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To Study And Analyze Effects Of Bracing In Design Of Building

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Abstract- *High rise structure thanks to its exposure to varied gravity loads, lateral loads and therefore the exponential height of structure has become a costlier solution. The increasing cost of concrete structure and therefore the time interval of construction in concrete high-rise structure has given chance to explore and research new technologies and new materials to form the structure more stable and economical. One among the solutions is to supply bracings to themember. There are many conveniences of the bracingsystems inorder that they're so widely used.Theseare: Braced frames are accessible to all or any sorts of structures like bridges, aircrafts, and cranes. There's no need of highly skilled laborers if the bolted connections are utilized and plus there's no deformation problem at the connection. In this paper, the seismic analysis of reinforced concrete (RC) buildings with different types of bracing (V-type, inverted V-type, X-type) are provided. Eightstorey(G+8) building is considered which is situated in seismic zone V. The building models are analyzed by using equivalent static analysis as per recommendation given by IS 1893:2002 using Staad Pro V8i software. In this analysis of multistoriedbuilding with considering the rectangular columns with different types of bracing are compared.*

INTRODUCTION

Bracing is one among the foremost versatile lateral load resisting systems in multi-storied buildings. Bracing may be a highly efficient and economical method of resisting horizontal forcein a frame structure. Braced frame may be a structural system, which is meant primarily to resist wind loads and earthquake forces. Braced frames are often an efficient system for seismic retrofit thanks to their high stiffness. Braced frames are nearly always composed of steel members. Multistory ferroconcrete buildings are susceptible to excessive deformation, which necessitate the introduction of special measures to decrease this deformation. RC bracing is one among the lateral loads opposing frameworks in multistory structures. RC bracing system enhances the resistance of the structure against horizontal forces by expanding its stiffness and stability. Bracings hold the structure stable by exchanging the horizontal loads, for instance, quake or wind burdens right down to the bottom and oppose sidelong loads, therein way keep the influence of the structure

BRACING MODEL

Typesof bracingsystem

1. XBracing
2. VBracing
3. InvertedV

X Bracing uses two diagonal members crossing one another. These only need to be resistant to tension, one brace at a time acting to resist sideways forces, depending on thedirectionofloadingas a result of steel cables, canals be usedfor cross bracingXBracingontheoutsidefaceofabuildingcaninterferewiththepositioningandfunctioningofwindow openings.It also results in greaterbending floor beams.Two diagonal members forming a V-shape extend downwards from the top two corners of a horizontal member and meet at a center point on the lower horizontal member. The systems can significantly reduce the buckling capacity of the compression brace so that it is less than the tension yield capacity of the tension brace. This can mean that when the braces reach their resistance capacity, the load must instead be resisted in the bending of the horizontal member.

Inverted V-bracing (also known as chevron bracing) involves the two members meeting at a center point on the upper horizontal member Both systems can significantly reduce the buckling capacity of the compression brace so that it is less than the tension yield capacity of the tension brace. This can mean that when the brace reaches their resistance capacity, the load must instead be resisted in the bending of the horizontal member. Bracing, which provides stability and resists lateral loads, may be from diagonal steel members or, from a concrete 'core'. In braced construction, beams and columns are designed under vertical load only, assuming the bracing system carries all lateral loads.

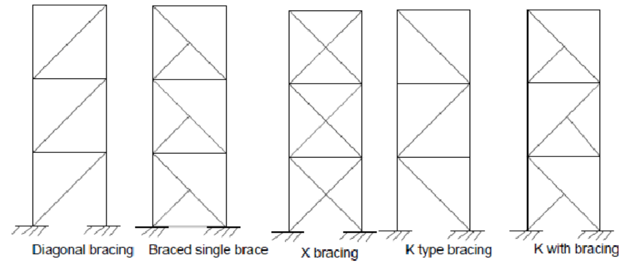

Figure 1. Concentric bracings

LOAD CONSIDERATIONS

D E S C R I P T I O N O F L O A D C A S E S

NO. LOAD CASE DESCRIPTION

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1 DL Dead Load
2 IL Imposed Load
3 EQX Earthquake Parallel to X Direction
4 EQZ Earthquake Parallel to Z Direction

Sr no.	L/C
1.	EQX+
2.	EQX-
3.	EQZ+
4.	EQZ-
5.	DL
6.	LL
7.	1.5(DL+LL+EQX+)
8.	1.5(DL+LL+EQX-)
9.	1.5(DL+LL+EQZ+)
10.	1.5(DL+LL+EQZ-)

MODELING

A multi-storied building of G+8 Structure

Plan Dimension – 30 X 30m

Number of floors – 8

Floor to Floor Height – 2.85m

Plinth Height – 3.5m

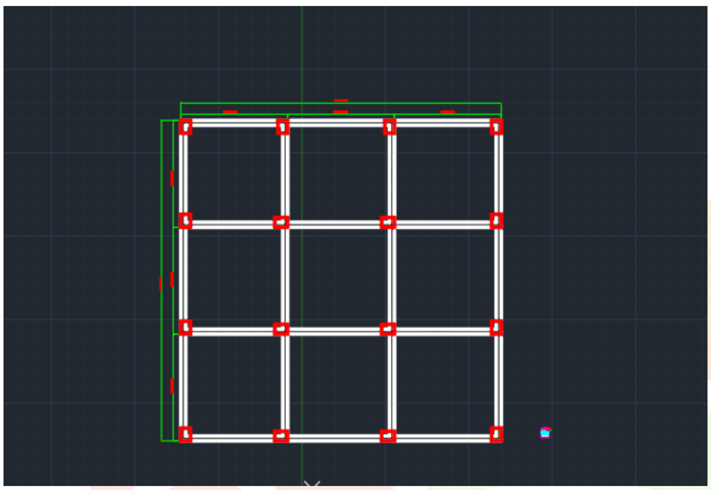
Total height of building – 25.65m

Zone – V

Seismic Intensity – Moderate

PLAN DETAILS

Storey	Displacementinmm
Groundfloor	15.23
1st floor	31.1
2ndfloor	46.86
3rdfloor	61.68
4thfloor	75.5
5thfloor	88.22
6thfloor	99.73
7thfloor	109.94
8thfloor	118.79

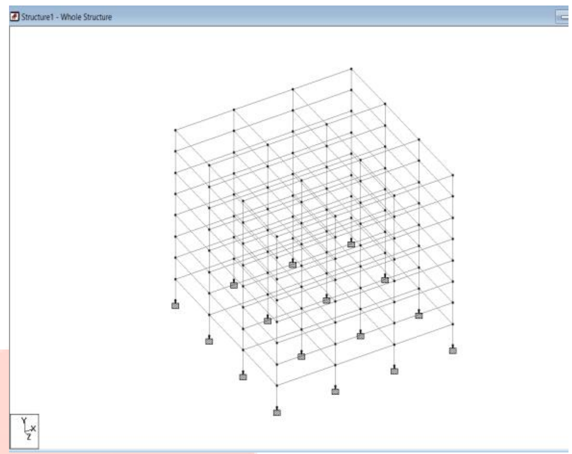


Load Considerations:

1. Dead load of 1.5 kN/m2 ,
2. Live load of 3 kN/m2
3. As per IS 875-part II, finishing of 1.5 kN/m2 and
4. Wall load for 230mm thick, load is 12kN/m and for 150mm thick, load is 7.8kN/m.
5. Earthquake loads as per IS-1893:2016(Part-I).

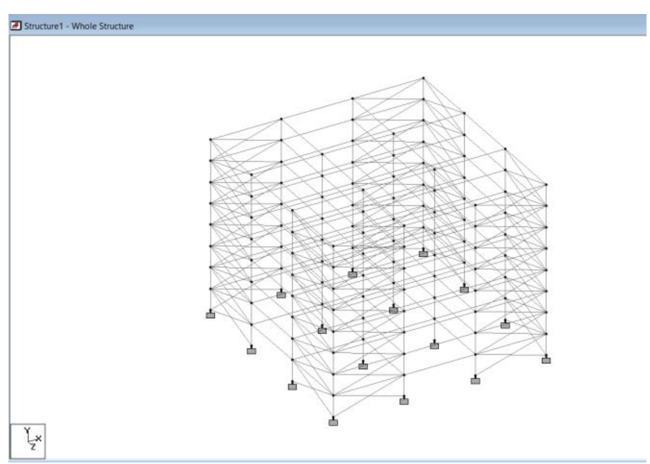
Model 1:

In the first Model Analysis is carried out considering the structure members without providing braces and the results are obtained as per considered properties mentioned in the modeling part.



Model 2:

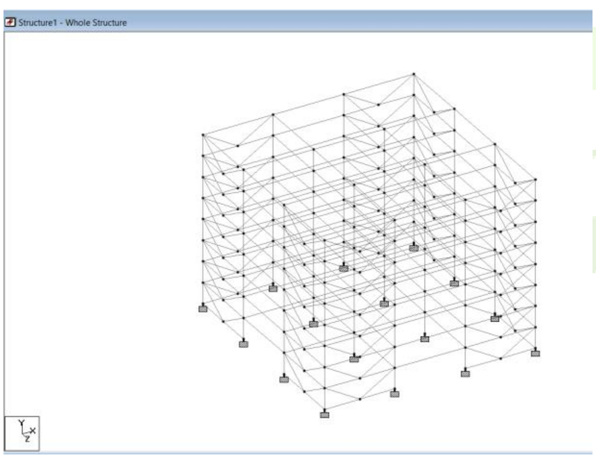
In the second model analysis the structure members are provided with x type bracings s and the results are obtained as per considered properties mentioned in the modeling part.



Storey	**Displacementinmm**
Groundfloor	7.8
1st floor	14.96
2ndfloor	22.1
3rdfloor	29.13
4thfloor	35.96
5thfloor	42.49
6thfloor	48.64
7thfloor	54.34
8thfloor	59.53

Model 3:

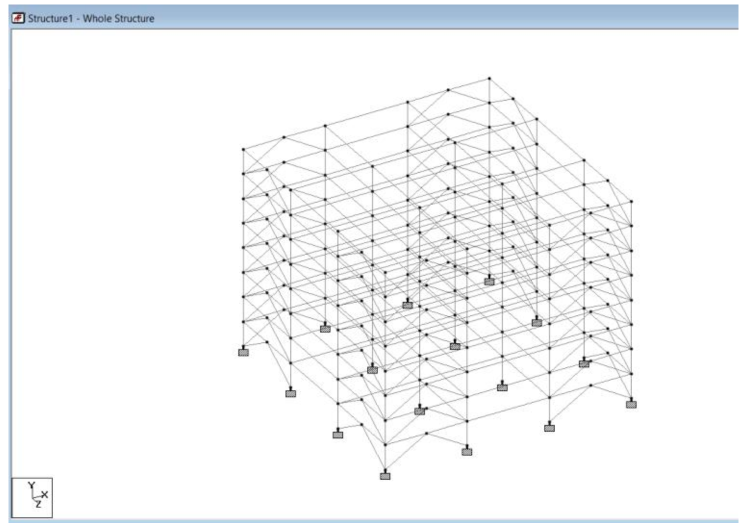
In the third model analysis the structure members are provided with V type bracings s and the results are obtained as per considered properties mentioned in the modeling part.



Storey	**Displacementinmm**
Groundfloor	8.9
1st floor	17.27
2ndfloor	25.52
3rdfloor	33.56
4thfloor	41.3
5thfloor	48.64
6thfloor	55.50
7thfloor	61.82
8thfloor	67.55

Model 4:

In the fourth model analysis the structure members are provided with inverted V type bracings s and the results are obtained as per considered properties mentioned in the modeling part.



Storey	**Displacementinmm**
Groundfloor	8.51
1st floor	16.51
2ndfloor	24.42
3rdfloor	32.13
4thfloor	39.55
5thfloor	46.59
6thfloor	53.13
7thfloor	59.18
8thfloor	64.61

Outcomes:

1. On comparison w.r.t storey displacement, the X type bracing has 56% less storey displacement whereas V type and Inverted V types have 42% and 38% less storey displacement as compared to the structure without bracings.
2. X type bracings performs better as compared to V and Inverted V type of bracings.
3. It can be seen that providing bracings can help structure perform better.

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