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Research Article

Base Shear Reduction by using Optimum Size of Beams with same Grade of Concrete: An Informative Review

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Abstract

India is the second largest country in population all over the world and the land shortage is the common concern in large cities now a days. To reduce this problem multistorey buildings are the only option available because it provides more convenience in less space. And to make these structures economical, safe and convenient it is really important to add new ideas and technologies. The base shear reduction is the one of them. By using optimum size of the beam at the top floors of the building the base shear can be easily reduced under seismic loading. In this study various papers allied to this topic are reviewed in which an enormous work is done in this field earlier. With the help of review of research paper we came to know the conclusive outcome which forms the research objectives of our further technical study.

Keywords: *Shear wall, Base shear reduction, beam, Grade change, Dimension change*

1. Introduction

In India, Multistorey building construction is at its peak in big cities because land cost for the construction is going high day by day in large cities of India. The land is minimum against population in the large cities therefore to reduce these problems multistory buildings are the only option where minimum land is caused and provide more convenience and safety to the people. To reduce the chances of failure and provide more stability to multistorey structures under seismic and wind forces many methods and analysis are in trend.

Base shear reduction

Base shear reduction is the theory by which base shear of the structure can be reduced by minimizing the size of members of the structure. Base shear reduction is important factor in the multistorey buildings under seismic loading. Reduction in the size of beam at top floors of the structure made structure economical. It reduces the self-weight of the structure.

Shear wall

It is a structural member used to resist lateral forces i.e. wind force, seismic force. In other words, Shear walls are members to resist the horizontal forces on structures. Shear wall provides strength to the structure.

2. Literature review

The multistorey building construction is now in trends with modern techniques. In this research work the seismic analysis of multistorey building which is made up of timber panels is done. The method and modeling is done by using response spectrum method and nonlinear static analysis. The effect of lateral loads is calculated and analyzed in this paper (M. Fragiacomoa *et al.*).

In this research the new development and research of multistorey pre-stressed timber buildings are presented. The origin of this system is New Zealand. This new system opens the gate of using new construction material or modern construction materials in multistorey buildings. The new products used in this building are timber and engineered wood (Massimo Fragiacomo *et. al.*).

In the present world Reinforced Concrete frame buildings are in use for the construction purposes. The advantages of flat slab buildings are use of space, flexibility, shorter construction time and easier formwork. The total six numbers of RC frame and flat slab buildings models are considered and analyzed. E-TABS software is used in the modeling of these buildings. The seismic analysis and behavior of the building is analyzed at different-different heights of the building (Navyashree K *et. al.*).

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Now a day's analysis and design of multistorey building is easy due to affordable computers and software like E-TABS, Staad pro and SAP 2000 etc. The static forces on RC frame structure like dead and imposed load and dynamic forces like wind and seismic forces are calculated & analyzed by this software. In this paper G+30 storey building is analyzed by Staad-pro software (Mohit Sharma *et. al*.).

In this paper the static and dynamic analysis is done on regular and irregular multistorey buildings. The software used in analysis is SAP 2000. In this research two multistorey buildings has been modeled and analyzed by using SAP 2000. This highlights the correctness of time history analysis with respect to response spectrum method (Romy Mohan *et. al*.).

In India Reinforced Concrete frame structure with brick masonry is most common in building construction. In this paper response spectrum analysis and non-linear pushover analysis is performed. The total number of cases is two in this modeling. The analysis is done on buildings situated in temperate seismic zones of India. The building shapes are irregular (A. Meher Prasad *et al*.).

The seismic coefficient method is used for the analysis of seismic loads in this paper. The analysis is done on symmetric multistorey building. The building is studied by manual calculation as well as soft computing techniques of ETABS software. The result analyzed and compared (Mahesh N. Patil *et. al*.).

Now a day to resist lateral loads safely most commonly used system is shear wall system. Shear wall has high in strength which is used to resist high lateral loads like wind and earthquake forces. In this research G+5 tier building is investigated and analyzed by changing various positions with the help of STADD-pro software (Himalee Rahangdale *et. al*.).

3. Locations of the structural components for reduction of base shear

The concept of Base Shear can be reduced by taking a plan and locating the ways by which we can reduce the sizes without compromising the architectural implementations. A typical plan shown below shows the locations of the structural components.

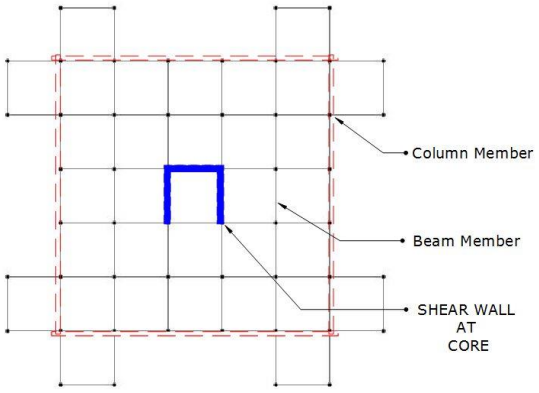

Fig. 1: Typical floor plan of Base Shear Reduction

Conclusions and outline of proposed work

So far by reviewing and analyzing above literatures I found that no one have discussed this new way to lessening the weight of the structure, importance of base shear reduction with seismic effects. Reduction in the size of beams at top floors and the various cases not created, analyzed and discussed yet to compare base shear effect on the structure. Here we come at conclusion drawn by reviewing the above researches that the location should be located for reducing the sizes of the member, ultimately reduced the base shear of the structure under seismic loading.

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