International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

A Study on Seismic Effect on High Rise Building With & Without Shear Wall

Mr. Ankit sonkar[1], Ms. Srishti Verma[2]

[1]M. Tech.Scholor, Department Of Civil Engineering, Mats School Of Engineering & Information, Technology, Mats University, Raipur, (C.G)
[2]Assistant Professor, Department Of Civil Engineering, Mats School Of Engineering & Information, Technology, Mats University ,Raipur, (C.G)

ABSTRACT:
In this paper we compare & analyze on high rise building, in this we included the reactions of seismic & effect of wind. In past years many research done on Analysis of building with and without shear walls. All the same we work for little Analysis of high rise building (G+10) with & without shear walls. The current work consist the correlation between framed & framed with shear wall building in presence wind force, earthquake force, etc For seismic design of buildings, reinforcement concrete structural walls or shear walls are higher earthquake resisting members which abstain from lateral load resistance.

In RC plates (shear wall) have properties of inelastic & stiffened member. It is a part of structure which is provided for resisting horizontal forces (like wind force, earthquake force, etc). It is very essential to determine capable, and ideal location of shear wall. In this paper we study of G+10 Storey building in Zone IV is conferred. In this article focuses on two different models with and without using shear walls in high rise building at different positions. This analysis is done by using STADD-pro Software by seismic analysis & wind effect.

KEYWORDS: STAAD Pro, shear wall, Seismic analysis, High Rise Building, lateral force, lateral Displacement

1. INTRODUCTION: - Now a days earthquake has become the biggest disaster, so many of them are threatening some of them are still suffering, from this fatal incident. As the population increasing gradually the needs for battle livelihood is yet also increasing hence, to make each and every life safe & comfortably.

the contribution of construction industry has made the effort to make an effective design & make earthquake resist structure which helps for peaceful living we will assure that we will reduce the risk & losses by earthquake at least amount.

In this paper I performance of shear wall in RCC building and simple RCC building have been studied with the help of two different models using STADD-pro in zone IV . The analysis is done static analysis method. The models considered for the analysis are as follows:-

Model 1 is RCC building without shear wall.
Model 2 is RCC building with shear wall.

1.1 OBJECTIVES OF THE PROJECT:-

This research is based on, building with shear wall at corner and without shear wall in G+10 Story building. To analyze the building using seismic, wind effect,& others general loads used method in STAAD Pro software. With minimum structure size of component & properties condition.

2. LITERATURE REVIEW:-

Mahendra Kumar. It's considered a five storey building which is subjected to Earthquake loading zone V to determine parameters like storey displacement, storey acceleration and base shear. Models were studied in V zone comparing lateral displacement, base shear and storey acceleration in X and Y direction for all structural models under consideration.

Amit Paul, G.D. Dhawle . The earthquake on high rise building in different position of shear wall using STAAD Pro to work out effective ,ideal location of shear wall, as much less economical in G+7 High rise building in Zone IV.

R.C .Bush, Anoop I. Shirkol. According to the Indian Code IS1893:2016, the dynamic method is a mandatory analysis procedure that needs to be performed in a structure if the height of the building exceeds 15 meters or if the structure is located in Zone IV [15]. Both the response spectrum method and the time history method are suitable for dynamic analysis.

Ashok Thakur , Arvinder Singh. The principle objective of this paper is to analyse and design a multi-storied building [G + 4(3 dimensional frame)] using STAAD Pro. The design involves load calculations manually and analyzing the whole structure by STAAD Pro. STAAD. Pro features a user friendly interface, visualization tools, powerful analysis and design engines with advanced finite element and dynamic analysis.

Mr.Hardik Mandwe, Simran Kagale. These buildings general used RCC framed structures subjected to vertical as well as horizontal loads. But for the buildings taller than 15 to 20 stories this system is not adequate because it does not provide the required lateral stiffness. Aim of the present study is to compare the behavior of multi-storey building with shear wall to analyze the effect of building height on the performance under earthquake forces.

K VenkateshT. Venkatdas. In this paper the analytical study on the lateral behavior of the structure is mainly concentrated and how it is varying in the different zones of zone II and zone III wit heights of a 6storey, 11storey, and 16 storey structure. The study also involves the orientation of shear wall.

Shivaraju G D, Usha S,Kumbar Bhanu Prakash. A Modal Analysis determines the vibration characteristics (natural frequencies and mode shapes) of the structure or a machine component. It can also serve as a starting point for another, more detailed, dynamic analysis, such as a transient dynamic

analysis, a harmonic response analysis, or a spectrum analysis. The natural frequencies and mode shapes are important parameters in the design of a structure for dynamic loading conditions.

Akansha Dwivedi. B.S Tyagi. In this paper effectiveness of shear wall in RCC building and building with composite columns have been studied with the help of four different models using Etabs in zone IV . The analysis is done by response spectrum analysis method and static analysis method. The models considered for the analysis are as follows:
Model 1 is RCC building without shear wall,
Model 2 is RCC building with shear wall,
Model 3 is building with composite columns having no shear wall and
Model 4 is building with composite columns in presence of shear wall

Mr. Ankur vaidya, Mr. Shahayajali Sayyed. In this paper review of different researchers on the concept of multistoried building with and without shear wall is paraphrased. In India, most adopted type of earthquake resistant structures is with shear wall. These structural walls may differ based on their design and utility and their position in any building plays an important role for resisting lateral force.

Abhishek Mishra, Surjeet Verma, Kumar Vanshaj. A G+25 multistory frame with eight different locations of shear walls situated in seismic zone IV have been taken for the purpose of the study. The size of the building in plan is 18 m x 18m. Height of each story = 3m, Size of Column = 600mm x 500mm, Size of Beam = 500mm x 400mm, Shear wall thickness = 150mm, Concrete Mix Used = M30, steel=Fe 415 All the supports are assumed to be fixed in nature. All the structural properties of building and dimensions as shown in the table no.1. Damping ratio 5% and soil type is taken as medium for all the 2 different models are without shear wall and with shear wall at corner.

3. METHOD & DESCRIPTION :- In this paper many IS Codes like IS 1893:2016(Part 1) and IS 456:2000 was referred & with the help of many researchers research paper this design purpose. The required architectural plan, sizes of beams and columns for analysis and design &define load are as follow in the table.

Particular of items	Properties
Building storey	**(G+10)**
Total height of building	**35 meter**
Beam size	**200mm x 300mm**
Column size	**300mm x 300mm**
Shear wall thickness	**125 mm**
Slab thickness	**125 mm**
Live load	**3KN/m^2**
Dead load	**1KN/m^2**
Grade of Concrete	**M30**
Grade of reinforcing steel	**HYSD 415**
Grade steel	**Fe 415**
Density of Concrete	**25 KN/m^3**
Zone	**IV**

Zone Factor	**0.24**
Response reduction factor	**5.0**
Damping ratio	**5%**
Height of each story	**3.5 meter**
Type of soil consider	**Loose soil**

Fig 1: Following data used in both RCC Structure model.

3.1. Define Loads ;- There are different types of loads acting on the Structure as per Indian standards.

3.1.1.Dead loads: - All permanent construction of the structure form the dead loads. The dead loads comprise of the weights of walls, partitions floor finishes, false floors and the other permanent construction in the structure

3.1.2.Live loads: -Live load is produced by the intended use or tenency of a building including the weight of movable partitions, distributed and concentrated loads, load due to impact and vibration and dust loads. Imposed loads do not include loads due to wind, seismic activity, snow, and loads imposed due to temperature and differential settlement.

3.1.3. Wind loads: -Wind loads is air in the motion rotation and differences in the terrestrial radiation relative to the surface of the earth.

3.1.4. Seismic loads: -Seismic loads is the basic concept of earthquake engineering. Which means application of earthquake generated agitation to a building structure or its model. It happens at contact surfaces of a structure either with the ground, or with the adjacent structures, or with the gravity waves from tsunami. Seismic loading depends primarily on: Anticipated earthquake parameters at the site, of the site, geotechnical parameters building structure's.

4. SEISMIC ANALYSIS METHODS . Seismic analysis is a major tool in earthquake engineering which is used to understand the response of buildings due to seismic excitations in a simpler manner. In the past the buildings were designed just for gravity loads and seismic analysis is a recent development. It is a part of structural analysis and a part of structural design where earthquake is prevalent.
There are different types of earthquake analysis methods in which one of them used in this project .
I. Equivalent Static program Analysis.
II. Response Spectrum Analysis .
III. Time History Analysis.
IV. Non Linear Static Analysis.

I.Equivalent Static Program Analysis: The equivalent static analysis procedure is essentially an elastic design technique. It is, however, simple to apply than the multi-model response method, with the absolute simplifying assumptions being arguably more consistent with other assumptions absolute elsewhere in the design procedure.

II.Response Spectrum Analysis: This approach permits the multiple modes of response of a building to be taken into account. This is required in many building codes for all except for very simple or very complex structures. The structural response can be defined as a combination of many modes. Computer analysis can be used to determine these modes for a structure. For each mode, a response is obtained from the design spectrum, corresponding to the modal frequency and the modal mass, and then they are combined to estimate the total response of the structure. In this the magnitude of forces in all directions is calculated and then effects on the building is observed.

III.Time History Analysis: Time history analysis techniques involve the stepwise solution in the time domain of the multi degree-of-freedom equations of motion which represent the actual response of a building. It is the most sophisticated analysis method available to a structural engineer. Its solution is a direct function of the earthquake ground motion selected as an input parameter for a specific building. This analysis technique is usually limited to checking the suitability of assumptions made during the design of important structures rather than a method of assigning lateral forces themselves.

IV.Non Linear Static Analysis: It is an improvement of linear static or dynamic analysis as it allows the inelastic behavior of the structure. But one thing is unchanged as it assumes a set of static incremental lateral load over the height of the structure. This analysis is also known as "pushover" analysis. A pattern of forces is applied to a structural model including non-linear properties and the total force is plotted with reference to displacement to depict a capacity curve. This can then be combined with a demand curve (typically in the form of an Acceleration-Displacement Response Spectrum (ADRS)) hence reducing the problem to an SDOF System. Moreover, this analysis is simpler, gives information on strength, deformation, ductility and the distribution of demands. Along with advantages it has some limitation like it neglects the variation in loading patterns and also the effect of resonance and higher modes influence on buildings.

5. CONCLUSION &DISCUSSION :-We study about some aspects of performance of shear wall & without shear wall building with the help of many structural software. After reading the research papers of many researchers, I have tried to implement in this paper .In this paper ,I have included seismic effect ,wind effect,& all necessary loads included under the Is codes together in this paper. In this we principally research about storey (lateral) displacement & bending moment at z direction, shear force at y-direction& axial force at x-direction is found & compared to the shear wall & without hear wall models. We have done the comparable research of both structures With the help STAAD.PRO software.

6. FUTURE SCOPE :- In new era of construction. shear wall building is a updated type of building in current time period instead of without shear wall building. Now a days there are many natural disaster happening ,we have to design building according to them that can reduce its effect.

7. REFERENCES :-

1. **Mahendra Kumar.** (issue 2018) "Seismic Behavior Of Building With Shear Wall", IJERT, ISSN: 2278-0181.

2. **Amit Paul, G.D. Dhawle.** (issue November 2019)"Effect Of Earthquake On High Rise Building In Different Position Of Shear Wall Using Staad Pro",volume 6 ISSN-2349-5162 JETIR
3. **R.C .Bush, Anoop I. Shirkol.** (2022). "Seismic Analysis of RCC Building with Different Shape of Shear Wall and Without Shear Wall", issue ASPS 983-989.
4. **Ashok Thakur , Arvinder Singh.**(1,June 2014.)"Comparative Analysis of a Multistoried Residential Building with and Without Shear Wall using STADD Pro.", ISSN: 2349-7688, Vol. 1
5. **Mr.Hardik Mandwe, Simran Kagale. (**06, June-2021) "Seismic Analysis of Multistorey Building with Shear Wall using STAAD Pro.", IJERT, ISSN: 2278-0181. Vol. 10 .
6. **K VenkateshT. Venkatdas**. (1, January 2017)"Study On Seismic Effect Of High Rise Building Shear Wall/Wall without Shear wall.",International Journal of Civil Engineering and Technology (IJCIET) Volume 8.
7. **Shivaraju G D, Usha S,Kumbar Bhanu Prakash.** (06 ,June -2019) "Study of Seismic Behavior of RC Flat Slab with and without Shear Wall Technique.", International Journal of Scientific Research in Engineering and Management (IJSREM) Volume: 03.
8. **Akansha Dwivedi. B.S Tyagi.** (06, June-2020) "Seismic Analysis of Building with and Without Shear Wall for Building with RCC and Composite Column.", International Journal of Engineering Research & Technology (IJERT),Vol. 9.
9. **Mr. Ankur vaidya, Mr. Shahayajali Sayyed. (**12 | Dec 2018)" Research on Comparing the Seismic Effect on Shear wall building and Without- Shear Wall Building.",International Research Journal of Engineering and Technology (IRJET),Volume: 05.
10. **Abhishek Mishra, Surjeet Verma, Kumar Vanshaj**. (03/March-2022) "Comparative Study Of High-Rise Building With Shear Wall And Without Shear Wall At Corner.", International Research Journal of Modernization in Engineering Technology and Science (IRJMETS), Volume:04