

TORSIONAL EFFECT ON RCC BUILDING WITH OR WITHOUT SHEAR WALL BY USING ETABS: A REVIEW

Prof. D. A. Narasgouda

Assistant Professor Department of Civil Engineering
Dr.D.Y.Patil College of Engineering & Innovation, Varale, Pune
darshan.n@dypatilef.com

Inamul Hussain Goundi

BE, Department of Civil Engineering
Dr.D.Y.Patil College of Engineering & Innovation, Varale, Pune
inamhussain4692gmail.com

Murad Pathan

BE, Department of Civil Engineering
Dr.D.Y.Patil College of Engineering & Innovation, Varale, Pune
muradpathan1311@gmail.com

Mujaffar Shaikh

BE, Department of Civil Engineering
Dr.D.Y.Patil College of Engineering & Innovation, Varale, Pune
mujaffarshaikh8087@gmail.com

Nawaz Shaikh

BE, Department of Civil Engineering
Dr.D.Y.Patil College of Engineering & Innovation, Varale, Pune
nawazs415@gmail.com

ABSTRACT—now a day's study on the shear wall structure is very important due to it's mainly provides the stability for the lateral forces. All over the world very conflicted and unsymmetrical structures are constructed. Due to unsymmetrical structure results in torsionally irregularity occurs and it's terrible when earthquake occurs. Find the behavior and damage of structure is very important which is at location of structural lean planes in the building. The laterally applied load on structural system, number of floors, degree of asymmetry and there type has to be analyzed and calculated to reduce the damage on the structure. The main objective of this paper is to understand the torsional behaviour of an asymmetric building by modelling and analyzing a 20 storey buildings with different configurations using dynamic analysis by Response Spectrum Method on ETABS software as per IS Codal provision 1893(Part I):2002 For earthquake, by comparing the maximum storey drift, storey displacement, time period with regular building and the summer is presented at the end of paper.

Keywords: Torsionally Irregularity, Story Drift, Story Displacement, Time Period, Modes.

1) INTRODUCTION

Now a day's there are so many tall structures are built all over the world, the most importance is given to the architectural view of the building but in other way we have to check the structure stability also. Due to vertical irregularity of high raised building the risk is increase in story drift and also torsionally irregularity leads to increase due to unequal displacement in the building at

severe conditions which causes distress in structural elements with laterally applied load. An important distinction of the earthquake problem is that the hazard to life is associated almost entirely with manmade structure expect for earthquake triggered landslides, the only earthquake effect that causes extensive loss of life or collapse of bridges, buildings, dams, and other works of man. With the help of construction and design of earthquake resistant structure effect of earthquake hazard can be reduced. The design of structure so as to minimize collapse in most possible earthquake shows the optimum engineering approach. Thus ensuring against loss of life but accepting the possibility of damage.

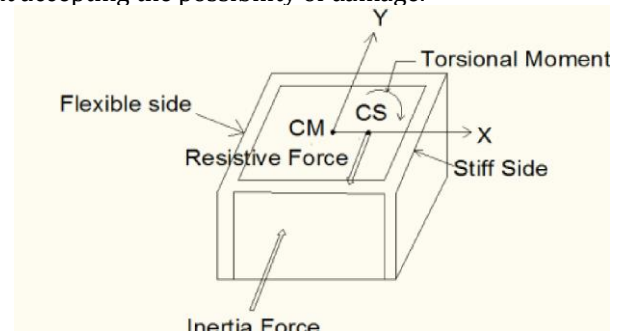


Fig 1: Torsional Moment

“Shear walls are vertical members which are used to resist lateral loads and they are parallel to the wall”. In thin wall stability is less so we provide shear wall to increase stability. It also resist load due to Cantilever Action. An example of shear wall is reinforced concrete wall. Due to heavy wind load, earthquake load and unsymmetrical

loading twisting force is occurred. Due to lateral load building or structure may get damage. Shear walls are very important in multistoried building. Generally they are plane or flange in shape and in core wall channel section are provided. Shear wall gives good strength and stiffness to control lateral load. In structure, shear wall which are provided at each of half of building shows excellent position. For shear wall more space is required therefore they are provided at the ends or corner of building. In the structure providing shear wall without opening it increases stability. We cannot provide windows on the side wall of structure.

II) REVIEW PAPER

In this paper author stated that shear wall provided to the building interior to implement more strength and stiffness to the building when exterior wall cannot implement tolerable strength and stiffness. In this work high-rise building with different location of shear walls is considered for analysis. The analysis of building is done by using equivalent static method and dynamic method. Using software ETABS-2015. Design of building using dynamic analysis building become more accurate and economical. [1]

In this paper author analyzed 14 storey asymmetric buildings using response spectrum method. For this study regular and irregular building models are analyzed and compare their outcomes. Irregular building model is L-shape plan. The results obtained from the Response spectrum method will be near to realistic. Due to earthquake irregularity buildings causes severe damage than the regular building in high seismic zones. [2]

In this paper author stated that Design and analyze multi-storied building under seismic response using ETABS to construct earthquake resistant building. They design and analysis frame structure and shear wall structure. They concluded that in shear wall structure displacement is less than frame structure. Shear wall structure is more suitable in earthquake prone area as compared to frame structure. [3]

In this paper author analyzed four different shapes of structure. They use linear dynamic response method for model analyze. Storey stiffness gradually varies with increase in storey height up to the 6th storey. They concluded that center of mass displacement value is more in T-shape structure and L-shape structure has lowest value. [4]

In this paper author studied that seismic analysis of multistoried building by various researchers using ETABS. They concluded that equivalent diagonals strut reduces displacement of structures and storey drift. The regular shape building performance is well during earthquake as compare to irregular shape building. Also researchers say that there is gradual increase in lateral force from bottom to top floor. [5]

In this paper author study is based on effect of shear wall on eccentrically loaded building is linear or non-linear. They provide shear wall with different location by using finite element computer software. They concluded that provision of shear wall improves the lateral stability of buildings especially for a symmetrical structure and also reduces the torsion in the buildings. For box type shear

wall at the core. Torsion is induced in the column is minimum. When shear wall is provided at outer edges torsion reduced by large amount. [6]

In this paper author modeled and designed the 6 storey's building in hilly area having seismic zone V. In this building provide the different shape of shear wall with different position. Checkout the behavior of building with shear wall on sloping ground is done by SAP 2000V 15.2.2 computer software. Seismic behavior of building is done by Response spectrum method using IS-1893 codebook. They concluded that due to shear wall some improvement noticed in the performance of building on slopping area. Due to increasing in slope displacement base shear also increases. [7]

In this paper author Analyzed 9 storey building with ground floor by providing with or without shear wall by using MATLAB with the help of IS Code 1893(part I):2002. They use Time-history method on MATLAB simulation. They concluded that shear wall rigidity is very important in symmetrical and unsymmetrical structure. Due to shear wall torsionally effect can be reduced by providing shear wall. [8]

In this paper author studied that shear wall and bracing system are used to improve performance of building against the lateral forces. They modeling and analyzing using STAAD ProV8i software. They concluded that RCC building with shear wall is more efficient than without shear wall. [9]

In this paper author studied the structural features of 56 storey RC building. In this building shear wall system with different opening are used under the lateral and gravity load. They concluded that the structure can be making more sensitive for different displacements with the help of different longitudinal stiffness. [10]

II) REVIEW SUMMARY

The shear wall structure is more effective in earthquake prone area. The cost of the frame structure may be less than the shear structure. Displacement in shear wall structure is less than frame structure. Asymmetrical plan undergo more deformation than symmetrical plan. Mass of displacement value is more in T-shape structure and L-shape structure has lowest value. Regular shape building gives better result than irregular shape building. Shear wall improves lateral stability of building and reduces the torsion effect on building. Increasing in slop displacement base shear also increases. Torsionally effect reduces in symmetrical and unsymmetrical structure by providing shear wall. RCC building with shear wall is more effective than without shear wall.

REFERENCES

1. B.Jaswanth, Surendra Y.L and M.Ravi Kumar 'Seismic Analysis of Multi-Storied Building with Shear Walls using ETABS' Vol.8, No.3 (May/June 2018)
2. Shaikh Muneer Hussain, Dr. Sunil Kumar Tengli 'Study on Torsionally Effects of Irregular Buildings Under Seismic Loads' Volume 13, Number 7 (2018)
3. Rinkesh R Bhandarkar, Utsav M Ratanpara, Mohammed Qureshi 'Seismic Analysis & Design of Multistory Building

Using Etabs' IJEDR | Volume 5, Issue 2 | ISSN: 2321-9939, 2017

4. Pushkar Rathod, Rahul Chandrashekar 'Seismic Analysis Of Multistoried Building For Different Plans Using Etabs' Volume: 04 Issue: 10 | Oct -2017
5. Mayur R. Rethaliya¹ , Nirav S. Patel ² , Dr.R.P.Rethaliya 'Seismic Analysis of Multistory Buildings Using ETABS-A Review' Volume 4, Issue 12, December -2017
6. P. Mary Williams* and R. K. Tripathi 'Effect of Shear Wall Location on the Linear and Nonlinear Behavior of Eccentrically Loaded Buildings' Vol 9(22), June 2016
7. S.P.Pawar,Dr.C.P.Pise,Y.P.Pawar, S.S.Kadam, D. D. Mohite and C. M. Deshmukh,N. K. Shelar 'Effect Of Positioning Of RC Shear Walls Of Different Shapes On Seismic Performance Of Building Resting On Sloping Ground' Volume 7, Issue 3, May-June 2016
8. R.B.Ghodke¹, Prof. M.V.Waghmare²,Prof. U.R.Awari³ 'Torsional Effect For Unsymmetrical R.C.Frames' Volume, 03 Issue: 07 | July-2016
9. Anshul Sud Raghav Singh Shekhawat Poonam Dhiman, 'Effect Of Different Shear Wall Configuration On Seismic Response Of A Moment-Resisting Frame' May 2014
10. O. Esmaili¹ S. Epackachi M. Samadzad and S.R. Mirghaderi 'Study of Structural RC Shear Wall System in a 56-Story RC Tall Building' October 12-17, 2008
11. Reference from Indian standard code
 - i) IS 1893:2002 (Part I)
 - ii) IS 1893:2016 (Part I)
 - iii) IS 456:2000