table-2: Prefabricted Building

2.4. GANTT CHART

Gantt chat is a tool or a basic tool, it represents the graphical representation of the project. By using Gantt chat we can understand the work easily, it is graphical representation of schedule, activity and time. From primavera software we can plan start and finish dates and chat will represent the dates according to our activities. In this we can add which colour we want to understand our activity, we can add bars, we can make settings according to our choice.

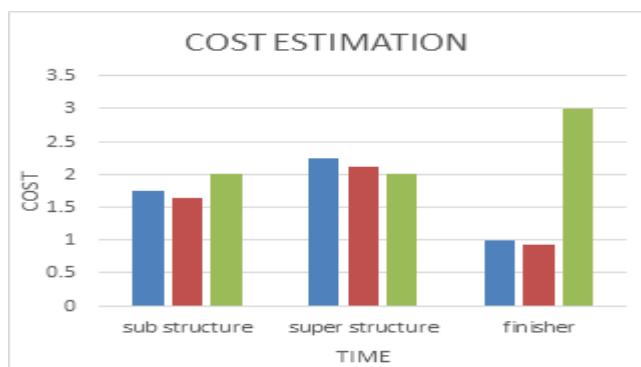
SL.NO.	DESCRIPTION	COST
1	Sub structure (Earthwork, soil filling and consolidation, basement, site clearance)	99 days
2	Super structure (roofing, slab, framing, walls)	528 days
3	Finishing works (painting works, electrical works, tiling work and doors and windows)	322 days
4	Total days	949 days

Table-3: Estimation time of Conventional Building

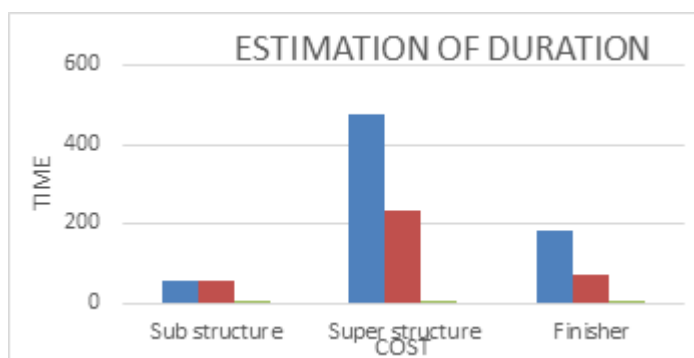
SL.NO.	DESCRIPTION	COST
1	Sub structure (Earthwork, soil filling and consolidation, basement, site clearance)	97 days
2	Super structure (roofing, slab, framing, walls)	289 days
3	Finishing works (painting works, electrical works, tiling work and doors and windows)	235 days
4	Total days	621 days

Table-4: Estimation time of Prefabricated Building

Cost Estimation Graph



Estimation of duration



4. RESULTS

- By comparing conventional building and prefabricated building we can know that prefabricated building will be constructed in lesser time, but conventional building needs more time.
- Prefabricated building needs less materials as compared to conventional building.
- When we compare cost of both buildings the cost of prefabricated building is 77,50,000 and conventional building is 64,00,000.
- As we compare cost of prefabricated and conventional buildings, prefabricated building cost more than a conventional building. By using primavera software when we compare the days conventional building needs more days as compared to prefabricated building. The cost of prefabricated building is more due to structural steel and equipment cost is more manpower is used less and machinery work will be more in prefabricated building.
- Conventional building is traditional type of construction where it needs more man power, more materials, needs more time but cost is less as compared to prefabricated building.
- In both the construction types different types of activities are added not similar type.
- For each activity time and dates are provided so that the work completes within the time of scheduling.
- The lifespan of both buildings is comparatively same.
- The approximately budget made for the two buildings based on the planning and scheduling of the project.
- If we have more time and budget amount then we can go for the conventional type of construction or else if we have less time and more budget then we can go for prefabricated type of construction.

5. COST ESTIMATION FROM PRIMAVERA SOFTWARE

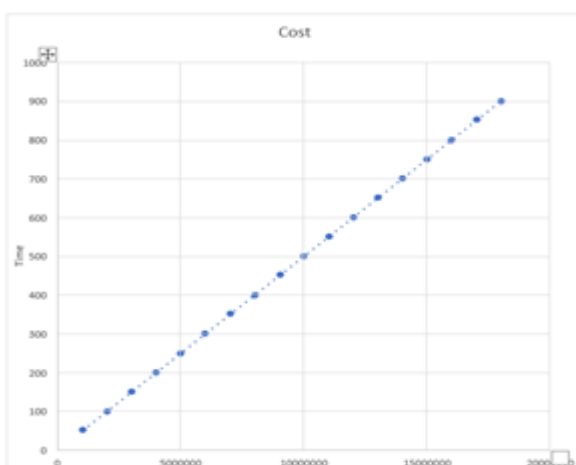
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Total Float	BL Project Total Cost
0222	COMMERCIAL BUILDING	885	779	88%	02-Feb-22 A	52	Rs. 24,850,937.45
0222.01	MILESTONES	885	749	0%	02-Feb-22 A	52	Rs. 0.00
0222.02	PRELIMINARIES	30	0	100%	02-Feb-22 A		Rs. 0.00
0222.03	ENGINEERING	85	0	100%	25-Feb-22 A		Rs. 143,520.00
0222.03.01	CIVIL	52	0	100%	25-Feb-22 A		Rs. 140,400.00
0222.03.02	MECHANICAL	20	0	100%	25-Apr-22 A		Rs. 3,120.00
0222.03.03	ELECTRICAL	20	0	0%	25-Apr-22 A		Rs. 0.00
0222.03.04	INSTRUMENTATION & CC	19	0	0%	27-May-22 F		Rs. 0.00
0222.04	PROCUREMENT	540	502	13.37%	09-May-22 F	329	Rs. 5,532,417.45
0222.04.01	CIVIL	540	502	13.37%	09-May-22 F	329	Rs. 5,532,417.45
0222.04.02	MECHANICAL	467	444	0%	27-May-22 F	388	Rs. 0.00
0222.04.03	ELECTRICAL	415	415	0%	08-Jul-22	368	Rs. 0.00
0222.04.04	INSTRUMENTATION & CC	52	52	0%	04-Jan-24	351	Rs. 0.00

Fig 10: cost of conventional building

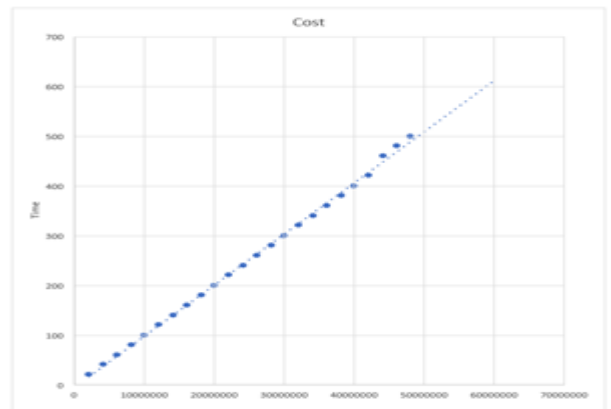
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Total Float	BL Project Total Cost
0222-1	COMMERCIAL BUILDING	749	642	85.71%	02-Feb-22 A	-7	Rs. 36,003,920.00
0222-1.01	MILESTONES	749	642	0%	02-Feb-22 A	-7	Rs. 0.00
0222-1.02	PRELIMINARIES	31	0	100%	02-Feb-22 A		Rs. 0.00
0222-1.03	ENGINEERING	85	0	100%	25-Feb-22 A		Rs. 0.00
0222-1.03.01	CIVIL	52	0	100%	25-Feb-22 A		Rs. 0.00
0222-1.03.02	MECHANICAL	20	0	100%	25-Apr-22 A		Rs. 0.00
0222-1.03.03	ELECTRICAL	19	0	100%	25-Apr-22 A		Rs. 0.00
0222-1.03.04	INSTRUMENTATION & CC	19	0	100%	27-May-22 F		Rs. 0.00
0222-1.04	PROCUREMENT	492	454	9.2%	09-May-22 F	181	Rs. 5,406,000.00
0222-1.04.01	CIVIL	492	454	0%	09-May-22 F	181	Rs. 1,886,000.00
0222-1.04.02	MECHANICAL	467	444	4.91%	27-May-22 F	152	Rs. 1,520,000.00
0222-1.04.03	ELECTRICAL	415	415	0%	08-Jul-22	172	Rs. 0.00
0222-1.04.04	INSTRUMENTATION & CC	52	52	0%	04-Jan-24	155	Rs. 0.00

Fig 11: cost of prefabricated building

5.1. COST AND TIME OF CONVENTIONAL BUILDING



5.2. COST AND TIME GRAPH OF PREFABRICATED BUILDING



6. CONCLUSION

- From the project we can know that by using primavera software it's easy to plan and schedule the project.
- Primavera helps us to estimate the project time, cost, materials and labours used for construction.
- Considering two buildings in primavera scheduling and planning and assigning the resources, there are two types of resources materials and labours we can assign the resources according to our use.
- The activity needs which kind of materials or equipment by considering that we can assign the resource.
- Primavera software helps us to save time and manage the project in proper way in the construction of a project.
- By using primavera software, we can understand the critical path that helps us to identify the critical activity and we can do it in a better way.
- While construction we can face many problems like design, planning etc, by using primavera we can coordinate on the persons present on the site.
- When we compare conventional and prefabricated building, we can understand the difference between them. In conventional building it is a traditional method which is coming from ancient time, whereas prefabricated construction method is a new method of construction which needs less time to construct.
- The lifespan of both buildings is comparatively same, the main difference is that time and cost.

- From estimation we can know that prefabricated building needs less time and more cost, whereas the conventional building needs more time and less cost as compared to the prefabricated building.
- In prefabricated building there are many new techniques used for construction of prefabricated buildings, machines are used more but in conventional building machines and labours are used in equal.
- From this project we can conclude that both construction methods are good but we have more time we can go for conventional construction, if we have lesser time then we can go for prefabricated construction method the cost will be more in prefabricated construction method as the steel rate is more.

7. REFERENCES

- [1] Time Analysis of Pre-Engineered Building with Conventional Steel Building by using Primavera P6 2019
- [2] Study The Application Of Primavera In Planning And Scheduling Of Prefabrication Technology Used In Construction

BIOGRAPHIES



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