NEED FOR SCHEDULE ESTIMATION IN CONSTRUCTION OF A RESIDENTIAL BUILDING

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Abstract : The main aim of project management is to complete the project within specified time and along with assured quality. Adopting conventional execution practices, it is difficult to constantly measure the progress of work, evaluate plans, and track the cost and time as well as adopt corrective measures wherever required. Planning effectively by systematic application of project management skills and techniques has become the need of the hour in order to overcome the problems faced by adopting conventional construction execution practices.
There are various tools and techniques available for optimizing the construction procedure to prevent time overruns. The monitoring tools adopted during construction plays a significant role for thriving completion of project on time and within estimated budget.
In this study, I have made an effort to estimate the overall time required to execute a residential building by use of conventional construction execution practices and by adopting project management techniques to compare the results for justification.

Index Terms **-** Project Management, Project Management Software, conventional construction execution, time optimization and primavera**.**

I INTRODUCTION

A *schedule* is a work program, set date-wise in a logical sequence; it is a time table for action. Time scheduling is the process of developing a work program. It implies programming of the chosen work plan on a calendar basis and provides the base against which all progress is measured. In order to accomplish this, the project must be broken down into well-defined work tasks. The details as well as relationship between these individual tasks must be determined.

A construction schedule is a communication tool with different levels of accuracy for different phases of the project. At a minimum, the Preliminary Construction Schedule should include milestones demonstrating the start and completion of major tasks or activities. Estimating a construction schedule is not limited to just the time when building is ongoing; there are tasks to be carried out both before and after the physical construction of the project to consider, and gives various parties involved responsibility over different functions.

Theme that underline scheduling

Set Goals ⟹ Plan

There are various techniques used for scheduling a project depending upon :-

- size
- Complexity
- Personnel
- Owner requirement

There are some of the general methods and techniques that are commonly used are :-

- Bar chart or gannt chart
- Critical path method (CPM)
- Work breakdown structure
- Concept of network and precedence (signify the order inwhich they would be completed)
- PERT (program evaluation and review technique)

The schedule estimation tells the project manager how long it will take to complete the project. It also helps the basis for planning cost and resource plans.

For example,

Whether you are constructing a house extension or building a large commercial unit, the duration of the project needs to be accurately estimated in order to correctly assess such items as resources and budget.

Estimating a construction schedule is not limited to just the time when building is ongoing, there are tasks to be carried out before and after the physical construction of the project to consider.

"A good schedule also establishes the relationship between task and time".

II BASIS OF STUDY

I Project Management in construction

A project generally starts at the right pace but as it proceed, activities gets off the schedule due to various tribulations like; improper planning, uncertainties, non delivery of resources on time, execution delays, environmental factors and so on, which directly impacts on cost.

Thus, application of project management in construction aims to accomplish the precise goals by virtue of perfect planning, scheduling, executing, monitoring as well as controlling time, finances and utilizing all resources effectively. It is an interconnected group of processes which directs the project team to accomplish a successful project within specified cost as well as time.

II Project Management Software

Project management can be implemented to projects achieved via software like Microsoft Project and Primavera, which are applications developed to help manage projects and other works effectively. The applications are able to perform the following:

a) Develop and schedule a plan

b) Create an appropriate standard base calendar or based upon usage working calendar

c) Assigning relationships between scheduled activities

d) Define resources required for the project

e) Helps to level and smooth out the resources between activities

f) Helps to update and track work progress regularly

g) Performs earned value analysis

h) Allows to incorporate revisions and reanalyzes the data

III Primavera P6 PROFESSIONAL R8.3

Primavera Systems Inc. provides project and program management software for the Architecture, Engineering and Construction industry. Focused on project portfolio management, or PPM, Primavera's solutions let users' measure progress, assure governance, improve team collaboration and prioritize project investments and resources.

Primavera's software packages include P6, Prosight, Contract Manager, Cost Manager, Pertmaster, SureTrak, Evolve and Inspire. The newest addition to the suite of project management solutions is Primavera P6, which is an integrated PPM (project portfolio management) solution that provides a real-time view of portfolio performance. P6 also offers what-if scenario modeling, tabular scorecards and capacity analysis.

Application of Primavera

- Balance resource capacity.
- Monitor and visualize project performance versus plan.
- Plan, schedule and control complex projects.
- Conduct what-if analysis and analyze alternative project plan.
- Allocate best resource and track progress.

III Review Paper CONCLUSION

With reference to all the review papers I would like to conclude the following points:

1- The use of project management techniques in a proper way reduces the cost and time of construction, without affecting the quality and performance.

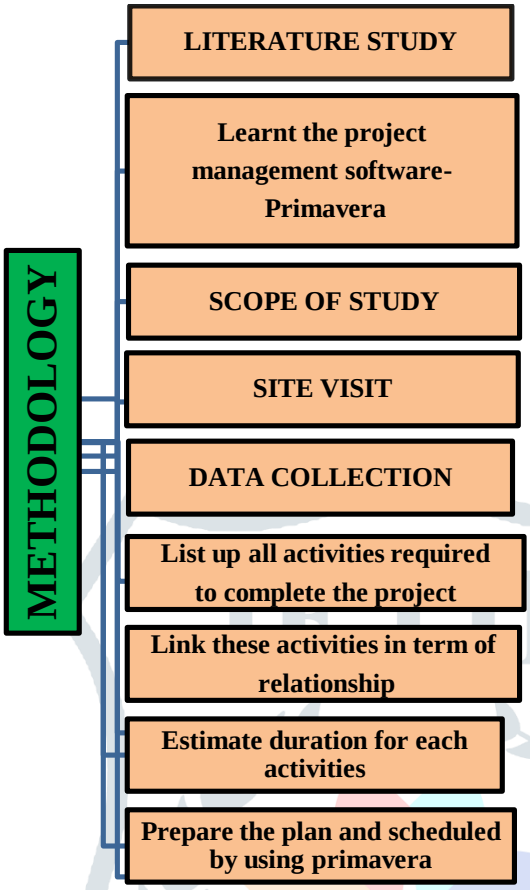
2- Application of proper management helps project manager to achieve efficient project performance by waste minimization and resource optimization along with proper planning, scheduling and controlling activities during construction processes.

3- Moreover with repect to tool (Primavera), The software is very easy to apply which enables to include almost all of the details of a project can have, It's very efficient for big projects with many branched activities. we can add all types of files we need in any section of the project so that it makes your project as inclusive as ever.

4- Though there are various tools available for schedule estimation as per this study is concern, I have opted for primavera p6 software for my analysis work.

5- This study will bring an entire schedule estimation of a residential building.

IV METHODOLOGY



V DATA COLLECTION

In this project primary data collection type sources is used .

For the completion of the project I had to visit the site and noted down all the activities which takes parts for the construction of the residential building .And also the materials required and total number of labor , total number of days required to complete the project .

The construction site is situated near **unitycity churaha,kalyanpur,lucknow U.P(226021)**

Size of plot = 40.6' x 23.6"

Area of plot = 951.75 sqft or 88.45 sqmt

VI DATA ANYALSIS

Details of measurement and calculation of quantity

Item no.	Description of items of work	No.	dimensions			quantities	Total quantity	unit
			L	B	H			
1.	Earthwork in excavation	1	71.13	0.75	0.75	40.01	**40.01**	cum
2.	PCC in foundation 1:6:12	1	71.13	0.75	0.15	8.00	**8.00**	cum
3.	Brick work in foundation							
	1st footing	1	71.13	0.57	0.15	6.08		
	2nd footing	1	71.13	0.46	0.15	4.09		
	Plinth wall upto G.L	1	71.13	0.35	0.15	3.73		
	Plinth wall above G.L	1	71.13	0.23	0.35	5.72	**20.43**	cum
4.	D.P.C 1:2:4	1	71.13	0.23	-	16.35	**16.35**	Sqm.

Mild steel used in slab

Item	Description of items	length	Breadth	Height	Quantity
1.	M/S Iron work slab	88.45 sqm.	0.13 m	78.5 density of steel q/cum	9.02 q

5.	Brick work	1	71.13	0.23	3.30	53.98	53.98	cum
	Deduction							
	Door	8	0.90	0.23	2.13	0.44	3.52	cum
	Window	1	1.20	0.23	1.50	0.41	0.41 +	
	Total deduction	-	-	-	-	-	3.93	cum
	Final brick work	-	-	-	-	-	**50.05**	cum
6.	P/L IN 1:2:4 c.c slab	1	12.30	7.19	0.13	11.50	**11.50**	cum
7.	Plaster 1:2 work							
	Bed room 1	1	14.12	-	3.30	46.59		
	Bed room 2	1	15.24	-	3.30	50.29		
	toilet	1	6.14	-	3.30	20.26		
	lobby +kitchen	1	21.27	-	3.30	70.19		
	drawing room	1	13.76	-	3.30	45.40		
	porch	1	10.53	-	3.30	34.74		
							267.47	Sqm.

8.	Electrical work labor charges	1	40.6	23.6	-	951.75	**951.75**	sqft
9.	Sanitary and water supply work,	1	40.6	23.6	-	951.75	**951.75**	sqft
10.	flooring	1	12.37	7.19	-	88.45	**88.45**	sqm
11.	painting	1	81.05	3.30	-	267.47	**267.47**	sqm
12.	wireing	1	40.6	23.6	-	951.75	**951.75**	sqft

Abstract of estimated cost

Item no.	Particular of items of work	quantity	unit	Rate Rs. per	per	Amount Rs. Per
1.	Earthwork in excavation	40.01	cum	110	cum	4,401.20
2.	PCC in foundation 1:6:12	8.00	cum	2750	cum	22,000
3.	Brick work in foundation	20.43	cum	3300	cum	67,419
4.	D.P.C 1:2:4	16.35	sqmt	290	sqm.	4,741.5
5.	Final brick work	50.05	cum	3750	cum	1,87,687
6.	P/L IN 1:2:4 c.c slab	11.50	cum	7375	cum	84,812.5
7.	Plaster 1:2 work	267.47	sqm	210	cum	56,168.7
8.	Electrical work labor charges	951.75	sqft	12	sqft	11,421
9.	Sanitary and water supply work,	951.75	sqft	12	sqft	11,421
10.	Flooring	88.45	sqm	490	sqm	43,340.5
11.	painting with primer and two coat oil distemper	267.47	sqm	162.50	sqm	43,463.87
12.	sanitary materials and fitting	-	-	-	-	14,567
13.	M/S Iron work slab	9.02	q	5400	q/cum	48,708
14.	wiring	951.75	sqft	-	-	50,000

15.	planning	951.75	sqft	-	-	14,000
16.	supervisor	951.75	sqft	-	-	45,000
17.	soil filling	88.45	cum	-	-	20,000
18.	kitchen work	56	sqft	-	-	5500
19.	pop work	671.42	sqft	35	sqft	23,500

ACTIVITY CHART

schedule estimtion mtech — Classic Schedule Layout — 03-Apr-19 18:59

Activity ID	WBS	Activity Name	Original Duration	Remaining Duration	Start	Finish	Resources	Budgeted Total Cost	Actual Total Cost
Total			108	54	30-Mar-19 A	03-Jun-19		rs1,108,528.40	rs772,607.23
schedule estimtion mtech			108	54	30-Mar-19 A	03-Jun-19		rs1,108,528.40	rs772,607.23
A1000	NEWPROJ-2	start of project	0	0	30-Mar-19 A			rs0.00	rs0.00
A1010	NEWPROJ-2	planning	3	0	30-Mar-19 A	01-Apr-19	planning cost	rs14,000.00	rs14,000.00
A1020	NEWPROJ-2	layout	1	0	01-Apr-19 A	10-Apr-19	SITE ENGINEE	rs366.00	rs366.00
A1030	NEWPROJ-2	marking boundaries	1	0	02-Apr-19 A	10-Apr-19	SITE ENGINEE	rs686.00	rs686.00
footing			13	0	03-Apr-19 A	18-Apr-19		rs57,016.00	rs57,016.00
A1100	NEWPROJ-2	excavation for footing	3	0	03-Apr-19 A	13-Apr-19	LABOR, SITE E	rs3,858.00	rs3,858.00
A1110	NEWPROJ-2	pcc	1	0	06-Apr-19 A	15-Apr-19	MASON, LABO	rs12,566.00	rs12,566.00
A1120	NEWPROJ-2	footing reinforcement	1	0	15-Apr-19 A	16-Apr-19	STEEL BAR, S	rs13,040.00	rs13,040.00
A1130	NEWPROJ-2	casting reinforcement footing	2	0	16-Apr-19 A	18-Apr-19	MASON, LABO	rs27,552.00	rs27,552.00
column and tie beam			9	0	16-Apr-19 A	26-Apr-19		rs160,268.70	rs160,268.70
A1140	NEWPROJ-2	column reinforcement	2	0	16-Apr-19 A	18-Apr-19	STEEL WIRE,	rs34,340.00	rs34,340.00
A1150	NEWPROJ-2	casting column	3	0	18-Apr-19 A	22-Apr-19	MASON, LABO	rs95,568.00	rs95,568.00
A1160	NEWPROJ-2	plinth beam reinforcement	2	0	18-Apr-19 A	20-Apr-19	STEEL BAR, S	rs24,512.00	rs24,512.00
A1170	NEWPROJ-2	casting plinth beams	2	0	24-Apr-19 A	26-Apr-19	MASON, LABO	rs25,848.70	rs25,848.70
soil filling			2	0	22-Apr-19 A	24-Apr-19		rs1,972.00	rs1,972.00
A1180	NEWPROJ-2	soil filling	2	0	22-Apr-19 A	24-Apr-19	LABOR, SITE E	rs1,972.00	rs1,972.00
shuttering			6	0	24-Apr-19 A	01-May-19		rs5,916.00	rs5,916.00
A1200	NEWPROJ-2	shuttering for slab and tie bear	6	0	24-Apr-19 A	01-May-19	shuttering labor	rs5,916.00	rs5,916.00
slab casting			6	0	01-May-19 A	08-May-19		rs130,161.00	rs130,161.00
A1240	NEWPROJ-2	beam and slab reinforcement	5	0	01-May-19 A	07-May-19	STEEL WIRE,	rs58,475.00	rs58,475.00
A1270	NEWPROJ-2	casting beam and slab	1	0	07-May-19 A	08-May-19	MASON, LABO	rs71,686.00	rs71,686.00
brick work			10	3	08-May-19 A	02-Apr-19		rs328,987.10	rs230,290.97
A1280	NEWPROJ-2	side walls and all partion walls	10	3	08-May-19 A	02-Apr-19	MASON, LABO	rs328,987.10	rs230,290.97
staircase			48	1	03-Apr-19 A	29-May-19		rs76,011.00	rs56,105.00
A1290	NEWPROJ-2	staircase shuttering	2	0	20-May-19 A	22-May-19	SITE ENGINEE	rs4,344.00	rs4,344.00
A1300	NEWPROJ-2	staircase reinforcement	1	0	22-May-19 A	22-May-19	STEEL BAR, S	rs1,776.00	rs1,776.00
A1310	NEWPROJ-2	staircase casting	1	1	03-Apr-19	03-Apr-19	MASON, LABO	rs19,906.00	rs0.00
A1320	NEWPROJ-2	mumti shuttering	2	0	24-May-19 A	27-May-19	shuttering labor	rs3,544.00	rs3,544.00
A1330	NEWPROJ-2	mumti reinforcement	1	0	27-May-19 A	28-May-19	STEEL BAR, S	rs6,955.00	rs6,955.00
A1340	NEWPROJ-2	mumti casting	1	0	28-May-19 A	29-May-19	MASON, LABO	rs39,486.00	rs39,486.00

Page 1 of 2 — TASK filter: All Activities — © Oracle Corporation

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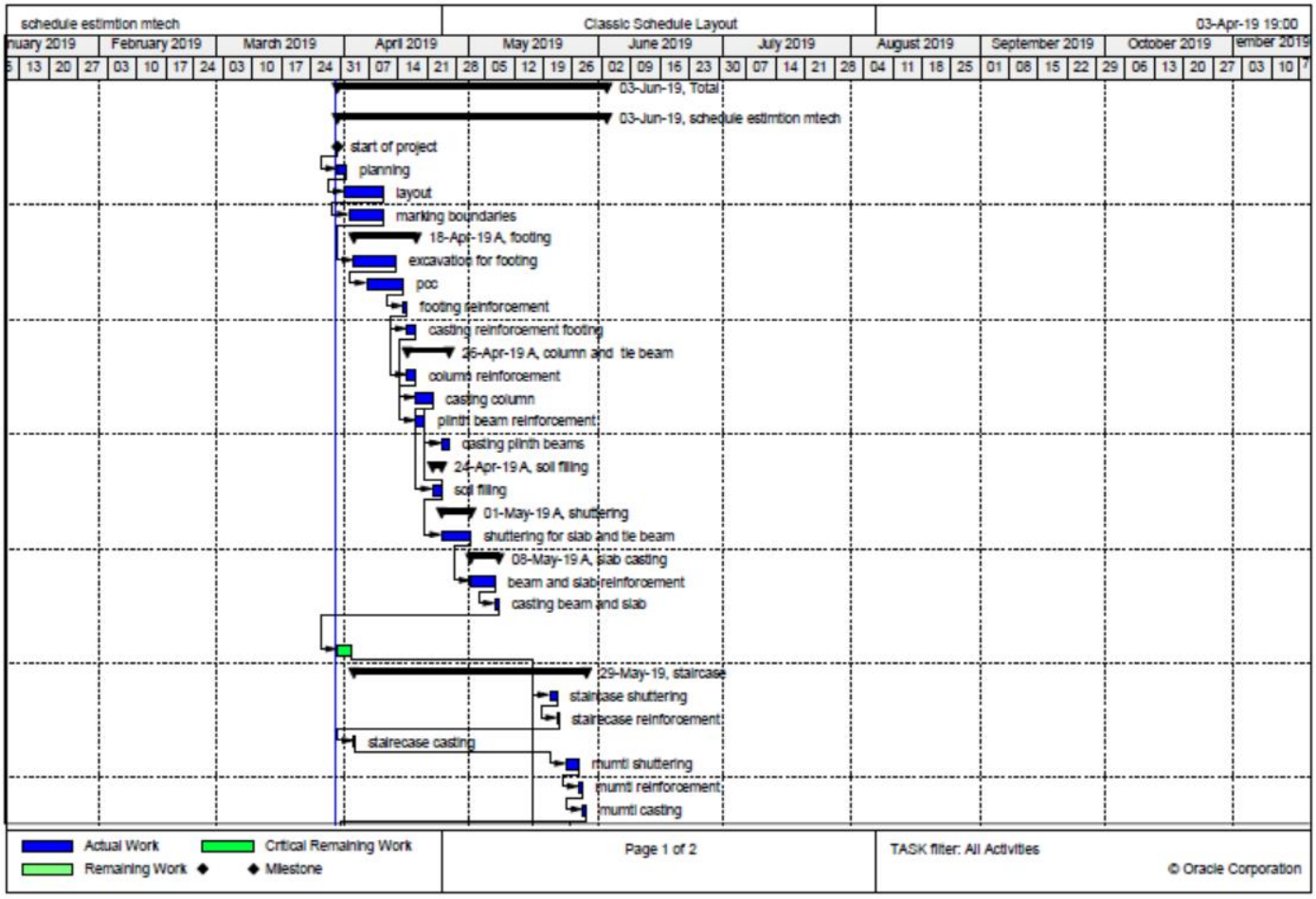
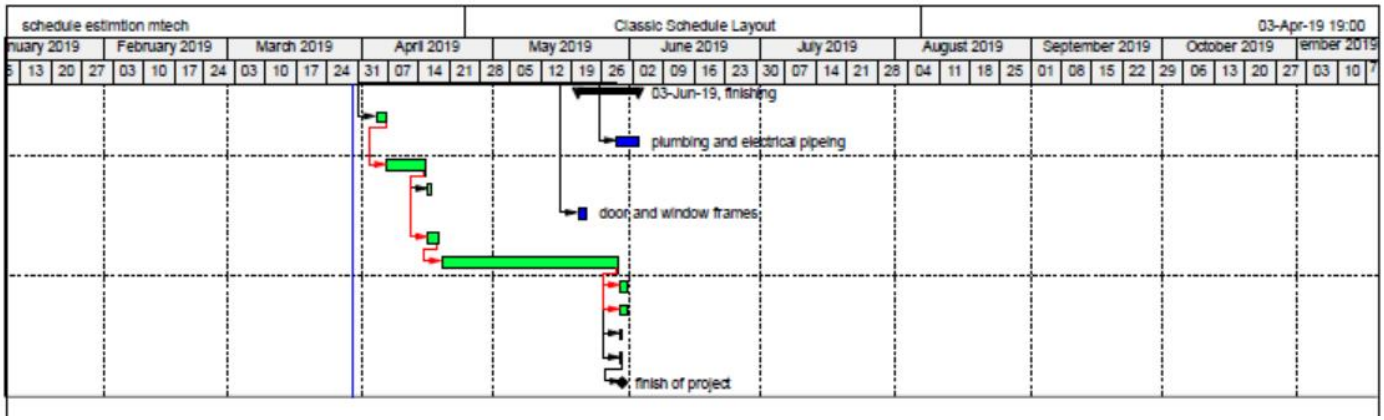
Activity ID	WBS	Activity Name	Original Duration	Remaining Duration	Start	Finish	Resources	Budgeted Total Cost	Actual Total Cost
finishing			65	50	20-May-19 A	03-Jun-19		rs313,124.60	rs96,805.56
A1350	NEWPROJ-2	plastering	7	3	29-May-19 A	06-Apr-19	MASON, LABO	rs52,834.60	rs31,700.76
A1360	NEWPROJ-2	plumbing and electrical pipeing	4	0	29-May-19 A	03-Jun-19	plumber, electri	rs22,344.00	rs22,344.00
A1370	NEWPROJ-2	flooring	8	7	06-Jun-19 A	15-Apr-19	SITE ENGINEE	rs49,888.00	rs4,968.80
A1380	NEWPROJ-2	kitchen top	1	1	15-Jun-19 A	16-Apr-19	granite work, SI	rs3,986.00	rs0.00
A1390	NEWPROJ-2	door and window frames	2	0	20-May-19 A	22-May-19	SITE ENGINEE	rs36,772.00	rs36,772.00
A1400	NEWPROJ-2	pop works	3	3	15-Jun-19 A	18-Apr-19	pop labor	rs1,050.00	rs0.00
A1410	NEWPROJ-2	painting work	35	35	19-Jun-19 A	29-May-19	painting	rs31,500.00	rs0.00
A1420	NEWPROJ-2	hardware	2	2	30-Jul-19 A	31-May-19		rs10,000.00	rs0.00
A1430	NEWPROJ-2	electrical works	4	2	30-Jul-19 A	31-May-19		rs19,750.00	rs0.00
A1460	NEWPROJ-2	sanitary fitting	1	1	30-Jul-19 A	30-May-19		rs80,000.00	rs0.00
A1470	NEWPROJ-2	kitchen sink	1	1	30-Jul-19 A	30-May-19		rs5,000.00	rs0.00
A1480	NEWPROJ-2	finish of project	0	0		30-May-19		rs0.00	rs0.00

GANT CHART





VII RESULTS AND DISCUSSIONS

Brief summery over the results obtained by the current study leads to the below conclusions:

1) The project completion date according to the planned schedule is **16 AUG-2019**.
2) Total of 35 activities are involved with this project from its initiation to delivery of the project with various steps.
3) The budgeted cost by the base estimation method is **8,27,150** Rs .
4) Total duration **137 days**.
5) The actual cost by schedule estimation with the help of **project management software** is **7,72,607.23 Rs**.
6) Total duration after scheduling estimate with the help of project management software **123 days** .
7) It provides an idea of arranging the required resources for the upcoming activity
8) The report of allocation of resources helps in cost and time saving which results in increase of economy.

9) It is very helpful in planning and scheduling of the projects quickly and conveniently.
10) In this software there is facility to get the attractive customized colorful Gantt charts, network diagrams, histograms and time based logic diagrams.
11) It controls budgets, estimates even after changes at finishing point to relic successful delivery of the project.
12) It enables spot and instant planning for the forthcoming days, weeks, months, years and so on and activities.
13) It creates good co-ordination among the Labours, Material, Equipment and subcontractors to make sure on-schedule and on budget completion.It records actual cost, earned value, units and planned value by once customizing the financial year period which aids in comparison of future and current trends.

CONCLUSION

The main goal and the mission of the study was to know the role of planning, Scheduling of the project progress with timely accomplishment of any construction project. This terminus was accomplished with the aid of literature references and the unique methodologies with the help of Primavera project management software. In this thesis the study proved as a cicerone in interpreting the progress of Residential building, The output results of the current case study defies the vitality of efficient planning and Scheduling. Along with that the essential need and the influence of the project management software like Primavera P6 in any type of medium to large scaled Construction Projects.

So at last I may conclude that there is a need for schedule estimation in a residential building as it overcomes the extra expenses and also reduces the chances of the delay for the completion of the project. Here with the help of schedule estimation we can easily track and monitor our project progress on daily basis or weekly basis.

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