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# SEISMIC DISASTER MITIGATION

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***ABSTRACT- An applied study on different types of construction techniques in order to make a structure complaint and be able to withstand lateral forces.***

- ***Magnitude and intensity of Seismic Waves depends upon the Earth quake, which in turn depends upon the origin of depth...***
- ***Non engineered construction practice resulting in massive collapse of buildings…***
- ***Construction practice not such to resist against such magnitude of earthquakes.***
- ***The only objective of this paper is to discuss regarding preventive construction methods used to resist the structures for Earthquake loads.***
- ***By using BASE ISOLATION TECHNIQUE,SHEAR WALL TECHNIQUE, we can reduce the loss of life and property due to the effect of Earthquake….***

***Base isolation technique is nothing but a simple principle or process of decoupling a sub-structure and a super-structure by various techniques.***

## INTRODUCTION

- Earthquakes have been a cause of major destruction and fatalities and as the process of urbanization continues at a much faster pace, the consequences of strong earthquake ground shaking are becoming more and more threatening to both life and assets. While earthquake prediction may be of some help, mitigation remains the main focus of attention of the civil society. The review presented in this paper identifies the salient features of earthquake mitigation aspects globally while specifically addressing the engineering aspects.

- Earth quake cannot be predicted neither the magnitude and intensity.

- Aim is to improve the level of construction and educate the people who don't have any idea about seismic resistant construction.

- Massive work done to improve the level of construction especially in rural areas.

- The idea behind the concept of base isolation are quit simple. The concept of base isolation is explained through an example building resting on frictionless rollers. When the ground shakes, the roller freely roll, but the building above does not move. Thus no force is transferred to the building due to the shaking of ground. Simply the building does not experience the earthquake.

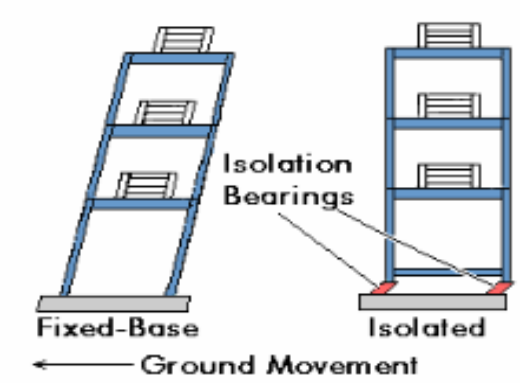
- In recent years base isolation has become an increasingly applied structural design technique for buildings and bridges in highly seismic areas. Many types of structures have been built using this approach, and many others are in design phase or under construction.

- Base isolation has advanced rapidly in japan for several reasons. The expenditure for research and development in engineering is high with significant amount designated specifically for base isolation.

- The approval process for constructing a base isolated building is a straight forward and standardized process and the high seismicity of japan encourages the Japanese to favour the long-term benefits of life safety and building life-cycle costs when making seismic design decisions.

- To get a basic idea of how base isolation works, first examine the below diagram. This shows an earthquake acting on base isolated building and a conventional, fixed-base building. As a result of an earthquake, the ground beneath each building begins to move.




- Each building responds with movement which tends towards the right. The buildings displacement in the direction opposite the ground motion is actually due to inertia. The inertia forces acting on a building are the most important of all those generated during an earthquake.

- In addition to displacing towards right, the un-isolated building is also shown to be changing its shape from a rectangle to a parallelogram.
  The primary cause of earthquake damage to buildings is the deformation which the building undergoes as a result of the inertial forces upon it.

**DEFINING THE PROBLEM:**

- The word mitigation may be defined as the reduction in severity of something.
- Earthquake Disaster mitigation, therefore, implies that such measures may be taken which help reduce Severity of damage caused by earthquake to life, property and environment.
- Conventional seismic design attempts to make buildings that do not collapse under strong earthquake shaking, but may sustain damage to Non structural elements like Glass, doors and to some structural members in the building.
- Special techniques are required to design buildings such that they remain practically undamaged even in severe earthquake.

**CONSTRUCTION STANDARDS:**

- Work on different types of construction is underway
- 2 types of which will be discussed

1) Reinforced Masonry
2) Confined Masonry

**REINFORCED MASONRY :**

- Reinforced Masonry is not RCC
- Its reinforcing the masonry work i.e. placing horizontal and vertical reinforcements at critical locations in a building in order to make it crack free in case of dynamic loading.
- Consists of stone, brick or block masonry with vertical and horizontal steel reinforcement bars.
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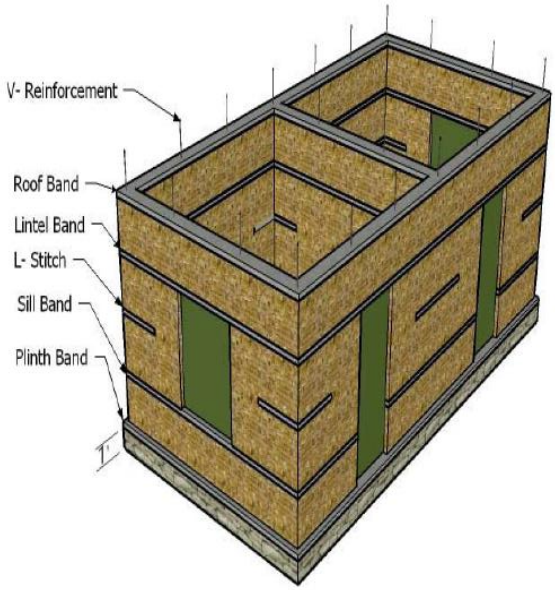
- Vertical reinforcement starting from the foundation is placed at wall junctions, openings and at 4ft spacing along the wall.
- Horizontal reinforcement consists of reinforced concrete bands (with 2 longitudinal reinforcements) at plinth, sill, lintel and roof levels.

- When the vertical bars are not placed at every 4ft, then the construction should be considered as confined masonry and should follow the confined masonry standards.
- Plinth, lintel and roof band reinforcement is extended into the four column bars.

4ft spaced Vertical Bars

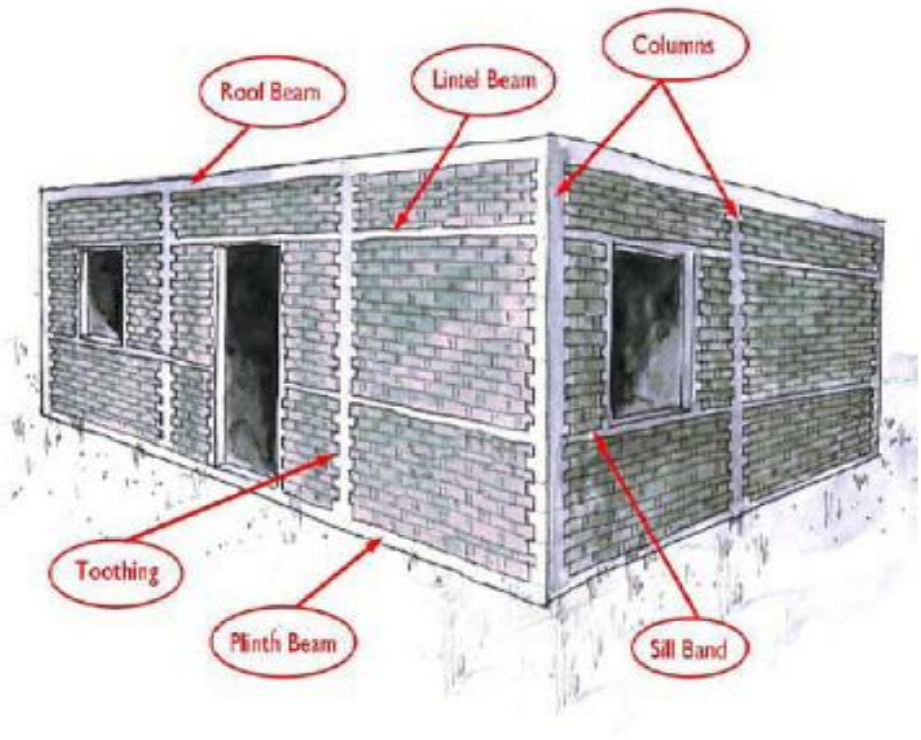
Column Bars




**CONFINED MASONRY:**

- Confined masonry consists of load bearing brick, or block masonry or in situ concrete panels surrounded by horizontal and vertical 'confining ' elements made from reinforced concrete.
- Wall panels are built first, and then the reinforced concrete columns poured afterwards.
- The wall should be built with toothing to ensure a good connection with the concrete column.
- Walls should also be tied to columns with horizontal reinforcement.

**Toothing**




CONFINED MASONRY BUILDING…..

**MITIGATION TECHNIQUES:**

- ❖ Social Aspects
- ❖ Engineering Aspects
- ➢ SHEAR WALL TECHNIQUE
- ➢ BASE ISOLATION TECHNIQUE

**SHEAR WALL TECHNIQUE**:

Earthquake damage can also be reduced by a technique called as Shear Walls. Reinforced concrete buildings often have vertical plate like reinforced walls called Shear Walls in addition to the general building components such as slabs, beams, columns. The thickness of Shear wall can be minimum of 150mm and maximum of 400mm.

**TYPES OF BASE ISOLATION TECHNIQUES:**

- Rubber Isolation

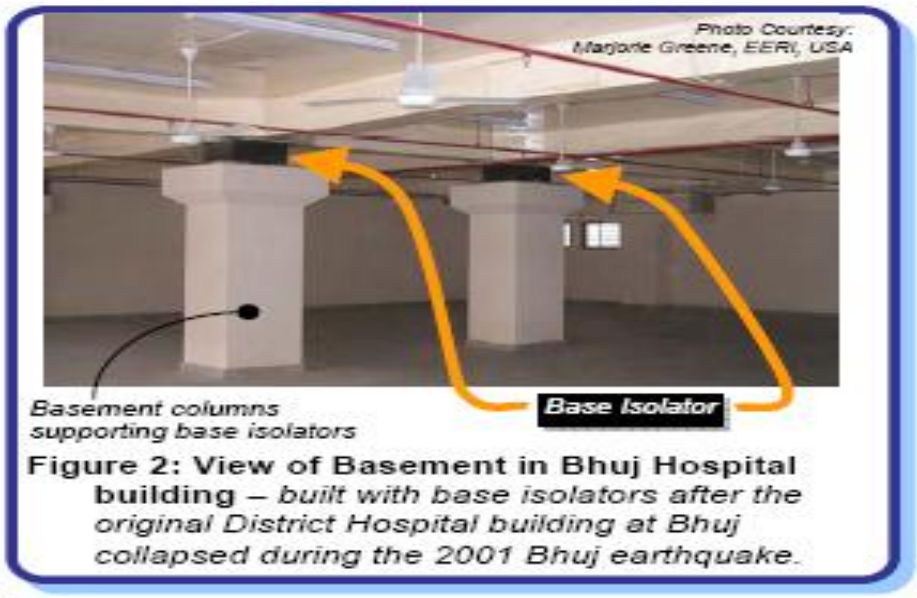



**Figure 2: View of Basement in Bhuj Hospital building** – *built with base isolators after the original District Hospital building at Bhuj collapsed during the 2001 Bhuj earthquake.*

**CONCLUSION:**

The above references have been made part of this review, to emphasize the need of identifying the responsibility that the engineers and planners have to play regarding mitigating efforts. It is not only the basic understanding of the phenomenon of earthquake, its resistance offered by the designed structure, but the understanding of the socio-economic factors, engineering properties of the indigenous materials, local skill and technology transfer models are also of vital importance. In conclusion, therefore, it is vital that the engineering aspects of mitigation should be made a part of public policy documents.

- Roller Isolation
- Ball bearing Isolation
- Spring Isolation

- Both the standards of construction has been successfully implemented in seismic areas of Pakistan.
- Confined masonry technique is slightly more advantages than the reinforced masonry as it provides more interlocking between the RCC members and the brick members.
- Construction cost of confined masonry is a bit more than reinforced masonry

**SCOPE:**

- This paper clearly talks only about the different methods of constructing buildings to resist seismic loading.
- To Analyse the soft structure against the seismic loading and find the alternate resource to resist the structure from seismic loading and dynamic analysis is also to be considered

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