

# **BEHAVIOUR OF A MULTI-STOREY BUILDING UNDER THE EFFECT OF CHANGES IN STRENGTH**

A DISSERTATION  
PRESENTED TO  
THE FACULTY OF  
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING  
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IN PARTIAL FULFILMENT  
OF THE REQUIREMENTS FOR THE  
DEGREE OF  
**MASTER OF TECHNOLOGY  
(STRUCTURAL ENGINEERING)**

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## **CERTIFICATE**

This is to certify that the thesis work entitled “**BEHAVIOUR OF A MULTI-STOREY BUILDING UNDER THE EFFECT OF CHANGES IN STRENGTH**” being submitted by me, is bonafide record of my own work carried by me under the guidance and supervision of Mr. Alok Verma, Associate Professor in partial fulfilment of requirements for the award of the Degree of Master of Technology (Structural Engineering) in Civil Engineering.

The matter embodied in this project has not been submitted for the award of any other degree.

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- c. I have followed the guidelines provided by the University in preparing the thesis.
- d. I have conformed to the norms and guidelines given in the Ethical Code of Conduct of the Institute.
- e. Whenever I have used materials (data, theoretical analysis, figures, and text) from other sources, I have given due credit to them by citing them in the text of the thesis and giving their details in the references.

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## ABSTRACT

For the study of effect of irregularity in strength i.e. discontinuity in capacity – weak storey on the performance of the building, a three dimensional 16 storey model of a RCC building is done in STADD PRO v8i.

The base floors of the existing buildings are generally arranged as garages or offices. No wall are built in at these floors due to its prescribed usage and comfort problems. But Upper floors do have walls separating rooms from each other for the residential usage. In these arrangements, the upper floors of most buildings are more rigid than their base floors. As a result, the seismic behaviour of the base and the upper floors are significantly different from each other. This phenomenon is called as the weak-storey irregularity. Weak storey is subjected to larger lateral loads during earthquakes and under lateral loads their lateral deformations are greater than those of other floors so the design of structural members of weak stories is critical and it should be different from the upper floors.

In this thesis the effects of seismic forces on the performance of building with weak storey is studied.

Design of the building for 5 cases of strength ratio viz. full strength, 90%, 80%, 70%, 60%, is done and Young's modulus of elasticity of the material of building in each storey is varied for these 5 strength ratio. Loads were applied on each floor in accordance with the IS 1893 2002 Part 1 for the study of weak storey phenomenon in multi storey building.

Thus varying the % strength ratio for each storey as the input parameter , various performance parameter are found out viz. frequency , time period, spectral acceleration, peak storey shear, roof drift, max forces and moments are calculated as output parameters.

Thus it can be concluded from the present study that as the strength ratio of building is being decreased the base shear is decreasing for the base of the building. The effect of change in shear is more pronounced for 1<sup>st</sup> storey and top storey than for middle storey. As the strength of building is decreased, the roof drift is increasing. Peak storey shear decreases with increase in height.