INVESTIGATION OF SEISMIC RETROFITTING OF STRUCTURES

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ABSTRACT: In India most of the existing structures are not able to withstand the seismic forces. From the past earthquakes which also give us lesson like Bhuj earthquake or Nepal earthquake .So we cannot demolish the existing structures but we can retrofit the existing structures due to the complex behaviour of RCC composite material building The vulnerability of structures and the seismic hazard (earthquake) on which the earthquake depends .In the seismic hazard evaluation we take the consideration on the like hood of earthquake of a particular magnitude or intensity affecting a site . The poor response of buildings towards earthquake is non uniformity of loads which transport from superstructure towards the foundation and also due to the construction of soft storeys. In this experimental investigation basic systems were seen more advantageous and make the building earthquake resident .In this work various types of bracing were used like X, V AND inverted V and so on, It was concluded that the lateral displacements in the braced buildings reduced as compared to unbraced buildings and the displacement at the top storey reduces

I. INTRODUCTION

In India most of the existing structures are not able to withstand the seismic forces. From the past earthquakes which also give us lesson like Bhuj earthquake or Nepal earthquake .So we cannot demolish the existing structures but we can retrofit the existing structures due to the complex behaviour of RCC composite material building. The vulnerability of structures and the seismic hazard (earthquake) on which the earthquake depends .In the seismic hazard evaluation we take the consideration on the like hood of earthquake of a particular magnitude or intensity affecting a site .Seismic Vulnerability is a quite complex task, considered both design and damage of building, the seismic weakness of building is related with the seismic deficiencies of structural elements in building include Columns, Beams, Foundation and Floor slabs. The seismic deficiencies is defined as the conditions which objections the building to meet the required performance level. For such buildings some steps must be taken so they can with-stand with these Hazards and very limited damage to both structural and non-structural components.

The seismic deficiencies in the building are categories to following.

Discontinuity in the load path, which transfers the load from super structure to sub structure.

For lateral load system, strength is low such as weak stories.

Low stiffness to resist the lateral load system e.g. soft storey condition.

II. EXPERIMENTAL PROGRAMME

GROUND SHAKING

Ground shaking is a term used to describe the vibrations of the ground during an earthquake. Ground shaking is caused by body waves and surface waves. The severity of ground shaking increases as magnitude increases and decreases as distance from the fault increases. Although the physics of seismic waves is complex, ground shaking can be explained in terms of body waves, compression, or P, and Shear, or S, and surface waves, The 'P' and 'S' waves mainly cause high-frequency vibrations; whereas, Rayleigh waves and Love waves, which arrive last, mainly cause low-frequency vibrations. Body and surface waves cause the ground, and consequently a building, to vibrate in a complex manner. The objective of earthquake-resistant design is to construct a building so that it can withstand the ground shaking caused by body and surface waves.

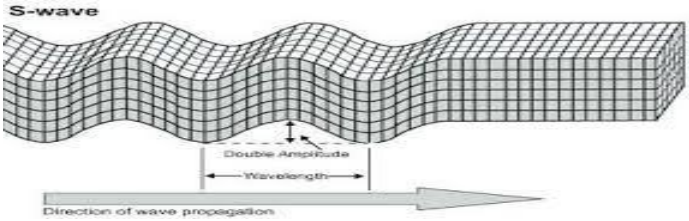

Fig 1. Diagram Showing Surface Waves

LIQUEFACTION INDUCED: - Liquefaction is not a type of ground failure; it is a physical process that takes place during some earthquakes that may lead to ground failure. As a consequence of liquefaction, clay-free soil deposits, primarily sands and silts, temporarily lose strength and behave as viscous fluids rather than as solids. Liquefaction takes place when seismic shear waves pass through a saturated granular soil layer, distort its granular structure, and because some of the void spaces to collapse. Secondary hazards include ground failure, liquefaction, landslides and avalanches.

TYPES OF BRACINGS:

There are two types of bracing systems

1) Concentric Bracing System and

2) Eccentric Bracing System.

The steel braces are usually placed in vertically aligned spans. This system allows to obtaining a great increase of stiffness with a minimal added weight.

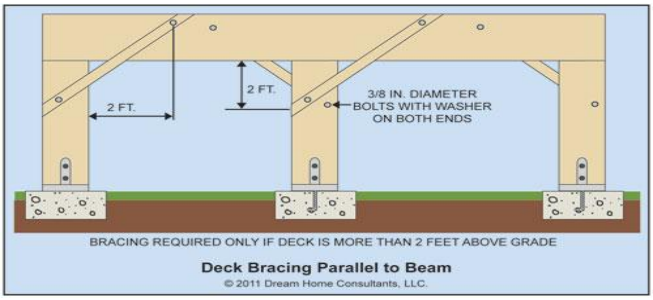

Fig 2. Diagram Showing Deck Bracing System.

III. BACKGROUND STUDY

In reinforced concrete buildings Bracings systems are considered to be one of the lateral load resisting systems. Seismic response of reinforced concrete structure by using different bracing systems uses seven models with different bracing that has been modeled and analyzed for linear static, linear dynamic, nonlinear static and nonlinear dynamic analysis using ETABS software were a fundamental time period, seismic base shear, storey displacement and storey drift have been evaluated and compared with bare frame model. Seismic response of RC building with different arrangement of steel bracing system discuss the seismic analysis of reinforced concrete with different types of bracing were the bracing is provided for peripheral columns. The building models are analyzed by equivalent static analysis by considering the parameters such as lateral displacement, storey drift, axial force, base shear and it shows that the X-type of steel bracing significantly contributes to the structural stiffness and reduces the maximum inter-storey drift of RC building than other bracing system. Structures possess less stiffness and strength in case of irregular configured frames; to enhance this, lateral load resisting systems are introduced into the frames. Effect of steel bracing on vertically irregular R.C.C building frames under seismic loads analysis G+5 storey building model considering different types of vertical geometric irregularities and steel bracings using pushover analysis with the help of ETABS software. Addition of X type brace, V type Brace and Inverted V and K type brace shows that use of X-type of bracing is found more suitable to enhance the performance of the irregular buildings. Earthquake seems to be a major threat for multistoried buildings in seismic prone areas. The structures lateral stability to resist and control the lateral forces and lateral drift of the building is of major concern for which the steel bracing is used in reinforced concrete frames. Behavior of RC Framed Building with Different Lateral Bracing Systems analyzes nine different cases of braced RC frames and compares them with un-braced RC frame, using Response Spectrum method.

IV. CONCLUSION

Based on analysis results following conclusion are drawn:

1. The displacement of the building decreases depending upon the different bracing system employed and the bracing sizes.
2. The storey drift of the braced building decreases as compared to the unbraced building which indicates that the overall response of the building decreases.
3. It was also observed that as the size bracing section increases the displacements and storey drifts decreases for the braced buildings.
4. The overall performance of X braced building better than other two types of braced building.

FUTURE SCOPE

1. Not much variation in values of nodal displacements, support reactions, support moments, beam end forces and beam end moments is found with the variation of deck profile. However, it should be noted that in the software one can specify only rib height and rib width; it does not consider effect of friction, thickness and other properties of material in the calculations
2. One of the disadvantages of the conventional concrete is the higher self weight compare to the light weight concrete. The difference becomes larger if number of storey increases, Due to the above reason, nodal displacements and support reactions are higher in case of conventional concrete structure compare to the light weight concrete structure.

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