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# Earthquake Resistant Building Working Model and Its Design Calculation According To Is Codes

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**ABSTRACT:** Earthquake is considered as major natural disasters which affect most of the part of India. Earthquake resistant structures are capable of resisting lateral and vertical forces acting on the structures. But no structures can entirely survive during earthquake without any damages. According to codes earthquake resistant structures are designed to withstand expected earthquake at least to occur once during the design life of the structure. Amongst all methods applied for earthquake resistant multi storied structures shear walls the most adopted. Shear wall is a structural member positioned at different places in a building from foundation level to top parapet level, used to resist lateral forces i.e parallel to the plane of the wall. Shear walls are structural members which are used to prevent lateral forces due to earthquake and wind. A comparison is made of the seismic response of Building with and without base isolators to investigate the seismic response of isolated building and compare it with corresponding response of non isolated building, to identify the effectiveness of isolation system, in this study. Various types of bearings is considered as base isolation systems.

**KEYWORDS:** Base Isolation, Shear Wall, Lateral Forces, Seismic Analysis, Base Shear.

## I. INTRODUCTION

Earthquake means sudden vibration of earth surface due to the motion of tectonic plates which releases energy in the form of vibrations. The earthquake can cause a severe damage to the life and property. Buildings are the most common structure where human being live. During an Earthquake, building tends to collapse. We have choose this project to save life and money too. Shear wall is a structural member positioned at different places in a building from foundation level to top parapet level, used to resist lateral force parallel to the plane of the wall. There are different materials by which shear wall can be constructed but reinforced concrete(RC) buildings often have vertical plate-like Reinforced concrete walls in addition to slabs, beams and columns. Shear walls are usually provided along both length and width of buildings. These walls are more important in seismically active zones because during earthquakes shear forces on the structure increases. Shear walls should have more strength and stiffness. Shear walls provide adequate strength and stiffness to control lateral displacements. Shear walls perform dual action that is they as lateral as well as gravity load-bearing elements. Concrete Shear wall buildings are usually regular in plan and in elevation. We are also used of Base isolation method to reduce the seismic forces. The basic objective with seismic isolation is to introduce horizontally flexible but vertically stiff components (base isolators) at the base of a building to substantially uncouple the superstructure from high-frequency earthquake shaking. We are using Indian standard code IS: 1893-2002 for design of earthquake resistant building.

## II. LITERATURE REVIEW

M.Sobaih(1992 and 1993), He makes various strategy for seismic risk mitigation like; seismic hazard work, development of seismic codes, seismic design of new building, Vulnerability assessment of existing structure, seismic risk evaluation of urban areas, Retrofitting of existing building, Earthquake e research, Public awareness, Earthquake disaster management engineering education, earthquake engineering engineerings research, Public awareness, Earthquake disaster .

**Mohammad Adil Dar, Dr A.R Dar, Asim Qureshi, Jayalakshmi Raj (2013)**, This literature paper that various technology is available to drastically mitigate the earthquake related disasters. Technology like terminology and sway mechanism. The purpose of this paper is to see the behavior of building designed and detailed by the provision of IS 1893:2002 & IS 13920:1993 through the pushover analysis. Pushover analysis shows that still building is fails to satisfy the life safety criteria which is given according to ATC-40.

**Mohammad Adil Dar, Dr A.R Dar, , Jayalakshmi Raj (2013)**, This paper the Earthquake Resistant Design Of Foundation, the Earthquake loads are the most complicated and complex. Design of earthquake resistant foundation is highly challenging. Proper design of foundation against earthquake loading requires through understanding over the behavior of soil, response of structure interaction of soil structure under earthquake loading.

**Lokesh kumar Gupta, Vivek Kumar Singh and Manorma Sharma (8sep 2014)**, That Earthquake is considered as major natural disaster which affect most of the parts of India. Sever damage and poor performance of buildings in all over the India during an earthquake is a matter of serious concern in which Aligarh is one of the city in India. The main focus of disaster management for the earthquake are check the causes and impact of natural disaster.

**Sagar R Padol, Rajashekhar S.Talikoti (3 March 2015)**, The various technique are used for making an earthquake resistant building. He study about the mass irregularity, stiffness and vertical geometry irregularity. He said that effect of earthquake can be minimize by providing shear wall and base isolation.

**Pamela Jennifer J P, Jegidha K J (10 October 2015)**, The Seismic Design of Multistoried RC Building using various code, Earthquake resistant structure are capable of resisting lateral and vertical forces acting on the structure. But no structure can entirely survive during earthquake without any damages. The structure is designed for seismic zone iv. The load combinations considered for the analysis and design is as per IS:1893-2002. The seismic weight is calculated using full DL+25% of LL. The buildings are designed for two cases such as ordinary moment resisting frame (OMRF) and special moment resisting frame (SMRF).

**Prof. V. R. Rathi, Gadakh Vishal Balkrishna (28-30 April, 2016)**, The Effect of Base isolation On Building, It is impossible to make a building which can resist the earthquake completely. To improve the seismic performance of building base-isolation method is used. Base isolation is one of the leading concept of earthquake engineering, which can be described as splitting the super-structure from its sub-structure. Base isolation method protect a structure when the ground shaking, the rollers free move, but the building does not move. Thus, no force is transferred to the building due to shaking of the ground, the building does not experience the earthquake.

**Mr. Alok kumar A. Mondal, Mrs. Gitadevi B. Bhaskar, Miss. Deepa. Telang (June 2017)**, He said about the comparing effect of earthquake on shear wall building and non-shear wall building, concrete shear wall are most common and useful type of shear wall for any multistoried building, the ability shear wall to resist lateral forces generated by earthquake and wind forces. Without shear walls supporting the exterior walls against wind and earthquake loads, the exterior walls would collapse inward.

**Vivek G. Jamodkar, Prof. N.P. Kataria (2017)**, That Performance of Base Isolated Building, the Base isolation as a flexible material which is provided at base to reduce the seismic forces of any structure. He said that Base isolation provide at the basement level because the base isolation reduces ground motion transmitted to the super structure. The Building with Base isolation is strong during an earthquake as compare to fixed base building.

### III. OBJECTIVE OF STUDY

- Using Base isolation method to reduces the damages of building when earthquake is occur
- Compare between base isolation building and without base isolation building.
- Shear wall to resist the lateral forces.
- Indian seismic code IS 1893:2000(part1) for design of building or calculation of earthquake loads.
- To identify the best building configuration in different seismic zones.

#### IV. CONCLUSION

- IT IS CLEAR THAT EFFECT OF EARTHQUAKE ON STRUCTURE CAN BE MINIMIZE BY PROVIDING SHEAR WALL BASE ISOLATION.
- It concludes that elastomeric bearing is more suitable for building as compare to other type of bearing.
- It is observed that in case of fixed base building it is not possible to achieve the intermediate occupancy and life safety performance level but it is possible in base isolated building.
- Building without shear wall is a subject of concern and need to be retrofitted in places of high earthquake and wind impact.

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