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Steel Bracing of RC Frames for Seismic Retrofitting

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ABSTRACT: This paper summarise the method of retrofitting for thercframe structure under the different seismic loading conditions. The RC structure are need to be retrofitting to resist the seismic load. Retrofitting is one of the best method which not only strength the structure but also proves to be safe against the seismic load. Based on the literature reviews we can analyse and investigate the behaviour for the performance of the steel bracing RC steel bracing in the RC construction field using the staddpro software. The paper which is based on the objective to find the and analyse the different forces under the different loading condition. In the Retrofitted structure which is govern by seismic methods.

KEYWORDS: Retrofitting, Reinforced concrete frames, Steel bracings, Strengthening.

I .INTRODUCTION

India at present is fast growing country and it requires to increase the infrastructure facilities along with the huge growth of population .due to increased in population the demand of land for housing and other commercial offices vertical development like multi-storeyed building are the only option the type of development required safety duo to this type of multi-storey building highly susceptible to additional lateral load due to earthquake and wind action.

Now in the past several year like have seen the moderate to severe earthquakes occuraround the world every year. such events lead to damage to the concrete structure as well as failure the structure; Thus the Aim is to focus on a some specific techniques procedure which may improve the practice for evaluation of seismic vulnerability of existing RC structure buildings. So we need adopt some innovative techniques to improved the if of RC structure. The techniques such as base isolation an d mas reductions. So seismic Retrofitting is a collection of reliable technique for Earthquake Engineering. Most of the structure before the 70's and 80's where designed to be able to resist only gravity loads, and thus structures performed very well under the such a loads. But their performance under the seismic load was questionable. Several recent earthquake, such as those in Taiwan (Taitungcountry 19 sept 2022) and Mexico (19 Sept 2017) have caused serious damage to the buildings and many reinforced concrete structures were collapsed because the did not comply with the current seismic codes and had deficiencies such as a poor detailing, discontinuous load path and lack of capacity design provisions.

Seismic isolation is actually a design strategy largely used all over the world either for designing the new structure or for retrofitting existing ones. There are mainly two type of retrofitting approaches that are generally used to improve the seismic performance of the existing structures, before that are subjected to an earthquake . the first one is to add new structural element such as steel braces or structural wall, and other one is to provide concrete or steel jacketing to the defective structural elements. However in the first approach; shear wall are provide RC structures and steel bracing is provided in steel structure. Now in recent years studied have been carried out to use steel bracing to retrofitted RC structure. The steel bracing system is one of the methods of retrofitting system intended to insert the existing structures that damage during the earthquake.

The function of the steel bracing is to resist the lateral loads acting on the building. Lateral loads are the forces coming from the wind and earthquake wave when they act to the structure. Steel bracing commonly made on a steel, and it helps the structures for protection of the lateral loads, and also it takes part in the energy dissipation within internal tension and compression during the earthquake. Structural elements like column and beam they help the structure from the loads that coming in the vertical direction, and the function of the steel bracing is the protection of the horizontal lateral loads. The inserting steel bracing depends on the type of damage of the structure but commonly, steel bracing is used to put in the openings between the vertical elements but steel bracing can be internal and external it depends on the condition of the building. There are two types of steel-bracing, and they are (concentric steel-bracing and eccentric steel-bracing); therefore, this research is concerned the concentric steel-bracing system. There are two types of concentric bracing system, and they are: concentric steel bracing (CBF) and the special concentrically bracing (SCBF). The difference between these two concentric systems are, SCBF can absorb more deformation in tension and compression than CBF. SCBF uses to give the soft story stability for the seismic loads that acting on the building.

II. LITERATURE REVIEW

Akshay S. Paidalwar¹ and G.D. Awchaet.al (2017)(35) stated that the stiffness of the structure is an important factor in case of OGS type building. RC framed building with open ground storey is known to be performing poorly during the strong earthquake shaking. In elastic analysis it has been observed that for OGS building the stiffness is almost same to Bare Frame building. 8. Ankita PramodShelke, Dr.

D E Nassani(2017), He studied the seismic behaviour of steel structures without bracing system and with a various bracing systems. They also provide the comparative assessment of steel frames with different bracing systems under seismic load. The study include diagonal bracing, X bracing, Chevron bracing and V bracing composition. In their research, they analyse a total of 30 high rise 2-D steel building frames in terms of capacity curves, base shear and plasticization using pushover analysis.

Soundarya N Gandhi (2017), They developed a model of G+14 R.C structure and analysed it using ETABS software for seismic zone V. They found the various aspects of the lateral displacement for different conditions of structure like braced frame using cross bracing, V bracing for the different heights in a structure at Seismic Zone V. The result was concluded as the Base Shear for X bracing was much higher than without bracing. However the Storey Displacement was lowest for the X bracing. And the Storey Drift was lowest for Inverted V bracing than X, V or without bracings. Thus from these results it was concluded that X bracing is the most suitable bracing for the G+14 R.C building.

Prof.DipakJivani, Dr. R.G. Dhamsaniya, Prof. M.V. Sanghaniet.al (2017)(33) examined the dynamic evaluation provides higher time period as in comparison to fixed analysis. Higher time period noticed in bare frames as well as the time period improves as the opening area portion of construction increases that is the happened due to decrease in stiffness. It's been discovered that optimum base shear as well as roof displacement capability both the items is bigger for the with no infill situation than the with infill situation. And developing modelled with infill stiffness has much more ductility than building modelled with infill stiffness. Also, he realized that following pushover analysis foundation shear multiplication element found out is smaller than the Is actually code recommended.

Moh. Imran, M.Visweswara, Dr.Jammi Ashok et.al (2017), In this particular work, to analyze and model of G three standard frame building inclusive of shear wall structure as well as G three flat slab inclusive of shear wall structure in Seismic Zone three completed with SAP-2000. The plan area is (twenty four x twenty four) m, level of plinth 1.8m plus floor level is 3.6m. Following the end result comparison frequent frame development has improved performance as compare to plate slab. In order to improve the functionality of flat slab developing, shear wall could be provided

Nasr. Z. Hussan, Mostafa A. Osman et. (2017), (25)In this proposed work, the discovery in the earthquake evaluation of multi-storeyed flat slab developing rested on plain and also sloping ground are done by the scientists. For sloping ground and plain ground, linear analysis technique is utilized in ETABS software. You will find 4 instances which had been viewed in ten storey developing resting on the rest and plain ground of 3 cases on oblique ground at perspective of

100,200,300 were also mentioned. Following the analysis as well as comparison of result Storey drift in flat slab is much more in basic ground as in comparison to inclining ground.

Kaulkhere R.V, Prof. G.N Shete, et. (2017)(21)The design and analysis of dull slab for various condition like square and rectangular with as well as with no drop, pushover analysis (statics analysis) as well as earthquake analysis (seismic co efficient method) by using ETABS application. Following the analysis of the end result, the optimum strip moment was practically identical for square and rectangular slab and also the importance of base shear was much higher in square smooth slab with no drop, The storey displacement appears to be much higher in rectangular slab as well as the storey drift importance for square and rectangular was identical, all-natural period great was almost same for both shapes.

Anchal V. Sharma as well as Laxmikant C. Tibudeet.al (2016) (30) learned a RC framed building (G three) with wide open ground storey was analysed for linear elastic evaluation with the by hand or maybe commercial software program it's realized the displacements for the wide open ground storey is smaller than the completely unfilled wall framed and blank framed building for all of the seismic zones.

Mindaye et al, (2016)(9) nine analyzed the seismic effect of non-commercial G ten RC frame development is examined by the linear evaluation methods of equivalent fixed lateral forces as well as Response spectrum technique using ETAB primary 2015 software as per Is actually 1893:2002 part1. Various result like lateral force, displacement, story drift, overturning moment, base shear are plotted to evaluate the outcome of the dynamic and static analysis. They concluded that powerful story shear is under story shear for those instances. Equivalent static lateral force technique provides higher worth of force as well as moments that make creating uneconomical hence consideration of reaction spectrum strategy is necessary.

Rajashekhar S. Talikoti(2015) concluded from the literature reviews that the RC framed building with open ground storey perform poorly at the time of earthquake shaking. The lateral stiffness is less than 70 percent of that of the adjacent upper storey or less than 80 percent of the average stiffness of adjacent three storeys above it causing soft story effect to produce. For a OGS building without shear wall or bracing the strength is very week and easily collapsed during earthquake. Also they stated that after analysis base shear can be more than twice to that expected by equivalent earthquake force method with ir without infill or by response spectrum method when no infill in the analysis of model.

III. CONCLUSION

This project work was a small effort towards perceiving the how introducing bracing or a shear wall in a building can make in difference in protecting the building in earthquakes. Almost all the buildings in India are RC frame, and earthquake tremors are felt every now a then in some or the other part of the country. Hence through this project it was tried to appreciate the effectiveness and role of this small extra structural elements that can save both life and property, at least for most of the earthquakes.

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