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A Study on the Earthquake Resistant Low Cost Construction Techniques

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Abstract: ***In India people lives in village and small houses and India people in short income thus more prone to earthquake effects thus losses of lives are much more there are many techniques to resist earthquake but they are very costly and not used by Everyone people so here some useful in low cost techniques to resist earthquake effects. The purpose of this research paper is how to save lives at the low cost of construction through use of low cost construction and proper seismic knowledge and also use of low cost earthquake resistant construction techniques.***
Keywords: ***Village, Houses, Quality, Losses, Plates.***

I. INTRODUCTION

The most frightening and destructive phenomena of nature is a severe earthquake and its terrible aftereffects an earthquake is a sudden movement of the earth caused in the abrupt release of strain that has accumulated over long time for hundreds of millions of years the forces of plate tectonics have shaped the earth as the huge plates that form the earth surface slowly move over the under and past each other sometimes the movement is gradual at other times the plates are locked together unable to release the accumulating energy When the accumulated energy grows strong enough the plates break free if the earthquake occurs in populated area it may cause many deaths and injuries and extensive property damage. Earthquakes are caused the movement of the earth tectonic plates earthquakes occur where the earth plates meet along plate boundaries see plate tectonics page for more information on this for example as two plates move towards each other one can be pushed down under the other one into the mantle If this plate gets stuck

Figure 1: Effect of Earthquakes Buildings

II. EARTHQUAKE RESISTANT CONSTRUCTIONT

The earthquake resistant construction the fabrication of building and structure that is able to withstand the sudden ground and shaking is characteristic of earthquake thereby minimizing structural damage and human deaths and injuries and suitable construction methods are the required to ensure that proper design objectives for a earthquake resistance are met construction methods can vary dramatically throughout the world so one must be aware of local construction methods and the resource availability before concluding whether the particular earthquake resistant design will be practical and realistic for the region. The conventional of approach to earthquake resistant design of the buildings depends upon the providing building with strength and stiffness and inelastic deformation capacity in which are the great enough to withstand a given level of the earthquake generated force this is a generally accomplished through the selection of appropriate structural is configuration and the carefully detailing of structural members such as a beams and columns and the connections between them.

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III. TECHNOLOGY AND PRACTICES FOR LOW COST EARTHQUAKE RESISTANT CONSTRUCTION

The among the most important advanced techniques of low cost earthquake resistant design and construction some There are the various low cost earthquake resistant design and construction. There are conventional and economical and simple construction practices that can be in corporated in constructing quality of the earthquake resistant buildings which can reduce cost and make it safer to live.

A. Waste Tire Pads

This technique focuses on the experimental studies conducted on the development of low-cost seismic base isolation pads using scrap automobile tires seismic base isolation is a well defined building protection system against earthquakes on which numerous studies have been conducted the majority of the previous studies focus on the performance improvement of the base isolation systems however this study aims at cost and weight reduction of seismic base isolation pads by recycling otherwise useless material scrap tires elastomeric-based isolators have been heavily studied and used for the last 30 years steel or fiber reinforcement inside the elastomeric isolators provides high vertical stiffness whereas rubber segments between reinforcement layers provide low horizontal stiffness for the seismic base Isolation since 1960 automobile tires have been produced by means of vulcanizing rubber with steel mesh in different forms which have a similar effect as the steel plates or fibers inside the conventional elastomeric-based isolators therefore rectangular shaped layers cut from tread sections of used tires and then piled on top of each other can function as an elastomeric bearing since the tires are the being designed for friction load to transfer between scrap tire the layers would be large enough to keep all layers intact.

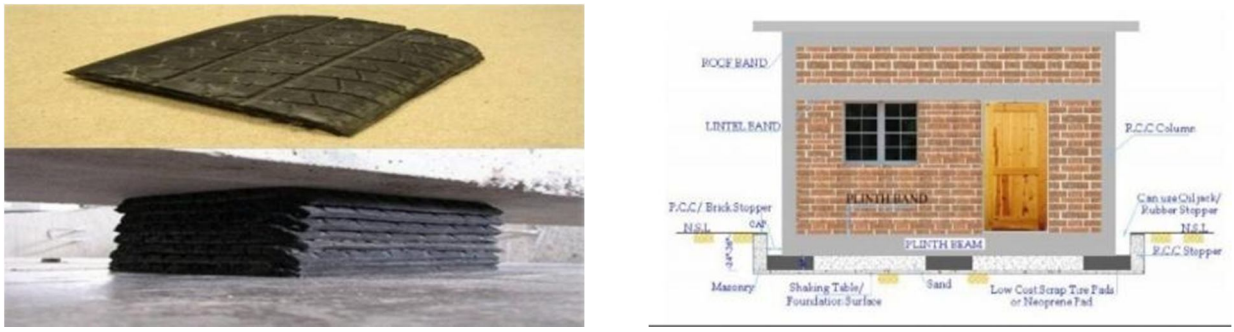

Figure 2: Use of Waste Tire Pads

This study concentrates on development and testing of alternative free-of-charge isolators and pads made from scrap tires on the other hand the STPs would not require additional preparation for small bridges the idea and investigation of using scrap tires and tinplates instead of conventional elastomeric pads is to have no-cost seismic isolation weight reduction ease of the handling simple shear stiffness of the adjustment by changing the layer numbers and positive environmental impact are complementary advantages.

B. Rice Straw/Wheat Straw Buildings

The rice and wheat straw bale buildings are the cheaper and stronger and are constructed with easily available more materials to the rural people these buildings are light and can be used as earthquake proof houses and using straw they have tested on shaking table and have achieved good results .

Figure 3: Use of Rice Straw/Wheat Straw

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C. Bamboo & Wooden Houses

The much of the severe devastation we ve seen is from collapsed older un-reinforced concrete and masonry structures and could have been prevented if these structures had been built from wood unfortunately un-reinforced or lightly reinforced concrete and masonry structures can't dissipate seismic energy or provide ductility under earthquake loads the way wood construction can a recent full-scale test in the India demonstrated that is a six-story wood apartment building can withstand a 7.5 magnitude earthquake considerably more severe than the one that struck Haiti wood being cheaper wooden structure buildings have been tested during earthquakes and the building wooden houses as a means to safer buildings against earthquake forces are in practice these days similarly bamboo is well known the cheap construction of material found everywhere it has good seismic performance properties it is lighter in weight and is ductile.

D. Bands

Why are horizontal bands necessary in masonry buildings role of horizontal bands -horizontal bands are the most important earthquake-resistant feature in masonry buildings the bands are provided to hold a masonry building as a single unit by tying all the walls together and are similar to a closed belt provided around cardboard boxes there are four types of bands in a typical masonry building namely gable band roof band lintel band and plinth band named after their location in the building the lintel band is the most important of all the needs to be provided in a almost all buildings the gable band is employed only in buildings with pitched or sloped roofs in the buildings with flat reinforced concrete or reinforced brick roofs the roof band is the not required because the roof slab and also plays the role of a band.

E. Indian Standards

The indian standards IS:4326-1993 and IS:13828 (1993) provide sizes and details of the bands when wooden bands are used the cross-section of runners is to be at least 75mm×38mm and of spacers at least 50mm×30mm When RC bands are used, the minimum thickness is 75mm and at least two bars of the 8mm diameter are required tied across with the steel links of at least 6mm diameter at a spacing of 150 mm centers.

F. Hollow Foundation

As we all know secondary & love types of waves are most destructible among other earth quake waves and the secondary waves can pass through water media thus by providing a hollow type raft foundation fully filled with water can be reducing some destructible effects of earth quake it might be filled with some viscous fluid worked as damper to reduce earth quake effects.

IV. LOW COST CONSTRUCTION MATERIALS

There are the various types of low cost materials for construction as per Indian flash sand lime bricks, clay fly-ash burnt bricks, and fly-ash based and pre-cast hollow concrete blocks standards.

V. RECOMMENDATIONS

Choosing low cost building material does not mean the material will provide poor quality and poor performance during earthquake shakings instead selection of low-cost building material is a basic criterion for providing safer and affordable houses to many needy people around the globe first of all locally available materials like adobe brick and stones and wood and bamboo and rice/wheat straw whatever they can find locally would be the best sources for reducing construction expenses however some modification on the material might be required for making them strong enough to resist significant amount of forces bamboo and wood are lighter flexible and ductile materials therefore they can be used effectively for seismic resistant construction they can be used in the constructing frame partitions and hence can be effective of earthquake resisting members of similarly Ferro-cement rice straw rice husk and potter like materials are also other less expensive materials.

VI. CONCLUSION

This paper is a study for the low cost earthquake resistant of the construction technologies in different parts of the low cost earthquake resistant of the construction technologies world the paper describes the circumstances leading to their development and highlights the ability of ancient cultures and civilizations to collect and process scientific knowledge spanning several generations.

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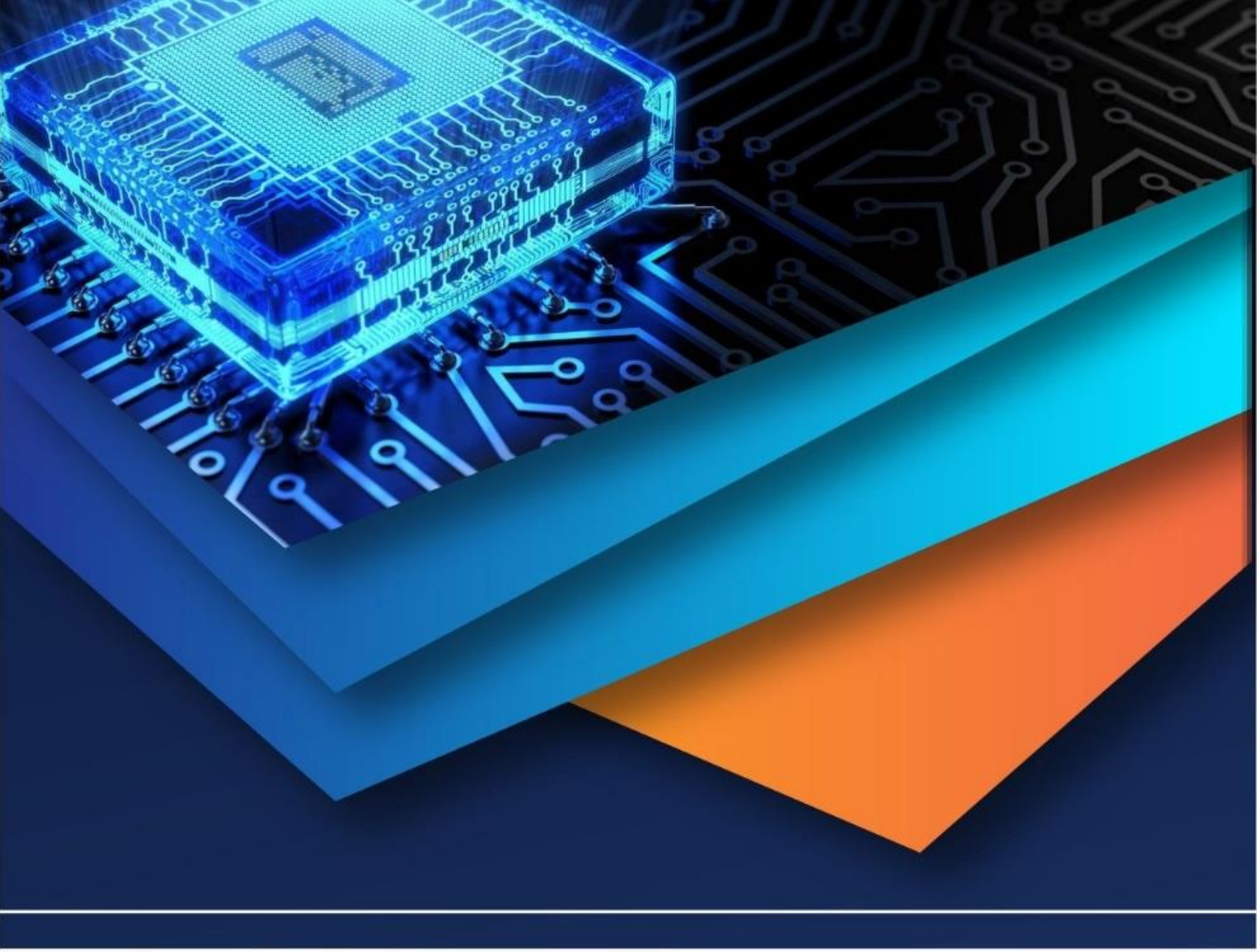

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