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Research Article

Determine the Best Location of Porch in Multistory Building with Seismic Loading

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Abstract

In the new era of high rise building the current job deals with the analysis, design of multi storey structure subjected to lateral load condition with different porch location . In adding up to the dead load and imposed load, the earthquake loads are applied to the structure and analysis of structure carried out. The design software staad pro software has been used for design and analysis. In the current era or scenario, a structure of G+12 situated in zone III is considered for Analysis. The Analysis is carried out for seismic zone III. The structure model are analyzed and compared with different porch location for the seismic zone III as per IS 1893-2016 for response spectrum analysis. The assessment of results is carried out for Displacement, Storey Shear, and Base Shear etc. The results are obtained and represented in the forms of graphs and tables for the seismic zone.

Keywords: *Porch, Porch Location, seismic analysis.*

1. Introduction

A **porch** is a word used in technical way to explain a balcony located in frontage of the doorway of a structure forming a near to the ground front, and located in face of the frontage of the structure it instructions. It can be distinct more just as a "projecting building that houses the entry door of a structure or as a entrance hall. There are a variety of styles of porches, many of which depend on the architectural custom of its position, as well as a variety of names used. Porches will permit for enough space for a person to happily pause before entering or after exiting a structure.

The word "porch" is approximately completely used for a structure that is exterior the major walls of a building, with a lot of dissimilar designs either under the similar roof line or as towers, supported by simple porch posts and arches.

2. Objective

To optimize the better location for porch in building. here we take seven models with different location of porch and study on staad pro. This study analyse the different parameters like displacements in longitudinal and transverse direction. After this, storey drift is calculated in both X as well as Z direction. The most efficient SHAPE will be analyzed after all parameters. There are total 7 cases or location of building multistoried building at medium soil condition under seismic forces for earthquake zone III exist.

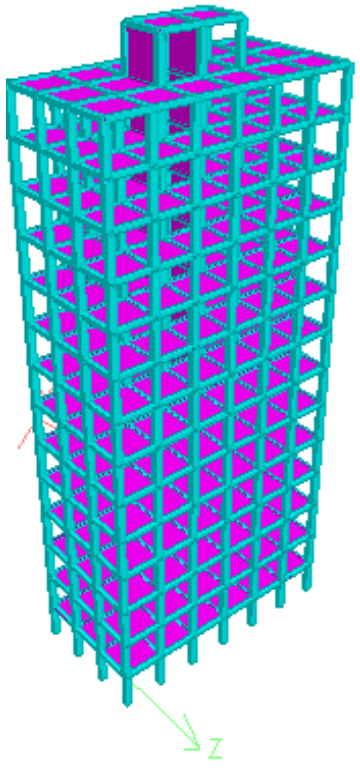

Fig 1 Porch location case no 1

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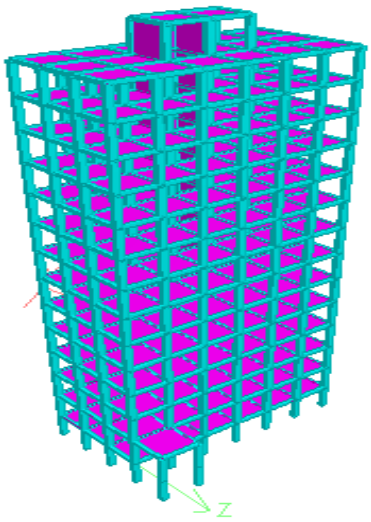

Fig 2 Porch location case no 2

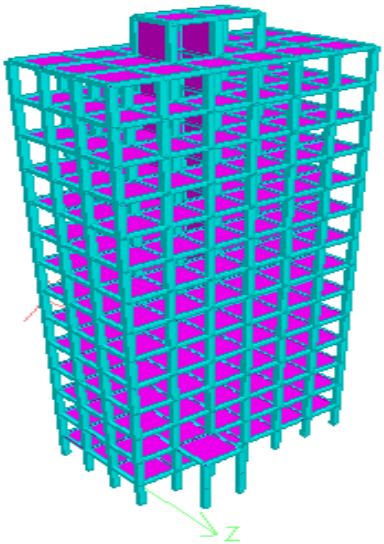

Fig 3 Porch location case no 3

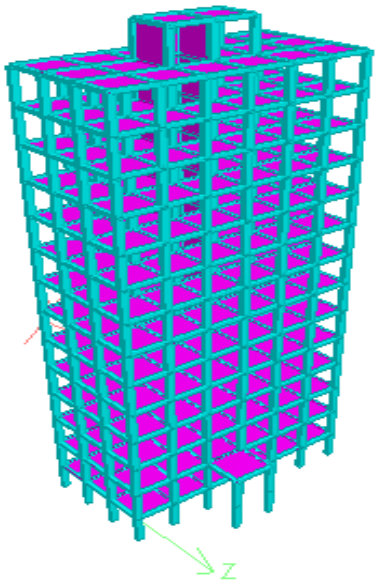

Fig 4 Porch location case no 4

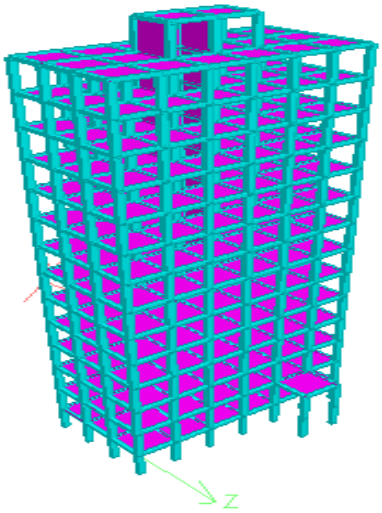

Fig 5 Porch location case no 5

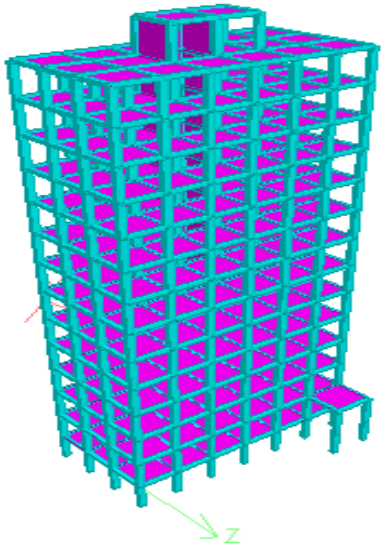

Fig 6 Porch location case no 6

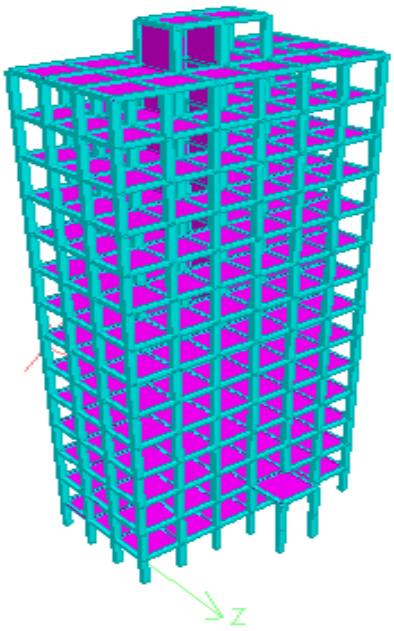

Fig 7 Porch location case no 7

3. Result and Discussion

Table 1: Maximum Displacement in X direction all 7 Locations in Zone III

Location No.	Maximum Displacement (mm)
	For X Direction
1	201.136
2	200.215
3	199.968
4	199.890
5	199.844
6	199.644
7	199.305

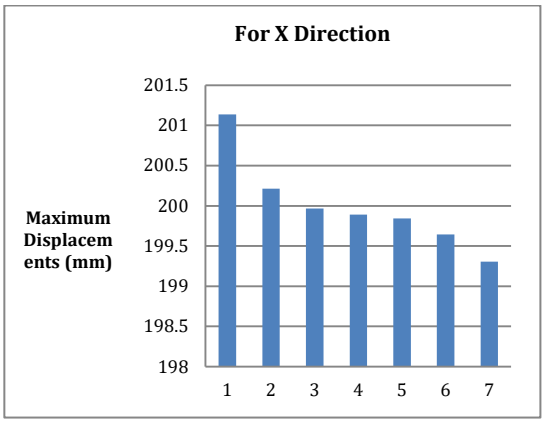

Fig.1: Maximum Displacement in X direction for all 5 Locations in Zone III

Table 2: Maximum Displacement in Z direction of R.C.C. for all 7 Locations in Zone III

Location No.	Maximum Displacement (mm)
	For Z Direction
1	185.409
2	185.554
3	185.187
4	184.724
5	184.101
6	183.309
7	182.515

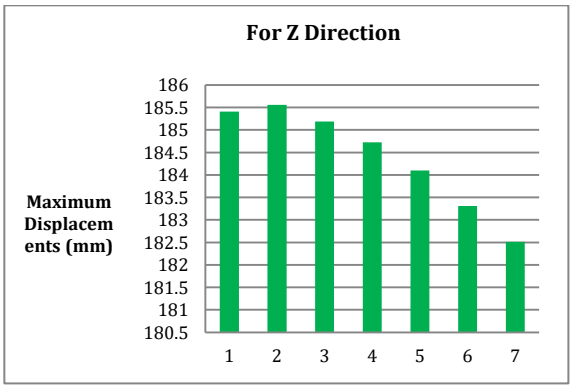

Fig.2: Maximum Displacement in Z direction for all 7 Locations in Zone III

Table 3: Base Shear in X and Z direction for all Building Locations

Locations	Base Shear (KN)	
	X direction	Z direction
1	2565.08	1748.58
2	2564.06	1750.72
3	2566.41	1752.55
4	2568.01	1754.18
5	2569.04	1755.98
6	2568.71	1757.60
7	2567.09	1758.97

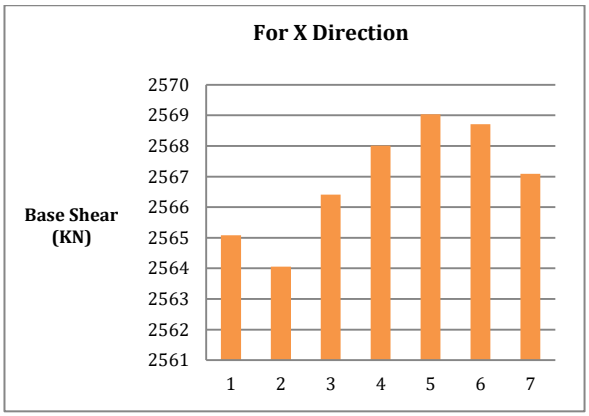

Fig. 3: Base Shear in X direction for all Building Locations

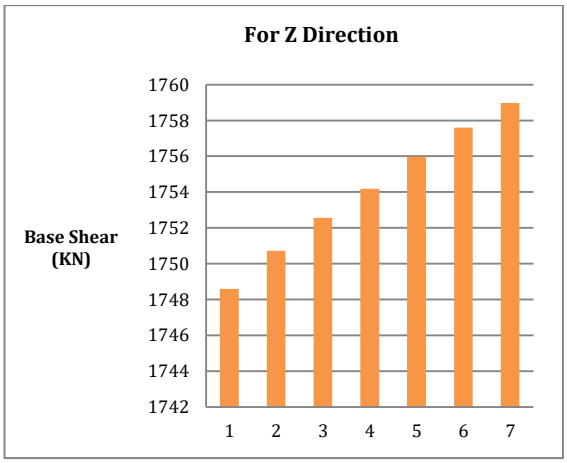

Fig. 4: Base Shear in Z direction for all Building Locations

Table 4: Maximum Axial Forces in Column at ground level for all Building Locations

Location No.	Column Axial Force (KN)
1	6320.379
2	6336.977
3	6326.258
4	6273.999
5	6293.311
6	6227.833
7	6258.875

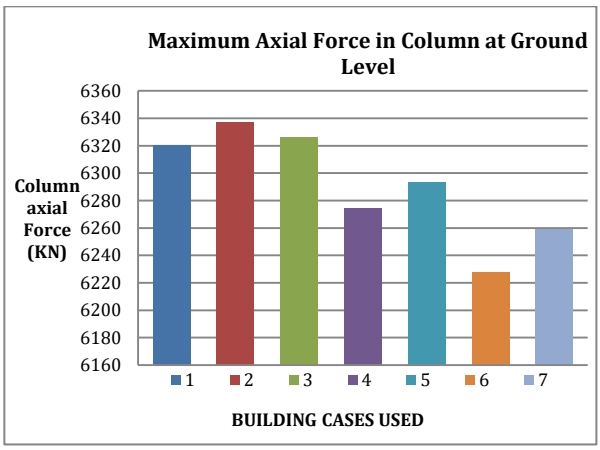

Fig. 5: Maximum Axial Forces in Column at ground level for all Building Locations

Table 5: Maximum Shear Forces in Columns for all Building Locations

Location No.	Column Shear Force (KN)	
	Shear along Y	Shear along Z
1	117.378	73.951
2	117.770	74.222
3	117.744	74.200
4	117.087	74.177
5	117.732	74.164
6	117.767	74.173
7	117.005	74.142

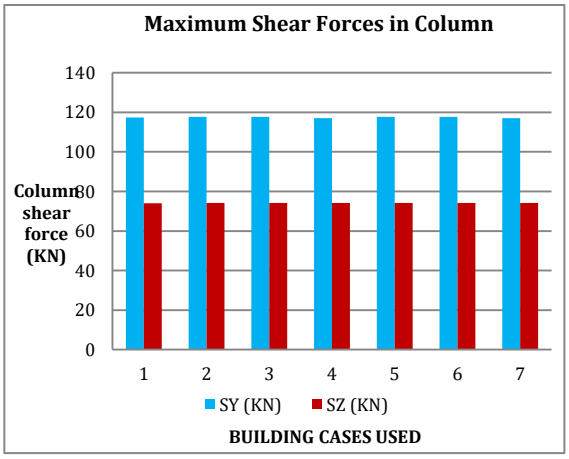

Fig. 6: Maximum Shear Forces in Columns for all Building Locations

Table 6: Maximum Bending Moment in Columns for all Building Locations

Location No.	Column Bending Moment (KNm)	
	Moment along Y	Moment along Z
1	148.068	236.129
2	148.615	236.911
3	148.572	312.516
4	148.529	312.542
5	148.504	313.773
6	161.472	309.678
7	171.821	300.156

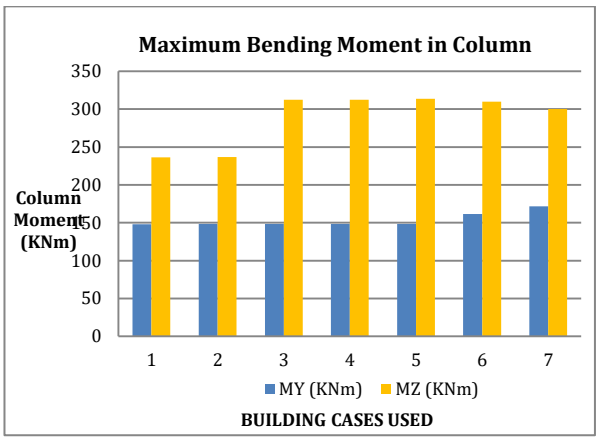

Fig. 7: Maximum Bending Moment in Columns for all Building Locations

Table 7: Maximum Shear Forces in beams parallel to X direction for all Building Locations

Location No.	Beam Shear Force (parallel to X direction) (KN)	Beam Shear Force (parallel to Z direction) (KN)
1	125.638	1.729
2	125.305	1.672
3	125.841	1.662
4	125.830	1.661
5	125.827	1.647
6	125.833	1.632
7	125.843	1.622

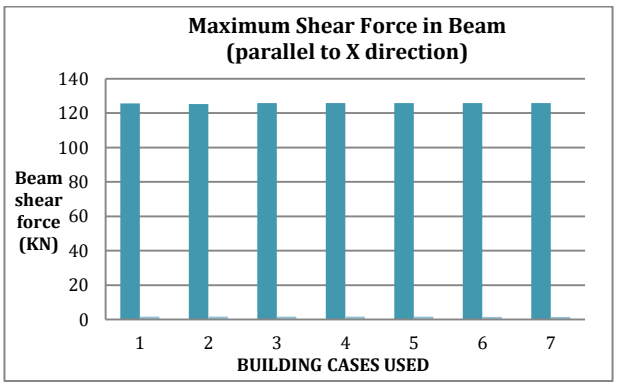

Fig. 8: Maximum Shear Forces in beams parallel to X direction for all Building Locations

Table 8: Maximum Shear Forces in beams parallel to Z direction for all Building Locations

Location No.	Beam Shear Force (parallel to X direction) (KN)	Beam Shear Force (parallel to Z direction) (KN)
1	109.426	1.173
2	109.559	1.175
3	109.470	1.537
4	109.535	2.430
5	109.515	1.874
6	109.495	1.843
7	109.575	1.955

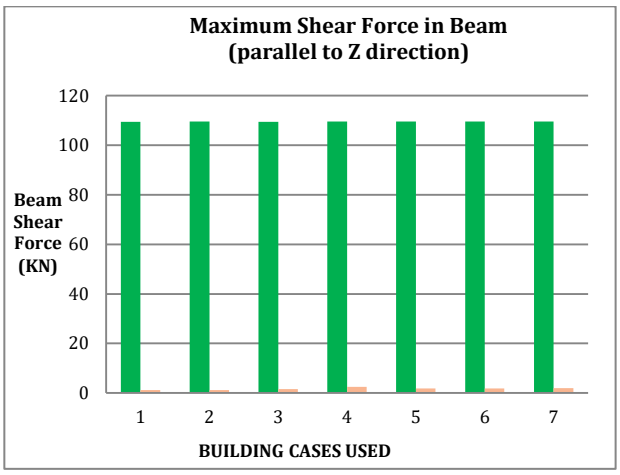

Fig. 9: Maximum Shear Forces in beams parallel to Z direction for all Building Locations

Table 9: Maximum Bending Moment in beams parallel to X direction for all Building Locations

Location No.	Column Shear Force (KN)	
	Shear along Y	Shear along Z
1	3.622	188.860
2	3.506	189.324
3	3.487	189.285
4	3.486	189.263
5	3.460	189.258
6	3.429	189.270
7	3.411	189.291

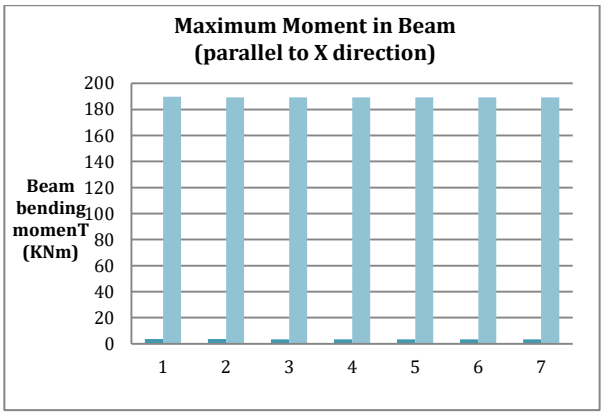

Fig. 10: Maximum Bending Moment in beams parallel to X direction for all Building Locations

Table 10: Maximum Bending Moment in beams parallel to Z direction for all Building Locations

Location No.	Column Shear Force (KN)	
	Shear along Y	Shear along Z
1	2.454	146.572
2	2.415	146.889
3	3.483	146.860
4	5.302	146.831
5	4.211	146.826
6	4.078	146.831
7	4.021	146.847

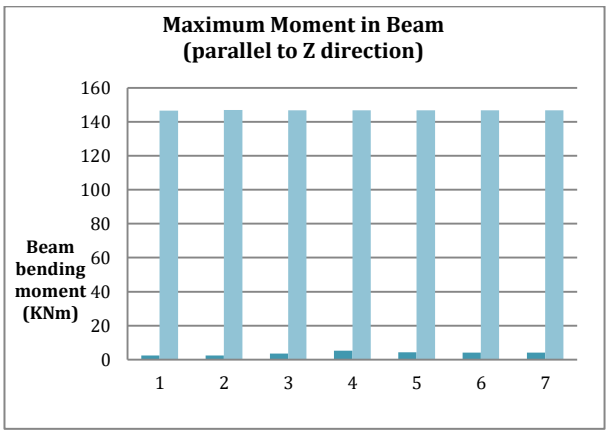

Fig. 11: Maximum Bending Moment in beams parallel to Z direction for all Building Locations

Table 11: Maximum Torsional Moment in beams along X and Z direction for all Building Locations

Location No.	Beam Torsional Moment (along X direction) (KNm)	Beam Torsional Moment (along Z direction) (KNm)
1	8.283	9.521
2	8.295	9.545
3	8.294	9.548
4	9.050	9.548
5	9.505	9.540
6	12.544	9.537
7	8.832	9.536

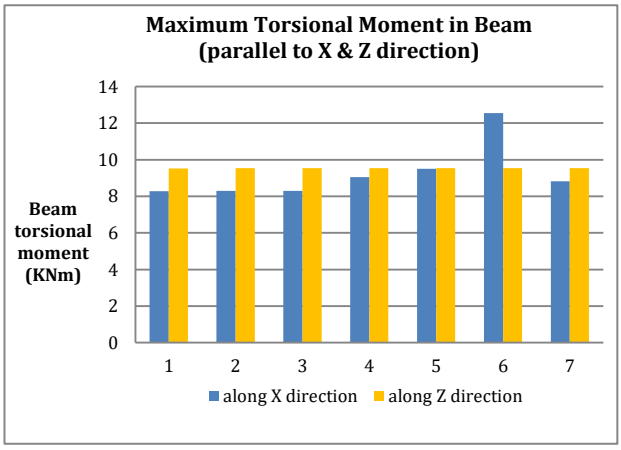

Fig. 12: Maximum Torsional Moment in beams parallel to X &Z direction for all Building Locations

Conclusions

The building with porch subjected to seismic effects with seven different location the analytical results obtained for seven location multistoried building. There are several result shown in results the maximum displacement in location 7, maximum base shear in location 1, maximum axial force in location 6 , maximum column shear force in location 1 , maximum column bending moment location 1 , beam shear force

location 7, tensional force location 1 . That means location 1 is very efficient cases for porch in building

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