



Design and Analysis of an Institutional Building

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Abstract: Institutional are the store house of knowledge development. They are a big source of developing knowledge. It provides a clear path for students to achieve in life. Number of students gets gravitation every year and starts their career. In addition, the learn more about the society, culture and responsibility. The aim of the project is to analyze and design of an institutional building provisions. A lay out plan of the proposed building is drawn by using AUTO CADD 2010. The structure consist of ground floor plus three floors. The planning is done as per Indian standard code provisions. The building frames are analyzed using the various text books. Using this so many standard books analysis of bending moment, shear force, deflection, end moments and foundation reactions are calculated. The structure was analyzed using STAAD.ProV8i.

Keywords: institutional building, AUTO CADD, STAAD.ProV8i

INTRODUCTION

Institution play a catalyst role in social transformation. These include any building used for school, college or day-care purposes

involving assembly for instruction, education or recreation and which is not covered by assembly building. The quality of a country's institutions matter for its. Indeed, the repeated failed interventions in these and other developing societies suggest that ensuring comprehensive institutional change is difficult. They play an important role in social development. They are centers for innovation and development.

FEATURES OF STRUCTURE:

- Framed R.C.C structure
- Materials used:
 - Cement: 43 grade (used for brick work and plastering).
 - 53 grade (used for R.C.C works)
 - Concrete: M20 grade for R.C.C
 - Steel: HYSD TMT rods
 - Brick: 1st class bricks (19cm × 9cm × 9cm)
 - Type of flooring: white marble flooring

PURPOSE OF DESIGN:

By constructing a Institutional building number of students get will trained for archiving there dream life through studies.

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And it's provides a platform to build up their carrier.

DESIGN OF MEMBERS:

- Design of slabs.
- Design of beam.
- Design of columns.
- Design of footing.
- Design of staircase.

OBJECTIVES

The main objective of our project is to know the various design aspects like planning, analysis and design etc. Our project carry out a complete design and analysis of G+3 building which includes footing, columns, beams, slabs, staircase and lift design calculation.

METHODOLOGY

The method we are design the entire structure is limit state Method

LIMITE STATE OF DESIGN:

Limit state method of design in a factor improvement of ultimate load design. In the limit state method, a structure is designed to withstand all loads likely to act on in the duration of its life span also to satisfy the serviceability requirements like deflection, limitation and crack width.

GEOMETRY OF THE STRUCTURE:

Institutional building is planned for the analysis and design, its plan was done by using AUTO CADD is shown in the figure 1(a) . 1(b), 1(c),1(e). and the detail design was given in table 1.

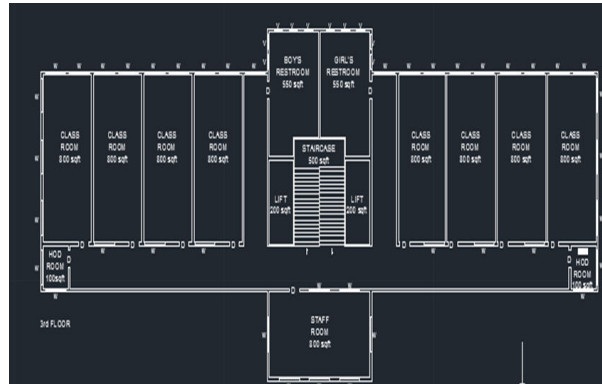


Figure1(a) GROUND FLOOR

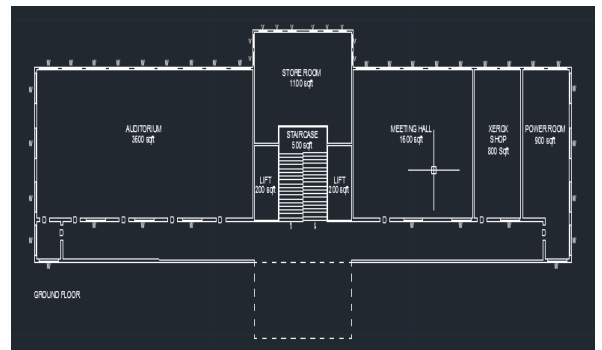


Figure 1(b) 1st FLOOR

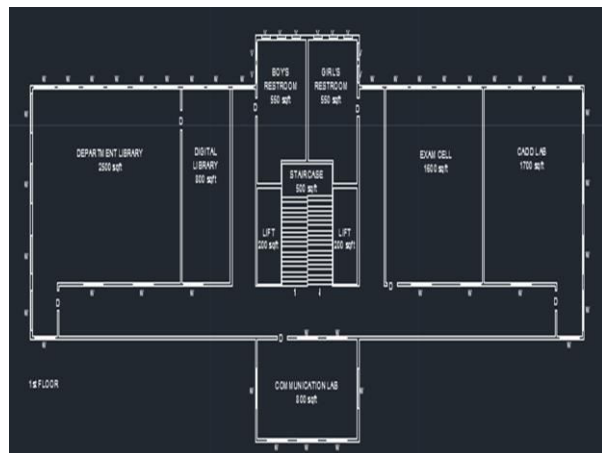


Figure1(c)2nd FLOOR



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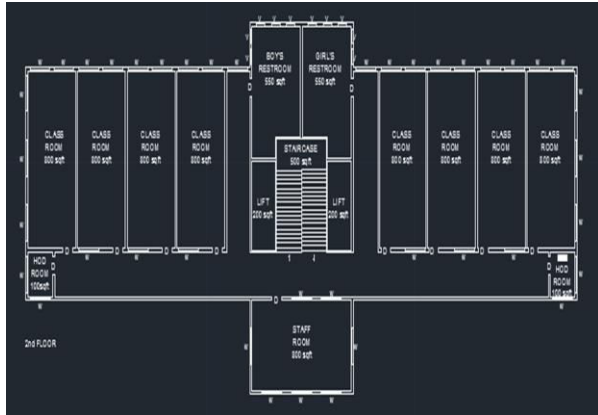


Figure1(d).3rd FLOOR

Table 1. Design of the members in detailed

S.NO	Name of The Member	Details of Design	Remarks
1.	Footing	<p><u>DESIGN OF ISOLATED FOUNDATION:</u> size of column=300mmx450mm total load on footing=270KN size of footing=1.3mx1.3m depth of footing (overall depth) =560mm safe bearing capacity of the soil=120KN/m² M20, $f_{ck}=20\text{KN/m}^2$ and $f_y=415\text{HYSDbars}$</p>	According to the code provisions check is ok.



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2.	Column	<p><u>COLUMN DESIGN:</u> Type of Column: Rectangular column Axial service load=180KN Uniaxial moment =52KN Size of the column=300x450mm S.B.C of the soil=200KN/m² width =1560mm,Depth(overall depth)=300mm And all other manual design is done by used standard code.</p>	All the checks are ok hence it is safe.
3.	Beam	<p><u>BEAM CALCULATION:</u> Effective span L=5m Breadth of the beam=250mm overall depth D=400mm dead load=2.5KN/m²,live load=20KN/m² Effective depth=450mm Provide 16mm dia 200c/c And the other manual required design is done by using codes</p>	All the checks are ok hence it is safe.
4.	Slab	<p>$L_x=12m, L_y=6m, f_{ck}=20N/mm^2, f_y=415N/mm^2$ where $l_y/l_x < 2$, overall depth =170mm, effective depth =145mm, effective span=12.145m, Design ultimate load=$W_u=25.27 KN/m^2$. 10mm diameter bars at 240mm centers-short span 10mm diameter bars at 300mm centers-long span</p>	All the checks are ok hence it is safe



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5.	Stair Case	<p><u>type of stair case: dog legged</u> $L_{ex}=6m$ $L_{ey}=7.5m$, height between floors=4m, number of rise=18, number of treads=17 <u>design of flight:</u> length of flight=17x300, effective span=5.1m. width=2m width of passage=0.5m, effective span=7.5m, <u>main reinforcement:</u> provided 12mm dia at 200mm centers as main reinforcement. <u>distribution reinforcement:</u> provide 10mm dia at 200mm centers as distribution reinforcement.</p>	All the checks are ok hence it is safe.
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ANALYSIS USING STADD PRO

STAAD.Pro, the most popular structural engineering software product for 3D model generation, analysis and design. It has an intuitive, user-friendly GUI, visualization tools, powerful analysis and design facilities. The Software Release Report for STAAD.Pro V8i contains detailed information on additions and changes that have been implemented since the release of STAAD.Pro 2007 build 03. This document should be read in conjunction with all other STAAD. Pro manuals, including the Revision History document. It works on “ Finite Element method” STAAD.Pro has been enhanced so that the model STD data file can be managed on a Project Wise server.

Four integration functionalities have been added. These are

- Open a STAAD model from a Project Wise repository.
- Save a local STAAD model into a Project Wise repository.
- Update an existing model from Project Wise.
- Review model properties (meta-data) which has been opened from a Project Wise repository.

Description:

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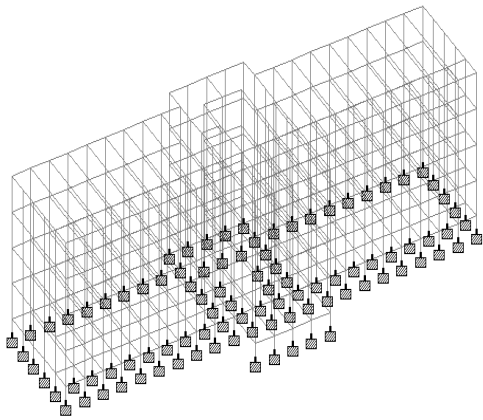


Figure 2 .Initial structure Diagram

RESULT

1. In this project a Institutional Building designed by using of STAAD PRO 2007.
2. Using of this software analysis of bending moment, shear force, deflections, end moments and foundation reactions are calculated.
3. Using this calculated Bending moment, shear force, and reactions the beams, columns and footing are designed.
4. By using the AUTO CAD we can design the footing.
5. Detailed drawings of all R.C.C. members such as slabs, beams, columns, and footings are also shown.

CONCLUSION

1. In developing countries like India, cities are growing very fast and the institution plays a major role in the development of nation's economy. This made us to think about this and we decided to go with it
2. The limit state method of design is adopted. We had done the design

aspects of the structure manually and software.

3. In our project we also used the code provision of the SP 16 and SP 34 (the design aids for concrete and detailing)
4. Finally we learn detailing of various structural members by using SP 34 design aids.
5. The knowledge gained from this project will help us to take up similar projects with courage and confidence in future course of actions.

REFERENCES

1. Design Aids for reinforced concrete IS 456 – 1978 Bureau of Indian standards, New Delhi.
2. Indian standard code of practice Reinforced concrete (third revision) IS: 456 -2000, Bureau of Indian standards, New delhi,1989.
3. Deneufville, sb, sm, phd, m.asce, m.orsa, f.aaas“Designing airport passenger buildings” for the 21st century r. accepted for transport journal proceeding of the institution of civil engineers (uk) paper 10284 (October 2008)
4. Punmia. B.C, Ashok kumarjain : “Design of Reinforced concrete”Seventh edition(2008)
5. Analysis and design of an office building with mono column byE K Mohanraj*, Kongu Engineering College, IndiaS Nisar Ahmad, Kongu Engineering College, India A Gowri Sankar, Kongu Engineering College, India27th Conference.