COMPREHENSIVE PLANNING, ANALYSIS, DESIGN AND COST ESTIMATION OF A RESIDENTIAL BUILDING

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Abstract:

One of the major problems that the country facing rapidly growing population, which necessities more facilities in the restricted availability of land this can be solved to a certain extent with the construction of residential building. A residential building is defined as a building which provides accommodation like individual houses or private dwellings, apartments, dormitories, hotels etc., In this project Analysis and Design a G+5 residential building in the area of 40ft x 60ft with 3 bedroom, one hall and kitchen will be follow the municipal rules and regulations and also follow the rules of local guide lines. For analysis and design using STAAD pro software by giving gravity loads like dead loads and live load as per IS 875 (part-1), IS 875 (part-2) and IS 875(Part-3) -1987. Finally estimate the total cost of building.

I. INTRODUCTION:

Shelter is the one of the basic needs of the habitation. In this project we have complete the planning designing and estimating of the residential building. The project is completed with the references to the Indian standard codes. In our project we are introducing our topic "Planning, Designing and Estimating of Residential Building". Structural design is an art and art and science of designing with economy and elegance, a safe, serviceable and a durable structure. The entire process of structural planning and style requires not only imagination and conceptual thinking but also sound knowledge of science of structural engineering besides knowledge of practical aspects, such as relevant design codes and bye-laws, backed by sample experience, institution and judgment. In this project, an attempt is made on planning, design and estimation of residential building. The main object of our project is to know the various aspect of building like planning, designing and estimation. Before construction of any residential building, we required making plan on AutoCAD, normally AutoCAD software is used for planning of residential building in 2D drawings form that we can draw elevation and sections of buildings and Revit is used to draw 3D drawing. The design of residential building is administered as per Limit State analysis. The various IS code are used for design of Residential building. Estimations are completed by using rates from schedule of Rate (2020- 21) by Public Work Department. The basic need of human existences is food, clothing and shelter. The man has been making efforts in improving their standard of living .The points of his efforts are to provide economic and efficient shelter .The possession of shelter gives a feeling of security, responsibility and shows the economical status of the man. Every human being has an inherent liking for a peaceful environment needed for his pleasant living, it can be achieved by having a place of living situated at the safe and convenient location. The engineer has to keep in mind the municipal conditions, building byelaws, environment, ancient capacity, water supply, sewage arrangement,

provision of future, aeration, ventilation, vaastu etc.., in suggestion to a particular type of plan The residential building ha proper ventilation, it is provide with sufficient doors, windows, structural analysis means determination of the general shape and all the specific dimensions of particular structure so that it will perform the function for which it is created and will safely withstand the influences which will act on it throughout its useful life Due to concentration and increase of population into urban cities, there is a need to accommodate the influx in urban cities. However, due to rapid increase of land cost and limited availability of land, construction of multistoried buildings is taking part in our daily life.

Problem Definition:

Planning: Planning of the residential building is the arrangements of the various components of units of a building in systematic manner so as to forma meaningful and homogeneous structure to meet its functional purpose. Building planning is the graphical representation of a building will be looked like after construction.

Design: The design is process of section percussion from the analysis results by using suitable analysis method. The aim of design is to achievement of an acceptable probability that structures being designed will perform satisfactorily during their intended life

Estimation: A cost estimate is defined for this report/project as the initial projected building construction cost figure. Cost estimation is the process by which, based on information available at a particular phase of project development, the ultimate cost of a project is estimated. This quantification of cost is the initial figure that allows the project to proceed to the next phases for final design and construction.

Aim of Project: The aim of the project is to plan, design and estimation of framed structure of a residential building.

II. METHODOLOGY:

First, we visited the site where we have to build the residential building after that we measured the dimensions of the field then we started planning according to the dimensions of the plot. A drawing was made for the plan of the plot with the help of software Like AutoCAD and Revit.
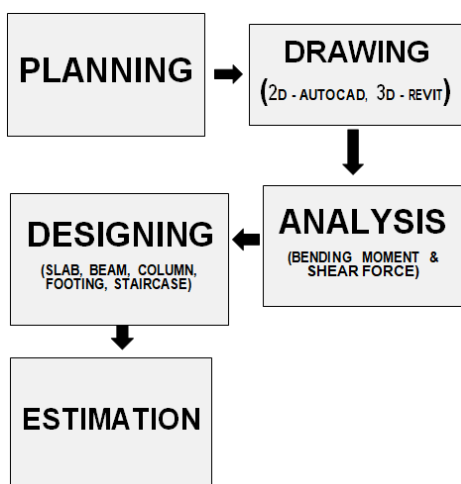

Fig.1. Flowchart methodology

After that we started our analysis on the basis of the plan made and it can be done manually or through software but we are doing it with the help of Staad Pro V8i. After this Designing will be started. Bending moment, shear force, slabs, beams and others factors will be taken into account while designing the residential building. At last estimation of the building will be done by taking all the material used while Construction of the residential building and it will also include the labor charge on it. We used AutoCAD for creating 2D, and Staad pro for analysis of the residential building. Revit was also used to create the 3D view of the residential building.

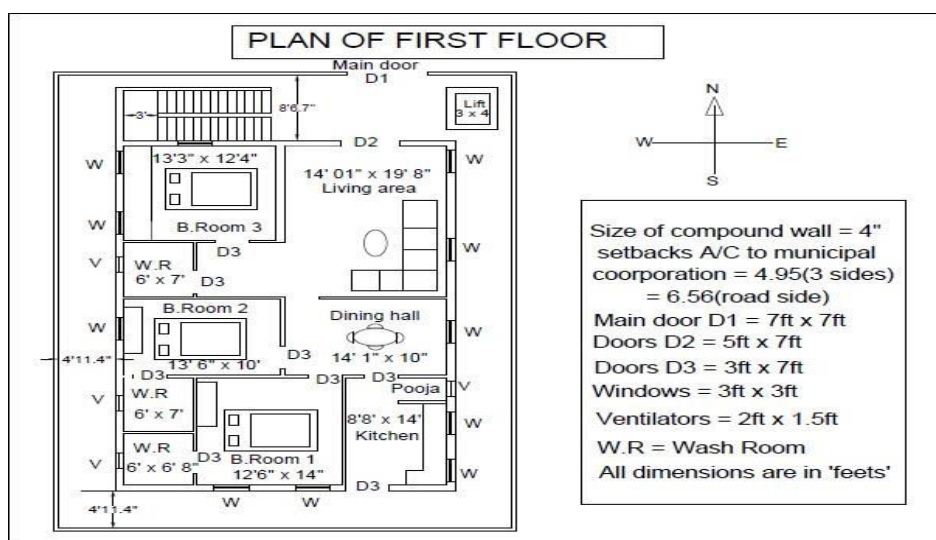## III. PLAN VIEW OF G+2 RESIDENTIAL BUILDING
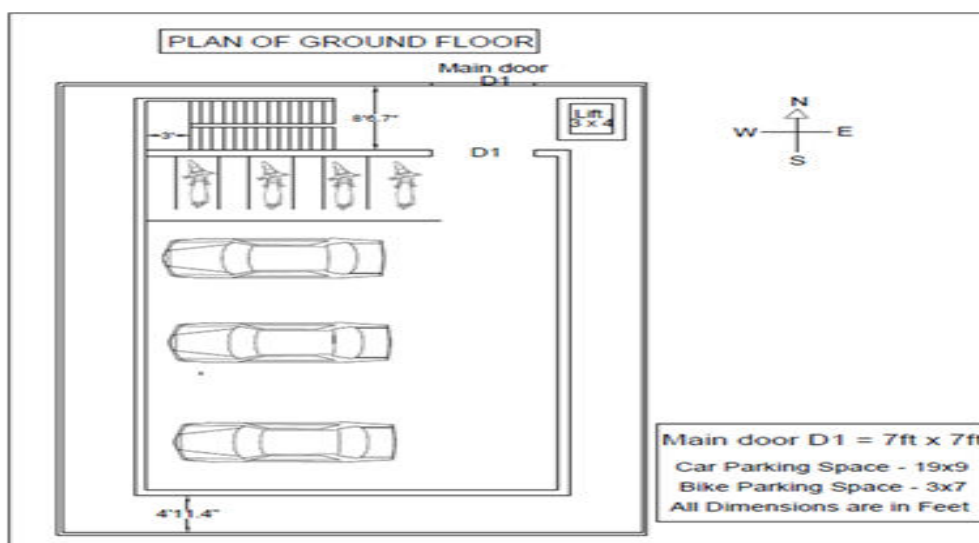
Fig.2. Ground floor Plan

Fig.3. First floor Plan
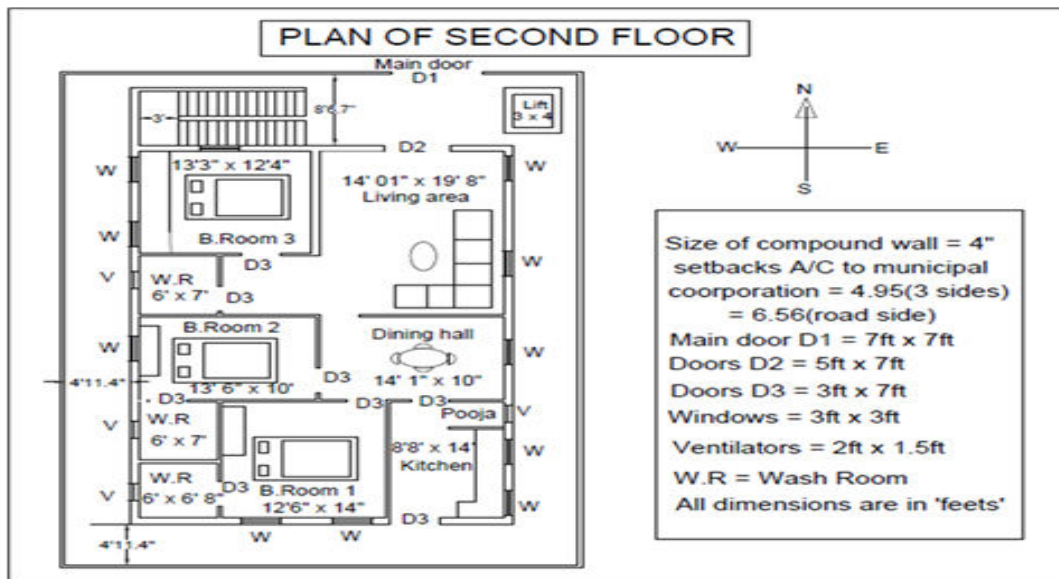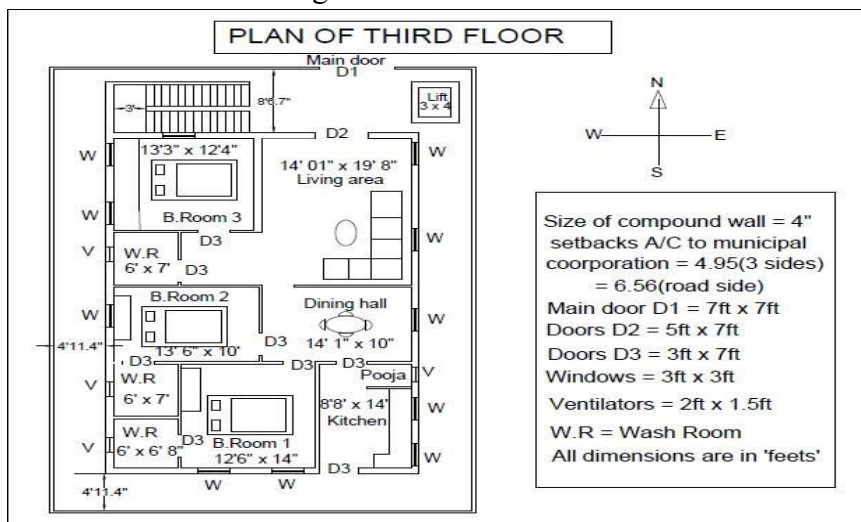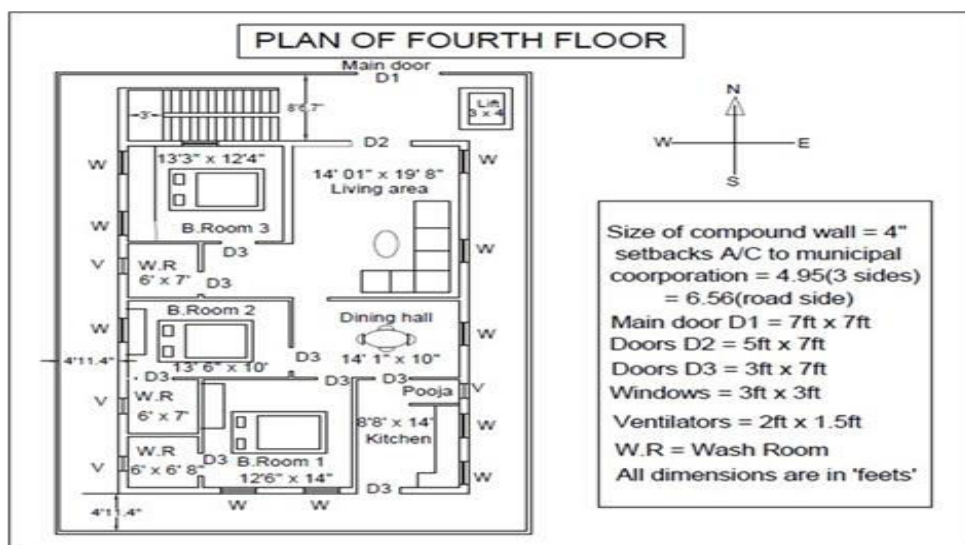
Fig.4. Second floor Plan
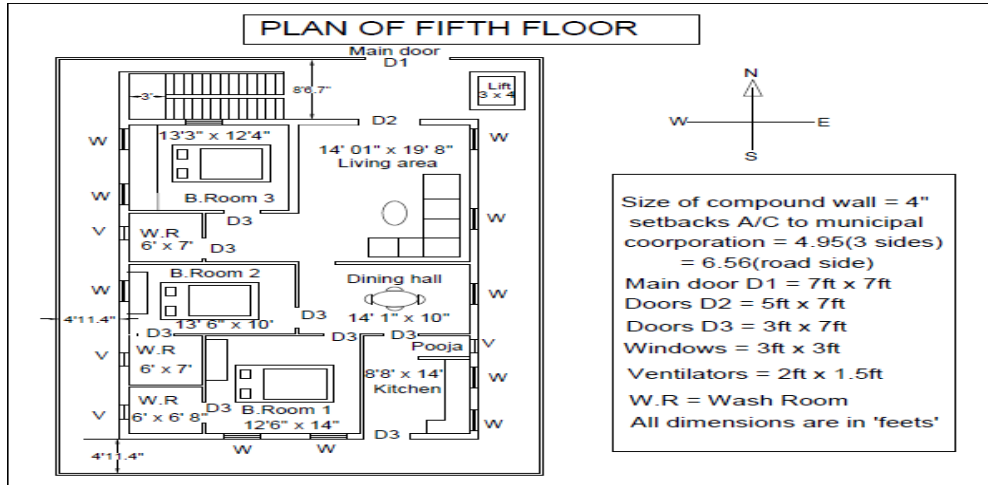

Fig.5. Third floor Plan
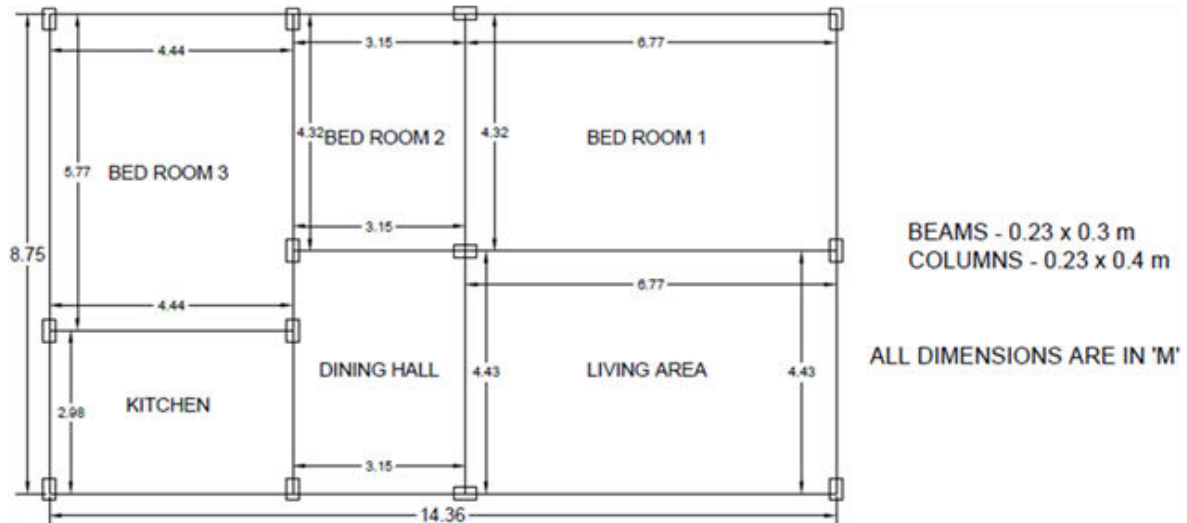

Fig.6. Fourth floor Plan

PLAN OF FIFTH FLOOR

Fig.7. Fifth floor Plan

Fig.8. Grid line marking

IV. ANALYSIS OF BUILDING IN STAAD Pro V8i:

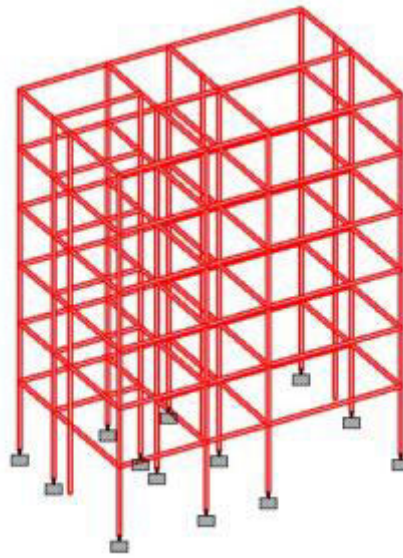| 1	Type of Building	Residential Building (G+5)
2	No. of Stories	G+5
3	Floor height Ground Floor Remaining floors	3.5m 3.0m
4	Material	Concrete (M20) and reinforcement of steel (FE415)
5	Size of beam	230mm x 300mm
6	Size of column	230mm x 400mm
7	Size of wall	300mm

Table.1. Building Data for Analysis

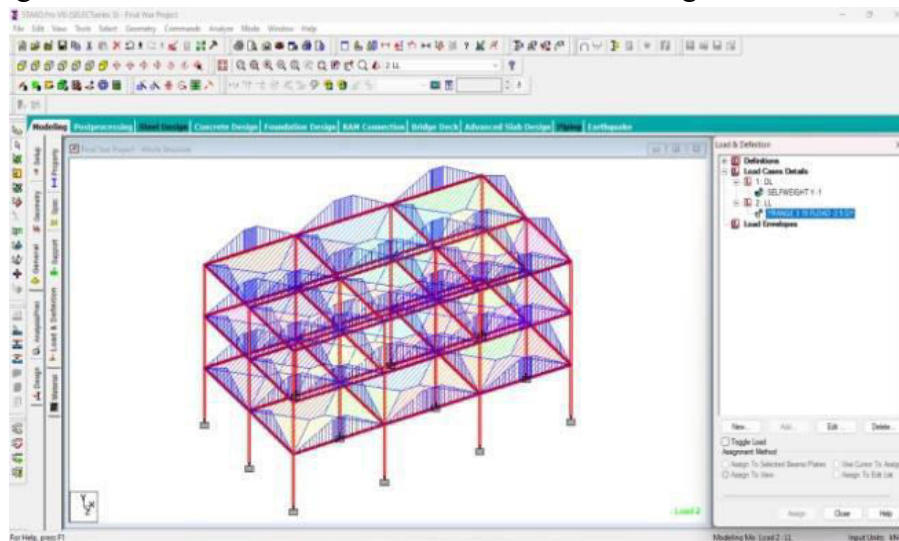Fig.9. Three dimensional rendered view of the building from STAAD Pro

Fig.10. Live loads Distributed to the nearing supports in Building Components
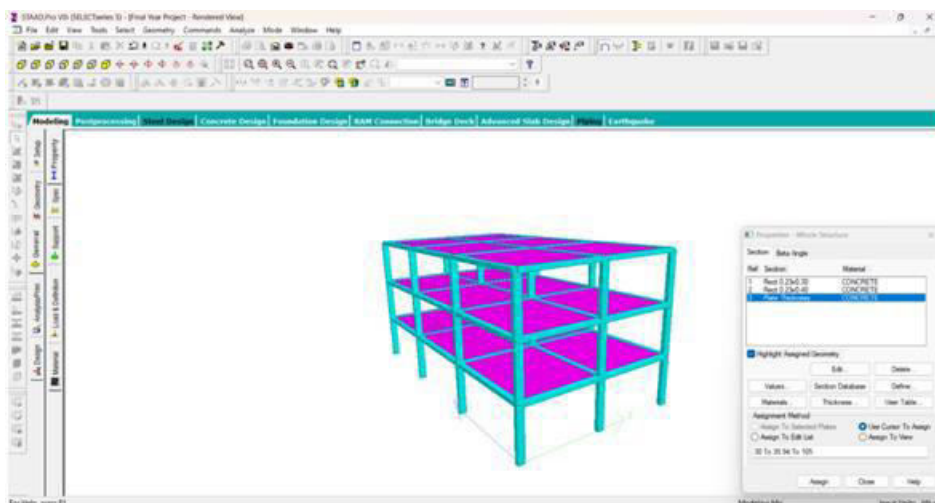

Fig.11. Rendered View of Beams, Columns, Slabs of Residential Building with Plate mesh

V. ESTIMATION:

Estimate for a work or project is necessary mainly for the following purposes:

1. To ascertain the necessary amount of money required by the owner to complete the proposed project. For public construction works, estimates are required in order to obtain administrative approval, allotment of funds, and technical sanctions.

2. Ascertain quantities of materials required to program their timely procurement.

3. Calculate the number of workers that are to be employed to complete the work within the scheduled time of completion.

4. Assess the requirements of tools and equipment required to complete the work according to the program.

5. Fix up the completion period from the volume of works involved in the estimate.

6. Draw up a construction schedule and program.

7. Justify the investment from the benefit-cost ratio.

8. Invite tenders and prepare bills for payment.

9. An estimation for an existing property is required for valuation.

CONCLUSION:

This project includes the planning of Residential Building using AutoCAD, Design using Is Code and concludes with the cost estimate for the entire project. The cost estimate for the project has been calculated using Long Wall Short Wall Method in Microsoft Excel. For the Abstract cost CPWD Schedule of rates has been followed. In this project Planning, Designing, and Estimating of Residential Building. We all the member of our team has learned to plan a building with reference of National Building Cod of India- 2005.

Planning, designing and estimating, these are the tree steps which are very important while constructing any structure. In this project we have detailed discuss about the planning, designing and estimating of the residential building. In future may be there are different methods are adopt to do the planning designing and estimating. For example there are newly software are comes in future to create plan. New software and advance option are generated to do these processes easily as we think that in future there are new software's, methods and advance option are developed.

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