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Earthquake Resistant Buildiing With Magnetic Based

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ABSTRACT

A performance-based design is aimed at controlling the structural damage based on precise estimations of proper response parameters. Performance-based seismic design explicitly evaluates how a building is likely toper form; given the potential hazard it is likely to experience, considering uncertainties inherent in the quantification of potential hazard and uncertainties in assessment of the actual building response. It is an iterative process that begins with the selection of performance objectives, followed by the development of a preliminary design, an assessment as to whether or not the design meets the performance objectives, and finally redesign and reassessment, if required, until the desired performance level is achieved. In this present study one R.C building symmetrical in plan (designed according to IS 456:2000) are analyzed using "The Displacement controlled Pushover Analysis" in this we have assigned auto hinges formation as per FEMA356 in possible location. Then we have found the capacity spectrum, demand spectrum & performance point of the building. Finally, I also did time history analysis of a building using a SAP2000V16. For time history analysis the time history of Bhuj earthquake & time history of IS code 1893 for medium soil is taken. Very Rare chances are there for the building to cross Life safety performance level. In the collapse state the failure was due to the collapse of ground floor Columns which is a serious issue and should be looked for further research. The Building designed as per Indian standards was found to be satisfying Life safety performance level considering Designed Based Earthquake.

INTRODUCTION

The ground vibrations, both feeble and strong, produced on the surface of the earth due to any reason what so ever are described as earthquakes. Whenever these vibrations traverse, an earthquake is said to have taken place. It may also be defined as "Violent shaking of earth's surface due to abrupt release of large amount of energy that has accumulated over a long time inside the earth". It is important to mention here that about 90 percent of all earthquakes are caused naturally whereas 10 percent earthquakes are related to manmade sources such as nuclear explosions, reservoir induced tremors, etc. The current seismic zone map indicates that more than 60 percent of the land area in India is considered prone to earthquakes. Many recent earthquakes of high magnitude which occurred in India during the last decade sound an alarming bell that the seismic risk in the country has been increasing day by day. Most deaths during an earthquake are caused by collapse of manmade structures. The basic knowledge of civil engineering and structural engineering without any exposure to earthquake engineering is not sufficient to build earthquake resistant structures. Hence the most important step towards an earthquake-resistant India is to train the practicing professional engineers in the subject of earthquake engineering. The knowledge of earthquake engineering is essential for a civil engineer to enable him to build earthquake resistant constructions that can appropriately withstand earthquakes. The vast devastation in Gujarat during the Bhuj earthquake of 2001, clearly shows that seismic design, detailing and related earthquake resistant practices are not being followed in the construction of buildings and other structures. The inadequate preparedness of the country to face damaging earthquakes is due to poor knowledge of science of seismology. We all know that earthquakes originate due to a sudden impact on the body of the earth. When the impact is of lighter intensity, milder or feeble vibrations are set up, whereas a heavier impact generates strong tremors having disastrous effects.

The causes of earthquakes may be broadly classified into following three categories.

1. Superficial or surface causes
2. Volcanic causes

3. Tectonic causes

LITERATURE REVIEW

Lin Su et al (1991): In this paper Lin Su, Goodarz Ahmadi and Iradj G. Tadjbakhsh, discusses about the analysis on a new combination of base isolator resulted after combination of the properties of electricity de France (EDF) base isolator and resilient base isolator(R-FB1) device, and new isolator formed i.e. sliding resilient base isolation system (SR-F).

H.W. Shenton et al (1993): In this paper, Shenton and Lin compared and analyzed relative results of fix based and base isolated structure. Referring the concrete fix base structure was designed according to the Structural Agencies Association of California (SEAOC), and comparison was done with a fixed base response.

Todd W Erickson et al (2010): In this paper, Erickson and Altoontash discuss the response of the industrial structure. It is shown that the response of industrial structure was presented under seismic forces and according to the IBC code, the building was designed.

Alex Y Tuan and GQ Shang (2014): In their paper "Vibration control in a 101 storey building using a TMD" an investigation was carried out on effects of TMD on structural dynamic responses of Taipei 101 tower. A detailed dynamic analysis was conducted for evaluation of structural behavior.

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.

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 TMD was done by applying three different recorded time histories of past earthquakes for analysis.

METHODOLOGY & EXPERIMENTAL WORK

MATERIALS

Cement- Cement is a vital component in self-compacting concrete (SCC) because it provides the binding and cohesive properties that hold the mixture together. The type of cement used in SCC can significantly impact its performance and characteristics. In general, ordinary Portland cement (OPC) is the most used cement in SCC due to its availability, cost-effectiveness, and well-known properties. However,

Aggregates- Aggregates are a crucial component in SCC, as they provide bulk to the mix and impart the required strength and durability to the resulting concrete.. For instance, SCC requires aggregates that are free from dust, clay, and other fine particles that can clog the mix and reduce its flow ability.

Water- Water is an essential component in the production of concrete, including self-compacting concrete (SCC). The quality of water used in SCC plays a significant role in the overall performance and durability of the concrete.

Chemical Admixtures: - Chemical admixtures are a vital component in the development of high-performance self-compacting concrete (SCC). These chemical admixtures improve the properties of SCC, including workability, durability, strength, and setting time. Chemical admixtures are mixed with the concrete at the batching plant or on-site during the mixing process. One of the commonly used chemical admixtures in SCC is the super plasticizer. Super plasticizers, also known as high-range water reducers.

Prestressing Steel- The prestressing steel shall be any one of the following:

a) Plain hard-drawn steel wire conforming to IS: 1785 (Part I)- 1966 and IS: 1785 (Part II)-1967,
b) Cold-drawn indented wire conforming to IS: 6003-1970 ||
c) High tensile steel bar conforming to IS: 2090-1962, and
d) Uncoated stress relieved strand conforming to IS: 6006-1970.

RESULT

Seismic analysis is a subset of structural analysis and is the calculation of the response of the building structure to earthquake and is a relevant part of structural design where earthquakes are prevalent. The seismic analysis of a structure involves evaluation of the earthquake forces acting at various level of the structure during an earthquake and the effect of such forces on the behavior of the overall structure. The analysis may be static or dynamic in approach as per the code provisions.

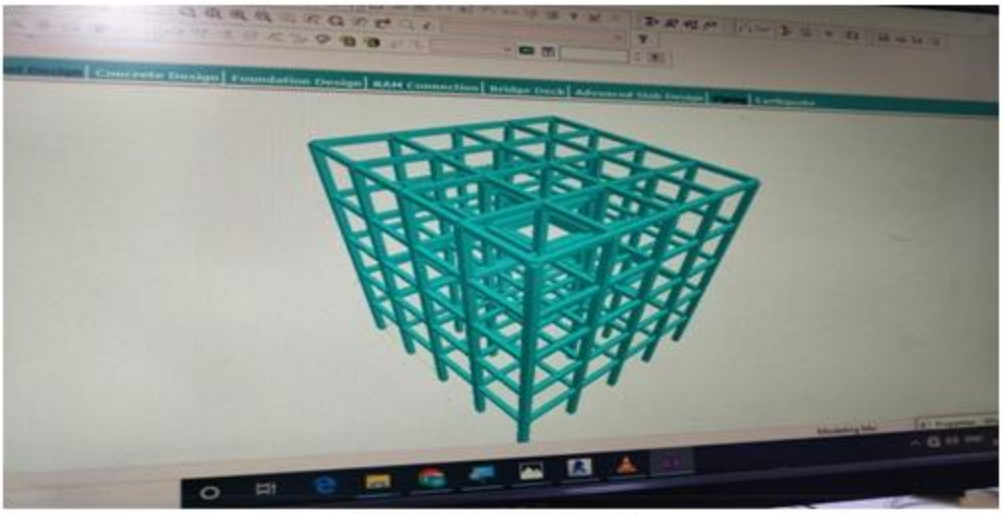

Figure 1 3D Diagram

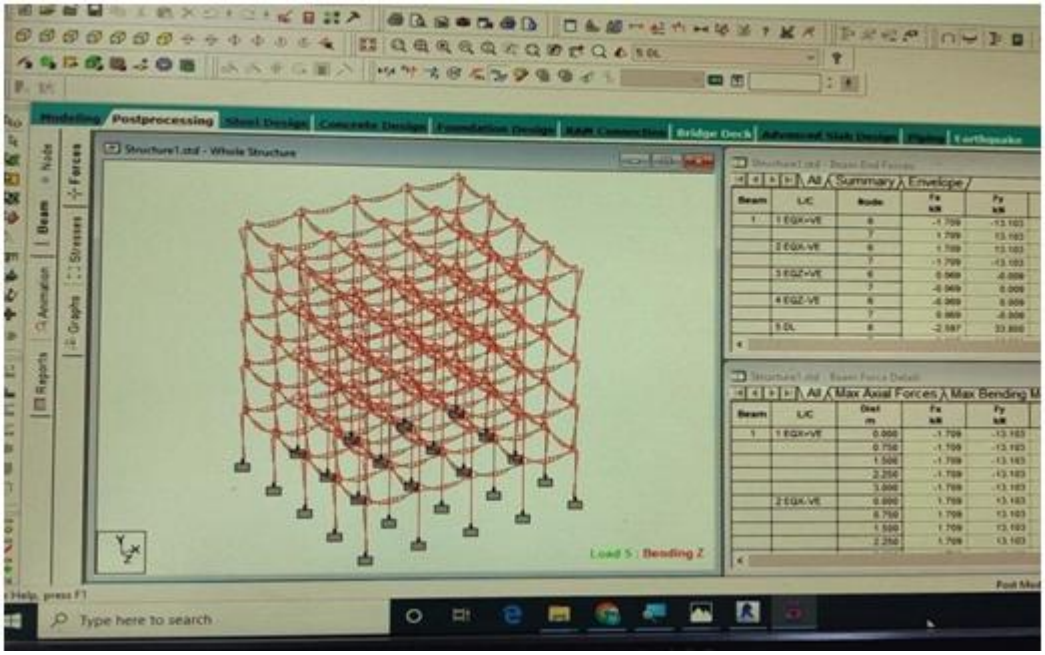

Figure 2 All combined forces Diagram

CONCLUSION

This results of this work demonstrated that base isolators are excellent seismic control devices for high rise or multistory symmetric building. Base isolation method has proved to be a reliable method of earthquake resistant design. Magnetic Base Isolation System has future method had to proved that very effective method of earthquake resistant design. Magnetic Base isolation system has structure exhibit less Lateral deflection, since the lateral displacement at the base never equal to zero, and less moment values than the fixed base structure. All the values put into Stadd Pro. V8

Software and analysis the all data. We found that if the Structure are prestressed and Pretension then the Elements are like beam, and column resist seismic forces. In magnetic Base building all the loads are calculated and analysis the data Stadd Pro. V8 Software. Finally, the conclusions are in Magnetic Base Isolation Building design is effective to neutralized the seismic fences. It is suitable method for single story and multistory as well as.

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