Design of 3-Storey Residential Building Behind City Law College

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Abstract - *Structure design is the art and technology of designing economical, attractive and working structure. This project is generally based on deigning and planning of building that's why the structure is a economical and durable. For designing and planning of structure requires imagination , knowledge of structure and designing. The analysis and designing of 3-storey residential building structure completed by using IS code. For drafting and detailing work we will use Auto CAD. " Limit state method Used for design of slab,beam and staircase etc. with the help of IS:456-2000 code book. Loads which is active on the beams and column are consider according to IS code 875-1987(Part 1, Part 2, Part 3). Staad Pro. Analysis the structure and design the members with the details of reinforcement for RCC Frame. Our final work is complete analysis and design of a 3-storey residential building with cost estimation.*

Key words: STAAD-pro,Economical Residential Building , AutoCAD, MS Excel.

1. INTRODUCTION

A residential Buildiing is a building that is used for residential uses. Every human has a wish to own home so people do maximum effort and spends hard earned savings in own building. A flat is contin drawing room, kitchen with dining room, bedroom and porch. IN urban location residential building that have multiple floors above ground in the building.main aim of multy storey building is increase the floor area of the building with out increasing the area of the land hence this is the right way to saving land. Building making is not a easy task there is full professional knowledge of IS Codes and software which is used in construction and designing. Safety and sustainability is the main factor so all work done on the we half of this standard. Response Spectrum Method is used for Earthquake analysis. Various loads are active on the builing like special load, load combinaton, Earthquake load, snow load,Live load, dead load.

2. Literature Review

A significant amount of research work on various aspects of building use and their methodology has been published by many researchers. Reviews of other worksheets are described below

2.1 "Analysis of the Multi-Floor Building is under consideration Hybrid Building ",Tanha B. Shah,

Hybrid Structures are usually built where lateral resistance is given to a combination of structures. The most common are temporary frames attached to the walls of a building or diagonal bracing. It is a composite structure of different building systems. In the Multistory building according to our engineering requirement parameter, such as Ground, Storey Drift, Storey Moment and Shear Forces, have been affected by earthquake-resistant structures. Tubular frame structure is one of the most effective systems for tall structures under lateral load. The analysis of these structures often involves a lot of time and effort due to the large number of members and members. Pushover (PA) Analysis, Vertical & Powerful Earthquake Analysis is widely accepted from an engineering perspective as an effective and attractive computer measure to measure the demands of an engineering need.

2.2 "Elastic Seismic Reinforcement Response Concrete Frames "Kulkarni J.G. et, al. April 2013

They presented a comprehensive earthquake response of reinforced concrete frames consisting of 3 bay, 5 bay and 7 bay 9 storey structures analyzed by gravity and seismic force and their response is explored as geometric parameters differ from a predictive behavior perspective. of similar structures under the same loads or combinations of load.

From the data presented in the analysis of buildings with various combined loading combinations the following conclusions are reached: The typical axial force calculated from the donor area is approximately the same as the actual load on the column section at higher levels in 3 bay 9 and 2 / 3rd structures. the height of the frame from the ground up to the highest level of 9-storey buildings and half of the column to 1 / 3rd of the frame height and lowers the highest level of 7-story buildings. The column segments at the lower level attract greater axial force as compared to the bay variation i.e. as the number of ports will increase the axial force in the column in the lower segments increases. Same with bending time.

2.3 Mr. k. Prabin Kumar , et.al [2018]: A Study on Design of multi storey Residential Building:

Reviewed and designed by STAAD Pro. They calculate the amount of reinforcement and the members of the whole structure required for the concrete part. There is an analysis of the action of a different structure which is considered to be the elements such as axial, flexure, tension and shear. The pillar is made intentionally and by recognizing the axial force and the bi-axial force ultimately. "The building was designed in accordance with the Indian Standard Code IS 456- 2000.

2.4 R.D. Deshpande, et.al [June, 2017]: Analysis, Planning and Design With A Lower Row Housing Rate + G + 2:

They found that the deviation check was secure. They analyzed the G + 2 residential buildings and their design using E-Tabs software on a mid-line construction scale. They designed the column and light safely using the SP-16 tested interactive formula.

2.5 Deevi krishna Chaitanya et.al [january 2017]: Planning Analysis and Design of [G + 6] Multi - Storey Building Using STAAD Pro. :

They have worked on static standing systems to test the unknown forces in all areas. Compliance with a well-known distribution situation that does not change is solved by a duplication method. To find the sequence in the frame you used the kani's method. the stability of the members of the building structure used this type of method similar to the method kani. They were designed and developed by STAAD Pro. Software that helps to save a lot of time on its construction and provides accuracy.
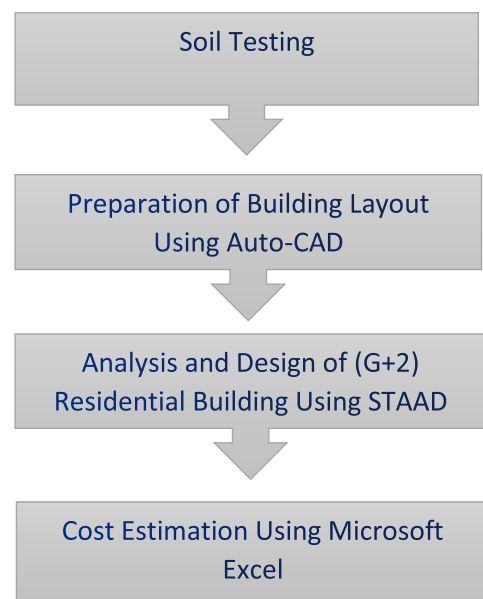
2.6 Dunnala Lakshmi Anuja, et.al [2019]: Planning, Analysis and Residential Design Design [G + 5] using STAAD Pro. :

STAAD Pro. Used for draft analysis. Beam, footing, slab and stairs were designed according to IS Code 456-2000 by LSM. Structures such as share deflection torsion, development duration are in line with the provisions of the Indian Standard IS code. Foot and column design made according to IS 456-2000 and SP -16 design charts. A check such as one-way or two-way check within the provision of the IS code. The design of the beam, slab, column, rectangular foot and stairs is done in the form of a boundary. And when we found, Compared to drawing, handmade design and geometric model with the help of using STAAD Pro.

2.7 Ibrahim, et.al [April 2019]: Design and Residential Building Design [G + 4]:

Work was done on the G + 4-story residential building, which was analyzed for loading such as dead load, live load, air load and earthquake loads. Auto CAD is used for depth, size, component length, height because it provides detailed information. Joint size such as frame size, column and slab etc. is given the type of load and what amount is used in the structure. Auto CAD provides detailed information on the length of the structure, height, depth, size and number etc. STAAD Pro has been used in architectural design and has the ability to calculate the exact result of a program containing a number of parameters constructed as er IS 456: 2000. The beams were designed for flexibility, shear and thickness and provided short numerical information, location and short space.

3. METHODOLOGY

Soil Testing

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Preparation of Building Layout Using Auto-CAD

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Analysis and Design of (G+2) Residential Building Using STAAD

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Cost Estimation Using Microsoft Excel

4. BASIC DATA

Type of building :	Residential building.
Type of structure :	3 storey Rcc framed structure
No. of storey :	3 (G+2)
Area :	1500 Sq Ft
Floor to floor height :	10 feet
External walls :	230 mm including plaster
Internal walls :	115 mm including plaster
Height of plinth :	0.6 m.
Depth of Footing :	2.4 m.

5. Brief Description of Software used

➢ **STAAD.PRO**

➢ **Auto CAD**

5.1 STAAD.PRO

STAAD.Pro is a software design and analysis software developed by Research Engineers in 1997.

STAAD.Pro is one of the most widely used software products worldwide. Supports design codes for steel, concrete, timber and aluminum over 90.

It can use a variety of analyzes ranging from standard vertical analysis to the latest analytical methods such as non-linear geometric analysis and Pushover analysis (Non-linear analysis). It can also use a variety of variable analysis methods from time history analysis to response spectrum analysis. The feedback diversity analysis feature is supported by both user-defined viewers.

5.2 Auto CAD

AutoCAD can be defined as the use of computer programs to assist in the creation, editing, and development of a project.

  • In this case, we can build both 2D and 3Ddrawings used in construction and production.

  • Founded by John Walker in 1982 with the help of AUTODESK and successfully preserved.

2. Design Codes

IS 456: 2000 Indian Standard standard for clear and reinforced concrete code for exercise. IS 456: 2000, which is the basic design code for all reinforced concrete structures (RC) IS 1893 (Part I): 2002 General Indian Regulations for the Design of Earthquake Buildings (Fifth Review)

IS 875 (Part 2): 1987 R 1197 Vertical design code (excluding earthquakes) for buildings and structures - Consigned loads

IS 875 (Part 2) deals with the various living loads to be considered in the design of buildings IS 875 (Part 3) deals with air loads which must be carefully considered in the design of buildings, structures and parts.

6. LOAD COMBINATIONS

The different combinations used in the project

are,

➢ 1.5 (DL + LL)

➢ 1.2 (DL + LL + WLX)

➢ 1.2 (DL + LL + WLZ)

➢ 1.2 (DL + LL - WLX)

➢ 1.2 (DL + LL – WLZ)

➢ 1.5 (DL + WLX)

➢ 1.5 (DL + WLZ)

➢ 1.5 (DL - WLX)

➢ 1.5 (DL - WLZ)

➢ 1 (DL + LL)

➢ 1 (DL + LL + WLX)

➢ 1 (DL + LL + WLZ)

➢ 1 (DL + LL - WLX)

7. Building Materials

Creating stability is hard to measure and define when reviewing a variety of construction methods, installation techniques, materials and production systems. Naturally, building materials they are an integral part of the evaluation of the life cycle, from the very beginning dumping of raw material for final disposal at a landfill site or recycling after the end of building life. The testing process takes over consider all inputs or outputs involved in the production of goods, consumption and disposal, from power, people and money, to environmental impacts. Material selection should be based on TBL (economic, social and environmental factors of impact) impacts and structure stability. Industrial products and recycled building materials to provide a way to reduce the pressure on natural resource extraction currently required to meet the growing demand for construction sector, however, local availability of these resources is important to reduce the indirect effects of TBL on a construction project.

8. SUSTAINABILITY IN RESIDENTIAL BUILDINGS

Sustainability is the main goal of all product development. According to Klöppfer , sustainability has three main components: economic, social and environmental, known as TBL targets. AnThe LCSA is a comprehensive assessment of these three key impacts due to the product.

9. CHECK THE BEARING CAPACITY OF SOIL

When calculating the excess weight of concrete to determine the carrying capacity of the soil and the location of the water table should be considered in the critical area, i.e., which will give maximum weight over the weight of the concrete -. direct (pressure load) in the foot area, the depth of the foot is less or equal to its width i.e., shallow foot and times at the base level the reason for the horizontal boats and other eccentric loading. Under the action of throwing and times, the ground pressure of the given area under the foot will not be the same and the maximum force such as the pressure of the toe 'p' on the ground can be determined.

10. DUCTILE DETAILING

After designing the frame-Beam frame, shear walls and foundation from a limited state perspective like IS456: 2000, all metal details of length, spacing, shear strength, binding reinforcement requirements, stirrps and tires etc. made using the provisions of IS13920: 1993 .

11. CONCLUSION

• Design of building, slab, beam, column, rectangular foot and stairs is done by IS 456: 2000 with the help of the boundary condition method.

• During the design of the G + 2 Storey Residential Building which is able to sustain all the workload in the building.

• The construction program was developed and documented using Auto CAD software with the required size.

• Using STADD.Pro, the analysis and design of a multi-storey building was completed much faster and was much easier than manual manipulation.

• quality and accuracy of structural analysis, design and reinforcement of structural details in order to achieve structural stability and ductile function. Proper design of the building and the stability of the internal installation or unsupported walls and partitions are additional safety requirements for the building as a whole.

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