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Research Paper

MODELLING, ANALYSIS AND DESIGN OF A RESIDENTIAL MULTI-STOREY BUILDING

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ABSTRACT

As part of M-tech course curriculum, fifteen days Industrial training was done on Analysis and design of a multi-storied residential/commercial building, under the guidance of Mr. Santhosh K, Design Spectrum,calicut Design Spectrum,calicut is one of the leading Structural Consultancy in Kerala.. They undertake wide range of reinforced concrete structures. The training was oriented towards assisting me in obtaining hands on experience of the design and construction industry. As a part of the training a Commercial Building at calicut analysed and designed according to the relevant Indian Standard Codes. The work was completed in three stages. First stage was modelling and analysis of the proposed building. Second stage was the design of different structural components. The final stage was the detailing of different structural components.The structure was analysed in STAAD Pro and the designs of the structural components were done manually. The detailing works were done in AutoCAD 2014.

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I. INTRODUCTION

1.1 GENERAL

Industrial training is an important component in the development of the practical and professional skills required by an engineer. The purpose of the Industrial training is to achieve exposure on the Practical Engineering side. The fundamental objective of Industrial Training is to prepare students for future employment in their chosen engineering discipline. Industrial Training enhances the academic material studied at University by allowing students to practice what they have learned and to develop key professional attributes.

Detailed planning of the structure usually comes from several studies made by town planners, investors, users, architects and other engineers. On that, a structural engineer has the main influence on the overall structural design and an architect is involved in aesthetic details.

The aims of mini project is to done the structural analysis and design of the structure by using STAAD Pro and design and compares the result with manual design and prepare structural drawing.

1.2 SCOPE AND OBJECTIVE OF THE MINI PROJECT

Our main objectives include;

- For getting the basic knowledge of construction of multi storied building.
- To practicing and experiencing the planning, designing, and field study of the construction projects.
- Awareness of building rules.
- Chance of getting the idea about construction equipments, construction methods and techniques.
- Study about soil condition.
- Using the software packages such as AutoCAD and STAAD Pro for designing and analysis of building.

II. LITERATURE REVIEW

2.1 STUDIES CONDUCTED

Manicka Selvam.V.K, Bindhu.K.R (2012) they conducted studies regarding the structure using various portal method and determined the shear in columns. After conducting studies

they obtained following conclusions, Multi storey building frames can be classified as short, intermediate and tall frames. For preliminary analysis of these frames subjected to lateral loads. The proposed method is a simple alternative for finding the stress resultants of short frames. The IPM is an efficient, powerful and explicit procedure which is used as final solution. Whatever may be the height of the building, axial force in the interior columns will be present to some degree.

Swati D.Ambadkar, Vipul S. Bawner(2012) conducted studies regarding the how wind load effect the high rise buildings, and they carried out the studies using the software's STAAD pro and they obtained following results, G+11 R.C.C. Building is analyzed on STADD-PRO maximum moment, maximum force and maximum displacement of column is taken for various categories and openings. This maximum moment, maximum force and maximum displacement is arranged in tabular form. Graph is drawn for category Vs maximum moment for various openings. The first step in the STAAD pro was the forming the framed structure.

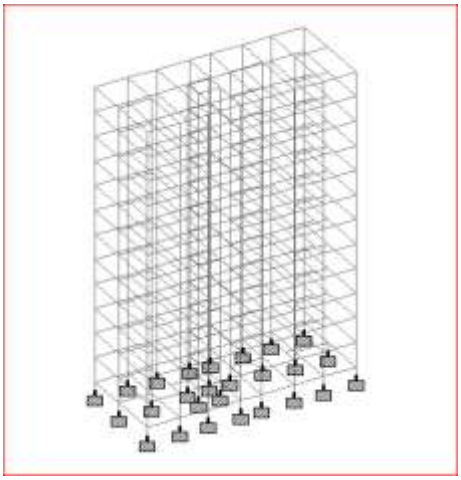


Figure 1 Frame of the building

III. DESIGNING OF BUILDING

3.1 GENERAL

When designing a structure, the design working life of the structure should be specified, and

The following fundamental performance requirements (1) to (3) should be ensured for the Specified period.

(1) Safety of human life in and around the structure is ensured against foreseeable actions (Safety).

(2) The functions of the structure are adequately ensured against foreseeable actions acting on Structures (Serviceability).

(3) If required, continued use of the structure is feasible against foreseeable actions by Restoration using technologies available within reasonable ranges of cost and time (Restorability). BEAM DESIGN

3.2 GENERAL

A beam is a structural element that is capable of withstanding load primarily by resisting against bending. The bending force induced into the material of the beam as a result of the external loads, own weight, span and external reactions to these loads is called a bending moment. Beams are characterized by their profile (shape of cross- section), their length, and their material.Beam carries transverse external loads that cause bending moment, shear forces and in some cases torsion.Concrete is strong in compression and very weak in tension. Steel reinforcement is used to take up tensile stresses in reinforced concrete beams. Mild steel bars or Deformed or High yield strength deformed bars (HYSD) are used.

The beams are classified as:

- According to shape: Rectangular, T, L, Circular etc.
- According to supporting conditions: Simply supported, fixed, continuous and cantilever beams.
- According to reinforcement: Singly reinforced and doubly reinforced.

Reinforcement Cover in Beam:

- Minimum cover in beams must be 25 mm or shall not be less than the larger diameter of bar for all steel reinforcement including links.
- Nominal cover specified in Table 16 and 16A of IS456-2000 should be used to

satisfy the durability criteria.

Types of Reinforcement in Beams:

Generally a beam consists of following steel reinforcements:

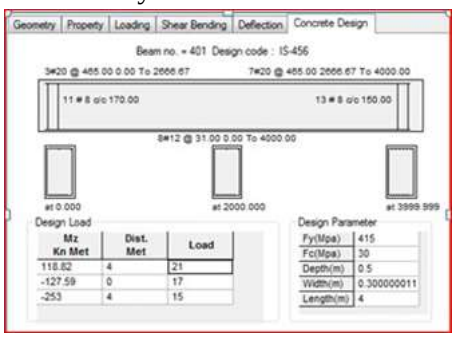
- Longitudinal reinforcement at tension and compression face.
- Shear reinforcements in the form of vertical stirrups and or bent up longitudinal bars are provided.

Side face reinforcement in the web of the beam is provided when the depth of the web in a beam exceeds 750 mm. (0.1% of the web area and shall be distributed equally on two faces at a spacing not exceeding 300 mm or web thickness whichever is less).

3.3 DESIGN OF BEAM

Section near the support

From staad analysis



SITE VISITS

As a part of industrial training, the construction sites of the following sites are visited.

- White School
- Hilite Mall Phase -2
- Nexzone- Residential Apartment

WHITE SCHOOL



Fig no 2: White school construction site

HI LITE MALL PHASE -2 CONSTRUCTION



Fig no 4: Hi lite mall phase 2 construction site



Fig no 5: Hi lite mall phase 2 construction site piling process



Fig no 6: Nexzone- residential apartment

IV. CONCLUSION

The industrial training, taken through a period of one month allowed me to gain ample exposure to various field practices in the analysis and design of multi storied buildings and also in various construction techniques used in the industry. The analysis was done using the software package STAAD Pro and the drawing details in AutoCAD 2014.In the training both software and manual calculations are used, that gave an overall idea of handling building design. Though the use of the software offers saving in time, the calculations are not appropriate. It takes value on safer side than manual work. Hence manual design was adopted. The analysis and design was done according to standard specifications to the possible extend.The various difficulties encountered in the design process and the various constraints faced by the structural engineer in designing up to the architectural

drawing was also well understood. This training helped to understand and analyse the structural problem faced by the construction industry. The training also gave the awareness of the construction sequence of a building project. Site visits also gave me an exposure to the industry.

REFERENCE

1. Ambadkar .S.D ., Bawner.V .S.,(2012), Behavior Of Multistoried Building Under The Effect Of Wind Load , *Journal Of Applied Science And Engineering Researc.*
2. Asohk K. Jain, *Reinforced Concrete Limit State Design*, Nem Chand & Bros, Civil Lines, 7 th Edition (2012)
3. B.C Punmia,A.k.Jain, *R.C.C Designs*, Lakshmi Publications (P)limited (2016)
4. IS 456-2000(PLAIN AND REINFORCED CONCRETE-CODE OF PRACTICE), Fourth edition
5. IS 875-Part I-1987(Dead Load), Second revision
6. IS 875-Part II-1987,(Live Load)Second revision
7. IS-875-Part III-1987(Wind Loads),Second revision
8. Kerala Building Rules-2004
9. Manicka Selvam .V.K , Bindu .K.R.,(2012) ,Distribution Of Shear To The Columns Of Short Multistory Building Frames Subjected To Lateral Loads , *International Journal Of Civil And Structural Engineering.*
10. Pillai.B., Guha.P.,(2015),Comparison Between Rcc And Steel With Wind And Earthquake Effect Using Staad Pro ,*International Journal Of Applied Research*.
11. Ramamrutham,Design *of Reinforced Concrete Structures*, Dhanpath Rai Publishing company (2003)
12. Ramya .D.,Saikumar. A.V.S .,(2015) , Comparative Study On Design And Analysis Of Multistoreyed Building (G+10) By Staad Pro And ETABS Software's , *International Journal Of Engineering Science & Research Technology.*