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A REVIEW ON: TO STUDY THE BEHAVIOUR OF RCC MULTISTORY BUILDING WITH VARIOUS TYPES OF BRACING SYSTEM ALONG WITH VARIOUS SEISMIC ZONE

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Abstract : The purpose of this study is to examine the behavior of an RCC multistory building with various types of bracing and seismic zones. As we all know, steel bracings are used in steel structures to offer additional support and to easily transfer tension stresses to the subsoil. As a result, in this project, we will design an RCC multistory structure using several types of bracing systems. It doesn't matter whose design is possible. This project calls for a G+12 structure. The project has a plot size of 16 x 16 metres and a structure height of 52 metres. The major goal of this project is to provide further assistance.

***IndexTerms* – RCC multistory Building, Bracing, Staad Pro, Bracing System, Analysis, Design.**

I. Introduction

As we all know, India is divided into five earthquake zones. Zones I, II, and II are considered normal areas for earthquakes, while zones IV and V are considered dangerous areas because we have suffered from earthquakes in the past. As we all know, the Burj Earthquake in Gujrat was one of the largest and most frequent earthquakes to strike India.

There was an earthquake. In general, it affects all structures, however it usually impacts RCC structures more than any other structure. As we all know, steel structures are more earthquake resistant than RCC structures. The main reason we state that the steel structure has strong tension and compression bearing capacity is because of this. The lack of stress bearing capacity in the concrete structure.

So, in this project we are trying to reduce the effects of earthquake by providing some extra support and arrangement by applying and design the structure by the help of Steel Bracing. Steel Bracings are generally, made in three different shapes, 1) X – Bracing 2) V – Bracing 3) K – Bracing in which X and V type of bracing are generally used in designing almost every steel structure or almost in every Bracing system but K shape Bracing system is critical to design but we are trying this bracing also in our structure.

II. Aim

To Study the Behaviour of Rcc Multistory Building with Various Types of Bracing System Along With Various Seismic Zone

III. Objective

1. The primary goal of this article is to examine an RCC high-rise building that has been subjected to a seismic load.
2. Base shear – Determine the base shear of a model with and without bracing for each zone.
3. Storey displacement – To determine the amount of lateral displacement that happens in each storey of high-rise buildings for each zone.
4. Storey Drift- Calculate the storey drift for each zone at each floor.

IV. Literature Review

1. **NaumanMohammed Islam Nazrul Structure Engineer, Depart ment of Civil Engineering, Faculty of Engineering and Technology, Jamia Millia Islamia, New Delhi, India Professor, Civil Engineering Department, Islamic University, Medinah Munawwarah, Kingdom of Saudi Arabia.** The goal of this work is to assess the reaction of braced and unbraced structures to seismic loads and to determine the best bracing strategy for effectively resisting the seismic load. STAAD V8i software is used to analyse G+14 floors for a particular moment resisting frame located in zone III. The RCC G+14 structure is investigated without and with various types of bracing systems. They discovered that after using the bracing method, lateral displacement is considerably decreased. The application of cross bracings results in the greatest reduction in lateral movement. After analysing the structure using various types of structural systems, it was discovered that when a bracing system is used, the structure's displacement decreases.

2. **Dhiraj Naxine, Associate Prof. R. V. R.K Prasad Civil engineering, K. D. K college of engg. Nagpur, india.** For the particular moment resistive frame located in zone V, ETAB'S programme is used to analyse G+10 floors. The RCC G+10 structure is investigated without and with various types of bracing systems. Bending moments, shear forces, storey shears, story drifts, and axial forces are all compared for both braced and unbraced structural systems. The highest decrease in axial force and bending moment comes after the installation of cross bracing and v bracing systems, according to the analysis of the structure with various types of structural systems. The bracing system in the columns lowers bending moments. The performance of the cross bracing and inverted bracing systems is superior than that of the other bracing systems.

3. **K N Jeevan Kumar, Sabyath P Shetty,** The, influence of lateral forces such as Earthquake forces for Zone III is studied in this project using a G+15 Storey R.C.C building with various bracing systems. Structure Types RCC bare frame with bracing system and RCC bare frame without bracing system were both examined. ETABS 18 will be utilised to do the analysis. Building Storey Displacement, Storey Drift, Natural Time Period, Base Shear, and other structural behaviours are compared. Based on the data, conclusions are developed, and a superior structural system is discovered with this study. After analysing the structure with various forms of bracing, it was discovered that the structure's Storey Displacement, Storey Drift, and Natural Time Period decrease after the application of Bracing System. After using the Mega X-Bracing system, the maximum decrease in storey displacement occurs. When compared to an unbraced building, Mega X-bracing reduces the structure's displacement by 52.93 percent in the X direction and 49.41 percent in the Y direction.

4. **Bharat Patel, Rohan Mali, Prataprao Jadhav, G. Mohan Ganesh,** They, make use of The RCC structure is 11 stories tall (G+10) and has a conventional floor layout with four bays of four meters each in both longitudinal and transverse axes. To see how bracing affects the building's base shear. To show how the storey displacement changed once the bracing was applied. The factors of strength and stiffness are especially important in high-rise constructions important. As a result, bracing systems are used to improve both of these properties. MRF buildings showed more store displacement, indicating that they are weak as compared to other braced buildings, making them more vulnerable to earthquake damage. When compared to buildings without bracing, the base shear of braced buildings increased, indicating that the stiffness of the structure increased. Using XBF and VBF, the building's storey displacement is reduced by 55 percent to 60 percent. When compared to VBF, XBF's performance has a larger margin of safety. One advantage of RC bracing is that it may be utilised to reinforce an existing structure.

5. **Rakshith K L Smitha,** Under, dynamic loads, investigate the seismic performance of RCC frame structures with various types of bracings. There are other findings in terms of displacement, storey drift, and base shear. RCC framed building with an area of 25m X 20m and a height of 30m with all supports fixed in this research. ETABS programmed does the analysis in accordance with Indian Standard standards. In order to investigate the behavior of structural steel during seismic activity in seismic zones III and V, twelve models of RCC frame structures with G+9 floors and various bracing systems for both regular and irregular structures were chosen. When comparing RCC frame buildings with and without bracings, the displacement and storey drift lowers for different types of bracing systems, while the base shear increases for different types of bracing systems compared to unbraced frame structures. In both regular and irregular RCC frame structures, X-bracing reduces displacement and increases storey drift and foundation shear. In both regular and irregular RCC frame structures, X-bracing reduces displacement and increases storey drift and foundation shear. The performance of X-bracing in regular and irregular RCC frame structures is superior to that of other bracing systems. In comparison to the vertical irregular RCC frame structure, the regular RCC frame has better stiffness.

6. **Mahmoud R. Maheri, R. Akbari,** Steel bracing of RC frames has garnered some attention in recent years, both as a retrofitting measure to boost the shear capacity of existing RC buildings and as a shear resistant element in the seismic design of new buildings. These parameters for fully braced frames have been illuminated by comparative experimental work on model X braced and knee-braced unit frames. Steel-braced RC dual systems have substantially higher ductility capacities than their corresponding unbraced moment resisting RC frames, according to the researchers. Steel-braced RC dual systems have substantially higher ductility capacities than their equivalent unbraced moment resisting RC frames when designed for a particular base shear. When opposed to X bracing, knee bracing delivers more ductility and R value in short dual systems. The same cannot be stated for the taller dual systems, where elements like brace share from base shear tend to have the most influence on R values. In terms of behavior, it is preferable to distribute the base shear between the bracing system and the RC frame more uniformly in the X braced dual systems. However, a higher share of base shear for the bracing system appears to be more appropriate in the knee-braced dual systems. The height of a moment resistant RC frame has an effect on its ductility. The height dependency of ductility is substantially increased when bracing systems are introduced. Steel-braced dual systems with shorter steel braces have higher ductility and, as a result, larger R factors.

7. **Pratik Patel, Sandip Patel, Tejasvee Patel, Kamlesh Damdoo,** They, used staad-Prov8i to investigate different bracing methods in rcc buildings. They discovered that the A Base Shear of a building with a bracing system is higher than that of a building without a bracing system. Using response spectrum analysis in the Staad Prov8i software, determine the seismic response of both models. To determine the effects of the existence of a bracing system on various parameters of an RC structure during seismic occurrences. In higher seismic zones, to identify whether construction is preferable to another. In higher seismic zones, to identify whether bracing method is superior to another. During an earthquake, raise the base shear at the bottom of the building. During an earthquake, to reduce Storey drift and displacement. After installing a bracing system, the Storey Displacement in structures is minimized. When compared to the v braced and diagonal braced systems, the X braced system performs well. After further investigation, we discovered that the provision of a floating column significantly increases Storey displacement. Based on the findings, we may conclude that square and plus shapes are preferable to other shapes. We can eliminate columns that obstruct open space in low-rise structures after installing a bracing system.

8. **K. S. K. Karthik Reddy,** Four, different types of bracing systems were studied for usage in tall buildings to give lateral stiffness in this research study. The usage of bracings has the potential to be more advantageous than other schemes because they are supplied for peripheral columns. A sixteen-story (G+15) skyscraper in seismic zone 2 is subjected to a wind speed of 220 kilometers per hour. The building models are analyzed using Staad ProV8i software to perform comparable static analysis in accordance with IS 1983:2002, and wind loads are estimated according to IS:875(part 3)-1987. Lateral displacement, story drift, axial force, and base shear are the primary factors considered in this research when comparing seismic analyses of buildings. The x-type of bracings is found to contribute significantly to structural rigidity and minimize the maximum inter-storey drift of R.C.C buildings when compared to other bracing systems. By utilizing diagonal steel bracings, the nodal deflection was decreased to a minimum of 80 percent and a maximum of 75 percent, maximizing the effectiveness of x bracing. When compared to reinforced concrete bracing of the same type, steel bracing with a back-to-back angle section reduced deflection by 3.2 percent. The axial load on the periphery column is higher when reinforced concrete bracing is utilized rather than steel bracing, and the increase in axial load is 4.5 percent higher when reinforced bracing is used instead of steel bracing. Regardless of the type and number of bracings utilized, the axial stress on the internal columns rose by 11.5 percent. The use of bracings reduced the column moments on the periphery columns by 11.5 percent, but the column moments on the interior columns were substantially reduced by 77.8 percent. By using steel X bracings and X reinforced bracings, the overall weight of the structure is increased by 3.8 percent and 7.6 percent, respectively.

9. **Sagar T. kawale, Prof. D.H. Tupe, Dr. G.R. Gandhe,** the goal of this study is to ensure that a building's displacement demand is kept below its displacement capacity. This can be accomplished primarily by lowering the structure's predicted displacement demand during strong motion or increasing the structure's displacement capacity. The building's lateral displacement and deflection are reduced by using a bracing system. Concrete bracings are a more practical system that can be used to strengthen or modify an existing structure. The implementation of a bracing system minimized the building's lateral displacement. Provision of SW has found to be effective in boosting the overall seismic capability characteristics of medium high-rise buildings (>10 stories).

10. **Jumi K M, Dr. Sreemahadevan Pillai.** They investigated the seismic behavior of multistory RCC structures with various RC X bracing locations for various aspect ratios. The major goal of this research is to use response history analysis to assess the seismic behavior of RC buildings retrofitted with RC X bracing. In comparison to the bare frame, all braced frame types showed a significant increase in lateral stiffness. When bracings are provided in the lower levels, the time period is observed to be shorter. The use of bracings increases the building's base shear. When bracings are placed in the level that is subjected to high lateral drift when unbraced, a more effective configuration is obtained. With the aspect ratio, the building's time period and top Storey displacement modified.

V. Conclusion

After bracings are applied, the base shear increases. For zones III, IV, and V, the largest base shear occurs in X-Bracing as compared to the bare frame. As the bracing is provided, the weight is increased. In comparison to bracings for zones III, IV, and V, X-Bracing carries the most weight. The use of V and inverted V bracings does not result in a considerable increase in weight or base shear for zones III, IV, and V. Bracing is installed to reduce storey displacement in the frame. For zones III, IV, and V, the highest reduction in Storey displacement occurs in frames with X-bracing. With the bracing in place, the Storey drift shrinks in frame. For zones III, IV, and V, the highest reduction of Storey drift occurs in frame with K-Bracing.

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