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# A Study on Pushover Analysis of Multi-Storey Building with Its Effects on Different Sections of Soft Storey by Using SAP 2000

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## ABSTRACT

The construction should be such that the building has adequate shear strength, high ductility, and will remain as one unit, even while subjected to very large deformation. Natural hazards under which like earthquakes are mainly caused by damage to or collapse of buildings and other man-made structures. Experience has shown that for new constructions, establishing earthquake resistant regulations and their implementation is the critical safe guard against earthquake-induced damage. With our development in modern society and continuous technological advancement, we have achieved sustained performance in structural infrastructure. Three Multi-storey building models are selected which contain different number of storeys as each and every model contains 27 columns and 45 beams in each floor. Use M-30 concrete and Fe-250 grade steel. In proposed work different shapes of beam with equal perimeter. We use Csi software SAP2000. Five hollow cross-sections ( Circular, Rectangular and Square) beams are considered with constant span length and unchanged perimeter. The example of hollow beamis modeled and analyzed inSAP 2000 and the responses are found to be fairly matching. Forthe purpose of the parametric study, the three hollow cross-sections are modeled in SAP2000. The span length, cross-section and material main unchanged. The best cross section and find minimum deflection and bending moment we choose a 08, 12, and 15-storey buildings of 15-meter-wide and height of each column is 3m.

*Keywords* — Longitudinal Bending Stress, Shear Lag, Transverse Bending Stress, SAP2000.

## I. INTRODUCTION

Due to Earth, the internal and external structure of the building is affected.Therefore, the combination of beam and column is done in such a way that the Hinge point located in them can be assessed at which the maximum bending moment is being created and the shear force can also be determined. Thus, pushover analysis can be used as a parametric view of the building is required

Previous earthquakes have shown that earthquakes can occured significant financial losses in building. Related financial losses during rehabilitation, periods of rest and disruption of performance must be taken into account fully assess the impact of the earthquake on society. For that, there are several ways to implement it a recent earthquake assessment has been proposed.

High-rise buildings are more attractive than low-rise to medium-sized buildings in large cities with expandable land resources. Although seasonal construction of low-rise buildings is used to a large extent, it is limited to high-rise buildings.Oneofthereasonsisthelackofknowledgeab outtheresistanceofthelateralforces oftallbuildingswhen they are built according to the conventional methodIn this way the power of combination of Beam and column can be registered correctly so that the building can be protected from internal and external damage. It is necessary that the value of shear force and Bending moment will be different for different floors. It is necessary that the building of different story height. This should be measured and a relation should be created between them on the basis of shear force and bending moment which should be plotted through graph. The values present in the graph will tell the value of bending moment and shear force. These values will be different for each8 storey building, 10 storey building and 15 storey building as the height of the building increases thus the ability to resist earthquake will also decrease.

The earthquake response differs between tall buildings and those of low to medium height. Therefore, it is crucial to consider resistance to future forces when planning and designing high-rise structures to ensure a unified structure. Seismic buildings are specifically designed and constructed to withstand seismic activity, aiming to prevent accidents during potential earthquakes. Despite being constructed based on digital decisions, historical evidence suggests failures during ancient earthquakes. Strengthening properties such as strength, stiffness, and energy stability are crucial areas for improvement to enhance the resilience of structures.

## II. REVIEW PROCESS ADOPTED

- Models featuring shear walls show maximum displacement as stiffness increases.
- Research indicates that force transfer with shear hinges and bracing walls is greater than in models featuring shear walls and bracing in various sections. The maximum distortion has been observed to decrease significantly after the installation or attachment of hinges in reinforced concrete frames.

- In multi-storey buildings, the optimal location for shear hinges is found to be parallel to shear walls, with cross bracing being the most effective type of bracing.
- FRP (Fiber-Reinforced Polymer) couplings are effective in improving structural vibration properties, enhancing connections, controlling expansion and contraction, and reducing stiffness and damage due to force.
- Differences in bending moment among models of 8, 12, and 15 storeys demonstrate that reaction time and voltage decrease as the bending range increases.

## III. LIMITATIONS

- The critical load combination under which max displacement is achieved is 1.5(DL+EQZ).
- The base structure has the highest value of story displacement as represented by the study.
- The use of seismic restraints significantly decreases the movement of the structure of reducing the story shear of all the stories.
- It is concluded that, optimization using cross bracings is the best procedure, in present work mode for maximum earthquake resistance.
- It imparts flexural as well as shear strength to the structure there by improving resistance of structures to wind or seismic forces.
- In order to perform the seismic analysis and design of a structure to be built at a particular location, the actual time history record is required.
- For static and response spectrum analysis also deflection value increases with increase in span to depth ratio.
- For response spectrum analysis also deflection, moment reaction and stress is less for trapezoidal shape. So for designing box girder trapezoidal shape is best.
- Stiffness and strength of the Rectangular box girder bridge is more as compared to the Trapezoidal and Circular box girder bridge

## IV. OBJECTIVES OF THE STUDY

- To analysis of bending moment, base shear for a long span beam with different hollow cross-section and equal perimeter.
- Find best shape of beam for which minimum axial force and deflection is finding for dead load and seismic load and combination of it.
- Draw a graph between different configurations for bending moment and base shear for all cross section of equal perimeter.
- Suggest shape of best beam.

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