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Critical Study on Curtailment of Shear Walls on Building

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Abstract – Shear wall in high-rise building is necessary for resisting lateral forces and reducing lateral displacements. Shear wall is normally provided from top to foundation level with opening wherever required. Curtailment of shear wall from top to bottom may be done, however the performance requirement of the structure such as storey drift may be ensured. Shear wall on floors above a particular level may be provided in some pattern. To study the effect of curtailment of shear wall and performance of various patterns a G+9 RC building located in seismic zone-V is considered with four shear walls which is analyzed by changing various location of shear wall for determining parameter like displacement, forces and moments is done by using STAAD PRO software. Based on such results, the best placement of shear walls in building plan is suggested. Afterwards, frame with best shear wall configuration is chosen and curtailing the shear wall from top to ground floor.

Key Words: Shear Wall, Curtailment, Pattern, Torsion

1. INTRODUCTION

Several studies, experiments and research works have been carried out since along time all over the world to understand and to evaluate the effect of reinforced concrete shear wall on the structure with latest measures techniques adopted for the improved performance of the reinforced concrete shear wall in structure. Literature review highlight various issues related with reinforced concrete shear wall and deformations of normal construction and use and have adequate durability and adequate resistance to the effects of seismic and wind. Structure and structural elements shall normally

2. LITERATUE REVIEW

The literature review has been suggested that on adding of shear wall to the building in different location reduces displacement, storey drift effect on structural seismic response in earthquake excitation. It was found that location, number and curtailment of shear wall alters structural forces and structural response. It is good way to provide more level of ductility and getting more stable behavior. Shear wall will help for structure to resist the major portion of lateral load induced by an earthquake.

Based on the literature survey objectives of the project were framed. They are:

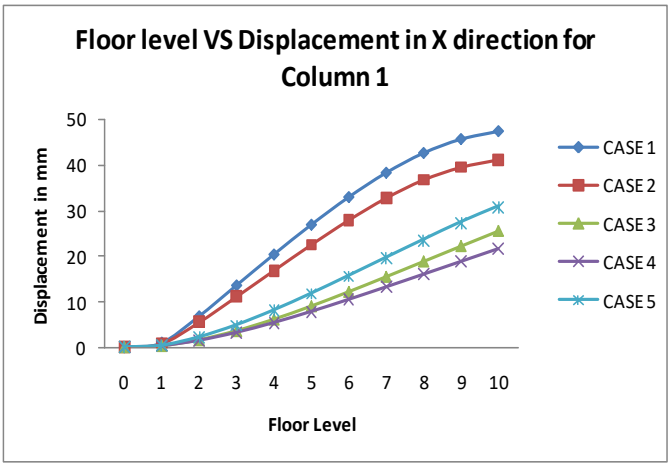
- To analyze structural frames with different location and Curtailment of shear walls.
- To compare displacements forces and moments obtained using various cases of shear wall placements in structures.

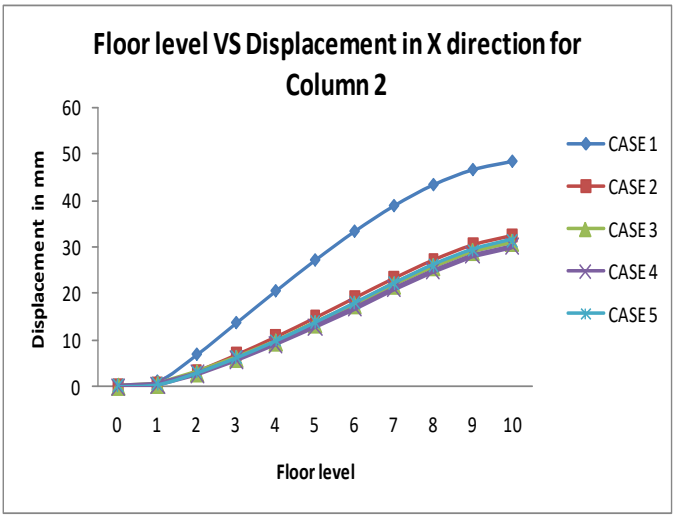
3.0 RESULTS AND DISCUSSIONS

RC G+9 building is analyzed for different cases related to location, curtailment in shear wall and shear wall is provided in X-direction with different patterns for four different columns in zone V. Parameters like lateral displacement, forces and moments is calculated. Graphical representation of data is discussed in this chapter. Lateral displacement along X-direction for column1.Similar type of observation taken for other column and work has been carried out

L/C		Case 1	Case 2	Case 3	Case 4	Case 5
(1.5D.L.+1.5EQX)	0	0	0	0	0	0
(1.5D.L.+1.5EQX)	1	0.114	0.126	0.112	0.128	1.019
(1.5D.L.+1.5EQX)	2	0.252	0.27	0.265	0.254	6.805
(1.5D.L.+1.5EQX)	3	0.46	0.484	0.563	0.443	13.594
(1.5D.L.+1.5EQX)	4	0.724	0.743	1.084	0.794	20.394
(1.5D.L.+1.5EQX)	5	1.041	1.018	1.781	1.764	26.939
(1.5D.L.+1.5EQX)	6	1.422	1.101	2.594	3.127	33.011
(1.5D.L.+1.5EQX)	7	1.901	1.566	3.536	4.721	38.366
(1.5D.L.+1.5EQX)	8	2.549	2.989	4.789	6.426	42.719
(1.5D.L.+1.5EQX)	9	3.514	4.446	6.149	8.147	45.775

(1.5D.L.+1.5EQX)	10	8.05	7.845	9.88	11.705	47.513





Observation

1. It is observed that the displacements are large at all floors for frames without shear walls (case 1).
2. In Case 2, Case 3, case 4, Case 5 displacements are reduced as compared to (Case 1) without shear walls.
3. Shear wall placed at outer edge parallel to X and Z direction (case 4) displacements are less as compared to all cases.
4. Percentage reduction in Displacement with respect to Case 1 (Without Shear wall).

Column 1-1.5(DL+EQX)

Displacement	*Case 2*	*Case 3*	*Case 4*	*Case 5*
%Reduction	*13.46*	*46.02*	*54.24*	*34.97*

Column 2-1.5(DL+EQX)

Displacement	*Case 2*	*Case 3*	*Case 4*	*Case 5*
%Reduction	*32.73*	*35.95*	*37.59*	*34.77*

4. CONCLUSIONS

1. Provision of shear wall is essential for reducing horizontal displacement of RCC structure placement of shear wall is also important from reducing the floor wise displacement in structure.
2. Shear wall is placed at outer edge parallel to X and Z direction of the building significantly reduces displacement.
3. Provision of shear wall significantly reduces the development of axial forces in columns directly connected to shear wall.
4. Introduction of shear wall may result in development of torsion in some columns, thus careful analysis and torsion check is essential for all columns.
5. The studies show that there is sudden change in torsion.

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