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A REVIEW PAPER ON COST AND DESIGN COMPARISON OFSTRUCTURE DESIGN BY IS: 1893-2002 AND IS: 1893-2016

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Abstract: significant enhancement in earthquake resistant design has been perceived in current preceding. As a result Indian seismic code IS: 1893 has correspondingly been revised in year 2002 after a gap of 18 years. Then again revised in the year 2016. With quick developments in earthquake engineering in the last several periods, the seismic codes are fetching gradually sophisticated. The first Indian seismic code (IS 1893) was published in 1962 and it has since been revised in 1966, 1970, 1975 and 1984. In recent times, it was decided to split this code into a number of parts, and Part 1 of the code covering general provisions (applicable to all structures) and specific provisions for buildings has been published. As Per Revised Code Is 1893 (Part 1): 2016Structure designed as per this standard are expected to endure smashed during stronger technique ground shivering.

Keywords: Earthquake, Cost comparison, Structure design, Ductile detailing, Seismic design

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INTRODUCTION

An earthquake is the shivering of the surface of the Earth, resultant from the sudden release of energy in the Earth's lithosphere that creates seismic waves. The seismicity or seismic activity of an area refers to the frequency, type and size of earthquakes experienced over a period of time. A number of significant earthquakes occurred in and around India over the past century. Some of these occurred in populated and urbanized areas and hence caused great damage. Many went unnoticed, as they occurred deep under the Earth's surface or in relatively un-inhabited places.

When an earthquake struck any residential area, Hundreds of people get killed and many get injured when an earthquake struck any residential area. Tremors can be felt from at hundreds of kilometres from the epicentre of the earthquake. An earthquake is a phenomena in which Earth's surface shakes due to the release of seismic energy from large blocks of the crust along a fault. Faults are cracks in the crust. The point under the earth crust on the fault surface where the processes of earthquakes begins, it is the source of earthquake and it is termed as the focus. Focus is the centre from where Seismic waves radiates outward. [1]

Recommendations provided by seismic codes help the designer to improve the behaviour of structures so that they may withstand the earthquake effects without significant loss. Seismic codes are unique to a particular region or country IS: 1893-2002 has been revised in year 2002 after the gap of 18 years (IS: 1893-1984). Now this is again revised as IS: 1893-2016. The building designed as per the earlier version of the code may be checked for recommendations made by the revised code. Such comparison is to be carried out to establish whether existing buildings designed by earlier version are safe for revised recommendations also. Buildings known to possess structural deficiency should be retrofitted to withstand expected design earthquake vibrations. [2]

A building shall be considered as irregular as per is IS code, if it lacks symmetry and has discontinuity in geometry, mass or load resisting elements. These irregularities may cause problem in continuity of force flow and stress concentrations. A building should possess four main attributes, mainly having simple and regular configuration, adequate lateral strength, stiffness and ductility. Structural analysis is mainly concerned with finding out the behaviour of a structure when subjected to some action. The dynamic loads include wind, waves, traffic, earthquakes, and blasts. Current earthquake codes define structural configuration as either regular or irregular in terms of size and shape of the building, arrangement of the structural and non-structural elements within the structure, distribution of mass in the building etc. [3]
Literature review

Narayan Malviya [3], 2017 has studied the seismic analysis and design of high-rise building. The structural analysis of high rise multi-storey storey reinforced concrete symmetrical and

asymmetrical frame building is done with the help of SAP software. In the present study, The Response spectrum analysis (RSA) of regular RC building frames is compare with Response spectrum analysis of regular building and carry out the ductility based design. As per IS 1893:2002 and IS 1893:2016. The author concluded that the Maximum deflection found with old code IS 18932002 for considered building is higher then new code IS 1893-2016.

Arvind Kumar Gupta [4] , 2017 in this paper study on the design a multi-storeyed RCC building in different seismic zones in India by limit state method. The design involves load calculations manually and analysing the whole structure by STAAD Pro.Based on Limit State Design conforming to Indian Standard Code of Practice IS: 456, IS: 1893, IS: 13920, IS: 875.The structure was subjected to self-weight, dead load, live load, wind load and seismic loads. Under the load case details of STAAD.Pro. The codes of practice to be followed were also specified for design purpose with other important details. The design of the building is dependent upon the minimum requirements as prescribed in the Indian Standard Codes. The minimum requirements pertaining to the structural safety of buildings are being covered by way of laying down minimum design loads which have to be assumed for dead loads, imposed loads, and other external loads, the structure would be required to bear. Strict conformity to loading standards recommended in this code, it is hoped, will ensure the structural safety of the buildings which are being designed. Structure and structural elements were normally designed by Limit State Method.

Anoop Singh[5] , 2016 has studied that the Earthquake or seismic analysis is the calculation of the response of a structure subjected to earthquake excitation. Various seismic data are necessary to carry out the seismic analysis of the structures In this study, the seismic response of the structures is investigated under earthquake excitation expressed in the form of member forces, joint displacement, support reaction and story drift. The response is investigated for g+10 building structures by using STAAD PRO designing software and observed the response reduction of cases ordinary moment resisting frame and concluded that The fundamental natural period calculated by staad pro matches with that calculated by IS 1893:2002. The displacement of beam coming in the building is within the limits of Indian standards.

Sanjay Kumar Sadh[6] , 2016 has studied The behaviour of a building during earthquakes depends critically on its overall shape, size and geometry. Earthquake resistant design of buildings depends upon providing the building with strength, stiffness and inelastic deformation capacity which are great enough to withstand a given level of earthquake generated force. This is generally accomplished through the selection of an appropriate building configuration and the careful detailing of structural members. Configuration is critical to good seismic performance of buildings. The important aspects affecting seismic configuration of buildings are overall geometry, structural systems, and load paths. The building slenderness ratio and the building core size are the key drivers for the efficient structural design. This paper focuses on the effect of both Vertical Aspect Ratio (H/B ratio i.e. Slenderness Ratio) and

Horizontal or Plan Aspect Ratio (L/B ratio), where H is the total Height of the building frame, B is the Base width and L is the Length of the building frame with different Plan Configurations on the Seismic Analysis of Multi-storeyed Regular R.C.C. Buildings. It is concluded that all the seismic parameters, viz. Base Shear, Storey Overturning Moment, Storey Drift, Storey Displacement and Modal Period of Vibration increase with the number of bays (Horizontal Aspect ratio/ Plan Aspect Ratio) and number of storeys (Vertical Aspect ratio/Slenderness Ratio).

Mahesh N. Patil [7], 2015 has studied that the effective design and the construction of earthquake resistant structures have much greater importance in all over the world. In this paper, the earthquake response of symmetric multi-storeyed building is studied by manual calculation and with the help of ETABS 9.7.1 software. The method includes seismic coefficient method as recommended by IS 1893:2002. The responses obtained by manual analysis as well as by soft computing are compared. This paper provides complete guide line for manual as wells software analysis of seismic coefficient method.

P.P.Tapkire [8], 2013 this research studied that intended to compare the design of High rise structure with different International codes. Two different famous structural building codes have been adopted. Those are the Indian Standards and European Standards. In R.C. buildings, frames are considered as main structural elements, which resist shear, moment and torsion effectively. These frames be subjected to variety of loads, where lateral loads are always predominant. Infrastructures of Gulf countries are always notable as they mainly follow EURO standards for construction development. In view of the demand of such code of practice across the developing countries like India, an attempt is made to compare EURO standards with Indian standards under Seismic Forces.

S.K. Ahirwar [9], 2008 this paper presents the seismic load estimation for multi-storey buildings as per IS: 1893-1984 and IS: 1893-2002 recommendations. Four multi-storey RC framed buildings ranging from three storeyed to nine storeyed are considered and analysed. The process gives a set of five individual analysis sequences for each building and the results are used to compare the seismic response viz. storey shear and base shear computed as per the two versions of seismic code. The seismic forces, computed by IS: 1893-2002 are found to be significantly higher, the difference varies with structure properties. It is concluded that such study needs to be carried out for individual structure to predict seismic vulnerability of RC framed buildings that were designed using earlier code and due to revisions in the codal provisions may have rendered unsafe.

Sudhir K Jain [10], 2003 has studied that the with rapid strides in earthquake engineering in the last several decades, the seismic codes are becoming increasingly sophisticated. The first Indian seismic code (IS 1893) was published in 1962 and it has since been revised in 1966, 1970, 1975 and 19841. More recently, it was decided to split this code into a number of parts, and Part 1 of

the code containing general provisions (applicable to all structures) and specific provisions for buildings has been published and concluded that The provisions on torsion in buildings have become too cumbersome for the design office. These need to be simplified. The provisions for treatment of soft storey buildings are quite ad-hoc and a rational framework needs to be developed for such building.

CONCLUSION

The study suggest that the deficiencies are take place if the structure is designed by considering IS: 1893:2002 Code. Which is not upright for any structure.But if the structure is designed by considering IS: 1893:2016 code then, the cost of structure is extremely greater than before but structure turn out to be more robust.

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