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Seismic Analysis of RC -Framed Building with and without provision of Bands at Different Level

Dr.Abhinandan R. Gupta[1], Mr. Mohd Afzaal Hussian Qureshi[2]

[1]*Asst. Professor, Department of Structural Engineering, College of Engineering & Technology, Akola, India*
[2]*PG Student, Department of Structural Engineering, College of Engineering & Technology, Akola, India*

ABSTRACT

Improperly designed cause undesirable effects below unstable loading in each bolstered concrete(RC) frames and masonry load wall structures. Doors and windows (openings) are inescapable parts in brick masonry in-filled RC structures and masonry load wall structures owing to its practical and ventilation necessities.The presence of openings in brick masonry walls reduces the lateral stiffness and strength of the enclose each RC and cargo bearing structures, that changes the particular behavior of structure. If these openings are settled within the restricted zones like areas inside middle 2 thirds of a wall, then the wall has to be strong by providing necessary horizontal (bands) structural components like header or header bands around them. Lack of such structural components could cause the structure to endure severe injury throughout the earthquake event [1]. In this paper, two case studies, (a) seismic analysis of RC framed building without provision of bands (b) seismic analysis of RC framed building with provision of bands at different level

1. INTRODUCTION

It has been seen from the many decades, that natural hazards produce ample impact on ecological and economical life. One such hazard is earthquake. A varied theory has been projected to search out the explanation and propagation of earthquake. The fundamental reason embrace movement of tectonic plates moreover as vibrations evoked thanks to wave generation. With the increasing mass, height crispiness and disintegrate this seismic result amplifies. But the impact of seismic forces cane be reduced to some extend by the training learnt from previous earthquake.Various abstract strategies square measure counsel in books and literature wish to enhance the malleability ,restricted structure height, gap space thought ,mass of structure similarly as insult amongst components.Considering the abstract integrity idea, it discovered that load bearing structure area unit additional vulnerable as compared to RC structures this as a result of, the integrity within the structure is additional once they area unit connected monolithically. As compared to clay material concrete bears additional compressive and flexural strength. and if this integrity and therefore within the sort of bands the strength may be enhanced one such ways of providing the bands at completely different location and finding out its impact on the structure must be think about for locating out seismal impedance.[2]

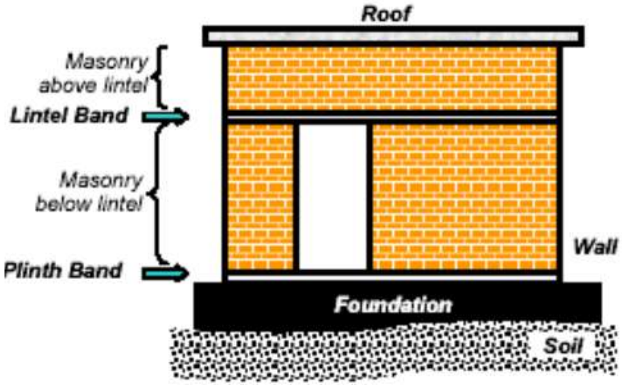


Fig. 1: Building with Flat Roof

2. SIGNIFICANCE OF THE WORK

Study of such unstable resistive technique could facilitate to avoid wasting the life and also the harm intensity of the unstable forces. With identical the any treatise work is think about.

3. OBJECTIVES

- To study the effect of earthquake on RC frame structure
- To study the conceptive seismic resistive technique
- To study various seismic analysis methods
- To modal and analysis the RC frame building with and without bands
- To do the comparative study of the various structure

4. METHODOLOGY

4.1 Phase 1

- Introduction to seismology effect of seismic forces on various structures such as columns, beam, soft storey at different level on RCC building.
- Literature survey, various case studies related with structure subjected to seismic forces, secondary survey.
- Research methodology

4.2 Phase 2

- Different method of seismic analysis applied to the storey with and without bands at different level.
- Normal analysis of RC building
- Analysis of building subjected to seismic forces with provision of band at different level computationally comparing normal analysis results of the structure with band at different level.

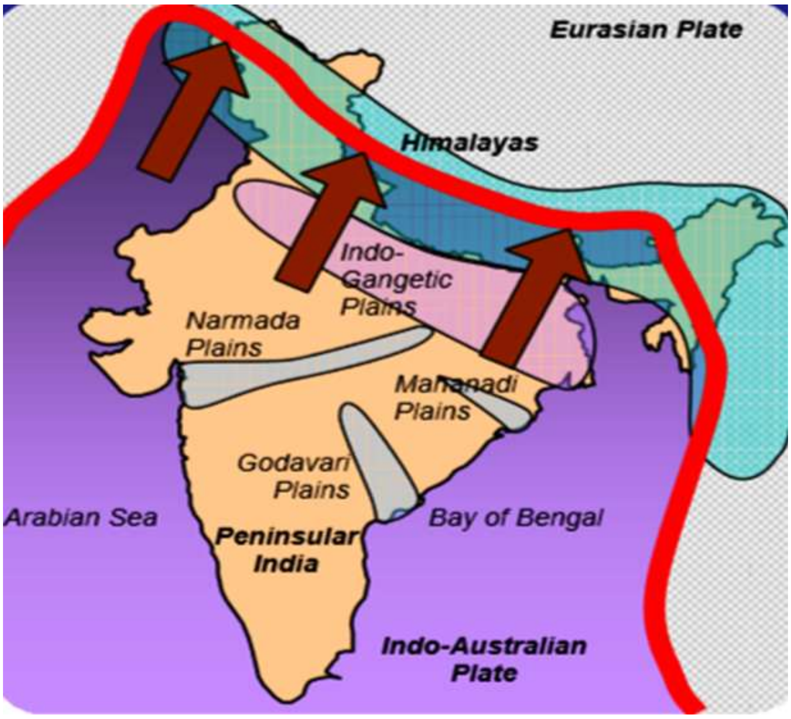
4.3 Phase 3

- Observation and remark drawing from the modelling and analysis work.
- Conclusion and limitation
- Future scope and references

5. DETAIL STUDY

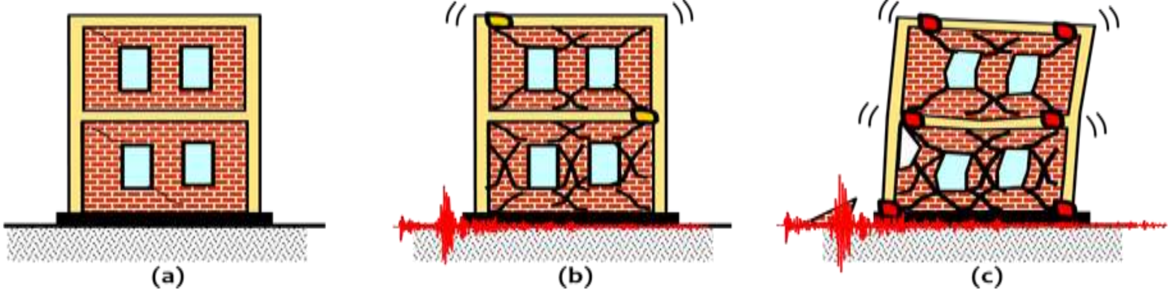
5.1 Seismology of India

India lies at the northwestern end of the Indo Australian Plate, which encompasses India, Australia, a major portion of the Indian Ocean and other smaller countries. This plate is colliding against the huge Eurasian Plate as shown in figure. And going under the Eurasian Plate; this process of one tectonic plate getting under another is called subduction. A sea, Tethys, separated these plates before they collided. Part of the lithosphere, the Earth's Crust, is covered by oceans and the rest by the continents. The former can undergo subduction at great depths when it converges against another plate, but the latter is buoyant and so tends to remain close to the surface.[5] Three chief tectonic sub-regions of India are the mighty Himalayas along the north, the plains of the Ganges and other rivers, and the peninsula. The Himalayas consist primarily of sediments accumulated over long geological time in the Tethys. The peninsular part of the country consists of ancient rocks deformed in the past Himalayan-like collisions. Erosion has exposed the roots of the old mountains and removed most of the topography. The rocks are very hard, but are softened by weathering near the surface. Before the Himalayan collision, several tens of millions of years ago, lava flowed across the central part of peninsular India leaving layers of basalt rock. Coastal areas like Kachchh show marine deposits testifying to submergence under the sea millions of years ago.

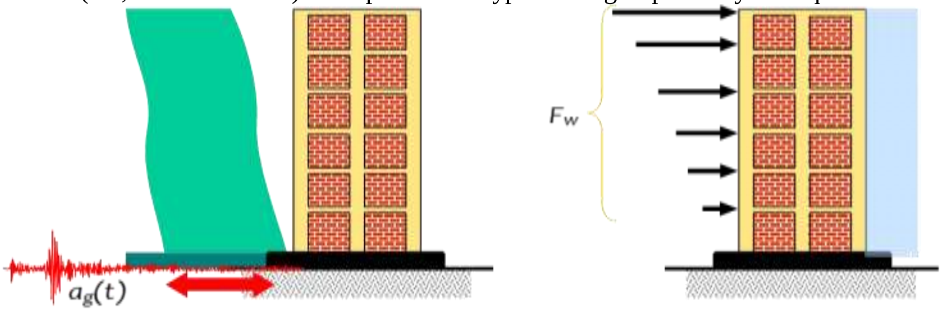


5.2 Effect of earthquake on RC structure

The mass of the building being designed controls seismic design in addition to the building stiffness, because earthquake induces inertia forces that are proportional to the building mass. Designing buildings to behave elastically during earthquakes without damage may render the project economically unviable. As a consequence, it may be necessary for the structure to undergo damage and thereby dissipate the energy input to it during the earthquake. Therefore, the traditional earthquake-resistant design philosophy requires that normal buildings should be able to resist (a) Minor (and frequent) shaking with no damage to structural and non-structural elements; (b) Moderate shaking with minor damage to structural elements, and some damage to non-structural elements; and (c) Severe (and infrequent) shaking with damage to structural elements, but with NO collapse (to save life and property inside/adjoining the building). Therefore, buildings are designed only for a fraction of the force that they would experience, if they were designed to remain elastic during the expected strong ground shaking, and thereby permitting damage. But, sufficient initial stiffness is required to be ensured to avoid structural damage under minor shaking. Thus, seismic design balances reduced cost and acceptable damage, to make the project viable. This careful balance is arrived based on extensive research and detailed post-earthquake damage assessment studies. A wealth of this information is translated into precise seismic design provisions. In contrast, structural damage is not acceptable underdesign wind forces. For this reason, design against earthquake effects is called as earthquake-resistant design and not earthquake-proof design [6]



Dynamic actions are caused on buildings by both wind and earthquakes. But, design for wind forces and for earthquake effects are distinctly different. The intuitive philosophy of structural design uses force as the basis, which is consistent in wind design, wherein the building is subjected to a pressure on its exposed surface area; this is force-type loading. However, in earthquake design, the building is subjected to random motion of the ground at its base which induces inertia forces in the building that in turn cause stresses; this is displacement-type loading. Another way of expressing this difference is through the load-deformation curve of the building – the demand on the building is force (i.e., vertical axis) in force-type loading imposed by wind pressure, and displacement (i.e., horizontal axis) in displacement-type loading imposed by earthquake shaking



5.3 According to IS 1893:2002 Seismic considerations

General Principles: Earthquakes cause random motion of ground which can be resolved in any three initially perpendicular directions. This motion causes the Structure to vibrate. 'The vibration intensity of ground expected at any Location depends upon the magnitude of earthquake, the depth of focus, Distance from the epicenter and the strata on which the structure stands. The predominant direction of vibration is horizontal. Relevant combinations of forces applicable for design of particular structure have been specified in the relevant clauses

The response of the structure to the ground vibration is a function of the nature of foundation soil; materials, form, size and mode of construction of the structure; and the duration and the intensity of ground motion. This standard specifies design seismic coefficient for structures standing on soils or rocks which will not settle or slide due to loss of strength during vibrations. [8]

The seismic coefficients recommended in this standard are based on design practice conventionally followed and performance of structures past earthquakes. It is well understood that the forces which structure would be subjected to in actual earthquakes, would be very much larger than specified in this standard as basic seismic coefficient. In order to take are of this gap, for special cases importance factor and performance factor where necessary) are specified in this standard elsewhere.[9] In the case of structures designed for horizontal seismic force only shall be considered to act in anyone direction at a time. Where both horizontal and vertical seismic forces are taken into account, horizontal force in anyone direction at a tingle may be considered simultaneously with the vertical force.

6. CONCLUSIONS

Based on post earthquake field study of masonry building behavior and finite component analysis of typical masonry building subjected to earthquake ground motions, it's clear that out-of plane flexural failure of walls is primarily liable for collapse of masonry buildings throughout AN earthquake. It's going to even be concluded that existing provisions for earthquake resistant style don't seem to be enough to forestall collapse of buildings and extra options to boost the malleability of the masonry wall up the vertical direction square measure needed. This paper reports a replacement and an innovative means of reinforcing masonry walls on the external faces within the vertical direction known as "containment reinforcement". Its effectively has been confirmed through laboratory studies conducted on scaled down masonry building models [10]

7. REFERENCES

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