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SEISMIC PERFORMANCE OF REINFORCED CONCRETE BUILDINGS WITH DIFFERENT LATERAL LOAD RESISTING SYSTEMS

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ABSTRACT

The objective of this research is to examine how well reinforced concrete buildings withstand seismic activity using various systems for resisting lateral loads. In this study, a reinforced concrete building with 11 floors (G+11) and 5 X 5 bays is selected, and various lateral load resisting frame systems are applied in different positions. These are shear wall, bracings, shear wall-bracings combinations (Combined) at five different locations/patterns i.e., at outer corners (Type- I), center of outer sides (Type- II), middle corners (Type- III), center of middle sides (Type- IV), and inner core and middle sides (Type- V) respectively. A total of sixteen models are created for this study, with one being a bare frame and the other fifteen consisting of three types of lateral load resisting systems arranged in five different configurations each. With the assistance of ETABS all models are analyzed by Equivalent Static Analysis and Response Spectrum Analysis. Earthquake load is calculated as per NBC 105:2020, the various parameters like response reduction factor, ductility factor, over strength factors, building importance factor, zone factor are taken and are applied to a building located in Birendranagar, Surkhet. The ETABS-2018 software was used to create models of the buildings.

The performance of building is evaluated on the basis of following parameters- maximum storey displacement, maximum storey drift, storey shear, storey stiffness, overturning moment and diaphragm maximum to average drift ratio (for torsion). At last the results are compared for different models. Among the three systems, the shear wall system exhibits the least displacement and the highest stiffness. Response of combined system is better than that of bracing system. Overall, the Type II shear wall model is more earthquake-resistant and structurally efficient than the other fifteen models.

KEYWORDS: *Equivalent Static Analysis, Response Spectrum Analysis, Maximum storey displacement, Maximum storey drift, Storey shear, Storey stiffness, Overturning moment, Torsion.*

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