



(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



## **Impact Factor: 8.699**

## Volume 14, Issue 6, June 2025

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www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

#### Volume 14, Issue 6, June 2025

#### |DOI: 10.15680/IJIRSET.2025.1406107|

# **Design of Duplex House by using ETABS**

#### Mr. G.Naveen Kumar, J.Kuldeep Nayak, M.Abilash, K.Ramya

Assistant Professor, Department of Civil Engineering, Guru Nanak Institutions Technical Campus, Ibrahimpatnam,

Telangana, India

U.G. Student, Department of Civil Engineering, Guru Nanak Institutions Technical Campus, Ibrahimpatnam,

Telangana, India

U.G. Student, Department of Civil Engineering, Guru Nanak Institutions Technical Campus, Ibrahimpatnam,

Telangana, India

U.G. Student, Department of Civil Engineering, Guru Nanak Institutions Technical Campus, Ibrahimpatnam,

#### Telangana, India

**ABSTRACT**: The aim of our work is to design the given DUPLEX HOUSE according to Indian Standard codes. The design of a building can be done manually or with the help of Software. We have selected to do our project with Software because designing manually consumes a lot of time, effort and can contain mistakes whereas by using software we can save time and obtain results without errors. Now days there are several software's are available in market for analysis and design of "Civil Engineering structures" like ETABS. At present work we used software. By using the software is that it is user friendly and has exceptional features like it designs the structural components individually along with their Analysis and Results.

#### **KEYWORDS**:

- Shear Force, Bending Moment, Deflection, Slabs, Beams, Columns, Footings, Etabs, AutoCad, IS 456 -Plain and Reinforced Concrete
- IS 875 (Part-1) Deal Load
- IS 875 (Part-2) –Live Load

#### I. INRTODUCTION

Carrying out a complete design of the main structural elements of a multi – storied building including slabs, beams, columns and footing.Getting real life experience with the engineering practices.Structure should be so arranged that it can transmit dead, wind and imposed loads in a direct manner to the foundations. The general arrangement should ensure a robust and stable structure that will not collapse progressively under the effects of misuse or accidental damage to any one element.

#### **II. LITERATURE SURVEY**

Kapo's, Mana pours (2000) presented new methodology for seismic design of RC building based on feasible partial inelastic model of the structure and performance criteria for two distinct limit states. The procedure is developed in a format that can be incorporated in design codes like Eurocode 8. Time-History (Non-linear dynamic) analysis and Pushover analysis (Non-linear Static analysis) were explored. The adopted method showed better seismic performance than standard code procedure, at least in case of regular RC frame building. It was found that behavior under "life-safety" was easier to control than under serviceability earthquake because of the adoption of performance criteria involving ductility requirements of members for "life-safety" earthquake. Esmail et al. (2008) studied the structural aspect of a 56 stories high tower, located in a high seismic zone in Tehran. Seismic evaluation of the building was done by non-linear dynamic analysis. The existing building had main walls and its side walls as shear walls, connected to the main wall by coupling of beams. The conclusion was to consider the time-dependency of concrete. Steel bracing system should be provided for energy absorption for ductility, but axial load can have adverse effect on their





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performance. It is both conceptually and economically unacceptable to use shear wall as both gravity and bracing system. Confinement of concrete in shear walls is good option for providing ductility and stability.

Viswanath K.G (2010) investigated the seismic performance of reinforced concrete buildings using concentric steel bracing. Analysis of a four, eight, twelve and sixteen storied building in seismic zone IV was done using E-tabs software, as per IS 1893: 2002 (Part-I). The bracing was provided for peripheral columns, and the effectiveness of steel bracing distribution along the height of the building, on the seismic performance of the building was studied. It was found that lateral displacements of the buildings reduced after using Xtype bracings. Steel bracings were found to reduce flexure and shear demand on the beams and columns and transfer lateral load by axial load mechanism. Building frames with X- type bracing were found to have minimum bending as compared to other types of bracing. Steel bracing system was found to be a better alternative for seismic retrofitting as they do not increase the total weight of the building significantly B.M.

#### **III. METHODOLOGY**

This method adopts permissible stresses which are obtained by dividing ultimate stress by a factor known as factor of safety. For concrete a factor of safety of 3 is used and for steel it is 1.78. This factor of safety accounts for any uncertainties in estimation of working loads and variation in material properties.

In working stress method, the structural members are designed for working loads such that the stresses developed are within the allowable stresses. Hence, the failure criterion is the stress. This method is simple and reasonably reliable.

In ultimate load method, structural elements are designed for ultimate loads which are obtained by multiplying the working loads with a factor known as load factor. Hence, the designer can able to predict the excess load the structure can carry beyond the working loads without collapse. Hence, this method gives the true margin of safety. This method considers the actual stress strain curve of concrete and the failure criteria is assumed as ultimate strain. This method gives very economical sections. However it leads to excessive deformations and cracking. Thus, this method is failed to satisfy the serviceability and durability requirements. To overcome these drawbacks, the limit state method has been developed to take care of both strength and serviceability requirements.

In the limit state method, the structural elements are designed for ultimate load and checked for serviceability (deflections, cracking etc.) at working loads so that the structure is fit for use throughout its life period.

A structure may become unfit for use not only when it collapses but when it violates the serviceability requirements such as deflections, cracking etc. The philosophy of limit state method of design is to see that the structure remains fit for use throughout its life period by assuming safety against strength and serviceability requirements i.e. the structure will not reach the limit state in its life time. The acceptable limit for safety against strength and serviceability requirements before failures occurs is called LIMIT STATE.

All the relevant limit states have to be considered in the design. The loads and strength of materials are to be assumed by characteristic values. The design loads and strengths are derived from the characteristic values through the use of partial safety factors.





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#### IV. EXPERIMENTAL RESULTS



fig 2:Column/Beam Layout of Duplex House





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fig 3: final result

#### V. CONCLUSION

We did a dual occupancy with two houses: one portion of building200 Sq. mtsand one on a difficult block. The good thing about Latitude 37 is that they in-house designed the houses required to a brief and price. The first design of the drawing board was so good that we only altered it in small detail. Once the build started everything moved very quickly. When we were starting to finish, the quality control Latitude 37 demanded from their trades was of a very high standard. The build was finished 4 months ahead of schedule, to standard and under budget. I am very impressed by this company, and can recommend them highly. In the view above project was made it very advantages.

#### REFERENCES

#### **TEXT BOOKS:**

- 1. REINFORCED CONCRETE STRUCTURES: M.R.DHEERENDRA BABU
- 2. DESIGN OF STEEL STRUCTURES: S.S.BHAVIKATTI
- 3. THEORY OF STRUCTURES: B.C.PUNMIA
- 4. DESIGN OF SLABS: Dr.G.P.CHANDRADHARA

#### **IS CODE BOOKS REFERRED:**

- 5. IS RCC CODE 456-2000
- 6. IS CODE OF LOADS 875 (Part-1 to 5)









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