ANALYSIS AND DESIGN OF STANDARD FRAME COMPARING MOMENT RESISTING FRAME AND BEHAVIOUR UNDER EARTHQUAKE CONDITIONS

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ABSTRACT

India is urbanising rapidly and it's far stated that by using the use of 2030 thirds of the populace can be living in urban areas. Smaller cities are growing and cities are getting megapolises with populations above 10 million. India can't comply with the American technique of city development of huge city sprawls, we've got were given a larger population and a smaller land region. The only sustainable manner construct towns is to move taller in location of wider to store fees and guard arable land. The regulatory companies need to permit skip of the priority of tall homes, instead they need to be advocated and constructed with current techniques for every safety and charge. Many big cities and no longer to say the largest Indian town Delhi is located within the Zone V region of the u . S .. Hence, this mission came into being to understand the way to construct a tall residential apartment that could resist extreme earthquake and defend its inhabitants. The principle objective of this project was to format and analyse a multi-storeyed building [STILT + G + 10 (3 dimensional frame)] the usage of ETABS. The structure became designed in two precise structural body configurations i.E., Standard Frame and Moment Resisting Frame (MRF). The distinction in frame modifications the behaviour of the structure during earthquakes. The structure is believed to be in a Zone V elegance area, which is the most extreme earthquake zone. The layout of the shape is executed manually and the systems are analysed by means of the usage of modelling them within the ETABS software. ETABS is an assessment and design software in which unique types of systems may be analysed designed constant with IS code provisions pre-set inside it. Lateral or dynamic analysis may be carried out thru Response Spectrum Analysis (RSA). The story drifts are in assessment giving a giving the lateral movement of the form and the efficacy of the structures emerge as gauged to determine the higher one. By inferring the outcomes, a quit may be derived on what form of structural body must be utilised underneath dynamic loading. Changes ought to be made in earthquake willing areas to make the systems extra long lasting and shield the humans residing in them. Key Words: Seismic, Moment Resisting Frame, ETABS, tall constructing.

INTRODUCTON

Earthquake has usually been a chance to human civilization from the day of its existence, devastating human lives, property and man-made systems. The very present day earthquake that we faced in our neighbouring usa of the united states Nepal has over again proven nature's fury, inflicting this type of huge destruction to the united states of a and its human beings. It is such an unpredictable calamity that it's far very important for survival to ensure the electricity of the structures in opposition to seismic forces. Therefore there's non-stop research artwork happening around the globe, revolving around development of new and higher techniques that can be incorporated in systems for better seismic average performance. Obviously, homes designed with particular strategies to face as much as damages inside the direction of seismic interest have an entire lot better charge of manufacturing than everyday homes, but for safety towards failures below seismic forces it's far a prerequisite. Earthquake motives random ground motions, in all feasible commands emanating from the epicentre. Vertical ground motions are unusual, however an earthquake is always observed with horizontal ground shaking. The floor vibration motives the systems resting at the floor to vibrate, growing inertial forces inside the shape. As the earthquake modifications recommendations, it can cause reversal of stresses within the structural additives, that is, anxiety may additionally alternate to compression and compression ma trade to anxiety. Earthquake can reason generation of excessive stresses, that may cause yielding of structures and huge deformations, rendering the form non-functional and unserviceable. There can be large storey glide within the building, making the constructing risky for the occupants to maintain dwelling there. Reinforced Concrete frames are the maximum not unusual production practices in India, with increasing numbers of high-upward thrust structures which includes as a whole lot as the landscape. There are many vital Indian towns that fall in highly active seismic zones. Such excessive-rise systems, constructed mainly in exceptionally prone seismic zones, must be analyzed and designed for ductility and need to be designed with greater lateral stiffening device to enhance their seismic performance and decrease damages. (Sweta Swagatika Dash) Two of the maximum commonly used lateral stiffening structures that may be used in buildings to hold the deflections below limits are bracing system and shear partitions. And there can be additionally every other method which lets in for lateral stiffening i.E., Moment Resisting Frames.

LITERATURE REVIEW

shear wall model evaluation by comparing different locations of different of models to assess the change in seismic value under earthquake conditions Chandurkar(2013) evaluated the reaction of a ten storey building with seismic shear wall the usage of ETAB v 9.Five. Main focus modified into to observe the alternate in reaction through converting the location of shear wall inside the multi-storey constructing. Four fashions were studied- one being a bare body structural machine and rest three have been of dual kind structural device. The effects have been excellent for shear wall in brief span at corners. Larger size of shear wall turn out to be decided to be vain in 10 or under 10 stories. Shear wall is an effective and less costly alternative for high-upward thrust systems. It grow to be discovered that changing positions of shear wall changed into located to attract forces, therefore proper positioning of shear wall is vital. Major quantity of horizontal forces had been taken by way of the usage of shear wall while the measurement is huge. It changed into additionally take a look at that shear partitions at enormous places decreased displacements due to earthquake.

providing different types of steel bracing for peripheral columns along the height of building to study the seismic performance under earthquake conditions

Viswanath K.G (2010) investigated the seismic performance of reinforced concrete buildings the use of concentric metallic bracing. Analysis of a four, 8, twelve and sixteen storied building in seismic region IV changed into carried out using Staad Pro software software, as constant with IS 1893: 2002 (Part-I). The bracing changed into furnished for peripheral columns, and the effectiveness of steel bracing distribution alongside the height of the building, at the seismic average overall performance of the building emerge as studied. It have become discovered that lateral displacements of the houses reduced after the usage of X-type bracings. Steel bracings were determined to reduce flexure and shear name for at the beams and columns and switch lateral load by using axial load mechanism. Building frames with X- type bracing were decided to have minimal bending as compared to different sorts of bracing. Steel bracing gadget changed into determined to be a better possibility for seismic retrofitting as they do now not growth the entire weight of the constructing drastically.

using x type and v type bracings for columns and assessing seismic values for better stiffness under earthquake conditions

Chavan,Jadhav (2014) studied seismic evaluation of reinforced concrete with unique bracing arrangements via identical static approach the usage of Staad Pro. Software. The arrangements taken into consideration had been diagonal, V-kind, inverted V-kind and X-kind. It became discovered that lateral displacement decreased via 50% to 60% and most displacement decreased via using X-kind bracing. Base shear of the constructing modified into additionally determined to growth from the bare body, with the useful resource of use of X-kind bracing, indicating increase in stiffness.

sesimic evaluation under non linear dynamic analysis and considering the main walls as shear walls for seismic sustainability which is unacceptable

Esmaili et al. (2008) studied the structural element of a 56 testimonies immoderate tower, placed in a immoderate seismic quarter in Tehran. Seismic assessment of the building modified into accomplished thru non-linear dynamic assessment. The present constructing had number one partitions and its side walls as shear partitions, related to the number one wall with the aid of using coupling of beams. The give up turned into to do not forget the time-dependency of concrete. Steel bracing gadget have to be supplied for strength absorption for ductility, however axial load may additionally have unfavorable effect on their overall performance. It is each conceptually and economically unacceptable to apply shear wall as both gravity and bracing system. Confinement of concrete in shear partitions is right opportunity for supplying ductility and balance.

using the combination of stronger bracing and weaker bracing to reduce the damage under seismic conditions for this chevron and x types baces are used

Akbari et al. (2015) assessed seismic vulnerability of metal X-braced and chevron-braced Reinforced Concrete with the useful resource of developing analytical fragility curve. Investigation of various parameters like top of the body, the p-delta effect and the fraction of base shear for the bracing device changed into finished. For a selected designed base shear, metallic-braced RC twin structures have low damage possibility and larger capability than unbraced system. Combination of stronger bracing and weaker frame reduces the harm opportunity at the entire device. Irrespective of top of the body, Chevron braces are extra effective than X-kind bracing. In case of X-kind bracing gadget, it's far higher to distribute base shear frivolously the various braces and the RC frame, whereas in case of Chevron braced tool it's far appropriate to allocate higher rate of proportion of base shear to the braces. Including p-

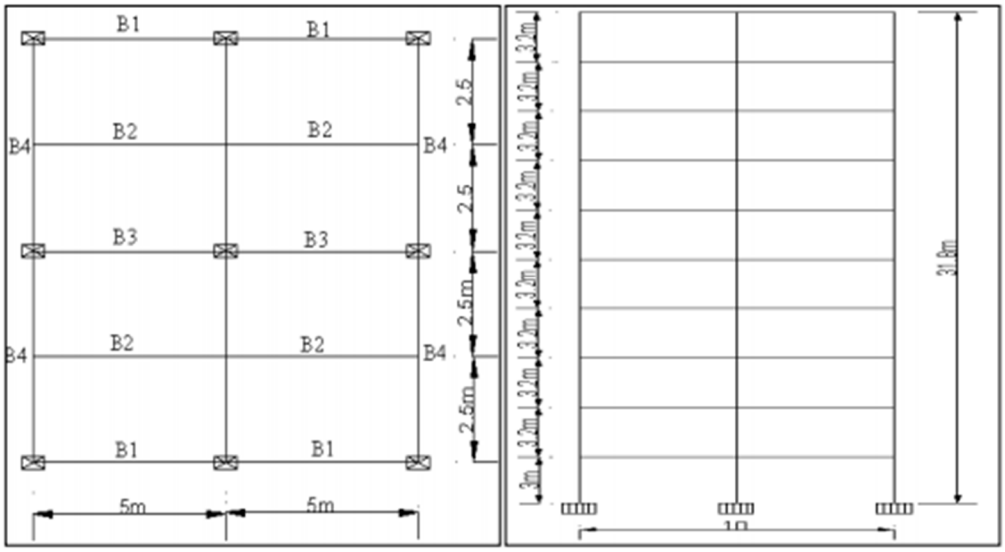
delta effect increases damage opportunity with the aid of the usage of 20% for shorter twin device and with the aid of one hundred% for taller dual structures. The p-delta impact is greater dominant for smaller PGA values.

Acheiving higher life safety of earthquake by using design codes Eurocode 8, Non linear dynamic analysis and non linear static analysis can be achieved

Kappos(2000) provided new approach for seismic layout of RC constructing based on viable partial inelastic model of the form and overall performance requirements for 2 awesome restrict states. The procedure is advanced in a format that can be integrated in layout codes like Eurocode eight. Time-History (Non-linear dynamic) analysis and Pushover assessment (Non-linear Static evaluation) have been explored. The accompanied approach showed better seismic ordinary overall performance than elegant code method, at the least in case of regular RC body building. It changed into located that behaviour under "existence-safety" became less difficult to control than under serviceability earthquake because of the adoption of performance requirements regarding ductility necessities of individuals for "life-protection" earthquake.

MathematicalFormulation Two kind of R.C.C. buildings were taken for analysis- MRF and Dual System. Different types of models to simulate real field problem were developed. A) Modeling of MRF Building: In moment resisting frame SMRF and OMRF were considered with Variations of heights, i.e. (G+4), (G+6),(G+8), (G+10) , and bays viz. (2x2),(3x3),(4x4),(5x5),(6x6) for bare frame and frame with brick infill. The models are developed for all seismic zones. Depending upon height of building depth of foundation is taken as 1.5m (G+4), 2.25m (G+6), 3m (G+8) and (G+10). This model consists of bays of 5m each in global X and Z direction, size of beam (B1, B3, and B4) is 230mmX600mm and of beam (B2) is 230mmX530mm. B) Modeling of Dual System Building: In dual system, structures with shear wall and without shear wall were considered with (G+8) storey for (5x5) bay for frame with brick infill. Thickness of shear wall is taken as 230mm. All beams are of 230mmX600mm. The support of shear wall is assumed as fixed. Following parameters are considered same for both the buildings size of columns varies according to loading conditions and support is assumed to be fixed, foundation soil type is taken as hard, density of concrete 25 KN/ mP 3 PR , Rdensity of brick masonary 20 KN/mP 3 P, density of brickbat coba 20 KN/ mP 3 PR ,R thickness of slab 130 mm, thickness of external wall 150 mm, thickness of internal wall 150 mm ,thickness of brickbat coba 200 mm, height of parapet wall 1.1m,floor finish load 1.25 KN/mP 2 P,LL on floor slabs 4 KN/ mP 2 P,LL on

terrace slabs 1.5 KN/ mP 2 P. A mathematical model is considered with view to have different types of beams such as, fixed beams and continuous beams. The plans and elevations of the moment resisting frames of (2x2) bay and frames without shear wall and with shear wall are as shown in Fig.1-6 respectively



CONCLUSIONS 1. In case of MRF structure, Storey Drift and Base Shear are increasing for bare frame and frame with infill walls with increase in bays for same storey and same seismic zone, with increase in height for same bay and same seismic zone and with change in seismic zone from II to V for same bay and same storey. 2. For seismic zone II and III, SMRF is economical than OMRF. 3. Storey Drift and Base Shear are more for MRF structure without Shear Wall than MRF structure with Shear Wall (Dual system) for same storey, same bays, same seismic zone, in bare frame and frame with infill walls. 4. MRF structure with Shear Wall (Dual system) is economical as compared to MRF structure without Shear Wall for seismic zone IV and

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