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A Review On Multi Storied Building By Changing Different Shapes of Shear wall For Zone IV & V Under Plain And Sloping Ground Condition

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***Abstract* - In the seismic design of buildings, reinforced concrete structural walls, or shear walls, act as major earthquake resisting members. Structural walls provide an efficient bracing system and offer great potential for lateral load resistance. The properties of these seismic shear walls dominate the response of the buildings, and therefore, it is important to evaluate the seismic response of the walls appropriately. In this present study, main focus is to determine the solution for shear wall location in multi-storey building. Effectiveness of shear wall has been studied with the help of four different models. Model one is bare frame structural system and other three models are dual type structural system.**

***Keywords*- RC wall, masonry wall, framed structure, Seismic analysis, Shear wall,**

I. INTRODUCTION

Buildings engineered with structural walls are almost always stiffer than framed structures, reducing the possibility of excessive deformation and hence damage. RC multi storied buildings are adequate for resisting both the vertical and horizontal load. When such buildings are designed without shear walls, beams and column sizes are quite heavy. Shear walls may became imperative from the point of view of economical and control large deflection. Lateral forces, that is, the forces applied horizontally to a structure derived from winds or earthquakes cause shear and overturning moments in walls. The shear forces tend to tear the wall just as if you had a piece of paper attached to a frame and changed the frame's shape from a rectangle to a Parallelogram.

The changing of shape from a rectangle to parallelogram is referred to as racking. At the end of shear walls, there is a tendency for the wall to be pushed down atthe end away from the force. This action provides resistance to overturning moments. Lateral loads can develop high stresses, produce sway movement or cause vibration. Therefore, it is very important to have sufficient strength for the structure against vertical loads. Earthquake and wind forces are the only major lateral forces that affect the buildings.

The function of lateral load resisting systems or structure form is to absorb the energy induced by these lateral forces by moving or deforming without collapse. The determination of structural form of a tall building or high rise building would perfectly involve only the arrangement of the major structural elements to resist most efficiently the various combinations of lateral loads and gravity loads. The taller and more the slender a structure, the more important the structural factors become and the more necessary it is to choose an appropriate structural form or the lateral loading system for the building. In high rise buildings which are designed for a similar purpose and of the same height and material, the efficiency of the structures can be compared by their weight per unit floor area.

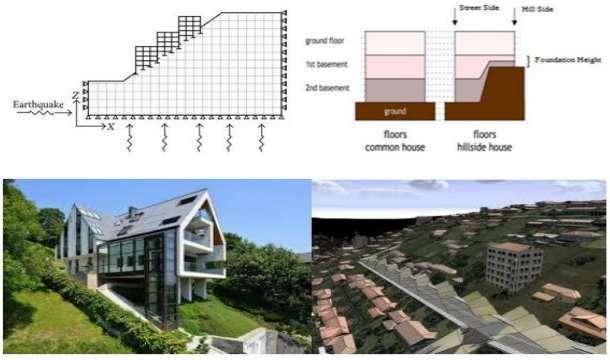

Figure 1: Buildings on sloping ground.

II. LITERATURE REVIEW

Asnhuman.S, DipenduBhunia, BhavinRanjiyani (2011), "Solution of shear wall location in multi-storey building", International Journal of Civil and Structural Engineering Research, 2(2), 493-506.
They conducted study on analysis on lateral-load resisting system in high rise building. From the study, it had been determined that shear wall was very high-in plane stiffness and strength, which may resist massive horizontal loads and support gravity loads. Resolution for shear wall location in multi-storey building supported its

each elastic and elatso-plastic behaviours resolve. Earthquake load was calculated and applied to building of fifteen stories settled in zone IV. Elastic and elasto-plastic analysis was performed using each STAAD pro 2004 and SAP V 10.0.5 (2000) software system package. Parameters like shear forces, bending moment and structure drift were computed in each the cases and additionally for various location of shear wall. dead load and live load are taken as per IS: 875 (part 1) (1987) and IS: 875 (part 2) (1987) .Results showed that the highest deflection had been exceeded the permissible deflection, i.e. 0.004 times the total height of building, [IS: 1893 (part 1) (2002)]. Load combination was 1.5 (DL + EQ) and (0.9DL + 1.5 EQ). Study ended that, the highest deflection was reduced and reached within the permissible deflection when providing the shear wall up any of the 6 - 7 frames and 1 -12 frames within the shorter direction.

Shaik Kamal Mohammed Azam, Vinod Hosur (2013), "Seismic performance evaluation of multi-storied RC framed buildings with shear wall." Journal of Scientific & Engineering Research, Volume 4, Issue 1, 101-111.

They conducted the study on seismic performance analysis of multi-storied R.C framed building with shear wall. The elastic also as in-elastic analysis were administered for the analysis of seismic performance on 6, 12, 24 and 36 storied moment resisting R.C. framed building using ETAB software package. Eight models were prepared for every variety of structure with arrange area of 30m x 20m and height of 3m.

Approximate technique was used for lateral static and dynamic analysis of wall frame supported the time approach and one dimensional finite part technique. Structure was analysed for varied load combination as per I.S 1893 (part-1)-2002 for seismic zone. Capacity curve was drawn supported load deformation responses. Result showed that the structure displacement for 6 and 12 structure building behave like shear building because of less height, whereas 24 and 36 structure building exhibit flexural behavior as grater height than lateral dimension. Non- linear static pushover analysis showed that lateral stiffness has the least price for the model while not shear wall and conjointly influence of shear wall was quite giant for shorter building. Study all over that provision of shear wall symmetrically within the outer most moment resisting frames provide higher performance for regular form building.

P.P. Chandurkar, Dr. P.S. Pajgade (2013), "Seismic analysis of RCC building with and without shear wall." International Journal of Modern Engineering Research, 3(2), 221-232.

They conducted a study on seismic analysis of RCC building with and while not shear wall using software system ETAB v 9.5.0. They compared parameters like lateral displacement, story drift and value needed for economy and effectiveness of shear wall. 10 story building model with 3m height for every story was studied on the software system. The buildings were assumed to be fixed at the bottom. Four models were ready and also the models were, Model one was clean framed structure, Model two was dual system with shear wall one on all sides, Model three was with shear wall on corner with L=4.5m and Model four was with shear wall on corner with L=2m. The analysis was done for zone II, III, IV and V. The results obtained were: displacement of all models for zone II, III, IV was reduced upto 400th as compared to zone V. Story drift was most for Model one whereas it had been minimum for Model 3. The corner shear wall up 2m was economical among all models. amount of concrete was additional for model 3. when analysis it had been over that shear wall was effective for buildings with 10+ construction and it had been not effective for buildings below 10 stories. additionally shear wall was tried to be effective and economical at adequate locations only.

Chaitanya Kumar J.D., Lute Venkat (2013), "Analysis of multi storey building with precast load bearing walls" International Journal of Civil and Structural Engineering, 4(1), 110-119.

They studied the G+11 storey residential building with formed concrete load support. This study analysed load support and a technique slab for gravity and lateral load using ETABS software system. Analysis was finished varied wall forces, displacement and moment that had been calculated for various load combination. G+11 structure shear wall building was thought of for one acre of site with 350 units. Around 400 sqft of carpet space per unit was taken with 300 units per floor.

Technology used was total formed resolution with load bearing RCC shear walls and slabs and also the modelling was wiped out ETABS. Shear wall structure having G+ eleven storeys was analysed for gravity and lateral loads. The parameters like axil force, out of plane moments, lateral masses, shear force, structure drift, structure shear and tensile forces were determined for various stories. Results showed that the variation of axial force with stories was linear and also the difference in most axial force between structure 11 and 12 was 7.26 %. Study ended that the variation of lateral loads with stories was non- linear, the difference in most lateral masses between structure 11 and 12 was 0.54 try to the variation in shear force with stories was non- linear and also the difference in most shear force between structure 11 and 12 was 19.98 %.

Lakshmi K.O., Jayasree Ramanujan, Bindu Sunil, LajuKottallil, Prof. Mercy Joseph Poweth (2014), "Effect of shear wall location in buildings subjected to seismic loads" ISOI Journal of Engineering and Computer Science. 4(1), 118-123.

They studied the performance of the structures under often occurring earthquake ground motion leading to

structural harm also as failure have repeatedly demonstrated the seismic vulnerability of existing buildings, because of their style based on gravity loads only or inadequate level of lateral load. the tactic was vital to make sure strength and stability. The comparison of assorted parameter like construction drift, construction shear, deflection, reinforcement demand in columns etc., of a building under lateral masses supported strategic position of shear wall studied were administered. The ETABS 9.5 and SAP 2000. V.14.1 was used for analysis. The finite component analysis software system ETABS9 9.5 was accustomed produce the 3D model and run the linear static and dynamic analyses and pushover analysis was tired SAP 2000.V.14.1.

Eight completely different models were considered. Result showed that base shear was the most expected lateral force which will occur because of seismic ground motion at the base of structure. Study conclude in medium high rise building (i.e>10storeys) provision of shear wall was founding to be effective in enhancing the seismic capability characteristics of the structure. Study additionally concludes that most reduction in drift worth was obtained once shear walls were provided at corners of the building.

Tarunshrivastava, Prof. Anubhav Rai, Prof. Yogesh Kumar Bajpai (2015), "Effectiveness of shear wall-frame structure subjected to wind loading in multi-storey building" International Journal of Computational Engineering Research, 5(2), 19-28.

They conducted the study on effectiveness of shear wall frame structure subjected to wind loading in multi-storey building. Totally differentcases were ready with different configuration of shear wall. Frames of eight structures R.C.C. structure in medium soil with a ground plan of 20m x 18m and height of the structure is 25.6m. Assumptive wind pressure of 1.5 KN/m2 and special moment resisting frame, analysis was dole out with shear wall at completely different location for normal form building.

Numerous parameters like lateral deformation, structure drift index, most bending moment and shear force were calculated. Result showed that model three with core shear wall case is most suitable as moment percentage of moment and shear force resisted by shear wall up this case is 93.2% and 98 that was a lot of larger than different cases. Additionally model three is stiffer against lateral masses. Study complete that effectiveness of shear wall wasn't serving to too much in reducing the base shear however providing a lot of lateral stiffness and taking most share of the moment.

Sunil Kumar Kalyani, Vishwanath. B. Patil (2015), Effect of Shear Wall Sections on Multi-storey Building with Satellite Bus-Stop having Floating Columns with Top Soft Storey, International Journal for Innovative Research in Science & Technology, Vol. 2, Issue 02, pp. 169-174.

They studied the behaviour of the columns at ground level of multi-storeyed buildings with soft ground floor as satellite stop and floating columns within the higher stories subjected to earthquake loading. The structural action of masonry infill panels of higher floors has additionally been taken into account by modelling them as diagonal struts. Shear wall is one amongst the most ordinarily used lateral load resisting in high rise building. During this study building is modelled with completely different shapes of shear wall with high and bottom soft level. Static and dynamic analysis is carried out by using ETABS 2013. The comparison of those models for different parameters like level drift and level acceleration is carried out.

MD Afroz Patel, Shaik Abdulla (2016), A Study on Positioning of Different Shapes of Shear Walls in L Shaped Building Subjected to Seismic Forces, International Journal of Engineering Research & Technology, Vol. 5 Issue 07, pp.480-487

They studied the optimum location and completely different shapes of shear walls in L formed high rise building. Shear walls are the structural member's accustomed increase the strength of RCC Structures. it's essential to search out the effective, efficient and ideal location of shear walls become essential to the building interior once the outside walls cannot give further strength and stiffness to the building.

During this study an L formed high rise building with different locations of shear walls and with different shapes of shear walls is considered for the analysis. The high rise building is analysed using the ETABS software system to see the varied parameters like period, Base shear, and storey drift and storey displacement. The results of the analysis on the assorted parameters are given within the tabular type and graphical type and also the results of varied parameters are compared using the various ways of seismic analysis like ESA RSA and Time history analysis.

III. SHEAR WALL IN RCC BUILDIN

Shear wall is defined as vertical structural member who can resist a combination of moment, shear and axial load induced by gravity load and lateral load transfer to the wall from other structural member. RCC walls including shear walls are the usual multi-Storied Buildings requirements. Coinciding centroid and mass centre of the building during design is the ideal for a Structure. An introduction to shear wall represents a most efficient solution to stiffen a structural system of building as the main function of a shear wall is to increase the lateral load resistance.

Cross-sections of Shear walls can be used are rectangular shapes to more irregular cores such as channel, T, L,

barbell shape, box etc. The use of shear wall structure is gaining popularity day by day in high rise building, especially in the construction of service apartment or office/ commercial tower. It has been proved, that shear wall system is efficient structural system for multi storied building in the range of 30-35 storeys. Shear Walls are uniquely composed structural walls incorporated in the buildings to restrict horizontal forces that are convey in the plane of the wall due to wind, earthquake and distinctive forces. They are fundamentally flexural members and normally gave in high rise structures to avoid the total fall of the tall structure under the seismic forces. Walls can be designed as plain concrete walls when there is only compression with no tension in the section. else, they should be composed as reinforced concrete walls. The value of the Shear Walls in the confining of structures has sometimes been recognized. At the point when arranged in favourable places of structures, they give an sufficient power to oppose horizontal force resisting system, while at the same time satisfying other functional requirements. For structures up to 20 stories the utilization of shear walls is a decisions matter.

For structure is more than 30 stories, shear walls may become basic from view point of economy and avoid of lateral deflection, Because a vast part of side long force on the structure and the lateral shear force usually from it is often assigned to such structural walls is known as "Shear Walls". Shear walls are behaves like vertical oriented wide beams that convey earthquake forces downwards to the establishment. That is the reason, it is always suitable to reliable them in structure built in regions likely to earthquake of high amount of intensity or large winds. Shear walls are provided to resist horizontal earthquake forces and to increase the rigidity of building. When shear wall has enough strength, it will transfer the horizontal forces to the next element in load path below. These elements in the load path may be another shear walls,

slabs, floors, foundation walls, or footings. The stiffness of shear wall will prevent floor and roof framing members from moving offtheir supports. Also, buildings that are sufficiently stiff, usually suffer less non-structural damage. Reinforced concrete (RC) buildings usually have vertical plate-like RC walls known as Shear Walls (Figure2) additionally to slabs, beams and columns. These walls typically begin at foundation level and square measure continuous throughout the building height. Their thickness will be as low as 150mm, or as high as 400mm in high rise buildings. The overwhelming success of buildings with shear walls in resisting robust earthquakes is summarized within the quote: "We cannot afford to make concrete buildings meant to resist severe earthquakes while not shear walls." Mark Fintel, a noted consulting engineer in USA.

RC shear walls give massive strength and stiffness to buildings within the direction of their orientation, which significantly reduces lateral sway of the building and thereby reduces harm to structure and its contents. Since shear walls carry massive horizontal earthquake forces, the overturning effects on them area unit massive. Shear walls in buildings should be symmetrically located in decide to cut back ill-effects of twist in buildings. They may be placed symmetrically on one or each directions in arrange. Shear walls area unit more effective.

Shear walls should give the mandatory lateral strength to resist horizontal earthquake forces. Once shear walls square measure strong enough, they'll transfer these horizontal forces to future part within the load path below them. These alternative components within the load path are also other shear walls, floors, foundation walls, slabs or footings. Shear walls additionally give lateral stiffness to prevent the roof or floor on top of from excessive side-sway. Once shear walls square measure stiff enough, they'll stop floor and roof framing members from moving off their supports. Also, buildings that are sufficiently stiff can sometimes suffer less non-functional damage.

IV. CONCLUSION

Shear wall are one of the excellent means of providing earthquake resistance to multistoried reinforced concrete building. The structure is still damaged due to some or the other reason during earthquakes. Behavior of structure during earthquake motion depends on distribution of weight, stiffness and strength in both horizontal and planes of building. To reduce the effect of earthquake reinforced concrete shear walls are used in the building. These can be used for improving seismic response of buildings. Structural design of buildings for seismic loading is primarily concerned with structural safety during major Earthquakes, in tall buildings, it is very important to ensure adequate lateral stiffness to resist lateral load. The provision of shear wall in building to achieve rigidity has been found effective and economical. When buildings are tall, beam, column sizes are quite heavy and steel required is large. So there is lot of congestion at these joint and it is difficult to place and vibrate concrete at these place and displacement is quite heavy. Shear walls are usually used in tall building to avoid collapse of buildings. When shear wall are situated in advantageous positions in the building, they can form an efficient lateral force resisting system.

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