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Earthquake Resistance Structure

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Abstract: *The effect of earthquake can be prevented or minimized by taking certain preventive measures as per standard scientific guidelines. In Earthquake prone areas, these measures may prevent the loss of lives and material. Due to suddenness of their occurrence, they are least understood and most dreaded. The earthquake resistant construction is considered to be very important to mitigate their effects. This paper presents the brief essentials of earthquake resistant construction and a few techniques to improve the resistance of building and building materials to earthquake forces, economically. This is the need of hour to educate the masses to adhere to the standard measures during the process of construction in earthquake prone areas. Organization of different workshops and revision of curriculum in engineering courses from the view point of frequent earthquakes in different parts of the country may be of great help to minimize the damage.*

Keywords: Earthquake Resistant Structure

I. INTRODUCTION

Disasters have always caused huge damage to humans ever since our existence. They are unexpected, unpredictable. In counter activities, there have been several attempts to alleviate the catastrophic effects of these disasters. Since ancient times, earthquake is one of nature's greatest hazards on our planet which have caused immense damage to human life. What makes it even worse is its sudden and unexpected nature. Bringing down the damage caused due to untimely earthquake excitations is a major concern for many parts of the world. Since they are unpredictable, the only way left to prevent structures from earthquake is to design earthquakes resistant buildings. Considering this concern, there have been several attempts in this direction globally. The outcome of such attempts are motivating in developed countries while on other hand in developing countries results have been terrible including ours too. This can be proved as there were less loss of life and damage in developed countries compared to developing countries, due to earthquake excitations. Earthquake being a natural phenomenon, it cannot be stopped but all that humans can do is construction of safe structures to mitigate the death toll and damage. Only if the buildings are built earthquake resistant, just as it is made in USA and Japan, the developed countries, we will be able to bring down the damage and death toll and provide a safe environment for humans to live on and carry out their daily activities peacefully without any fear of losing life to earthquake.

II. LITERATURE REVIEW

A brief review on earthquake resistant techniques by some of the researchers is given below:

1.SM Kalantari: SM Kalantari who for decreasing the base and storey shear of structure investigated effect of using two various types of seismic isolators. Four models of 2, 5, 8 and 12 stories had been created for cases of fixed base, lead rubber and friction pendulum isolator with varying stiffness. All this four models were analyzed under earthquake characteristics of Electro, Naghan, Tabas and Manjil by use of non linear finite element program. The outcome showed that use of LRB had more displacements in lower storey of building compared to fixed base model. While in most number of cases was seen that using FPS isolators didn't guarantee displacement requirement.

2. Mr Ashish A Mohite, Prof. G.R. Patil (2015): In his paper "Earthquake analysis of tall building with tuned mass damper", a software study on TMD was conducted. In which TMD is placed on the top of the building and storey drift,

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storey displacement and base shear was analyzed with and without TMD on ETAB. The analysis was done by investigating seismic behavior of 10th, 12th , 14th, 16th, 18th and 21st floor and excitations of Bhuj earthquake were applied using time history analysis. They concluded that the TMD should be placed at top floor for best control of the first mode and also proper implementation is necessary

3. Balakrishna G.S et al (2014): In his paper, it is presented that by using passive energy absorbing devices, seismic response of the building in earthquake prone areas can be improved. By use of SAP2000 v14, a 6 storey building was analyzed with provision of Viscous Fluid Dampers (VFD), Tuned Mass Damper (TMD), and without any damping devices and non linear time history analysis was conducted by applying equivalent to Bhuj earthquake.

4. Thakur VM et al (2012): This paper comprises of explanation of use of TMD in soft storey form constructed at the top of building. A six storey building, rectangular in shape was considered and analyzed using SAP2000 software by using direct integration approach. Percentage mass of TMD used were 2% and 3%. Comparison between buildings with TMD and without.

III. DESIGNING

3.1 Methods of Designing Earthquake Resisting Building

Earth quake-Proof Buildings Are Designed Throughout history, we've built impressive structure and cities only for them to encounter the forces of nature. Earthquakes are one of the Earth's most destructive forces — the seismic waves throughout the ground can destroy buildings, take lives, and costs tremendous amounts of money for loss and repair. According to the National Earthquake Information center, there is an average of 20,000 earth quake each year —16 of them being major disasters. On September 20, 2017, a magnitude 7.1 rocked Mexico's capital city and killed approximately 230 people. As with the case with other earthquakes, the damage was not caused by the quake itself but by the collapse of buildings with people inside them, making earthquake-proof buildings a must. Over the past few decades, engineers have introduced new designs to better equip buildings to withstand earthquakes. Read on to learn how earthquake-proof buildings are designed today.

3.2 How Earthquakes Impact Buildings.

Before we look at the features, it's important to understand how earthquakes impact manmade structures. When an earthquake occurs, it sends shockwaves throughout the ground in short rapid intervals in all different directions. While buildings are generally equipped to handle vertical forces from their weight and gravity, they cannot handle side-to-side forces emitted by quakes. This horizontal load vibrates walls, floors, columns, beams and the connectors that hold them together. The difference in movement between the bottom and top of buildings exerts extreme stress, causing the supporting frame to rupture and the entire structure to collapse.

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IV. CONCLUSION

- There is a lack of awareness in the earthquake disaster mitigations. Avoiding nonengineered structures with unskilled labour even in unimportant temporary constructions can help a great way.
- Statewide awareness programmes have to be conducted by fully exploiting the advancement in the information technology.
- Urgent steps are required to be taken to make the coral provisions regarding earthquake resistant construction undebatable.

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