Effect Of Shape Inconsistency On Level Section Building Under Seismic Loading

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ABSTRACT:

The fast development of the urban populace needs to build huge renowned structures for organizations and mechanical reason. The development of multi- story structures and extensive range structures is turning into an essential piece of our living style. Development of expansive range structure utilizing level piece framework is straightforward to develop and furthermore proficiently gives most extreme clear stature. The present goal of this work is to look at the different parameters like base shear, story removal and story float following up on level piece framework. With that conduct of development joint which is given between existing building furthermore, modern structure in tremor inclined district is additionally checked. Investigation of the expansive modern structures built utilizing 10m and 7m boards of level piece for square shape and rectangular shape design is done with the assistance of Wound programming in reference with IS 456-2000 code. Level section building structures has real favourable circumstances over conventional piece bar segment structures as a result of the free plan of room, shorter development time, engineering useful and practical viewpoints. As a result of the nonattendance of profound pillars and shear dividers, level section auxiliary framework is altogether more adaptable for horizontal loads then conventional RC outline framework what's more, that make the framework more helpless under seismic occasions.

INTRODUCTION:

The flat floor framework opposes the gravity stack (dead load and live load) following up on it and transmits this to the vertical confining frameworks. In this procedure, the floor framework is subjected principally to flexure and transverse shear, though the vertical edge components are for the most part subjected to hub pressure, regularly combined with flexure and shear. The floor likewise fills in as a level stomach associating together and hardening the different vertical edge components. Under the activity of horizontal loads, the floor stomachs carry on inflexibly (attributable to its high in plane flexural solidness) and adequately convey the parallel load to the different vertical casing components and shear dividers. In cast in situ strengthened solid development the floor framework for the most part comprises of one of the accompanying. RC chunks with long traverses reached out more than a few bayous and just bolstered by segments, without shafts known as level section. Level section framework is extremely easy to develop and is effective in that it requires the base building tallness for a given number of stories. Such structure contains huge twisting minute and vertical powers happen in a zone of backings.

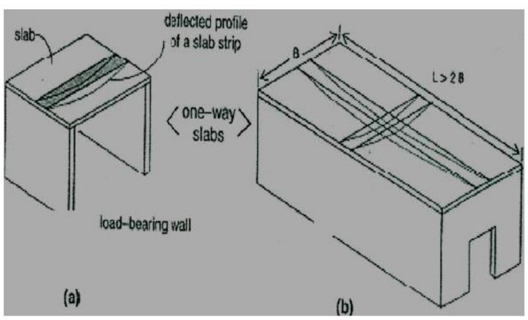

Figure 1.1: Wall Supported slab systems

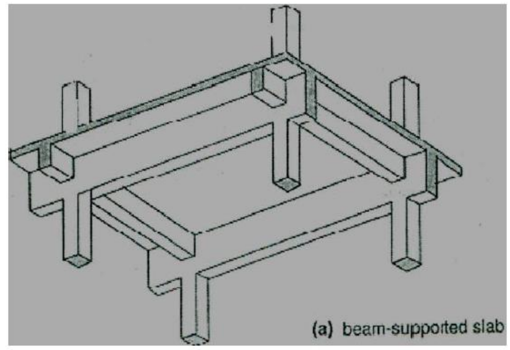

Figure 1.2: Beam Supported Slab System

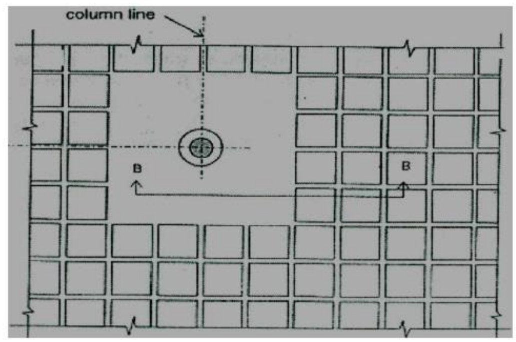

Figure 1.3: Two way ribbed (waffle) slab system

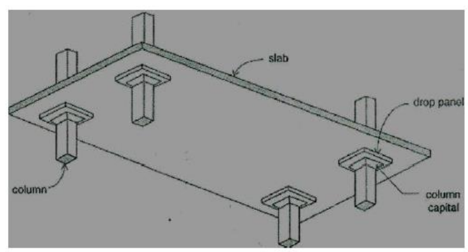

Figure 1.4: Flat Slab Systems

This gives an exceptionally productive structure which limits material utilizations and abatements the monetary range go when contrasted with fortified cement. Post-tensioning enhances the auxiliary conduct of level chunk structure impressively. This is more adequate idea to numerous fashioners. It is embraced in some places of business.

The level sections are plates that are solidified close to the segment underpins by methods for "drop panels" and additionally "column capitals" (which are for the most part hidden under "drop ceilings"). Contrasted with the level plate framework, the level chunk framework is appropriate for higher burdens and bigger ranges, due to upgraded limit in opposing shear and hoarding minutes close to the backings. The piece thickness differs from 125 mm to 300 mm for ranges of 4 to 9m. Among the different floor frameworks, the level piece framework is the one with the most noteworthy dead load per unit territory. All in all, in this kind of framework, 100 percent of the chunk stack must be transmitted by the floor framework in the two headings (transverse and longitudinal) towards the sections. In such cases the whole floor framework and the sections demonstration indispensably in a two-manner outline activity

OBJECTIVES

 To evaluate the response of irregular flat slabs structure subjected to lateral loads.

 To identify the values of lateral displacement, storey drift, time period and base shears subjected to seismic and wind loads.

 To compare the variation in maximum lateral displacement for different types of irregular flat slabs.

 To compare the values of all the above parameters among irregular flat slabs under lateral loading.

SCOPE

The present study is limited to reinforced concrete (RC) multi-storeyed building with different irregular flat slabs. All the building models analysed in the study has eleven storeys with constant storey height of 4 m. The RC building used in this study is eleven storied (G+10) building have different floor plans with 5 bays having 7 m distance along longitudinal direction and 7 bays having 3.57 m distance along transverse direction as shown in figure. The floor slabs are modelled as rigid diaphragms.

LITERATURE REVIEW:

K. S. Sable et al (2012), compared the seismic behavior of multistoried flat slab building and conventional reinforced concrete framed structure. The modelling and analysis of the structure have been performed using STAAD Pro 2007. Certain analysis were also made for the analysis such as the height of the structure was kept 17.5m, 25m, 32.5m, 39.5m and from ground these buildings are of 5 storey, 7 storey, 9 story and 11 story. Zone II was considered for the analysis. The author concluded that natural time period will increase as the height of structure increases for both but it will be same if they are provided with shear wall. As the height of the structure increases, the base shear also increases. The Conventional RCC building has less base shear as

compared to the flat slab structure. The flat slab structure has more story drift then that of conventional RCC building.

Pradip S. Lande and Aniket B. Raut (2015), carried out a parametric investigation to identify the

seismic response of system considering Zone V. They have considered the following elements for their works- (a) building with flat slab, (b) flat slab with parametric beam, (c) flat slab withshear walls, (d) flat slab with drop and (e) conventional building. Analyses were carried out using ETabs nonlinear version 9.7.3 for determining the seismic performance of the structure. They considered G+6 and G+12 storied building. Column size 450mm x 450mm and beam size 230mm x 400mm were considered for G+6 and column size of 650mm x 650mm and beam size 230mm x 500 mm were considered. On the basis of the work carried out, the author concluded that the storey displacement is found to be maximum for flat slab building as compared to conventional RCC building. The maximum storey drift found for G+6 building was 0.04 % of

height.

Basavaraj and Rashmi B. A (2015), considered G+4 and G+8 storied building for their work. In

their model they have also added parameters like perimeter beam, infill walls, shear walls and they have also increased the cross sectional area of the columns. The outer beam and column size

provided was 0.4m x 0.4m for G+4 storied building and for G+8 storied building, the columnprovided up to 5th story was 0.5m x 0.5m and from 5th to 9th story 0.4m x 0.4m column was provided and the outer beam provided was 0.4m x 0.4m. They considered Seismic Zone II for their analysis and soil type II (medium). From the analysis they concluded that the fundamental natural period of the building decrease with increase in storey stiffness due to the presence of infill walls, shear walls and perimeter beam. The presence of infill’s can significantly reduce the lateral drift. Base shear will increases with increase in mass and stiffness of building, also the shear wall is very effective to resist horizontal forces during earthquake and wind forces etc.

R.S.More, V.S. Sawant "Examination of Level Section". A prevalent type of solid building development utilizes a level solid section (without bars) as the floor framework. Level sections investigation and outline of level chunks are as yet the dynamic territories of research and there is still no broad concession to the best plan system. The present day Indian Standard Codes of Training plot plan systems just for pieces with customary geometry and format. Be that as it may, as of late, because of space crunch, tallness constraints and different variables, deviations from a consistent geometry and standard design are ending up very normal. Additionally conduct and reaction of level chunks amid tremor is an unavoidable issue. This paper gives the rules for investigation of level chunk.

Moehle, J. what's more, Diebold, J. (1985). Lateral-load reaction of a flat-plate outline under recreated seismic tremor base movements is inspected. The test structure is a three-tenths scale model of a two-story, three-bay level plate outline, which was planned and point by point asindicated by current methods for beamless chunks in districts of direct seismic hazard. Generally protection from low, direct, and high force base movements is analyzed, and design-oriented techniques to assess lateral-load firmness and quality are inspected. It is inferred that the outline brought about an adaptable however sensibly extreme basic framework. Moderately straightforward systems to assess firmness and quality are displayed and observed to be acceptably exact for the test structure.

METHODOLOGY

Normal routine with regards to plan and development is to help the chunks by pillars and bolster the shafts by sections. This might be called as pillar chunk development. The bars diminish the accessible net clear roof tallness. Thus in distribution centers, workplaces and open corridors once in a while shafts are maintained a strategic distance from and pieces are specifically bolstered by sections. This kinds of development is tastefully engaging too. These sections which are straightforwardly bolstered by segments are called Level Chunks.

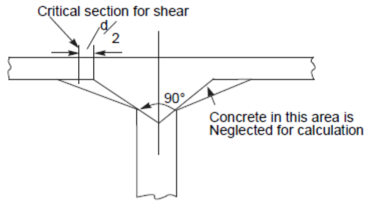

Fig. 3.1: Slabs without drop and column head

The section head is now and then broadened in order to decrease the punching shear in the piee. The extended bits are called segment heads. The segment heads might be given any point from the thought of engineering yet for the plan, concrete in the segment at 45º on either side of vertical just is considered as viable for the outline . Minutes in the chunks are more close to the segment. Consequently the chunk is thickened close to the segments by giving the drops as appeared in Fig.

RESULTS AND DISCUSSIONS

TABLE 1: Lateral Displacement

LATERAL DISPLACEMENT (MM) OF BUILDING MODELS				
	X		Y	
MODEL NO	10th FLOOR	GFL	10th FLOOR	GFL
1	419.9	17.3	998.4	42.1
2	428.7	17.4	1060.1	44.2
3	423.8	17.1	1125.7	46.7
4	402.9	16.6	1006.8	41.8
5	395.7	16.2	758.9	33.9
6	391.6	15.7	875.7	36
7	432.1	17	1044.2	41.5

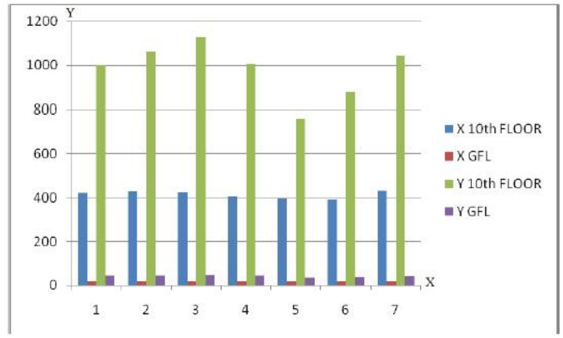

Figure .1:Graph showing maximum lateral displacement in X and Y directions

From the above graph it is observed that the lateral displacement is reduced in X direction compared to Y direction by 58% as the width of the building in X direction is more than the width of the building in Y direction.

STOREY DRIFT

TABLE 2: Storey Drift

STORY DRIFT (mm) OF BUILDING MODELS				
	X		Y	
MODEL NO	10th FLOOR	GFL	10th FLOOR	GFL
1	0.004208	0.00578	0.008051	0.014046
2	0.004387	0.005799	0.008359	0.014748
3	0.004369	0.005714	0.009029	0.015578
4	0.004955	0.005545	0.00785	0.013919
5	0.008081	0.005389	0.008013	0.011299
6	0.003972	0.005221	0.007275	0.012014
7	0.004567	0.005657	0.009409	0.013828

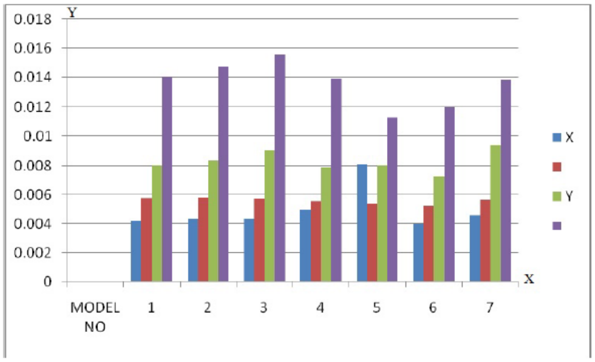

Figure 2: Graph showing Storey Drift in X and Y directions

From the above graph it is observed that the storey drift in X direction for is less compared to Y direction. And the values obtained from the table above shows us that the model 5 among all the other irregular models has least amount of storey drift in Y direction

.RECOMMENDATIONS

1. A non rectangular building has to be studied with G+25 floors.

2. The present study is based on linear static analysis and dynamic analysis. The results need to

be verified with the push-over analysis results.

3. The study can be extended to find out a method to control irregularity in such buildings.

CONCLUSIONS

1) Lateral displacement is reduced in X direction compared to Y direction by 58% as the width of the building in X direction is more than the width of the building in Y direction.

2) Storey drift observed that the X direction for less compared to Y direction ,values obtained that the model 5 among all the other irregular models has least amount of storey drift in Y direction.

3) Minimum base shear should be that of response spectrum when compared to static analysis.It is observed that base shear is minimum for model 3 among all the models for both the analysis results.

4) Storey drift due to wind loading for G+10 building is hardly considered because of very low values obtained.

5) Maximum displacement for tenth floor is found to be in X direction for model 3 with re entrant corners L shape.

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