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"Seismic Assessment of a RC Structure existing School Building usinganalytical tool Staad.Pro : A Review"

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Abstract:

In heritage protection, there is vital necessity to recognize the impending seismic risk in prevailing historic buildings for hazard moderation, disaster alertness and preceding knowledge of probable hazards. Seismic risk estimation remains centered on safety assessment, which necessitates qualitative and computable data. In this study we are reviewing the past researches and publications related to retrofitting of an existing historical structure.

Keywords: Seismic Assessment, Staad.pro, forces, displacement, strength, rebound hammer, retrofitting.

Introduction:

There are many buildings that have primary structural system, which do not meet the current seismic requirements and suffer extensive damage during the earthquake.Presently we are surrounded with technology and the same is highly visible in civil industry as now a days the shortcomings which were faced previously can be easily overcome with computer aided technologies where we are able to monitor the designing of the structure and analyze the best outcomes for further enhancement.

Here we are providing statements of researchers and authors who provided researches related to seismic assessment of historical structures and their strengthening methods.

Sakalleet. al. (2018) Author studied the analysis of frames and manually checked the accuracy of the software and compared results. In this analysis they considered G+4, G+9, G+14, & G+19 storey buildings initially for all possible load combinations likes [Dead, live and seismic loads]. Author prepared model of the structure of different story like G+4, G+9, G+14 and G+19 and applied all zones (II, III, IV, & V) with different soil condition. Concluded that by using STAAD.Pro that is very interactive software and user interface which gives the result according to seismic code (IS1893). Then according to the specified criteria assigned it analyses the structure and analysis the structure in different seismic Zone. In this paper we have to calculate such parameter as storey drift, displacement, Lateral forces, bending moment, Shear force, & axial forces.

Burak Yon &OnurOnat (2018) here the author analysed existing reinforced concrete buildings before and after shear wall retrofitting. For numerical applications, an existing RC building was selected and retrofitting with shear walls. Incremental dynamic analysis and static pushover analysis of these buildings was performed using the distributed plastic hinge approach. The results proved that seismic retrofitting which shear walls increase rigidity and capacity of the building, while decreasing the lateral displacement and damage.

While investigating the seismic behaviour of existing reinforced concrete buildings before and after seismic retrofitting, the authors found that the capacity curve of the retrofitted building is larger than that of the existing building. This situation Proved that the shear wall

increases the capacity of the building. For the existing building, responses of the existing structure during the low amplitude ground motion was close to the capacity curve of the same model. However, responses obtained from high ground accelerations had larger displacement and lower base shear force. This situation proved that the high seismic excitation causes collapse of the non retrofitted building. In terms of retrofitted building, the responses of the structure of obtained from dynamic analysis was too close to each other. Moreover, capacity curve values and seismic response of the structure under the low magnitude seismic motion was nearly the same. But, response is obtained from high amplitude seismic motion did not exceeded the capacity curve of the retrofit building. This situation proved the contribution of additional shear wall to the capacity of building and damping factor of the shear wall two over all system.

As all analysis result was investigated in terms of a retrofitted building, the maximum interstory drift ratios were obtained from soil class z3 with 0.4 grams. The registered inter storey drift levels did not exceeded the MN performance level except for Z30.4g.

Abdul Kalam&MuzeeraBabu SK (2017) here to author study highlighted the principles of assessing and retrofitting of structures against seismic events.some of these methods were practically implemented and procedures were illustrator using a case study of four storey RCC building retrofitted for a moderate earthquake.finite element method was used to investigate the performance of the building during the earthquake and to check the behaviour of the structure after applying retrofitting techniques. The metal such as steel and concrete jacketing and application of fibre reinforced polymer FRP composites were used to improve the load bearing capacity of individual structural elements which were highlighted

and methods such as shear wall and shear cores which can be used to improve overall stability was discussed.

yeah the primary objective of the study was to verify the results of theoretical predictions on the structural stability of the braces validate the inelastic capacity of the braces under severe earthquake demand and calibrate a macroscopic hysteretic model that was found to predict, with fidelity, the brace force and displacement behaviour. This study concluded that the unbounded brace was a reliable and practical alternative two conventional framing systems to enhance the earthquake resistance of new and existing structures; capable of providing both the rigidity needed to satisfy structural drift limits, while delivering a substantial and repeatable energy absorption capacity.

Research on advanced materials had mainly concentrated on frp composites weather studies prove that externally bonded frap components can be applied to various structural membranes including beams columns slabs and walls in order to improve their structural performance such as stiffness load carrying capacity and ductility.

Sonu S Yadav&RanjanaGhante (2016) here the author covered seismic evaluation of reinforced concrete structures and made comparison along with suitability. Conducted various application of non destructive techniques to concrete members, interpretation of results and assessment of quality of membrane with reference to strength and serviceability. case study of existing building and seismic evaluation was done.

Here the authors concluded that the building I was capable of taking lateral force up to 6% of its seismic weight. The performance point led between the zone of immediate occupancy and life safety. Hence, when a lateral force equal to around 1087 KN was acted upon the

building, they shall be light to moderate damage. Cracking was observed with permanent drift the gravity elements functions with no collapse of structures where as the building may go beyond economical repairs.

Sameh A & El-betar (2016) here the light was shed on the significant contributions in the field of seismic vulnerability evaluation of buildings in order to suggest a suitable procedure for seismic evaluation of existing RC buildings in Egypt. seismic evaluation was applied on the selected cases where one represented the gld buildings and the other represented the buildings design according to Egyptian code. Pushover analysis was conducted to investigate the vulnerability of these buildings.

In order to evaluate the existing RC buildings in Egypt, rapid screening based on FEMA P-154 procedure was used for large number of RC buildings. ASCE 41-13 methodology was used for buildings that could not achieve the seismic resistance in rapid visual inspection, as well as individual structure that required evaluated. The priority of evaluation was for the old or non engineer buildings in high seismic regions.

The gld school buildings tend to be more vulnerable under high seismic loads, while school buildings design according to the Egyptian code had a high capacity to resist earthquakes.

MariamolKuriakose&PreethaPrabhakaran (2013) here the author investigated the evaluation of existing buildings in Karnataka. Most of the buildings existing in Karnataka was designed only for dead load and live loads (gravity loads), loads due to earthquake were not considered in the design. the project included the evaluation of building by analysing and existing building in Karnataka, considering the seismic loads along with gravity load. SAP 2000 was used for the analysis of the building.

Hear the results obtained from detailed analysis proved the deficiency of building towards the earthquake loads. The members may fail in case of seismic activities in future. Demand capacity ratio (DCR) what is the main key to evaluate a member. If the demand was more than the capacity of the member it will result in direct failure. DCR values were calculated for flexible and shear capacities of beams and columns at face of joint.

After evaluation it was found that most of the framing beams and columns of the joint was safe in shear reinforcement. The flexural capacity of beings was checked for sagging and hogging moments. The results presented that almost all beans wale hogging and in case of columns most of them failed in flexure. at the end the author suggested does need for sending the frame and retrofitting it.

Dinesh J Sabu& Dr. P.S Pajgade (2012) here the author focused on need for evaluating the seismic adequacy of the existing structures following the damage and collapse of numerous concrete structures due to earthquake in the past years. In order to carry out seismic evaluation, a simplified procedure for evaluation was highly in need for a country like India which was prone to earthquakes. There was I need to estimate the response of buildings under earthquake from the viewpoint of life reservation and risk management. The response spectrum analysis procedure was applied for the evaluation of existing design of a reinforced concrete bare frame, frame with infill and frame with infill and soil effects. In order to examine the performance of these models, the response spectrum analysis for seismic evaluation of existing building was performed. After performing the analysis reinforcement required in each format was determined and retrofitting was suggested accordingly. Weather of study different retrofitting methods in his work and concluded that the effects of infill played a very crucial role in seismic evaluation of existing RC buildings.

The authors entire study concentrated on seismic evaluation and retrofitting of existing RC buildings. Seismic analysis was carried out for existing reinforced concrete building.the reinforcement provided in building was compared with all the three formats of modelling which were bare frame modelling, brick infill frame modelling and infill + soil effects interaction model where the authors concluded that if the standing was done the strength of the existing structure could be enhanced to the required level and it will definitely improve the systemic resistance capacity of the building required for zone III. The concrete jacketing method was easy, effective and economical method for improving the systemic resistance capacity of the member and building as well. results indicated that infill panels had a large effect on the behaviour of frames under earthquake excitation and due to infill effect stiffness of the frame increases and due to which comparatively competitively less reinforcement was required as compared to reinforcement required in base frame. Deflection was very large in bare frame compared to infill frame. It event concluded that about 30% to 40% less in reinforcement required in building with brick infill + soil interaction effect as compared to bare frame in ground storey and relatively less difference in reinforcement in other upper storey.

N. Lakshman(2006) here the author attempted to gather the available information particularly on non linearbehaviour, and the various approaches available to evaluate the seismic safety of buildings. It was emphasized that the existing procedure was grassy approximate, and hence improving sections of their approach to high levels of accuracy would not necessarily lead to better results. The need of the present was to see what needs to be done in the Indian context. The basic inputs were earthquake spectrum, nonlinear load

formation behaviour monotonic cyclic and random loading, acceptable levels of damage under various performance level etc, and these had a lot of grey areas.

The need for evaluating the various repair strategies for use in the improvement of the seismic performance of reinforced concrete structures was highlighted. It was observed that inherent deficiencies in the detailing of the beam column joints gets reflected even after repair, though the performance factors indicated significant improvement. There was a need to evolve suitable performance factors when the system should a negative stiffness.two of the logical extension proved that the repair would not be as effective in the selected cases.

Conclusion:

Here authors observed that the existing structures are resulting in weak stability during earthquake assessment due to their unbiased strength over time and also due to there lack of maintainance. Thus there is a need of retrofitting in these structures, but non of the author in past researches proposed any method of retrofitting neither they perform analysis over the most weakest part of the structure.

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