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ANALYSIS OF MULTI STOREY BUILDING BY USING STEEL BRACING

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Abstract : The most of steel structure are failed in latral loads. Different bracing systems are different seismic responses. Steel bracing system have both practical and economical advantage. The applications of Steel bracing is quicker to execute. The aim of the study of a seismic response of building is to style and build a structure during which the damage to the structures and its structures component by earthquake may be a minimised. The paper aims to was the review of study of study of an brased and brased multi-story steel building conducted by various authors within the post.

Key Words Steel frame, Bracing, Earthquake, seismic

1.INTRODUCTION

1.1 General

The huge strength of steel is of great advantage to steel structures. Pliant is important factor of steel structure. Great advantage of the steel is plasticity or ductility it means that when subjected to considerable force it will not suddenly crack like glass, but slowly bend out of shape. It allows steel structure to bend out of shape, or deform. Failure in steel frames isn't sudden, a steel structure rarely collapses. Steel in most cases performs far better in earthquake than most other materials because ofthese properties. A soft story building is a multi-story building in which one or more floors have large unobstructed commercial spaces, windows, wide doors or other openings in places where a axialwall would nomally be required for stability as a matter of earthquake engineering design.

1.2 Types of bracings

A) Diagonal bracing
B) Cross bracing
C) Zip type of bracing
D) K type of bracing
E) V Type of bracing

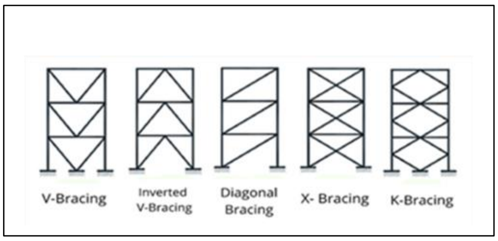


Fig.1.1 Types of bracings

2. MODELLING

1.PLAN

The analysis of G+5, G+10, G+15, and G+20 by using X and V bracing in steel structure in Staad Pro software. G+5, G+10, G+15, and G+20 is analysed with and without bracings. To find out maximum bending moment , Nodal displacement.

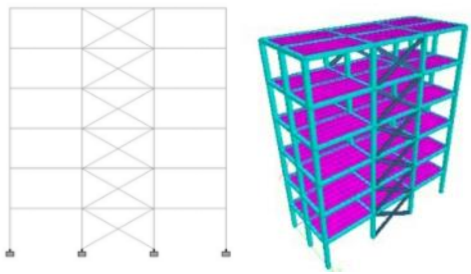


Fig. 2.1 Plan of building with x bracing

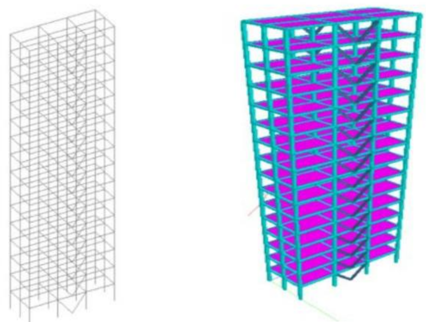


Fig. 2.2 Plan of building with v bracing

2. STEEL BRACINGS WITHOUT BRACINGS

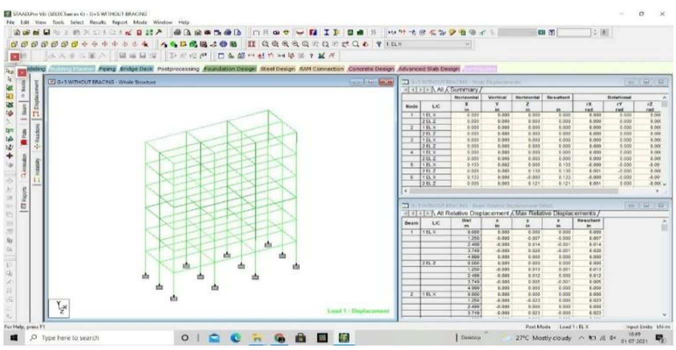


Fig. 2.3 Unbraced G+5 building

Selected plan area is rectangular size. The advantage of bracings system is completely small increasing in mass associated with retrofitting scheme.

3. STEEL BRACINGS WITH X BRACING

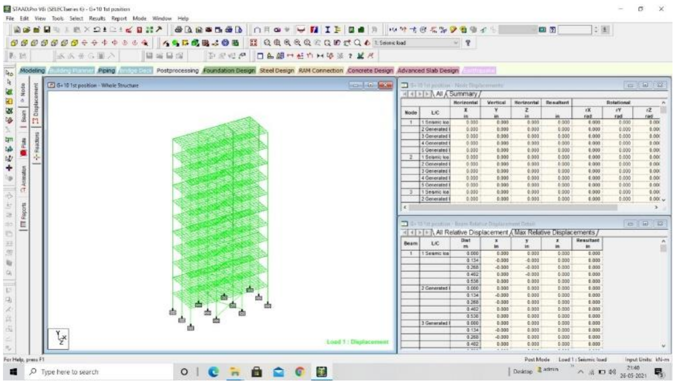


Fig 2.4 X braced G+10 Building

The bracing system is used in the case of Steel in clan and member with the cross section dimension 150×150×10 mm.

4. STEEL BUILDING WITH V BRACING

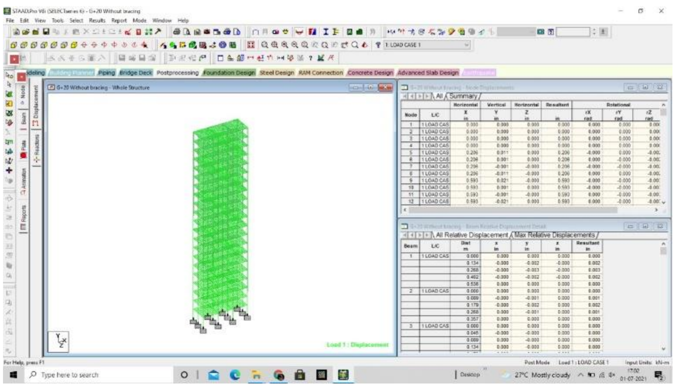


Fig 2.5 V braced multi-story stracture

CASE 1

WHEN BRACINGS ARE PROVIDED AT THE NEED BE COMPLETELY THROUGHOUT THE STORY BOTH IN X AND V TYPE

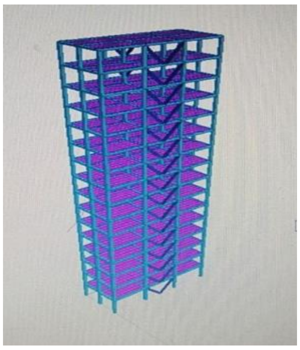


Fig .3.7 V bracing in middle Bay

CASE 2

WHEN THE BRACING SUPPORTED AT THE OUTER PERIPHERY CAL COLUMNS WITH A GAP OF ONE STOREY UN BRACED.

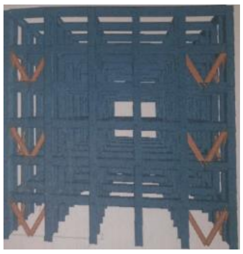


Fig.3.8 V bracing 2nd postion

CASE 3

WHEN BRACINGS ARE PROVIDED AT THE OUTER PERIPHERYCAL COLUMN WITH ALTERNATE FASHION

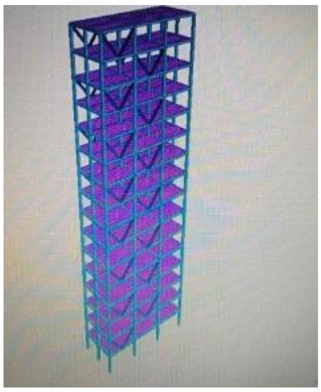


Fig 3.9 V bracings 3rd position

4. RESULTS

The following results are based on their case study the following result shows the nodal displacement acting on a X Braced and V Braced G+5 building.

Table -1: Nodal displacement vs Different Storey level

STOREY LEVEL	UNBRACED	X BRACED	V BRACED
GF	0	0	0
1	0.061	0.028	0.014
2	0.111	0.145	0.016
3	0.18	0.155	0.022
4	0.231	0.19	0.428
5	0.318	0.286	0.723

Fig. 4.1 Graph showing nodal displacement vs different story level

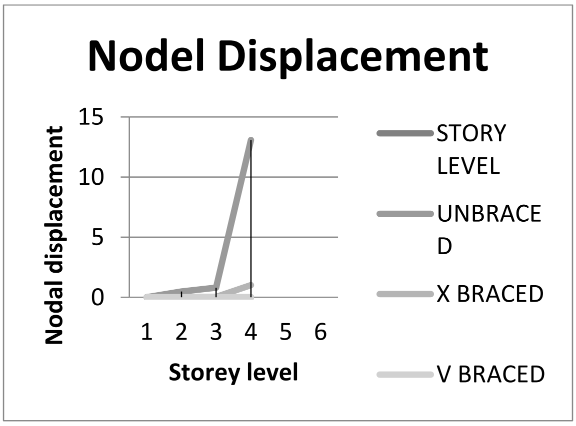
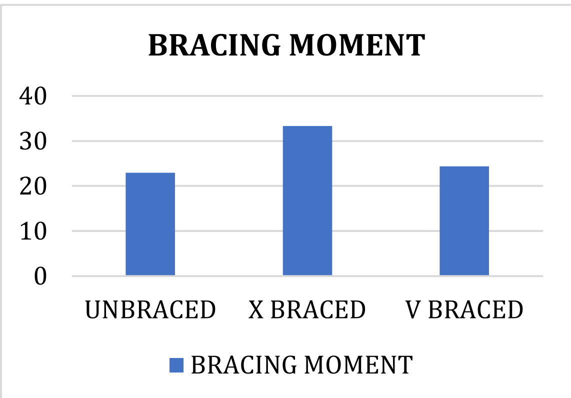


Table 2 Bending moment with different bracing type

BRACING TYPE	BRACING MOMENT
UNBRACED	22.965
X BRACED	33.328
V BRACED	24.325

Fig. 4.2 Graphical view of Bending moment



The following results are based on their case study the following result shows the nodal displacement acting on a X Braced and V Braced G+10 building.

Table 4.3 Nodal displacement VS Storey level G+10

STOREY LEVEL	UNBRACED	X BRACED	V BRACED
GF	0.764	25.008	23.862
1	0.689	24.126	21.018
2	0.694	22.216	20.203
3	0.808	21.919	15.149
4	0.741	18.163	14.256
5	0.679	16.315	12.926
6	0.429	13.916	7.035
7	0.329	9.216	4.108
8	0.126	7.073	3.481
9	0.106	6.231	2.32
10	0.103	5.412	1.235

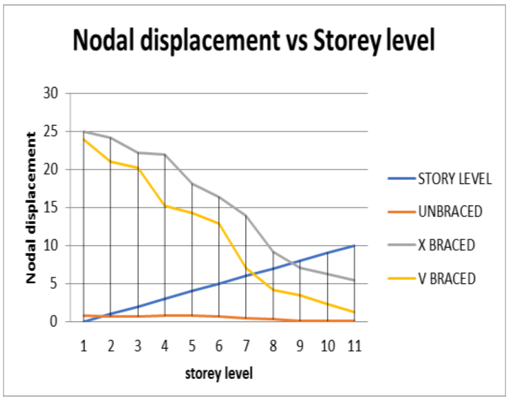


Fig.4.3 Graphical view of nodal displacement vs Storey level

Table 4.4 Bending moment with types of bracings

BRACING TYPE	BRACING MOMENT
UNBRACED	12.41
X BRACED	42.928
V BRACED	24.196

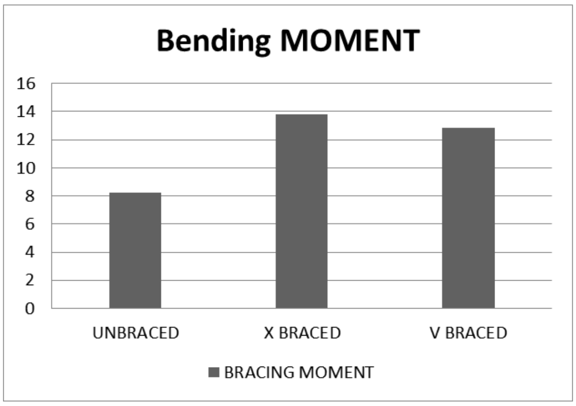


Fig. 4.4 Graphical view of bending moment

Table 4.5 Nodal displacement VS Storey level

STOREY LEVEL	UNBRACED	X BRACED	V BRACED
GF	0	0	0
1	0.094	0.156	0.187
2	0.173	0.279	0.245
3	0.269	0.413	0.336
4	0.349	0.61	0.483
5	0.425	0.651	312
6	0.492	0.711	0.678
7	0.549	0.756	0.731
8	0.597	0.753	0.818
9	0.492	0.82	0.821
10	0.483	0.896	0.832
11	0.482	0.921	0.869
12	0.357	0.935	0.901
13	0.235	0.943	0.912
14	0.226	0.956	0.923
15	0.213	0.962	0.935

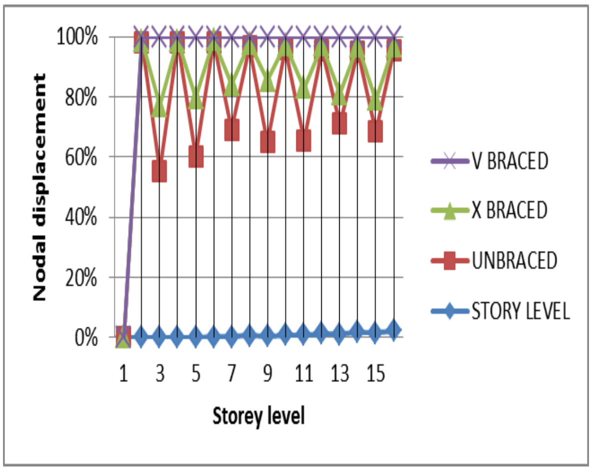


Fig.4.5 Graphical view of nodal displacement vs Storey level

Table 4.6 Bending moment with types of bracings

BRACING TYPE	BRACING MOMENT
UNBRACED	89.24
X BRACED	54.308
V BRACED	24.596

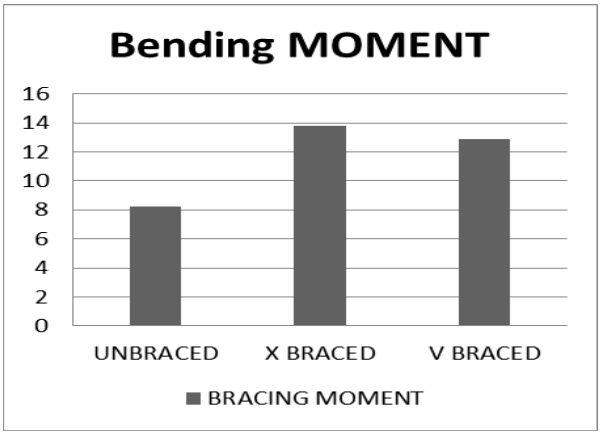


Fig. 4.6 Graphical view of Bending moment

Table 4.7 Nodal displacement VS Storey level

STOREY LEVEL	UNBRACED	X BRACED	V BRACED
GF	0	0	0
1	2216.642	12.968	29.329
2	2113.321	830.39	878.396
3	2013.256	12.899	26.44
4	1923.56	614.23	651.32
5	1915.89	12.78	24.226
6	1856.23	401.106	429.938
7	1080.49	12.792	24.32
8	940.21	301.12	212.32
9	845.53	12.432	23.15
10	754.23	203.12	200.12
11	732.12	12.32	22.23
12	730.22	103.22	198.32
13	632.12	12.29	21.22
14	625.36	99.32	196.23
15	621.23	11.32	20.26
16	620.12	98.32	194.32
17	614.23	11.1	19.33
18	514.32	97.32	193.26
19	400.32	10.32	18.36
20	330.12	10.12	190.23

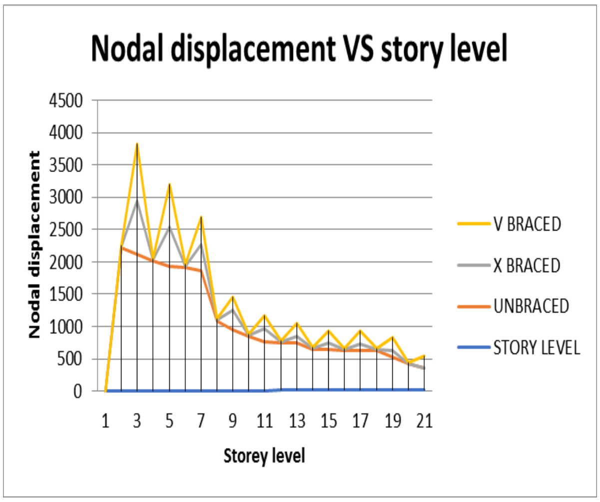


Fig.4.7 Graphical view of nodal displacement vs Storey level

Table 4.8 Bending moment with types of bracings

BRACING TYPE	BRACING MOMENT
UNBRACED	8.23
X BRACED	13.823
V BRACED	12.855

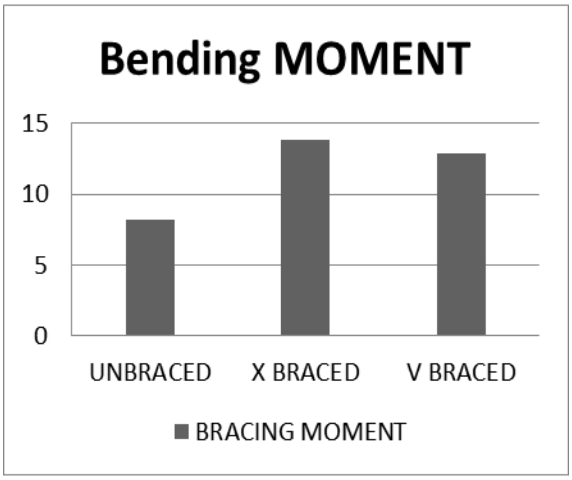


Fig. 4.8 Graphical view of Bending moment

5. Conclusions

1) The efficiency of x bracing 1s maximum as By using X bracings and V bracings the lateral nodal displacements are reduced by 75% and 68% respectively compared to braced steel building structure.
2) Steel bracing using a back to back angle section reduced the deflection by 3.2% when compared to steel bracing of the same type of bracings system.
3) The axial loads on the peripheral columns increase racings. The axial loads increase in their value by 33.65% using X steel bracings.
4) The axial load on the interior columns increased by 15% irrespective of kind and type of bracings used.
5) The column moments on the peripheral columns have reduced bracing by using 15% but the column moments on the interior columns have drastically reduced by 74.31%.
6) Bending moment in column decreases from unbraced to braced system.

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