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ANALYSIS, DESIGN AND ESTIMATION OF MULTI- STORIED RESIDENTIAL BUILDINGB BY ETABS

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Abstract - *The present work deals with the analysis and design of a multi storied residential building of (G+4) by using most economical beam to column method. The dead load &live loads are applied and the design for beams, columns, footing is obtained from E tabs with its new features surpassed its predecessors with its data sharing. Our main aim is to complete a multi-storey building and to ensure that the structure is safe and economical against gravity loading conditions and to fulfil the function for which the structures have been built for. For the design of the structure, the dead load and live load are considered. The analysis and design of the structure done by using software package ETABS. The results of analysis are used to verify the fitness of structure for use. Computer software's are also being used for the calculation of forces, bending moment, stress, strain & deformation or deflection for a complex structural system.*

Key Words: **ETABS and AUTO CADD**

1. INTRODUCTION

The economical execution of a concrete structure depends more on overall layout of the structure with respect to the construction feasibility and cost (called construct ability) than on its theoretical analysis. The knowledge economy is generally acquired only through experience and study of projects already executed out. On the other hand, the structural safety of the individual member depends primarily on the theoretical analysis and design. The best way to ensure this safety is to design the structure according to the relevant codes of practice and construct the structure according to accepted practice. Civil engineers will be called upon to carry out design of structures to be constructed as well as analyse (or review) structure already constructed, they should be familiar with the current codes and methods of analysis and design. Concrete structures in concrete have become very common in construction industry in last 50 years. Concrete has established itself to be a universal building material because of its high compressive strength and its adaptability to take any form and shape. Its low tensile strength is substituted by the use of steel reinforcement, the resulting combination of the two being known as reinforced concrete (RC). It is this combination that follows almost the unlimited use of reinforced concrete in construction of buildings, bridges, tanks, dams etc., with the result that almost every civil engineer is intimately concerned with reinforced concrete structures. Therefore, it is necessary that every civil engineer know the basic principles involved in the design of RC structures. So, it is necessary to know the basic principles of structural design.

2. OBJECTIVES

1. To study and plan the project site, identify problems, analyse, apply appropriate parameters, assumption and design criteria in consideration of safety, ethics, economic, environment and sustainability.
2. To carry out manual analysis and design calculations based on the required criteria
3. To carry out manual analysis and design calculations based on the required criteria
4. To carry out manual analysis and design calculations based on the required criteria

3. METHODOLOGY

Details of project

BUILDING DATA

Utility of Building: Residential Building.

Area of the site: 70' X 60'

Building Height: 15m.

Number of Storey: (G+4).

Type of construction: R.C.C Framed Structure.

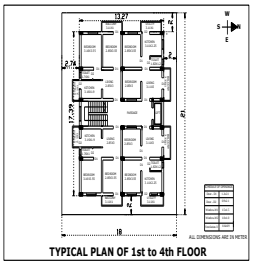
Shape of Building: Rectangular.

Type of staircase: Dog Legged.

Number of Lift: One.

Type of Walls: Concrete block & light weight bricks

Plan



Preliminary measurements & tests

Auto cadd drawings

Analysis by Etabs

Designs

Detailing's and drawings

Estimation

4. RESULTS OF ETABS

ETABS is a sophisticated, yet easy to use, special purpose analysis and design program developed specifically for building systems. ETABS 2016 features an intuitive and powerful graphical interface coupled with unmatched modelling, analytical, design, and detailing procedures, all integrated using a common database. Although quick and easy for simple structures, ETABS can also handle the largest and most complex building models, including a wide range of nonlinear behaviours necessary for performance based design, making it the tool of choice for structural engineers in the building industry.

1. **2D Analysis3**
2. **3D Analysis (portal bay analysis)**
3. **Model of plan**
4. **3D Rendering**
5. **2D SFD**
6. **2D BMD**
7. **3D SFD**
8. **3D BMD**

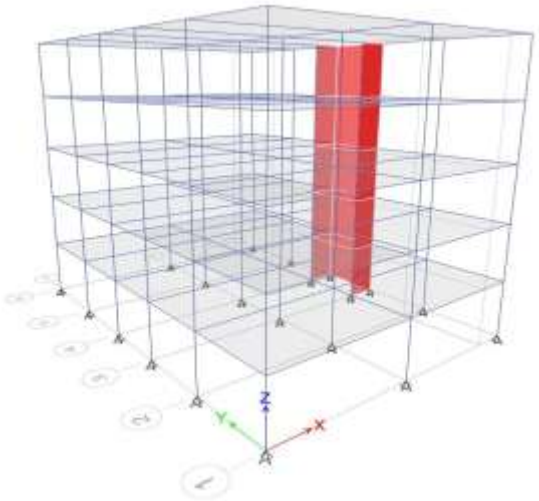


Fig 1: 3-D ANALYSIS (PORTAL BAY ANALYSIS)

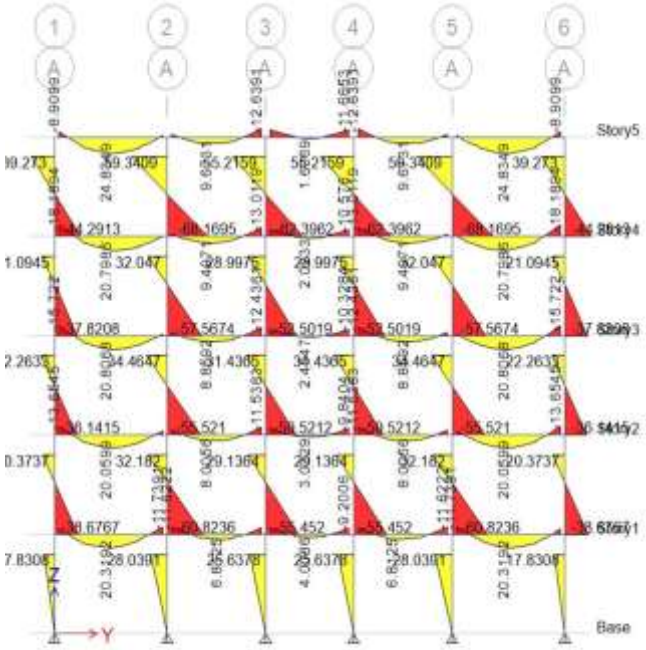


Fig 2: 2-D BENDING MOMENT

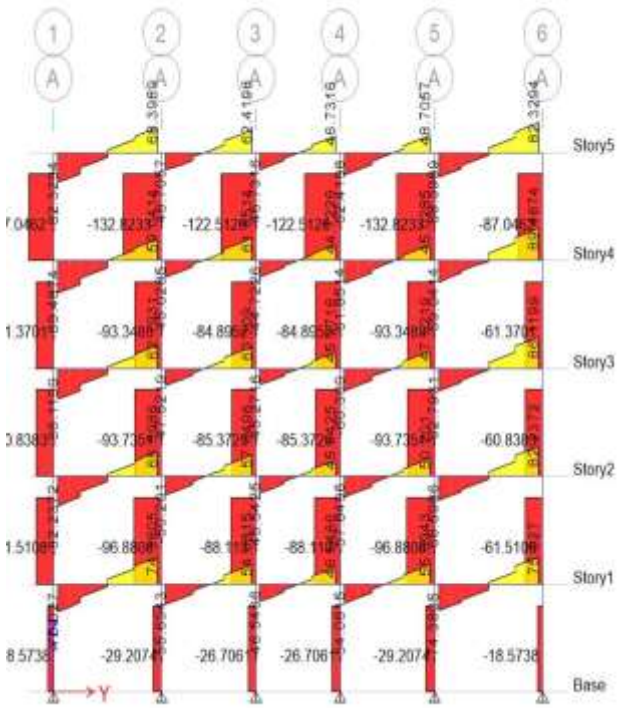


Fig 3: 2D SHEAR FORCE DIAGRAM

Fig 4: 3D RENDRING

5. ESTIMATION

1. Construction cost estimators can be contractually hired in many different ways.
2. They may be employed by the owner's representative/project manager, construction manager, professional design team, or separately hired by the owner.
3. They estimate building costs through all the stages of design and the construction of the project.
4. It is very important to have the cost estimator involved right from the start of the project to check the estimation as follows
5. Quantity Take off
6. Labour Hours
7. Labour Rates
8. Material Prices
9. Equipment Costs
10. Subcontractor Quotes
11. Indirect Costs
12. Profit Amount

6. CONCLUSIONS

1. This project report has sought to give details of the components of a multi-storey building and an idea of structural components can be achieved when structural drawings are read.
2. ETABS was used for the analysis for all loading combinations since it reduces the time consumption and gives required accurate results, but when it comes to designing, ETABS gives uneconomical design and hence manual design is adopted.
3. The Detailing of Reinforcement is made as per IS- code provision which provides Ductility to the Structure and hence better performance.
4. All the structural components are checked to satisfy the serviceability criteria and hence provided dimension of all structural components are adequate.
5. From the "Analysis and design", we can estimate the cost of whole structure before the work is to be executed. Hence the appropriate cost of whole building will be known in advance.

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