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A Study on Seismic Analysis of High Rise Building with Mass Irregularities, Torsional Irregularities and Floating Column

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ABSTRACT

In a many techniques of S.A. of structure. Analysis of the structure is critical techniques for structural S.A. in general evaluate structural reaction is non-linear in nature. This type of analysis, a representative earthquake time history is required. In this case study S.A. of RCC buildings with mass irregularity at different floor level are carrying. Seismic forces can origin major structural damage or demolition. In multi story RC building have been subjected to the heavy earth quakes, the existence of irregularity in RC construction was vertical irregularity of the building stap-0nds it apart from other structures.

In this study is to design and analysis of the structural elements like Slabs, Beams and Columns etc. All loads like dead load, live load, wind load etc. are consider according to standards and by considering seismic and wind force to ensure the safety and careful balance b/w financial system and safety. As a final point the analysis parameters like shear force, bending moment and displacements are comparatively presented.

KEYWORDS: *SA- Seismic analysis, Time history, Storey Shear, Story*

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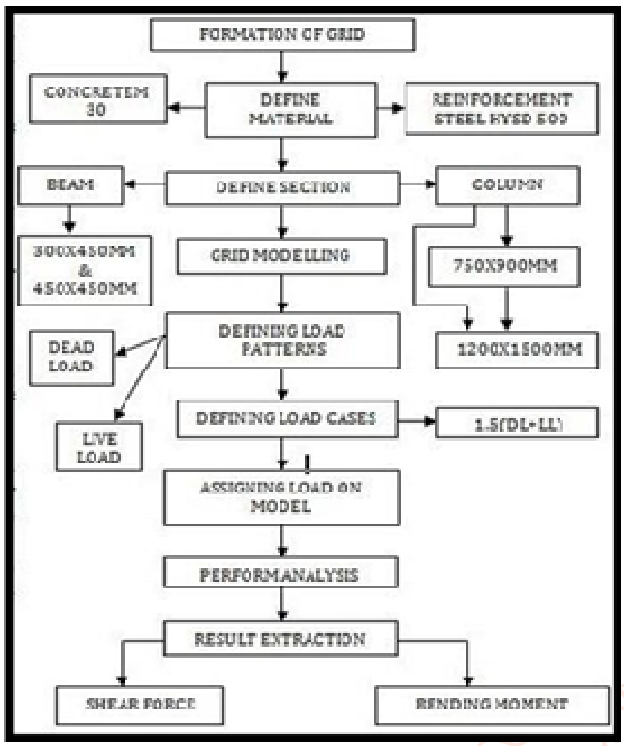
I. INTRODUCTION

In the past studies weakness is due to geometry, the mass discontinuity and stiffness of structure. The structures having this discontinuity are termed as Irregular structures. These types of structures have a large portion of urban infrastructure. Therefore structures fail during earthquakes due to vertical irregularity. These structures are referred to as irregular structure since they have this discontinuity. In urban infrastructure is partially or completely irregular structure. Irregularities in a structure are key variables that decrease the seismic performance of any structure as earthquake .

In a frame structure be utilize to model the first and second storey of building G1, and a frame-shear wall structure was utilized to model the remaining storey of the building. Study of the two different types of building structure, the second storey was treated as the transfer storey by using several strength end frame beams to distribute the wall loading of the upper storey to the frame columns in the lower storey. In a plan views of the first and second storey of building G1, as well as the standard plan view of the other twelve storeys, are illustrated. The usual geometric dimensions and concrete material grades of the frame structure and frame-shear wall structure.

II. METHODOLOGY

Following types of methods used to study these types of case different literature survey by reference books, technical papers carried out to understand basic concept of topic, type of structures, modeling of the selected structures, analysis of the structures, analysis of results and conclusions. In present scenario it is proposed to carry out S.A. of multi stored RCC buildings using TH analysis method considering mass irregularity at different floor levels with the help of STAAD PRO software.



The following changes to be made to the parameters for vertical irregularity:

Table no.1

Types of irregularity	Changes	Parameter
Stiffness irregularity	Height of that floor	3.1 m.
Mass irregularity	SDL of that floor	20.9 KN/m^2
Vertical geometric irregularity	Setback in building	After every 3 story

There is following three types of irregular buildings were considered, regular structure, mass irregular structure, and vertically geometric irregular building. All three structures are of fifteen storey's.

Dead load: All permanent constructions of the structure form the dead loads. The dead load comprises of the self-weight, weight of walls, partitions floor finishes and the other permanent constructions in the buildings.

The loads considered in this project are as per IS 456 2000.

Weight of concrete = 7.178KN/m^2

4½ inches thick wall weight = 2.389 KN/m^2

9 inches thick wall weight = 4.778 KN/m^2

Weight of glass area = 0.469KN/m^2

Weight of elevator = 2.11tons

Weight of ceiling and finishing = 1.211KN/m^2

Imposed loads do not include loads due to wind, seismic activity, snow, and loads imposed due to temperature changes to which the structure will be subjected to, creep and shrinkage of the structure,

Live load on lobbing = 4.778 KN/m^2

Live load on corridors = 4.778 KN/m^2

Live load on stairs = 4.778 KN/m^2

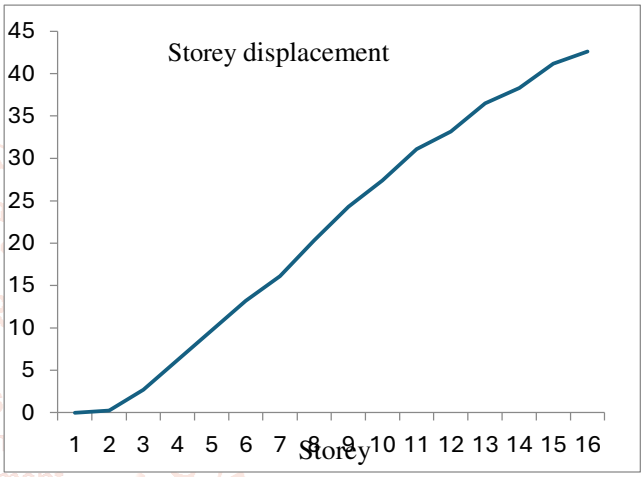
Live load on restaurants = 4.778 KN/m^2

Live load on assembly hall = 4.778 KN/m^2

Live load on bedroom =1.899KN/m^2

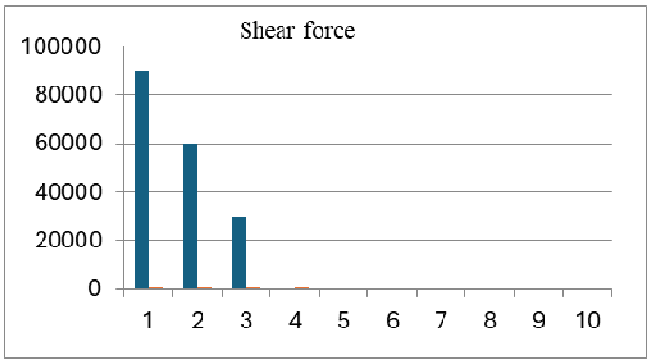
Live load on roof =0.944KN/m^2

III. RESULTS AND DISCUSSION

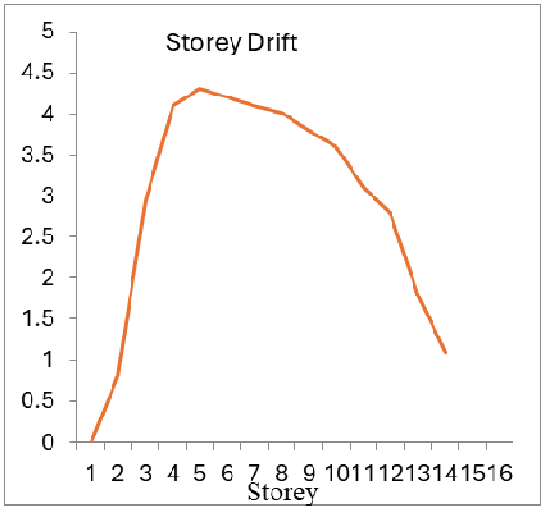


Storey Displacement

In the above graph the X-axis represents the storey of the building and Y-axis represents the displacement in mm. It is mini. at the base level and gradually increases with respect to storey. The maximum displacement is at the top storey.



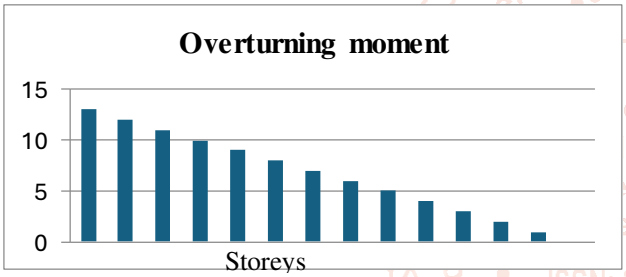
In the above graph the X-axis represents the storey of the building and Y-axis represents the shear force. The shear force is maximum at the first storey and it decreases with respect to the storey height.



Storey Drift

In the above graph the storey drift is maximum at the fifth storey and it is minimum at base plinth level.

Storey Overturning Moment: It is the sum of the moments on the column and any shear on the column multiplied by the distance from the base of the column to the base of the footing.



The X- direction represents the storey of the building and y- direction represents the overturning moment in KN. The overturning moment is max^{m} at the base level and gradually decreases with respect to height of the storey.

Table No 2 Design Parameters

Sr. No.	Design Parameter	Result
1	Storey displacement	43mm
2	Storey shear	1ststorey - 4167.3KN 5thstorey - 3293.6KN 10thstorey-2351.6KN 15thstorey- 632.29KN
3	Storey drift	4.311mm
4	Storey overturning moment	118000KN

The structural model formed in the software has been studied to consider torsion irregularity following the provisions of IS for Earthquake Resistant design. In the III floor of the building has been measured to check the corner displacements. Min & max obtained in this floor are 5.99 mm and 10.99 mm respectively.

IV. CONCLUSION

- In this study analysis of vertically irregular structure, the behavior of the structure has been studied under dynamic loading.
- The performance of the vertically irregular structure under plane ground conditions has been analyzed through the Response Spectrum Method.
- Developed 3D-model for the building using STAAD PRO software.
- It is suggested that irregular buildings are safer than regular buildings under seismic situation and should be chosen for regular buildings.
- Seismic performances of a high-rise building with structural irregularities and transfer floors under frequent, moderate and rare earthquakes were evaluated.

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