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Review Article

A Literature Study to Seismic Isolation in Building and Water Tank

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Abstract

The explanation contented of base isolation formation strategy consists of two portions: the major is blueprint of base isolation device, and the one more is drawing of structural element overhead tank the separation layer. They are two linked aspects. Collective with the concrete exactness of base isolation system in China, it is recommended that two part design method may be used to plan and design base isolation device. There is an increasing need for vibration isolation in many different fields: magnetic resonance imaging, semiconductor industry, car suspension, microscopy, machine tools, aircraft, and gravitational wave detectors. Even though the level of the vibrations to isolate and of the environmental disturbances can differ by several orders of magnitude, the strategies to achieve the required level of stability can be very similar. Depending on the application, vibration isolation may also be referred to as vibration suppression, vibration cancellation, stabilization or immobilization.

Keywords: *The Seismic, Residential Building, Base isolation, Fixed Support, Deflection, Stress, Strain, intz water tank, natural gas tank*

1. Introduction

The idea of earthquake resistant design is that the elevated water tank should be designed to resist the forces, which arises due to Design Basis Earthquake, with individual minor damaged and the force, which rises due to Extreme Considered Earthquake, with approximately acknowledged structural damaged but no failure. This scheme report includes of seismic analysis and design of an elevated water tank. The elevated water is modelled as a 3D space frame SAP2000 v 20. Water tank is investigated using Response Spectrum method. The Response Spectra as per IS 1893 (Part 1&2): 2002 for rocky or hard soil and soft soil is used.

Dynamic response of a structure resting on soft soils in particular, may differ substantially in amplitude and frequency content from the response of an identical structure supported on a very stiff soil or rock. However, data on many failure examples of rigid structures resting on flexible soils and intensive analytical studies in recent years have made considerable advances in the field of soil-structure interaction and analytical techniques are now available. This interaction phenomenon is principally affected by the mechanism of energy exchanged between soil and the structure.

Considering the soil-structure interaction effect which is mainly due to the fact that buildings with high stiffness on loose soils behave differently. Base shears have shown significant variation with high values for structures resting on loose soils and low values in case of hard rock. This attributes mainly due to more absorbing energy capacity of soils when compared to rock materials.

Base Isolation systems decrease building's vibrations for the period of earthquake. In this way building distorts less, dropping the probability of damage usually, a building's is supported straightforwardly on its foundations, and it is held to have a fixed-base. Once base isolation is used, unique structure's bearings are inserted connecting the bottom of the building's and its foundation's. These bearing are not very stiff in the horizontal direction, so they decrease the fundamental's frequency of vibration of a building's. The frequency become so small that the building's doesn't shake as sturdily during an earthquake for the duration of an earthquake, a fixed-base building's can swing from side to side. When a base isolation system is induced, the sideways movement occurs mostly in the bearing's, and the building almost not distorts at all.

Base isolation, also known as seismic base isolation is one of the mainly admired means of protecting a structure against earthquake forces. It is a group of structural's elements which should significantly decouple a superstructure's from its substructure sleeping on a quaking ground thus

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defending a building or non-building structure's reliability.

2. Literature Survey

Sameer S. Shaikh1, P.B. Murnal , 2015 :- In this author had describe about base isolation at different level in building. In this method was adapted to verifies in giving flexibility to the structure by increment time period of structure and de-couples a superstructure from its substructure. The seismic response of multi-storey building maintained on base isolation at unlike levels is examined under earthquake time history motion. study has been performed on the performance of base isolated structures. The behaviour of building structure sleeping on plastic-coated rubber bearing is related with fixed base structure under maximum capable earthquake. An output results for acceleration and displacement are present and Seismic base isolation can decrease the seismic effects and therefore floor accelerations are reduced by lengthen the natural period of vibration of a structure via used of rubber isolators amongst the column and the foundation and directly above the beam for plinth and first floor level. In case the deformation capacity of the isolators exceeded, isolator may rupture or buckle. Therefore, it is important to exactly approximation the peak base displacements in case of most important earthquakes, particularly if the base isolated building is likely to be stuck by near- fault earthquakes. it is determined that seismic base isolation is a effective technique that can be used in earthquake resistant design. the conclusions are the crowning top floor acceleration is reduced for footing level, 7.163 to 6.305 for plinth level, 6.305 to 5.452 for first floor level in case of Northridge earthquake while for footing level, for plinth level,for first floor level in case of El-Centro earthquake, from which it is conceivable to arrive at ideal location of the isolator so as to get the extreme benefit of base isolation

Saiful Islam, Mohammed Jameel .and Mohd.Zamin Jumaat, 2011, In this paper the author had evaluate a amount of articles on base isolation grouping in building structure. Lead rubber bearings (LRB), high damping rubber bearings (HDRB), friction pendulums system (FPS) have been seriously explore.

It is determined that the responsibilities for applied isolation system to be combined in building structure are flexibility, Damping and resistance to service loads. Extra requirements such as durability, cost, ease of installation and specific project requirements impacts device selection but all real-world systems should contain these essential elements.

Yong-Chul Kim *et.al*. (2004), A imaginary model of a friction pendulum system (FPS) is make known to to inspect its application for the seismic isolation of spatial lattice shell structures. An equation of motion of the lattice shell with FPS bearings is established. Then, seismic isolation studies are made for both double-layer and single-layer lattice shell structures under changed seismic input and design parameters of the FPS.

Aung Chan Win (2008) studied for the 16-storey R.C.C building which is situated in seismic zone 2A is used as test model. Lead rubber bearing (LRB) is provided in this studied The key purpose of this study is to decrease the storey accelerations and storey drifts due to earthquake ground simulation, given to the superstructure of the building by providing base isolation devices at the foundation level and to relate the dissimilar performances between the fixed base condition and base-isolated state with ETABS software.

Donatello Cardone *et.al*. (2009), studied offerings a new approach for the assessment of precise lateral force distributions for the Linear Static Analysis (LSA) of Base Isolated (BI-) buildings.

Lin Su (2009), studied performances of different base isolation devices under a variety of conditions are evaluated and compared. Combining the desirable features of various systems, a new design for a friction base isolator is also developed and its performance is studied.

J. C. Vielma *et.al*. (2008), structural elements have a non-linear behavior during an earthquake, similar to what is considered in the design process, which implies that elements are damaged and it is interesting for designers to be able to estimate structure expected global damage and correlate it to design ductility, as well as to ductility demand. Damage indexes calculated when applying the finite element method have values not reflecting deterioration in case of buildings designed for low ductility; this feature being contrary to damage indexes calculated for ductile buildings. Therefore, an objective damage index is proposed, based on ductility and elastic and ultimate stiffness values, independent to selected structural typology. The procedure is illustrated by means of an index assessment from damage caused to three buildings, two designed for low ductility (buildings with waffle slabs and framed buildings with wide beams) and a framed building, designed for high ductility. For the three buildings static non-linear response has been determined by means of a force-based procedure. Results obtained demonstrate that the proposed objective damage index provides values which describe properly the damage suffered by the buildings at the instant of collapse.

Gh. Ghodrati Amiri (2008), During design of structures, different parameters like stress in members, deflection of members, inter-storey drifts and etc. are considered. In this research damage index as a design parameter has been used and with minimizing damage index as a constraint, the total weight of structure has been minimized. The Park model has been applied as a damage estimating model.

Zhang Ruifu†, Weng Dagen‡ and Ren Xiaosong,2011 In this study the author had used the base isolation system for long storage tank for natural fuel by providing multi friction isolator to reduce the deflection and cracks in the structure

,wave height and different level of water.the analysis is provided .to get crack and displacement free structure by using time history analysis.

3. Expected Outcomes And Need of the Study

The seismic response of intz water tank supported on base isolation systems during impact with adjacent structures. The main purpose of this study is to decrease the displacement and base shear due to earthquake ground simulation.

1) To pursuit for maximum effective intensity measures leading to demand forecasts with smaller dispersion.
2) To determine displacement and base shear ,drift capacities of existing RC frames and water tank under consideration.

4. Problem Formulation and Objective

The seismic performance of RC structures before and after the application of flexibility and stiffness-based elements technique is to be studied in the current project. In this study we are introducing isolation system instead of conventional technique to get better performance of building during the earthquake.

The specific aims and objectives of the project can thus be mentioned as:

1. Analysis of Intz Water tank as per IS codal provided supposing fixed base using sap2000 software for zone V.
2. Analysis of Intz water tank after using base isolator using sap2000 software for zone V.
3. To relate the seismic performance of Intz Water tank before and after the application of base isolation

Conclusions

On performing the extensive survey of the literature available on building and water tank structure it can be concluded that due to a wide variety of buildings, the in depth understanding in the field of seismic analysis and design of building structures is inadequate.

1) The IS codes has provided certain guideline on the basis of which the building and water tank structures can be designed when subjected to seismic loads.
2) The literature survey in the performance and behavior of building and water tank structures when exposed to seismic loads proposes that the condition of establishing a methodology for studying the response of building and water tank structure to earthquake loads has become vital. This will move us toward implementing performance-based design by using pushover analysis and nonlinear time history analysis and response spectrum analysis.
3) Numerous researchers have made work over numerous types of isolation systems such as; Lead rubber bearing, high damping rubber bearing, friction pendulum bearing etc. on the various types of buildings and find out the important parameter which is beneficial for understanding the behavior of isolation system
4) In the intz water tank the base isolation system is adopted to decrease the base shear and displacement by providing base isolator

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