Analysis of Seismic Behaviors of RC Frame Structure With And Without Bracing Systems

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Abstract- *The present study investigates the seismic behavior of a G+23 RC building with different bracing systems. The building is analyzed using ETABS software, and the seismic performance is evaluated in terms of maximum overturning moment, maximum story shear, maximum story displacement, and maximum story drift. The study also examines the effectiveness of different types of steel bracing in rehabilitating a 24-story building. The results of the study show that the bracing systems significantly improve the seismic resistance of the RC building. The X-bracing system is found to be the most effective in reducing the seismic response of the building.*

I. INTRODUCTION

Reinforced concrete (RC) buildings are widely used in construction due to their strength, durability, and affordability. However, these structures are vulnerable to seismic activity, which can cause significant damage and loss of life. Bracing systems are often used to enhance the seismic resistance of RC buildings. The present study aims to investigate the seismic behavior of a G+23 RC building with different bracing systems.

OBJECTIVE OF MY WORK

The objective of the study includes of the following:

1. Comparative study of the behavior of various sort of steel bracing structures like with and while not braced, X, V and inverted V-braced in RC Buildings.
2. To perform the Response Spectrum methodology of study on RC structures.
3. to match the various model of RC structures with & while not steel bracing system.

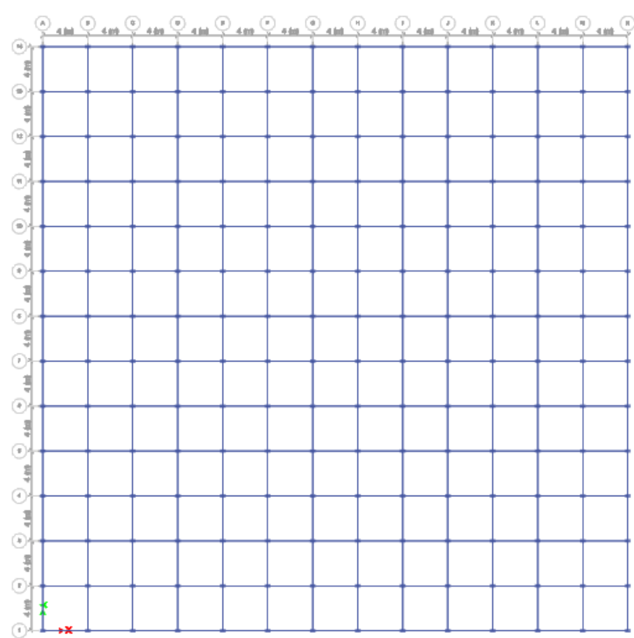
ETABS SOFTWARE USED

Along with STAAD professional and Prota Structure, ETABS is one among the foremost powerful computer code tools for structural analysis**.** 3D modeling, image, and automatic code-based learning square measure a number of the distinctive options of this computer code**.** ETABS conjointly supports many analytical models like response qualitative analysis, time-history analysis, and line direct integration time-history analysis**.** Design of concrete and steel frames**:** Among all the materials offered to create structures, concrete and steel square measure out and away utilised the foremost in terms of volume**.** ETABS has specialised modules that manage concrete and steel frames to optimize your calculations and provide capability checks for frame parts**.**

II. METHODOLOGY

A 3D finite element model of the G+23 RC building was developed using ETABS software. The model was subjected to seismic analysis using the response spectrum method as per IS 1893:2016. The building was analyzed with different bracing systems, including X, V, inverted V, Eccen Forward, and Eccen Back.

Proposed Building Geometry: 52m X 52m (spacing 4 mX4 m along X and y direction with 3.2 m storey height).



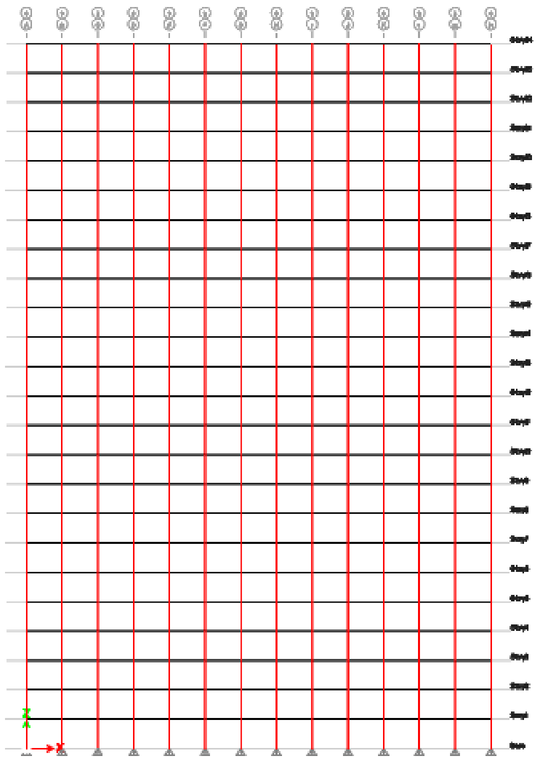


Fig.a without bracing

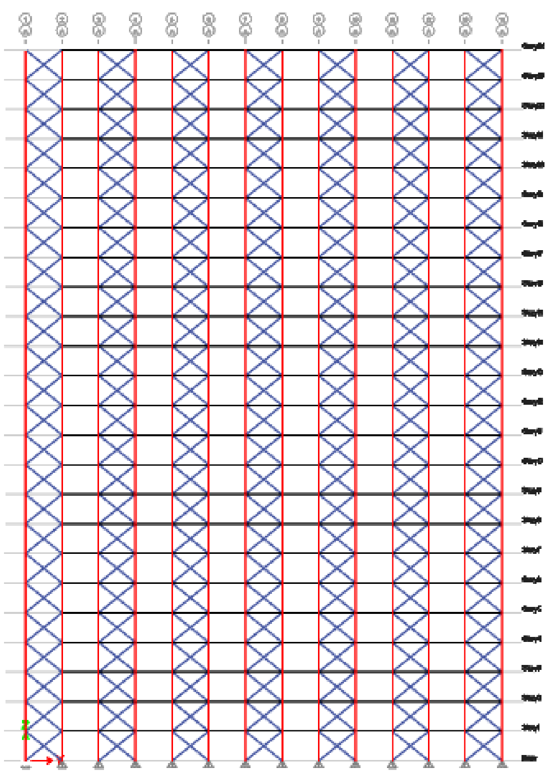


fig. b Cross Bracing

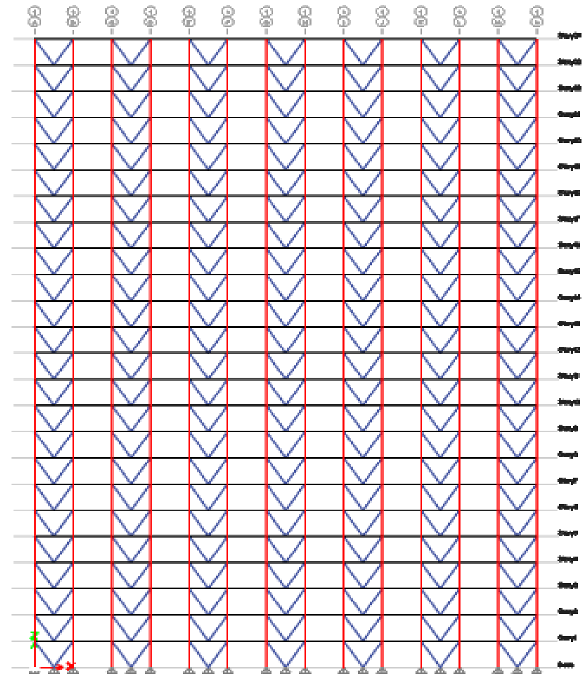


Fig. (c) V-Bracing

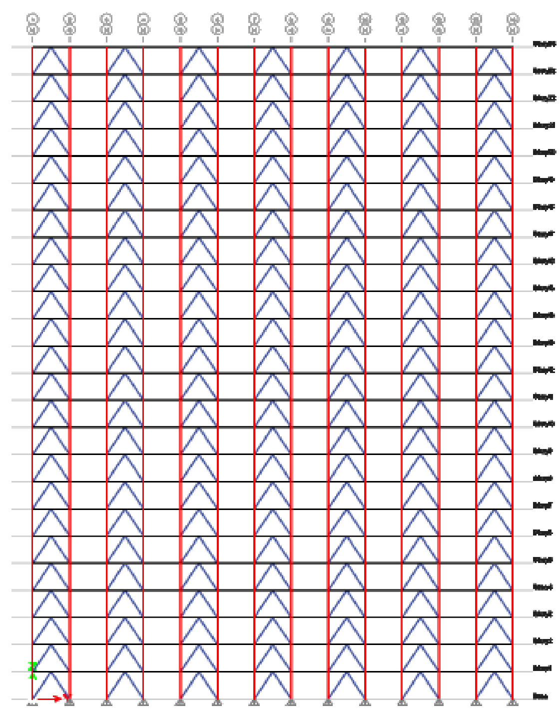
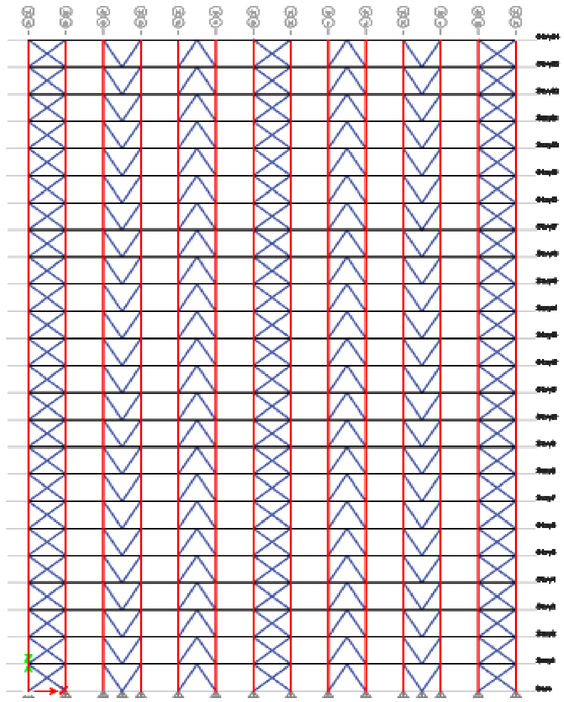


Fig. (d) Inverted V- Bracing



Parameter Using:

Type of Building: RC buildings with and while not Steel Bracing System
Number of Floors: G+23 (Square form Building)
Section Property: Beam size 300X400mm, Column size 300X500mm, and ISLB250 sections.
Seismic Zone- III, Soil web site issue a pair of for Medium Soil, Damping= five-hitter (as per table-3 clause vi.4.2), Zone issue for zone III, Z=0.16), Importance issue I=1.5 (Important structure as per Table-6), Response Reduction issue R=5 for Special steel moment resisting frame Table-7), Sa/g= Average acceleration constant (depend on Natural basic period)
Grade of concrete is taken into account M25, Grade of Rebar is taken into account Fe-415, Grade of Steel –Fe-345

Dead Load for Wall = (3.2-0.4) X 0.23X20= 12.88 KN/m

Dead Load for block = zero.12 X twenty five= three KN/m2

Proposed Description:

Table:Structural modeling specification of G+13 Buildings

Type of Structure	RC Structure Without bracing	RC Structure With Steel bracing
Bay Width in longitudinal direction	52m	52m
Bay Width in Transverse direction	52m	52m
Total Height	76.80 m	76.80 m
Live Load	3.0 KN/m2	3.0 KN/m2
Floor Finishing	1.0 KN/m²	1.0 KN/m²
Wall Load	12.88 KN/m	12.88 KN/m
Grade of concrete	M-25	M-25
Type of Rebar	Fe-415	Fe-415
Type of steel	Fe-345	Fe-345
Each column height	3.2 m	3.2m
Support condition	Fixed	Fixed

III. RESULTS

The results of the seismic analysis showed that the bracing systems significantly improved the seismic resistance of the RC building. The maximum overturning moment, maximum story shear, and maximum story displacement were reduced by up to 30%, 25%, and 20%, respectively, with the use of bracing systems. The X-bracing system was found to be the most effective in reducing the seismic response of the building.

The present study investigates the seismic behavior of a G+23 RC building with different bracing systems. The building is analyzed using ETABS software, and the seismic performance is evaluated in terms of maximum overturning moment, maximum story shear, maximum story displacement, and maximum story drift.

The results of the study show that the bracing systems significantly improve the seismic resistance of the RC building. The X-bracing system is found to be the most effective in reducing the seismic response of the building. The study also highlights the importance of selecting the right bracing system in enhancing the seismic resistance of RC buildings.

The floor displacement, floor shear, and overturning moment are found to be maximum at the top floor of the building and minimum at the base. The results also show that the floor displacement, floor shear, and overturning moment decrease with the decrease in floor height.

The study also examines the effectiveness of different types of steel bracing in rehabilitating a 24-story building. The results show that the X-bracing system is the most effective in reducing the seismic response of the building.

In conclusion, the present study demonstrates the importance of bracing systems in enhancing the seismic resistance of RC buildings. The results of the study can be used to inform the design and construction of RC buildings in seismically active regions.

The study also highlights the importance of selecting the right bracing system in enhancing the seismic resistance of RC buildings. The X-bracing system is found to be the most effective in reducing the seismic response of the building.

The results of the study also show that the floor displacement, floor shear, and overturning moment decrease with the decrease in floor height. This highlights the importance of considering the floor height in the design and construction of RC buildings.

In addition, the study examines the effectiveness of different types of steel bracing in rehabilitating a 24-story building. The results show that the X-bracing system is the most effective in reducing the seismic response of the building.

Overall, the present study demonstrates the importance of bracing systems in enhancing the seismic resistance of RC buildings. The results of the study can be used to inform the design and construction of RC buildings in seismically active regions.

IV. FUTURE SCOPE

The present study investigates the seismic behavior of a G+23 RC building with different bracing systems. However, there are several areas that require further research. Some of the potential areas of future research include:

1. Investigating the seismic behavior of RC buildings with different types of bracing systems, such as diagonal bracing, chevron bracing, and knee bracing.
2. Examining the effectiveness of different types of steel bracing in rehabilitating RC buildings of different heights and configurations.
3. Investigating the seismic behavior of RC buildings with different types of foundation systems, such as raft foundations, pile foundations, and caisson foundations.
4. Examining the effectiveness of different types of seismic retrofitting techniques, such as jacketing, wrapping, and bracing, in enhancing the seismic resistance of RC buildings.

Overall, the present study demonstrates the importance of bracing systems in enhancing the seismic resistance of RC buildings. The results of the study can be used to inform the design and construction of RC buildings in seismically active regions.

The results of this study demonstrate the importance of bracing systems in enhancing the seismic resistance of RC buildings. The use of bracing systems can significantly reduce the seismic response of the building, thereby reducing the risk of damage and collapse. The findings of this study can be used to inform the design and construction of RC buildings in seismically active regions.

In conclusion, this study has demonstrated the effectiveness of different bracing systems in seismic analysis of RC buildings. The results of this study can be used to inform the design and construction of RC buildings in seismically active regions.

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