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Costing and Estimation of Earthquake Resisting Structure: A Review

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Abstract: ***This review report is the analysis of costing and estimation of different earthquake resistance structure and which method will me most economical and efficient method for the construction of any structure which is under the effect or lies in the region of the high seismic zones of the earth . To prevent structure from the earthquake excitation , nowadays several techniques are used such as Dampers , Base Isolation, TMD etc… this paper is a detailed report carried out by the various researchers on various engineering structure by professors from all over the world and the results.***

I. INTRODUCTION

Earthquakes always cause damage to any type of the structure and mankind both . It also causes a major impact on the economy of the nation as it causes huge damage to the structures . This paper is related to the study of the various seismic zones and to construct a cost efficient and Earthquake resistance structure by investigating various preventing techniques. Since the effects of the Earthquake are unpredictable the only thing that can be done is to prevent their hazardous effects by making structure earthquake resistance such preventing methods is widely seen in the construction of building in the USA , Japan and many other developed countries this has also brought down the death toll by the seismic effects. As bringing down the damage caused by the Earthquake is the major concern in many part of the world. This has brought down a peaceful environment for the peoples to carry out their daily work without any fear of losing life by such natural calamities

II. LITERATURE REVIEW

A Brief review on earthquake resistance technique by some of the researchers is given below :

A. Willam D Schuze (1987)

In this research paper a detailed evaluation has been done for the construction of the earthquake resistance structure and various methodology for estimating the cost as well as resistance benefits . The methodology draws upon the economic approach for valuing risk to life and results are useful for the officials who are the policy makers of the earthquake resisting structure and also for the engineers who are working over a project in a highly seismic zones.

B. H W Shenton (1993)

In this paper study was conducted to analyze the relative results of the fix base isolation structure . The concrete fix base structure was designed according to structural agencies and comparison was done with a fixed base response , the building performance was checked for various for lateral forces , recorded data was used of the post earthquake and tests were performed on these data.

C. Thakur V.M. (2012)

In this paper a research was conducted by the use of the TMD on a multi storey building which has a rectangular shape using a software called SAP2000 by using direct integration approach % mass of the used TMD is 3% . A comparison was done over the building with TMD and without TMD by using the recorded data of the past years of earthquake.

D. Alex y Tuan and GQ Shang et el (2014)

In this paper a research was conducted experimentally using a TMD (Tuned Mass Damper) on a high storey building and investigation was carried out on its effects . A detailed analysis was conducted and evaluation of the structural behaviour.

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E. Franco Braga

In this paper a research was done experimentally on a series of the dynamic snap back tests. This test was performed on Potenza Basilica , a residential building in south Italy . The study was performed to investigate the behaviour of the low rise Base Isolated rubber bearing.

F. L. Mathew

In this paper a study was conducted on RCC building via Fluid Viscous Damper and one without it. The aim was to find the optimum damper properties for RCC frames . It was analyzed using a software called SAP2000 on a symmetrical Square Building data was presented in a graphical form which can be compared.

G. A k Sinha

In this paper a research was conducted on a non - linear time analysis , on a 3D model of 12 storey building with the help of 3D synthetic accelerogram . Two cases of building models were analyzed one with supplemental damping and other without it ,using E-TABS .Absolute maximum displacement was compared with the past recorded data and was compared with various responses, the dampers proved to be the effective in structural responses.

H. Mr Ashish , prof. GR Patil et el (2015)

In this research paper study was conducted by the use of software using TMD. It is placed at the top of the building storey displacement and base shear was analyzed with and without the TMD using E-TABS. The analysis was done on various seismic behaviour on past recorded data . It concluded that the TMD should be placed at the top floor for the best control.

I. Balakrishna GS (2014)

In this paper study was conducted by the use of passive energy absorbing devices , seismic responses of the structure in earthquake zone can be improved , by using SAP2000. Multi storey building was analyzed with the provision of viscous fluid Dampers (VFD). TMD without any damping devices non - linear history analysis was conducted equivalent to Bhuj earthquake .

J. Mubarak Mubarak (2019)

A research paper has been published by Department of civil engineering , university of syiah kulla , Indonesia . By considering the fact flexibility plays an important role in an earthquake , as the seismic potential plays role in the life of the structure and people residing in it especially for the buildings that are constructed with a high level of the earthquake vulnerability , regarding the type of structure , considerations are important as they play an important role in the efficiency against earthquake.And by the results we can say that the cost of the structure vary according to the zones of the earthquake , as safety considerations are increased if it lies in high seismic zone .

III. CONCLUSION

1) In low rise structure Base Isolation gives better outcome and there is no need to modify the characteristics of the superstructure.
2) Damping makes the super structure stiff and by increasing it we can reach effective base isolation in high rise structure.
3) It was seen that the displacement can be reduced to 25% by providing 3% TMD .
4) Due to the wide use of the seismic control system the selection of the suitable dampers becomes important to minimize the structural vibrations .TMD acts as the best passive Dampers.
5) One thing can be concluded from this research that the primary efficiency of the base depends upon the type of the soil on which structure stands .
6) After going through all these research paper one thing can be concluded that the earthquake vulnerability can be reduced by the applying various earthquake resistance techniques , providing safe living conditions.
7) Viscous fluid dampers reduces the response , it further can be reduced by proper selection and installation.

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8) By allocating additional base mass and increasing damping of the superstructure , better isolation can be achieved in middle rise structure .

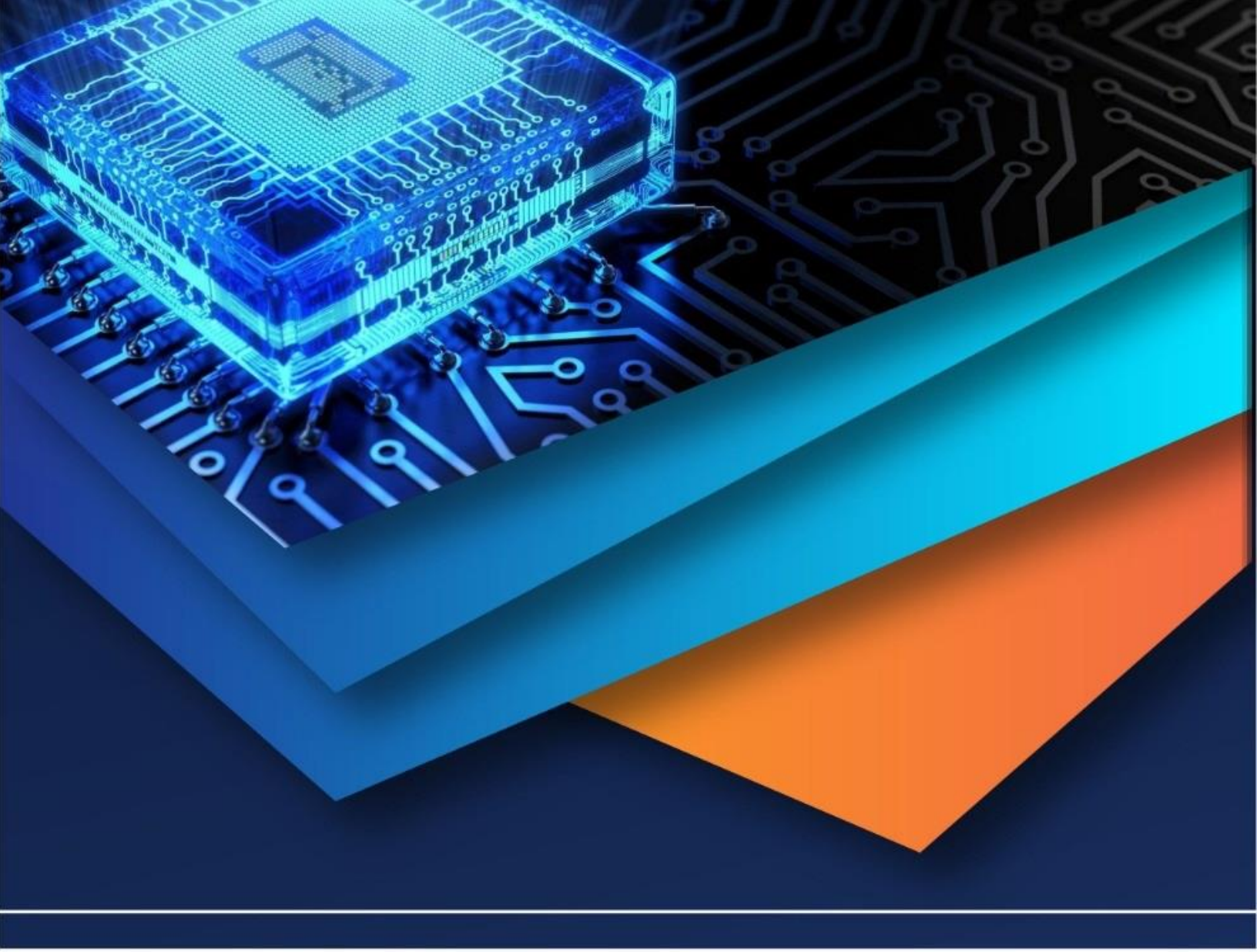
9) On testing the structure by shake table a significant decrease in structure is seen using EPB .And it can be seen from he results , free vibration test considerable increase in damping of the structure . Use of EPB was effective in reducing the structure vibrations.

10) Efficiency of the isolators varies with the height of the structure , Structure having medium height efficiency of isolators are good , the response of the structure changes due to change in different properties of the isolators.

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