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Planning, Analysis & Construction Controlling Of G+5 Building By Using Primavera

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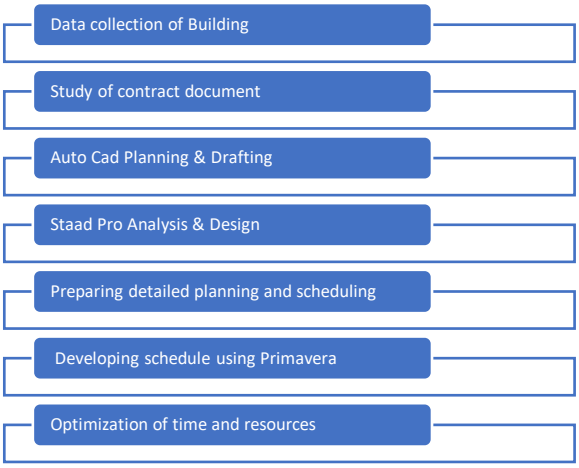
Abstract *- Now a days, the people from village are coming to towns for employment and educational facilities hence with the limited land available so as to proposed the apartment building and individual houses are feasible with each other. The main objective of this project is to analyse and to construction scheduling of an apartment building (G+5) using STAAD Pro and Primavera P6 software. First of all, the planning is done using AutoCAD and code refers for this project is IS 456-2000. The first and foremost thing which we can get by effectively planning in primavera is start date on 01 July 2019 and finishing date of 27 Dec 2022 project. Primavera P6 helps in effectively scheduling the project by assigning two relationships at a time to each activity and considerably reduces the float. All the important steps like creating an EPS, creating a WBS, linking of activities according to their interdependence and availability of resources and determination of critical path are clearly exhibited in this report. Budgeted cost, time, and materials of the project are obtained by resource allocation.*

Keywords - *STAAD Pro, Primavera p6, Auto CAD, Code, planning, scheduling.*

I. INTRODUCTION

Due to growing population & less available land, multi – storied building is constructed to provide accommodation for many families in limited area. In this project, we have drafted G+5 building plan in AutoCAD and Analysis and Design of structure is done by using STAAD Pro and then Scheduling and controlling is done by using Primavera software. Management of a construction project mission entails the multi directional interaction of dynamic forces represented by its scope, time, resources, costs and quality. There is a dynamic link on how to manage scope, resources, product quality and how to stay within time and budget limits. Here we are use primavera p6 to defined in terms of quality specifications, completion time, budgeted costs.

II. METHODOLOGY



III. LITERATURE REVIEW

A. Literature Review on Auto Cad

F.Lazzali, S.Bedaoui:- performance of masonry building in Algeria. The authors have categorized data of numbers and types of house construction to draw the plan for AUTOCAD software. To drafting the high rise building for (g+6). Light weight construction materials, standard workmanship, interior quality of mortar used to construct the building.

B. Literature Review on STAAD pro

Vrushali S. Kalsait, Dr. Valsson Varghese: - In this paper the structural analysis software STAAD Pro v8i ‘is used to study the effect of sloping ground on multi-storeyed building performance during earthquake. The purpose of the paper is to perform linear static analysis of medium height RC buildings and investigate the changes in structural behaviour due to consideration of sloping ground.

V.Varalakshmi: The design and analysis of multi-storeyed G+5 building at Kukatpally, Hyderabad, India. The Study includes design and analysis of columns, beams, footings and slabs by using well known civil engineering software

named as STAAD.PRO. Test on safe bearing capacity of soil was obtained.

C. Literature Review on Primavera P6

Ghadge et. al. (2017) Project cost is the one of the governing factors in project success. Project management is used to increase productivity in terms of human resource and materials. Earned value management (EVM) is a project performance evaluation technique which has been adapted for application in project management. The technique helps in comparison of budgeted cost of work to actual cost. The present study deals with the review of the project management involving earned value analysis.

B.S.K.Reddy (2015) - They did resource optimization exercises on two on -going projects in Dubai, UAE. They individually leveled and then combined option with aggregated and then levelled clearly indicates reduction in demand of resources by 5.65% in later option, which could be best considered for economy. They concluded Resource levelling at project job site and forwarding demand leads a possible sharing of resources among projects.

Bagade et. al. (2018): - Explored that Planning, booking and Resource levelling assumes an imperative part in any development venture perhaps it is development of building or development of street. Without appropriate arranging, booking and asset levelling development industry does not get benefit over the venture. For this reason, legitimate programming's and methods must be use. This paper is focusing on the benefits of Oracle Primavera P6 Software. The most recent rendition of Primavera is P6-17. In any development work tremendous measure of printed material is required, which makes the administration extremely oppressive. By utilizing Oracle's Primavera P6 Software printed material can be decrease, bringing about diminishment of weight. Primavera P6 give change in development administration. Primavera P6 is the time redeemable device, with legitimate asset enhancement.

IV. DESCRIPTION OF SOFTWARE

In this project we have used three software's. They are

1. AutoCAD
2. STAAD Pro
3. Primavera P6

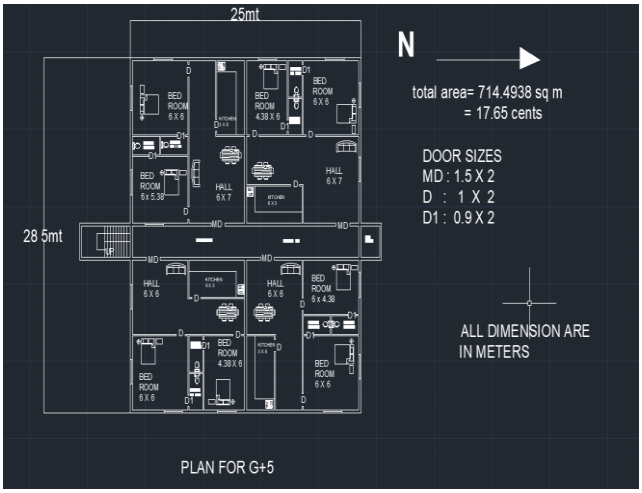
A. ROLE OF AUTOCAD

AUTOCAD is a computer aided design (CAD) program used for 2D and 3D design and drafting for the high-rise apartment building(G+5) design and drafting for various fields in engineering like civil, mechanical, electrical, automation, architecture etc. It was first launched in 1982 by Autodesk, Inc.

AutoCAD Architecture allows designers to draw 3D objects such as walls, doors and windows, with more intelligent data associated with them rather than simple objects. Use of AutoCAD has drastically reduced the drafting time when done manually thus saving time which can be used in other productive work.

AutoCAD or Computer Aided Design is a very helpful tool in drafting and designing any structure. AutoCAD uses a Graphical User Interface for the purpose of drafting and designing any structure. The software has various inbuilt tools for complex drafting. Also, AutoCAD can be used for 2D and 3D design and also for perspective design. Below is a screenshot of the GUI of AutoCAD. With the help of AutoCAD all the drafting for the project has been done.

It has made the life of a drafter quite easy than the conventional drafter using paper and pencil. It has made possible to make easy changes in the drawing as and when required. Also, various commands such as COPY, OFFSET, ROTATE, MOVE have made the tedious process of redundant work quite easy and faster. Also, one of the important features of AutoCAD is the import and export feature which allows users to move their plans drawn using AutoCAD to other design software's such as STAAD Pro with the help of DXF file format which has in turn reduced load on the designer. Also, structural designs made on STAAD and ETABS are also exportable to AutoCAD for minute detailing required.



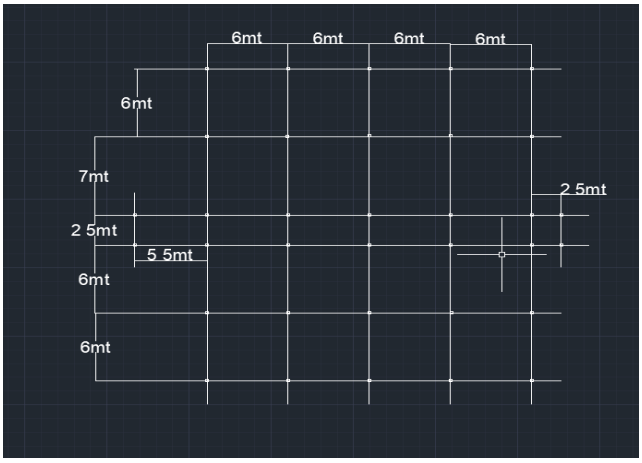


Fig: 1 G+5 Multi storied building Plan with Column Layout

In the above column layout picture, the black lines signify the beam Centre line while the white rectangular boxes signify the Columns. The beams have a cross section of 0.3x0.4 m. The columns have a cross section of 0.3x 0.45 m. Slabs have a uniform thickness of 150 mm while the

staircase slab has a thickness of 200mm. The floor to floor to height is kept at 3 m.
All the work has been done in layers in AutoCAD, for easy editing and viewing. Layers make it easy to manipulate each individual layer making it visible and invisible for clarity as well as locking the layer to prevent editing in them. The proposed project has Multi stored building in each floor having a 2BHK layout along with a study and a family lounge. Each Multi stored has two master bedrooms with attached bath n toilet. There is a total of in 20 houses in 5 floors. The ground floor of the building will be used as parking.

C. ROLE OF STAAD PRO

STADD or STAAD Pro is a structural analysis and design computer software was developed by Research Engineers International CA. It was acquired by Bentley Systems in 2005. It is one of the most widely used design and structural analysis software's for concrete, steel and timber design codes. STAAD pro allows designers and structural engineers to design and analyses virtually any type of structure through its very flexible modelling environment, fluent data collection and advanced features.
It was one of the earliest structural analysis and design software with a user friendly and support for building codes of countries. It is nothing but to analysis the framed structure and it gives the detailing of the particular structure. We can design a structure for any types of loads and load combination with code provisions. It is easier way of redesign a structure. STAAD Pro software is used for static or dynamic analysis for structures such as bridges, low-rise or high-rise buildings, stadiums, steel structures, etc. First step in STAAD Pro is to specify the geometry of the structure and then the properties of the members are mentioned. Then the supports are generated and loadings are specified on the structure. Finally, the structure is analysed.

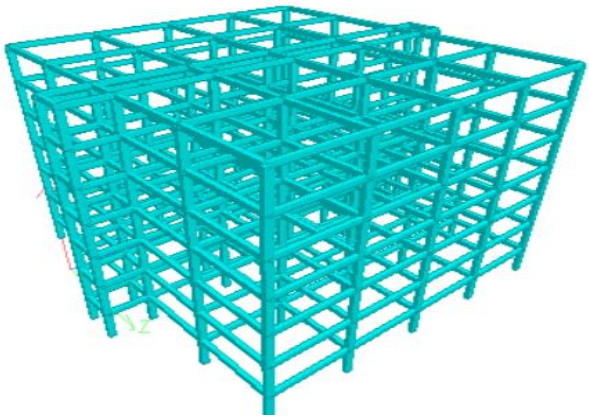


Fig:2 Rendered View of Model.

D. DEAD LOAD

a constant load in a structure (such as a bridge, building, or machine) that is due to the weight of the members, the supported structure, and permanent attachments or accessories

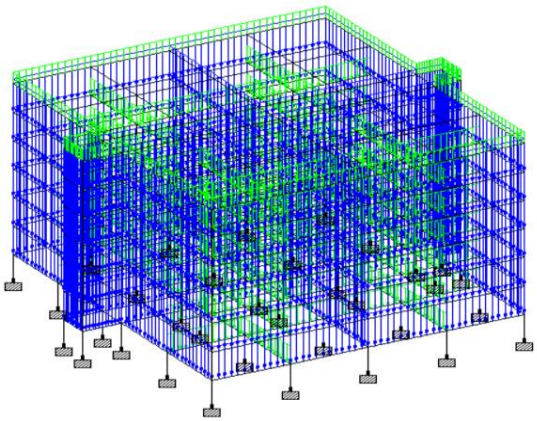


Fig:3 Dead Load

E. LIVE LOAD

Imposed load is created by the meant use or occupancy of a building together with the load of movable partitions, distributed and concentrated loads, load due to impact and vibration and dust loads. Live loads are specified in IS 875 (Part 2)

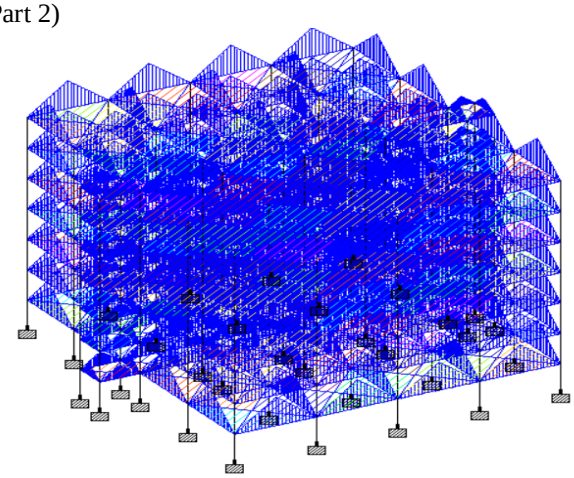


Fig:4 Live Load

F. WIND LOAD

These loads rely on the rate of the wind at the situation of the structure, permeable Ness of the structure, height of the structure etc. They will be horizontal or inclined forces. Wind loads are specified in IS 875 (Part 3).

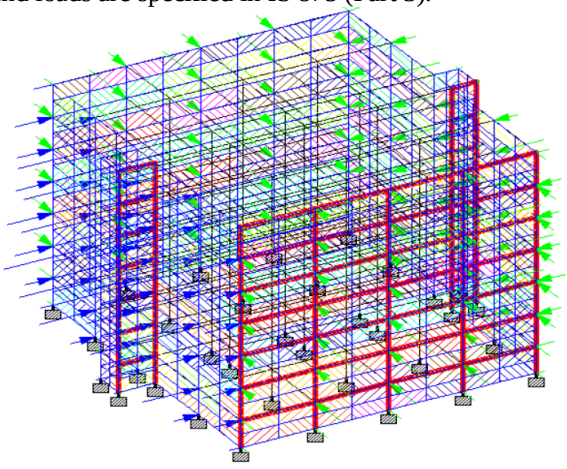


Fig:5 Wind Load

E. DESIGN

After completion of analysis, we go for design of concrete. Design is done as per IS456- 2000.

- Select design
- Select concrete
- Select code IS456-2000
- Select parameters (compressive strength of concrete 25000, yield strength of reinforcement 415000, yield strength of shear reinforcement 415000)
- Give commends (design beam, design column, design element and take off) Select Fc and assign to view. Select fymain and fysec assign to view. Select design beam (select beams parallel to x and beams parallel to z) assign. Select design column (select beams parallel to y) assign. Select design element assign to view. Take off it give total concrete and steel used in project. After completion of assigning load click run analysis.

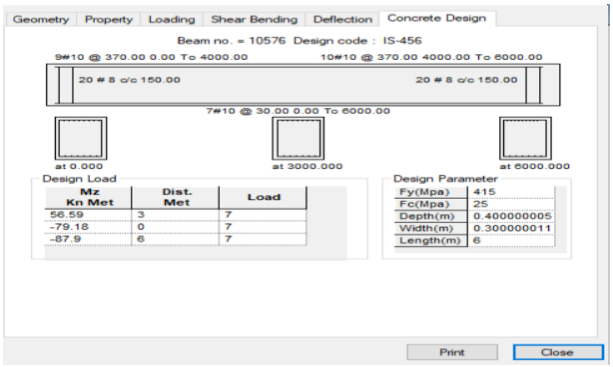


Fig:6 Reinforcement details of beam

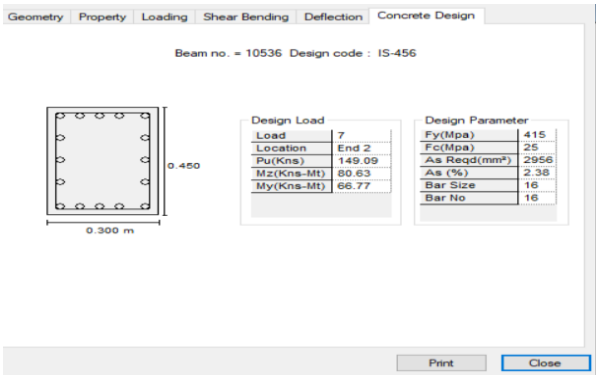


Fig: 7 Reinforcement details of column

F. ROLE OF PRIMAVERA P6

Oracle primavera p6 is also known as EPPM which is abbreviated as enterprise project portfolio management. It is also the most powerful strong and easy handling software and used solution for worldwide, Organizing, planning, managing, and execute project, programs and portfolios. Primavera P6 software helps to achieve the maximum return on investments in project and progress. Primavera P6 gives a single solution for multi projects of any size. Primavera can handle the projects of large size according the persons need.

History of primavera: - In 1983, primavera came into System Corporation, whereas in 2008 primavera was undertaken by oracle and is now known as oracle primavera

Primavera P6 version provides us a sophisticated integrated project portfolio management (PPM) solution which consists of role-specific tools that has to satisfy each team member's needs, their responsibilities, and skills. This solution uses a standard Windows interfaces, client/server architecture, Web-enabled technology, and stand-alone (SQL Server Express) or networked based (Oracle and Microsoft SQL-Server) databases.

Primavera offers us the following software component and various better options for us to choose from: Primavera P6 Professional was built to get us running, planning and scheduling as early as Possible. With a very easy and an intuitive navigation, we can begin planning, scheduling and controlling our project faster than anyone can ever think possible. Required by many of the owners in their project specifications, this product is the gold-standard when it comes to its planning and managing projects. Whether the project is a sophisticated complex multi-billiondollar infrastructure project or an easy and simple residential or commercial building, P6 Professional is what we need.

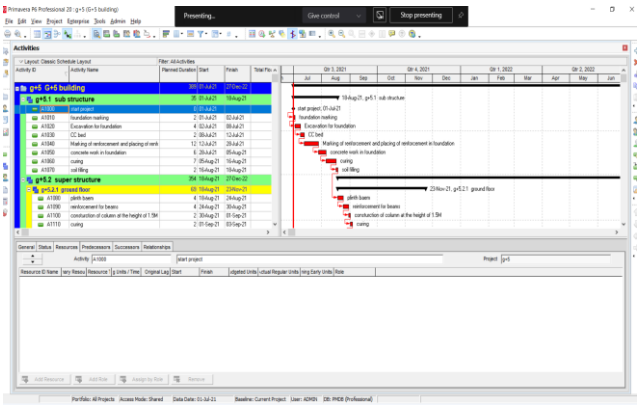


Fig: 8 Interface of Primavera

G. Data collection of building

A. Pre data collection: This stage consists of literature review, setting of objectives and problem statement and based on that selection of research area has been done. For the research purpose, Hostel building is taken for study.

B. Data collection: Frequent site visits were carried out to identify the construction sequence. Of the building and also practical time durations for executing activities were worked out. The data required for conducting analysis in the software is collected.

C. Post data collection: The analysis will be carried out in Primavera software, for tracking of the project schedule and all the reports and results generated from the software will be studied

V. STUDY OF CONTRACT DOCUMENT

Contract Document is the written documents that defines the basis of contract including both parties' roles, responsibilities, and detailed description of the work or

service such as drawings, specifications, procedures, any other conditions, etc. The Contract Document should include sufficient information to be able to complete the work or service.

1. Title page - Having the name of work, contract bond numbered.
2. Index page - Having the contents of the agreement with page references.
3. Tender notice - Giving brief descriptions of the work, estimated cost of work, date & time of the tender, amount of earnest money & security money, time of completion, etc. Earnest money, usually 2% of the estimated cost, is deposited along with tender.
4. Tender form - Giving the bill of quantities, contractors rates, and total cost of works & time for completion, progress of works, security money, penalty cause, etc.
5. Bill of quantities or schedule of quantities - Giving quantities & rates of each item of work & cost of each item of work & the total cost of the whole work.
6. Schedule of issue of materials - Giving list of materials to be issued to the contractor with rates & place of issue.
7. General Specifications - Specifying the class & type of works in general. ***i.***
8. Detailed Specifications - Specifying of each item of work, & of each material to be used in the work.
9. Drawings - Complete set of drawings including plans, elevations, sections, detailed drawing, etc. & site plan, all fully dimensioned.
10. Conditions of contract - Containing the terms & conditions of contract in detail.

- Rates inclusive of materials, transport, labour, T and P all other agreements necessary for completion of work,
- Amount of the security money,
- Time for completion of the work,
- Progress to be maintained,
- Penalty for unsatisfactory & bad work, for failure in maintaining progress, for delay in completion,
- Mode of payment, running account payment, security money refund,
- Extension of time limit of contract,
- Rules for employment of debatable agency, termination of contract,
- Minimum wages to labour, compensation to labour,
- Authority deciding extra items & contractor claims, etc. ***ii.***

VI. STEPS INVOLVED IN MONITORING AND CONTROL

A. CREATING EPS

To create an ideal schedule for any project, first step is to collect data available for the project. The following steps can be followed in Primavera P6 software. Create the complete structure of the company with its branches, which is executing the project using primavera P6. This is known as Enterprise project structure (EPS).

B. CREATING NEW PROJECT

The project contains a set of different activities and associated information that constitutes a plan for creating a product or service. The project is created under respective divisions in EPS. The project can be given planned start and finish dates. The project is assigned a calendar which can be global, resource or project calendar.

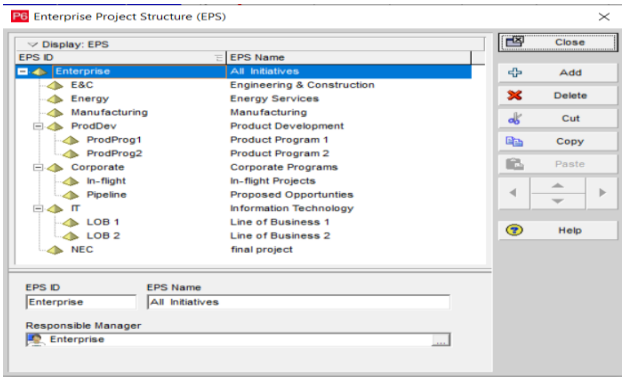


Fig:9 Enterprise Project Structure

C. CALENDER

Calendars enable you to define available workdays and work-hours in a day. You can also specify public holidays, recognized holidays, company's RDOs and project-specific work/non-workdays. You can establish an unlimited number of calendars to accommodate different work patterns. There are three types in calendars.

They are as follows;

- Project Calendar
- Resource Calendar
- Global Calendar

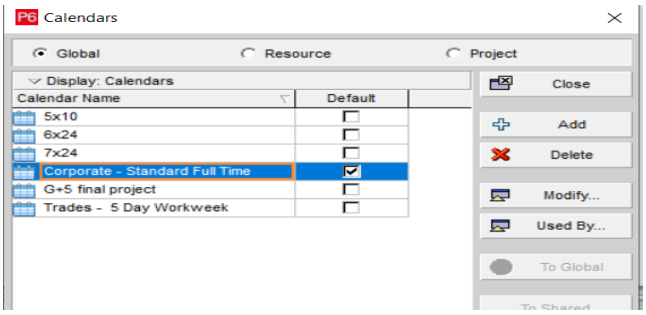


Fig:10 Calendar

D. CURRENCY

A currency in the most specific sense is money in any form when in use or circulation as a medium of exchange, especially circulating banknotes and coins.

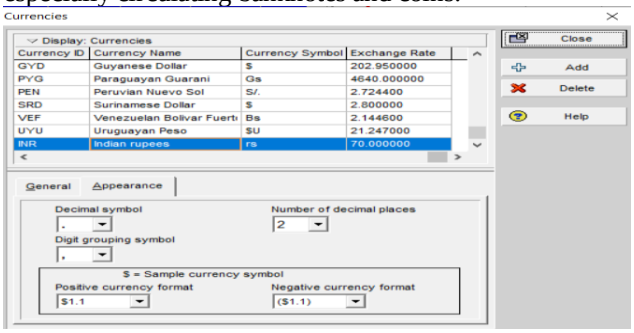


Fig:11 Currency

E. WORK BREAK DOWN STRUCTURE (WBS)

It is hierarchy structure to which activities are assign. It is used to define organization project elements so that you clearly identify the delivery of its report summaries, schedule and cost data at different levels of details.

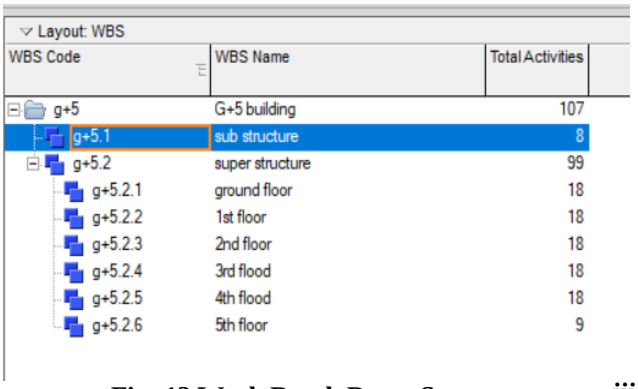


Fig: 12 Work Break Down Structure ***iii.***

F. ACTIVITY

Activities are the basic work elements of a project. An activity is also known as a task, item, or event. Activities typically have estimated resources, costs, and durations. However, milestone activities do not have any duration or cost

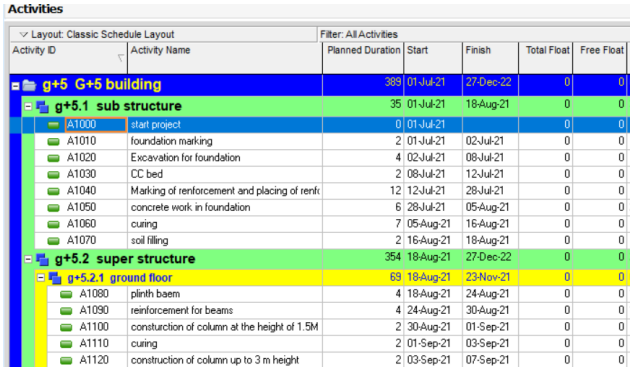


Fig: 13 Activities

G. GANTT CHART

A graphic display of schedule related information listing project elements on left side of the chart. Date across the top and activity duration are shown as date placed horizontal bars. It is also known as Bar Chart

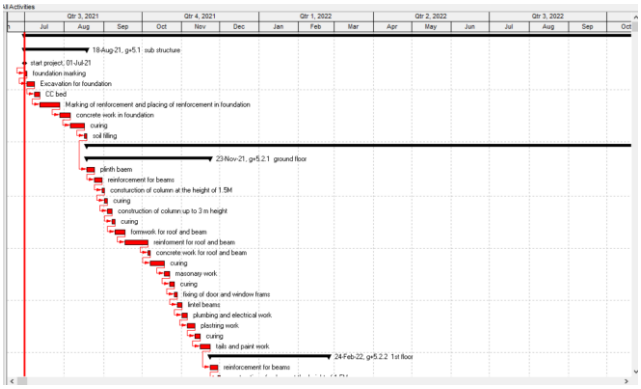


Fig:14 Gantt chat

H. UNIT OF MEASURE

User-Defined Fields (UDF's) enable you to add an unlimited number of custom fields and values to the project database. Resource UDFs enable you to create a custom unit of measure, so you can track critical items.

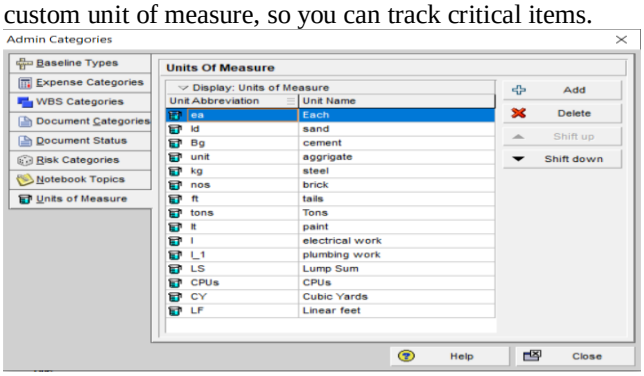


Fig: 15 Unit of Measure

I. RESOURCE ASSIGNING

The resource allocation window shows all the resources grouped by labour and non-labour. An approximate rate analysis was done for rates of individual resource groups, considering the various component resources. Most of the resources are taken as material. Machines are taken as non–labour and human worker is listed as labour.

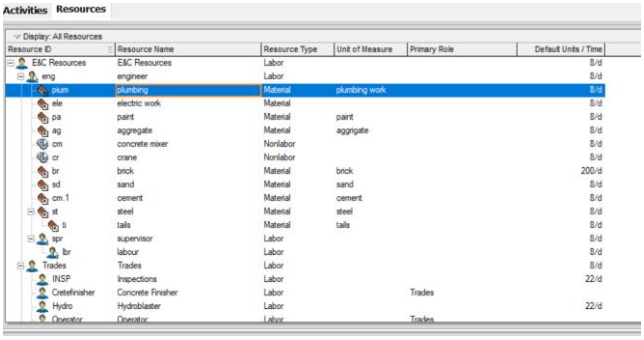


Fig: 16 Resource

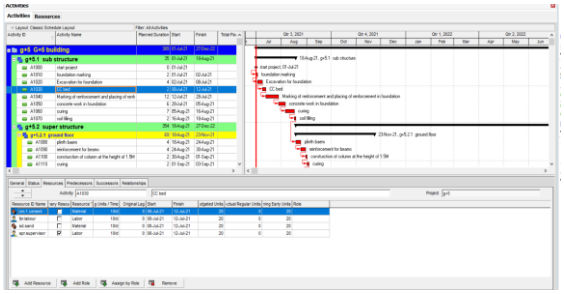


Fig:17 Resource Allocation

VII. CONCLUSION

Planning, monitoring and controlling, as well as the need and effectiveness of the project management software like Primavera P6 in a construction project 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 methodology involved in monitoring and control the study proved to be a guide line in understanding the progress of 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 running project. an efficient and cost-effective new project management plan is brought to conclusion.

VIII. ACKNOWLEDGEMENT

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