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Comparative Study of RC Moment Resisting Frame of Variable Heights with Steel Bracing and Shear Wall

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Abstract: **Among all the natural hazard, earthquake is one of the most dangerous. For safety of the buildings, it is essential that structures should have adequate lateral stability, strength, and sufficient ductility. There are various types of lateral load resistance structural systems for reducing the affect of earthquake forces for RC buildings. For my study I consider the RC moment resisting bare frame and RC moment resisting frame with steel bracing system and RC moment resisting frame with shear wall system. In case of steel bracing system three types of bracing used as X type, V type and inverted V type bracing. In case of shear wall I take three locations of shear wall which are more effective. Three different heights of building as low rise, medium rise and high rise are taken. Effect of brick infill walls is also considered. For analysis of these building frames Staad ProV8i software used. The performance of building is evaluated on the basis of following parameters – Bending moment, Shear force, Storey displacement, Storey drift, Base shear.**

Keywords: **RC Moment Resisting Frame, Steel Bracing, Shear Wall, Variable Heights.**

1. LITERATURE REVIEW

K.G. Viswanath et al (2010) evaluate the seismic performance RC buildings rehabilitated using concentric steel bracing. The bracing is provided for peripheral columns.As per IS 1893: 2002 , four story building located in zone IV is analysed using STAAD Pro software. The effectiveness of various types of steel bracing is examined in rehabilitating the building. The study is extended to eight storied, twelve storied and sixteen storied building. It is found that the X type of steel bracing significantly contributes to the structural stiffness and reduces the storey drift and storey displacement.

M.D. Kevadkar, P.B. Kodag (2013) studied the responses of R.C.C. building to earthquake for three cases. These cases are I) RC building frame without bracing and shear wall, II) RC building frame with different shear wall system, III) RC building frame with Different bracing system. Analysis is done by using E-TABS .It is found that the X type of steel bracing system significantly contributes to the structural stiffness and reduces the maximum inter story drift, lateral displacement and demand capacity (Performance Point) of R.C.C building than the shear wall system.

Miss. S.A. Ghadge et al (2013) performed equivalent static analysis of high-rise building using STAAD.Pro software for different location of shear wall and bracing. Some models are prepared that is pure frame structure, brace frame, shear wall frame. It is found that shear wall frame and brace frame have more resistance against seismic forces than pure frame structure.

S.K. Mohammed et.al (2013), studies about the structural behavior of shear wall in terms of strength, stiffness and damping characteristics by arranging shear walls at different locations/configurations in the structural framing system. The nonlinear analysis are carried out for the evaluation of seismic performance. The results of the study indicate that the provision of shear walls symmetrically in the outermost moment resisting frames of the building will lead to better seismic performance.

S.R. Thorat and P.J. Salunke (2014) studied the seismic behavior of RC multistory building frame with shear wall and with bracing. The STAAD-PRO V8i software is used for dynamic and stiffness analysis.The location of shear-wall and brace member has significant effect on the seismic response of the shear-wall frame and braced frame respectively. It is found that braced frame is very efficient in resisting seismic force than shear-wall frame and plane frame.

Umesh.R.Biradar, Shivaraj Mangalgi (2014) workout the seismic response of reinforced concrete structure by using different bracing systems. To know the importance of different bracing systems in multistorey RC frame structure seven models with different bracing systems have been modeled and analysed for linear static , linear dynamic , non linear static , and non linear dynamic analysis by ETABS software . X type of bracing system is showing better seismic performance out of all the models.

Anshul Sud et al (2014) studied the effect of different shear wall configurations on seismic response of a moment-resisting frame. Five different configurations of shear walls viz. bare frame, shear wall centrally placed at exterior bays, at core and adjacently placed in exterior of the building, are considered. The frame with shear wall at core and centrally placed at exterior bays showed significant reduction in lateral displacement, bending moments, Shear forces.

2. OBJECTIVE OF THIS PAPER

The objective of this study is to evaluate the seismic performance of RC moment resisting frame with steel bracing system and with shear wall system and to identify the suitable system on different heights of building for resisting the seismic load effectively.

3. METHODOLOGY

To achieve the above objective three different heights of building as low rise, medium rise and high rise are taken as bare frame and with steel bracing system and with shear wall system. Three types of steel bracing system as X type, V type and inverted V type are used. Three different locations of shear wall viz. shear wall centrally placed at exterior bays, at corner of exterior bays and at core of the building. The effect of brick infill walls is also considered. For modeling and analysis of these frames STAAD ProV8i software is used and referring IS: 456-2000, IS: 1893-(part1)2002

4. CONCLUSION

From the literature review it is found that RC moment resisting building frame with different types of bracing system and different configuration of shear wall have better resistance against earthquake forces. However, the steel bracing system provide better performance than shear wall system with variable heights of building.

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