ISSN - 2250-1991 | IF : 5.215 | IC Value : 77.65

Original Research Paper Engineering

ANALYSIS OF SEISMIC TRAMORS & REHABILITATION PROCESS OF BUILDINGS FOR SAFETY

Er.Nishchay Singh M.Tech Scholar Swami Vivekanand University Sagar M.P.

Er. P.C. Diwan HOD, Civil Engineering Swami Vivekanand University Sagar M.P

KEYWORDS Seismic tremors, rehabilitation, building safety.

ABSTRACT

"The process of Rehabilitation is a cyclic process the evaluation of strength of rehabilitated buildings in India. It is the process contributed by the materials used, the methodology used, the work force & the rehabilitated strength.
The research paper focuses on the seismic tramors & the rehabilitation process and the factors that must be accounted.
The information gathered from the professional agencies by per revised journal and happenings like Gujarat and the analysis of the buildings these were not collapsed.
This research paper spread awareness about various methods those can be considered such as retrofitting of the multistory buildings as the higher safety level for the residential compress. As well as the eco-friendly aspects of making the structure good.

1. INTRODUCTION

The residence, "The Home, the 'Sweet Home'" the utterance of these words gives a pleasure to one and all, it may be a simple shelter made out of leaves of trees or a big bungalow, but the quality relaxation and pleasure fillings are same.

Even the thought of getting back to home, is unmatchable, whoever he / she may be, a daily wedge earning worker or a managing director of multinational corporate, a teacher in a school or homemaker wife, after a hectic activity day.

After the event of earthquake, the concrete structures either collapse or damaged. It is essential to ascertain the residual strength of the structure, before original occupants allowed to re-establish, by the concerned authorities.

Further, NDTs operated for judging the serviceability of the buildings during structural auditing, and prior to retrofitting of survived buildings, or proposed strengthening.

NDT Testing performed, ideally without damaging the concrete. The tests available, range from the non-destructive, where there is zero damage to the concrete, through few where the concrete surface gets slightly damaged, to partially destructive tests, where the surface requires repair or touch up after the execution of test.

The Nondestructive testing techniques determine the integrity of a component, material, or structure or quantitatively measure. NDT's assess without destroying the test object, harming, or stressing it. On the other hand, in Partial destructive Tests the destruction may damage the member from where the test specimen is to be gathered.

Evaluation is a process of assessment or revision of estimate as on date, with consideration to future maintenance cost and current requirement of retrofitting cost. Maintenance cost is the sum cost that includes, normal repairs to the structure, renovation of the structure current or planed in future to suit the then requirements, and Eco-friendly retrofitting cost. The process of retrofitting enhances the life of the structure, which in turn elevates the valuation, on the date, the process is of cyclic nature, and hence that defines the, "Life cycle evaluation."

The Evaluation of the strength, quality, and life of the structure is also equally important and essential, to assertion the proper method of retrofitting Visa Vis reconstruction of the structure. Here the issue is more of economics that will rule decision.

2. EFFECT OF STRUCTURES' DEAD WEIGHT AND HEIGHT IN SEISMIC CONDITIONS EXPLAINED IN THE FOLLOWING PARAGRAPHS

When structures in vicinity receive seismic tremor, their mass, configuration, Buildings constructed close to each other. Are these buildings Safe against Pounding Effect Materials used in construction, type of construction, age of the structure, their residual potential strength, all or part, can be different, therefore their responses will be different and at different point of time. The result of all these, every individual structure will generate base shear of different magnitude and at different point of time. The responses local or global of individual structure are in tandem, resulting behavior will be different chance of collusion of structures, and aggravating the damages increased.

Figure 1:- Buildings close to each other (less than 10 ft. apart)

The effect of urbanization, construction multi storeyed building groomed in urban areas. The demolition and reconstruction of the buildings, works out uneconomical, such old buildings found extended over the existing structure. The effect of this, concentration of population in particular zone. The extensions connected at the footing/ foundation level. It is therefore essential for local bodies to check and ensure compliance of structural design as per IS Code's recommendations, of all such buildings, extensions or new buildings. To initiate stricter action against, the buildings found violating recommendations, giving them options of demolition and reconstruction, or retrofitting to IS Code's

recommendations. Such steps if not taken immediately and judiciously, disaster is waiting to happen.

Figure 2: - Building collapsed due to Pounding

3. WHICH BUILDING, STIFF, OR FLEXIBLE, IS PREFERABLE IN STRUCTURAL ENGINEER'S VIEW IN CASE OF SEISMIC HAZARD?

The buildings divided in two categories, first most important buildings e.g. Nuclear reactor, Hospital, Emergency response stations, School, College building, where more number of people gather at times and or the rescue service providers and all other buildings clubbed in the second category.

The earthquakes are unpredictable. When, where and of what magnitude it will strike is a mystery and the science has no clue for it yet. From the history of earthquake records show that low and medium intensity quakes probability is more and frequent, and high intensity quakes are rare and less frequent. Therefore the IS Code of specifications, suggest the application of different coefficients for application in designing of structure as per seismic zones and in respect of two categories of the building. The categories specified are a Important All other buildings lubbed in general buildings.

The structures from first category are of importance, as more number of human lives to safeguarded, at time occupying the structure, and here economy seconded to the life safety. Therefore these structures are provided, as per maximum provisions of IS Code, the seismic resistivity for the rarest possible magnitude of respective zones, without compromise, for their survival without significant damage to the structure. Cost of the structure increases, to accommodate the expenditure, towards special safety measures.

On the other hand, the structure from second category with a designed life span of 50 years may receive low-mild intensity quake 3-4 times but may not experience any high intensity at all. The risk factor reduces considerably and in such case, the design, if based to take care of high intensity quake will be a futile exercise, on ground of economics. For providing more resistivity to the structure the cost of the structure rises high, but it is not optimally justifiable, nor the IS Code of specifications recommends it; hence these are designed for medium intensity.

- **Ductility and its effect on the structure:-**

During flood, the trees on the banks, having stiffness and less ductility, are rooted out but the blade of grass survives. The property known as ductility, of the grass blade helps it to survive.
The ductility of the structure, allows the structure to deform and receive damage if any, but do not allow the structure to collapse without warning, under seismic conditions. The ductility do not allow the structure to regain the original configuration, it is the elasticity imparts this phenomena to the structure. If the structure being theoretically safe, but remains deformed visually, all will deny entering in it. In such case, the structure needs retrofitting treatment, in order to rehabilitate the usage.

The different combinations and compositions, impart variation in the composite strength. This makes it essential, to select proper composition of different materials used in construction, to achieve the designed strength. This process termed as reinforcement. A wall can be erected by placing stone over stone, but it has less strength as compared to, stone wall raised with joints filled with mortar. The different combinations and compositions experimented and tested in past and the data are available, based on which structural engineer chooses suitable combination as per material availability, possibility of implementation.

4. GEOTECHNICAL SEISMIC HAZARDS

Liquefaction, heaving, ground cracking, Tsunami in comparatively level area and slope failure in hilly terrain are prominent effects of geo-seismic hazards. The evaluation of hazards is based on characterization of that particular location. It is accomplished by the study of subsurface investigation, properties of soil, and seismicity of the location.

- **Liquefaction**

During seismic action shear waves propagated, raising pore pressure and resulting in loss of shear strength of soil, and soil behavior transform alike viscous liquid known as "Liquefaction."

- **Mitigation**

The evaluation of the liquefaction potential based on the standard penetration tests and the cone penetration tests done will help to chose the improvement technique and the techniques are:

a. Drainage techniques
b. Reinforcement
c. Densification and
d. Grouting/mixing

Heaving compressive action uplifts the ground and damaging or collapsing the structures on it, if any, along the fault line.

- **Ground Cracking**

It is similar to cracking of any article, ranging from few meters to Kilometers in both in vertical and horizontal directions, damaging everything on the way in proportion to the strength of quake and the corresponding response of the structures.

- **Tsunami**

When the epicenter of quake happens to be in sea, any or all the above stated phenomena happen, as well as the uplifting force raises the water body above in ripple form and the height of the wave thus formed may be up to 15 Mts. The waves thus formed when travers and reaches the shore with the potential force smash, damage, collapse and suck in everything coming along, this intrusion can be 500 Mts or more depending upon the intensity of the quake, the distance between epicenter and the shore, and as regards the structure, of course the structure's response.

- **Slope Failure in Hilly Terrain**

In hilly terrain, the rocks and soil form slopes. The stability of slopes depends on the densification of the soil, rocks, or their combination. Further, it is also function of the moisture contains in the mass on the slope. During quake action, the liquefaction effect takes place and stability is disturbed, causing landslide down the slope. The lump of this sliding mass takes away, damages, collapses, destabilizes slopes down the line, coming along its line.

- **Study of Seismicity**

The aim of study of seismicity is to point out level and types of ground motion at location. To collection and examine in detail data available of seismic activities in past in respect of the location, To establish and locate probable; sources and mechanisms of source

for quake. Based on the information so collected model analysis done and is called as Earthquake hazards Analysis.

5. CONCLUSION

It is clear that there are flows in the system of making building with taking this fact into consideration that the codes & specification. Aspects like economy Benefit. Must be treated as secondary facts when it comes to safely.

Some of the codes those are requested for their will engineering to adhere with are as follows:

1. Provisions for safety in Seismic zone
2. Building Bylaws in architectural planning.
3. Structural Designing,
4. Geotechnical advice must be sought,
5. Material selection, use and application,
6. Execution of construction work

References

[1] ASCE 41-06, (2007), Seismic Rehabilitation of Existing Buildings, American Society of Civil Engineers, USA Bachmann,H., (2003), Seismic Conceptual Design of Buildings – Basic principles for engineers, architects, building owners, and authorities, BBL Vertrieb Publikationen, Bern

[2] Bhattacharya Shubhamoy, Nayak Sanket, Datta Sekhar Chandra, (IJDRR, V-7, March 14). A critical review of retrofitting methods for unreinforced masonry structures.

[3] BMTPC/TARU "Action Plan for Reconstruction Earthquake Affected Garhwal," 1992

[4] BMTPC/TARU "Action Plan for Reconstruction Earthquake Affected Garhwal," 1992

[5] BMTPC/TARU Action Plan for Reconstruction in Earthquake Affected Regions of Maharashtra, New Delhi October 1993

[6] Bose P.R. and Verma A.," Retrofitting of Low Cost Buildings", Workshop on Retrofitting of Structures, Oct. 10-11,2003,Indian Institute of Technology Roorkee, Roorkee pp297-308.

[7] Bose P.R.," Earthquake Resistant Non Engineered Buildings", JI of Indian Building Congress Vol.4.No.1, 1997.