

Review on Study of Strengthening of Soft Storey Building

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Abstract— Soft story is its typical feature in the Modern construction in urban India. at the soft story level, there is a discontinuity in the rigidity of the structure due to lack of infill walls or due to variation in floor height in this study, seismic analysis of soft storey building frames have been carried out considering G+ 6 building model with 5 different soft storey cases. Soft storey we have been created by varying the soft storey from floor to floor and the building was evaluated by staad pro v8i and parameters such as Base shear, deflection and soft drift where studied.

Key words: soft storey, building

I. INTRODUCTION

This Reinforced-concrete framed structure in recent time has a special feature i.e. the ground storey is left open for the purpose of social and functional needs like vehicle parking, shops, reception lobbies, a large space for meeting room or a banking hall etc. Such buildings are often called open ground storey buildings or soft story buildings. Generally, the soft or weak storey usually exists at the ground storey level, but it could be at any other storey level. Soft storey buildings, having first storey's much less rigid than the storey's above are particularly susceptible to earthquake damage because of large, unreinforced openings on their ground floors.

II. STUDY AREA

A. Soft storey

Soft storey buildings are characterized by having a storey which has a lot of open space.

Or

As per IS 1893(part 1):2002, clause no.4.20, page no.10. It is one in which the lateral stiffness is less than 70% of that in the storey above or less than 80% of the average lateral stiffness of the three storey above.

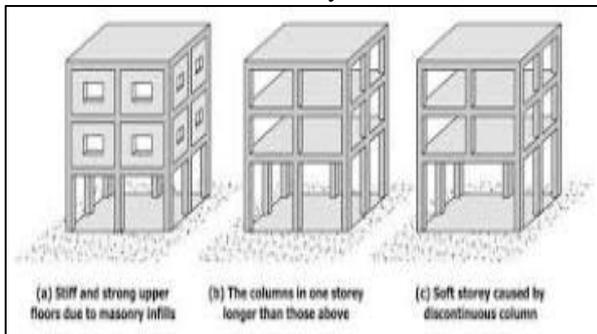


Fig. 1:

B. Lateral (storey) Drift

Lateral (storey) drift is the amount of sideways between two adjacent stories of a building caused by lateral (wind and seismic) loads.

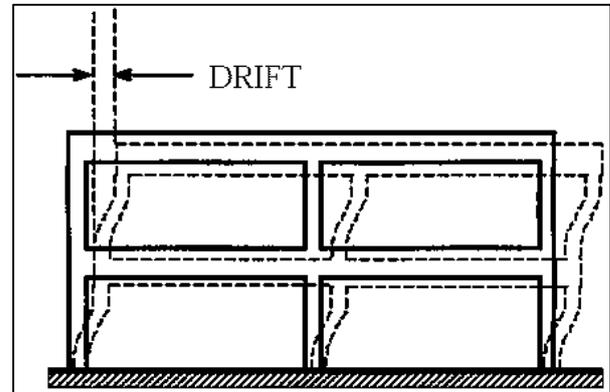


Fig. 2:

C. Soft Storey Failure

Multi-storeyed buildings in metropolitan cities require open taller first storey for parking of vehicle and for retail shopping etc. due to functional requirement, the first storey has lesser strength and stiffness as compared to upper stories, which are stiffened by masonry infills walls. This characteristics of building construction creates “weak” or “soft” storey problems in multi-storey buildings. Increased flexibility of first storey results in extreme deflections, in addition, most of energy developed during the earthquake is dissipated by the column of the soft stories. In this process plastic hinges are formed at the ends of column, which transform the soft storey into a mechanism. In such cases collapse is unavoidable. Therefore, the soft storey deserve the special consideration in analysis & design.

It has been observed from the survey that the damage is due to collapse and buckling of column especially where parking places are not covered appropriately. On the contrary, the damage is reduced considerably where the parking places are covered adequately. It is recognized that this type of failure results from the combination of several other unfavourable reasons, such as torsion, excessive mass on upper floors and lack of ductility in the bottom storey.

There are many examples of failure of soft stories such as “the Apollo apartment in Ahmedabad nearly 15-16 years ago & burj earthquake are the examples of failure.



Fig. 3:

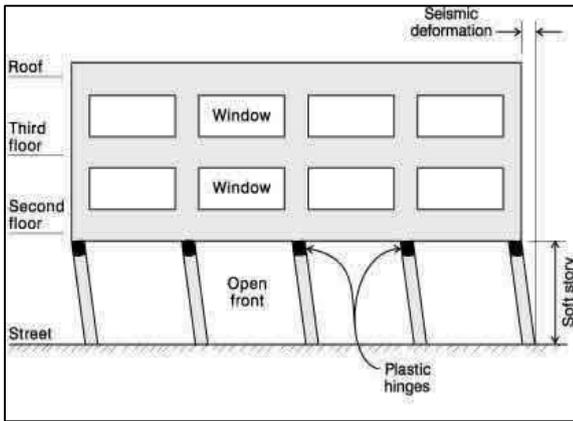


Fig. 4:

D. Causes of Soft Storey Failure

There are many causes of soft storey failure mainly due to the earthquake. In is this continuity which is the cause of structural failure of multi-stored buildings under earthquake load .while damage and collapse due to soft storey are most often observed in building.The soft storey effect and presence of infill in any building changes the behavior of frame action due to the relative changes of stiffness of the frame by a factor of three to four times and lateral load distribution. Such buildings are required to be analyzed by the dynamic analysis and designed carefully.

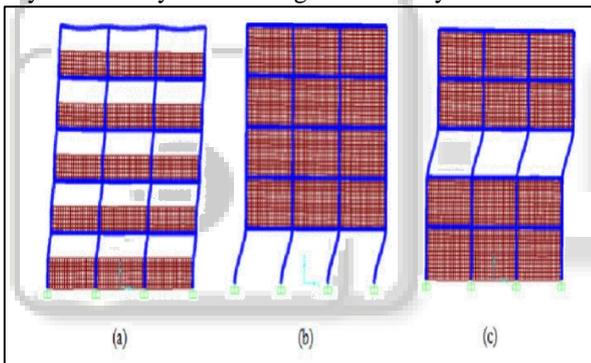


Fig. 5:

III. CONCLUSION

If the soft storey fails, many reinforced concrete structures suffered minor to catastrophic damage. The most commonly observed damage to RC structures in the form of cracking in the walls, the most striking failure was the structural failures of modern multi-story buildings. Damage to RC buildings especially concentrated on the five-story or eleven-story buildings, which had soft ground floors used for parking. Since buildings with sound construction should not have experienced any major damage for the level of ground motion experienced, those damage due to poor design & improper planning, etc. This explains the widespread structural damage to RC buildings in cities very far from the epicenter like Rajkot and Ahmedabad. As a result soft storey should be above or minimize to provide in the building.

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