

Analysis of Different Link Length along Different Story Height in Eccentric Braced Steel Frames

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Abstract: The effect of different parameters has been considered in present study having constant link length and different link length along the story height. The current study deals with the eccentrically Braced Steel Frames (EBF). In the present study eccentric braced steel frames are used with constant link length and decreasing link length for 7 STORY, 14 STORY AND 21 story. The building is a 7 STORY, 14 STORY AND 21 story building with bracings provided at the corners. Various parameters such as Maximum story drift, Stiffness are calculated for each floor using pushover analysis with the help of ETABS. In this research the story drift and stiffness of constant link length and variable link length along the story height in eccentric braced frames are compared. The aim of this research is to find the most effective arrangement amongst the models generated.

Keywords: Eccentric Braced Steel Frames, Link Length, Pushover Analysis, ETABS etc.

I. INTRODUCTION

In the steel structure providing bracings gives better strength, stability and ductility. the structural bracing element plays an important role to resist the wind and earthquake forces. The braced frames are designed in tension and compression. Bracing are strong in compression. Properly designed and detailed EBFs behave in a ductile manner through shear or flexural yielding of a link element. The link is created through brace eccentricity with either the column centerlines or the beam midpoint. Different structural forms of all type of buildings can be used to improve the lateral stiffness and to reduce story drift. This research is based on the behavior of the constant link length and decreasing link length along the story height for 7 STORY, 14 STORY AND 21 story. In this research a 7 STORY, 14 STORY AND 21 story building is analyzed having properties as given in the table.

BUILDING DISCRPTION: GEOMETRICAL PROPERTIES:

S.NO.	STRUCTURAL PART	DIMENSION
1	NO. OF GRID LINE IN X & Y-DIRECTION	4M
2	SPACING IN X & Y-DIRECTION	4M
3	FLOOR TO FLOOR HEIGHT	4M
4	TOTAL HEIGHT OF THE BUILDING	28, 56, 84

5	SLAB THICKNESS	127MM
6	BEAM	ISMB 350
7	SECONDARY BEAM	ISMB 300
8	COLUMN	ISHB 450-2
9	BRACING	ISLB 250

MATERIAL PROPERTIES:

S NO.	MATERIAL	GRADE
1	CONCRETE(SLAB)	M20
2	REBAR	HYSD-500
3	STEEL	Fe345

SEISMIC DATA:

S NO.	PARAMETER	FACTOR
1	SEISMIC ZONE FACTOR	V
2	TYPE OF SOIL	MEDIUM
3	IMPORTANCE FACTOR	1
4	RESPONSE REDUCTION FACTOR	5
5	TIME PERIOD	PROGRAM CALCULATED

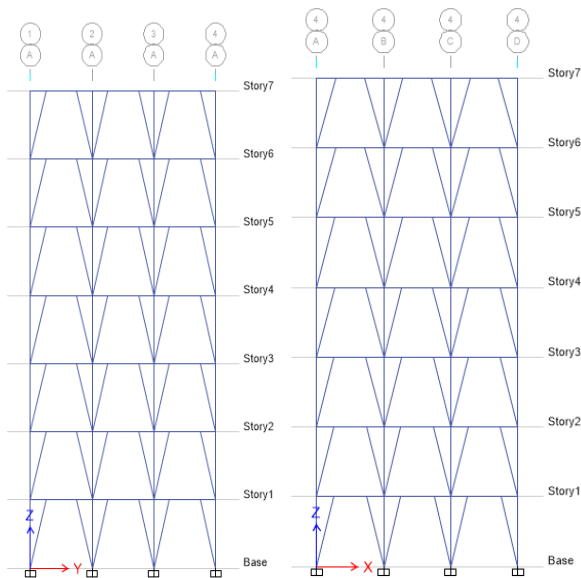
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FLOOR	MODEL 7-1	MODEL 7-2	MODEL 14-1	MODEL 14-2	MODEL 21-1	MODEL 21-2
	LINK LENGTH(mm)	LINK LENGTH(mm)	LINK LENGTH(mm)	LINK LENGTH(mm)	LINK LENGTH(mm)	LINK LENGTH(mm)
1	2000	2000	2000	2000	2000	2000
2	2000	1950	2000	1950	2000	1950
3	2000	1900	2000	1900	2000	1900
4	2000	1850	2000	1850	2000	1850
5	2000	1800	2000	1800	2000	1800
6	2000	1750	2000	1750	2000	1750
7	2000	1700	2000	1700	2000	1700
8			2000	1650	2000	1650
9			2000	1600	2000	1600
10			2000	1550	2000	1550
11			2000	1500	2000	1500
12			2000	1450	2000	1450
13			2000	1400	2000	1400
14			2000	1350	2000	1350
15					2000	1300
16					2000	1250
17					2000	1200
18					2000	1150
19					2000	1100
20					2000	1050
21					2000	1000

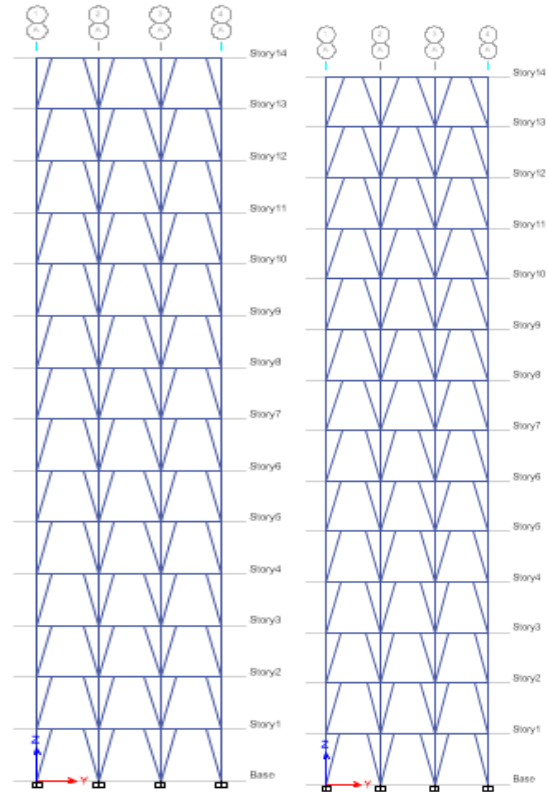
MODELPROPERTIES:

MODEL:



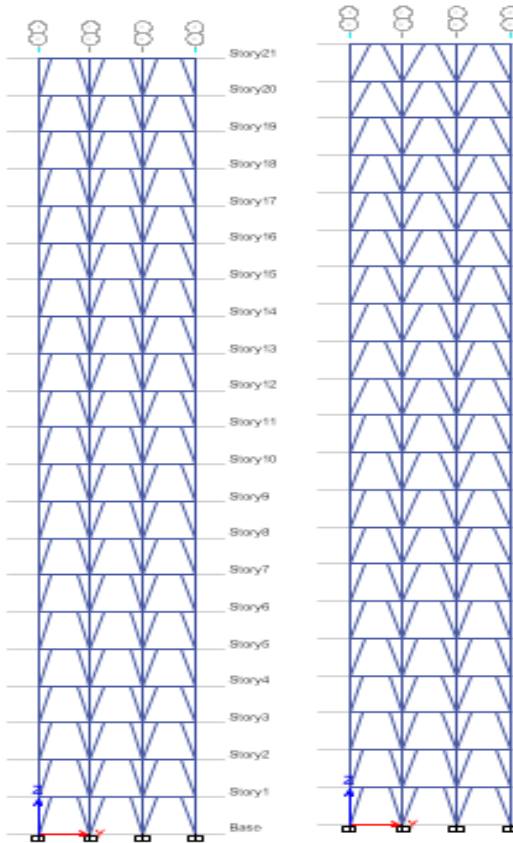
MODEL 7-1

MODEL 7-2



MODEL 14-1

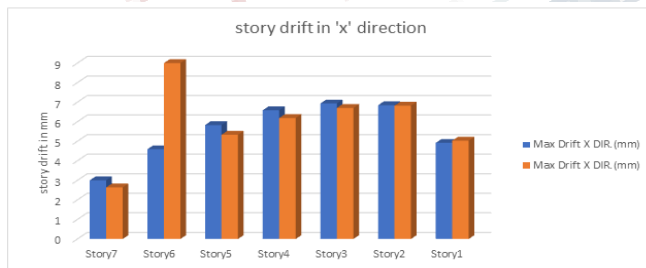
MODEL 14-2



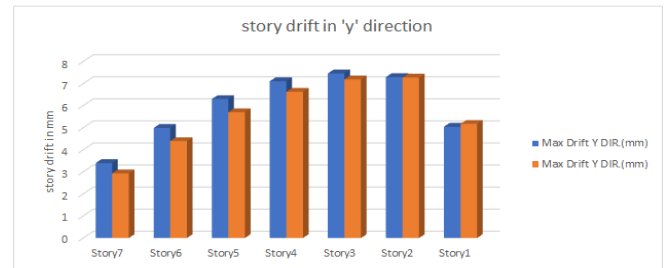
MODEL21-1

MODEL 21-2

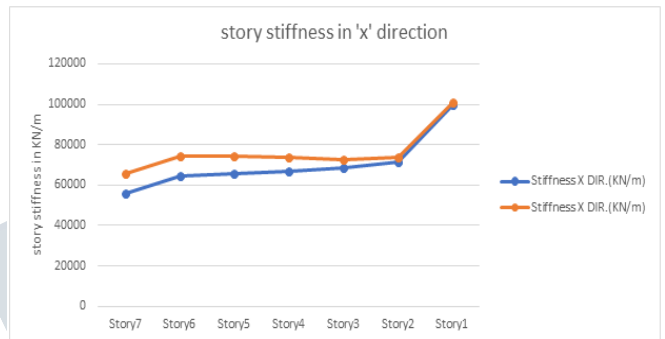
ANALYSIS:



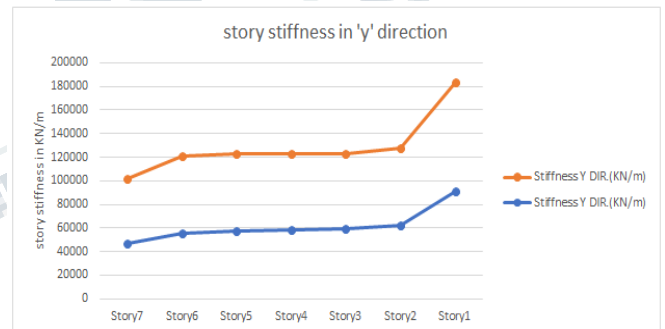
STORY DRIFT FOR 7 STORY IN X DIRECTION



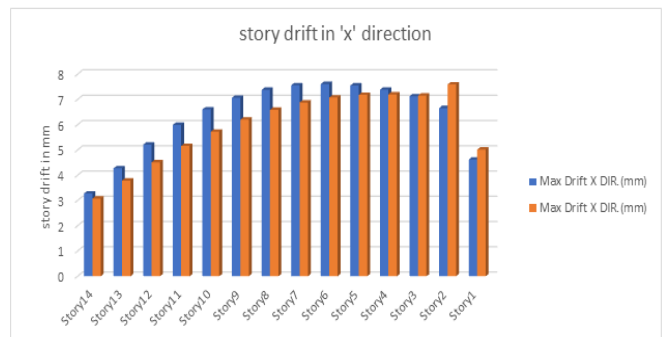
STORY DRIFT FOR 7 STORY IN Y DIRECTION



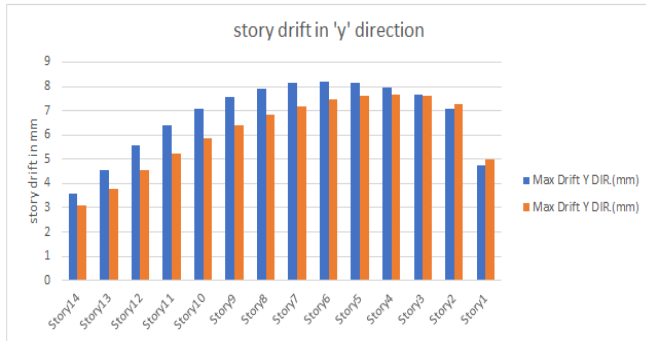
STORY STIFFNESS FOR 7 STORY IN X DIRECTION



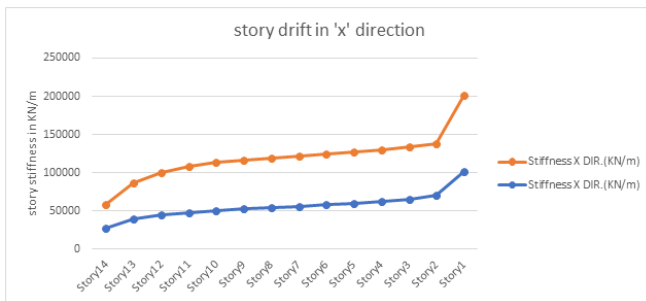
STORY STIFFNESS FOR 7 STORY IN Y DIRECTION



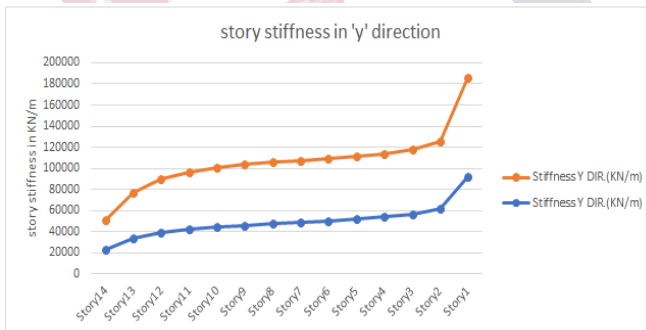
STORY DRIFT FOR 14 STORY IN X DIRECTION



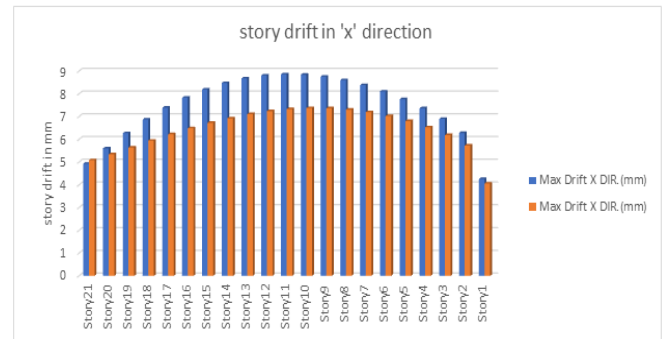
STORY DRIFT FOR 14 STORY IN Y DIRECTION



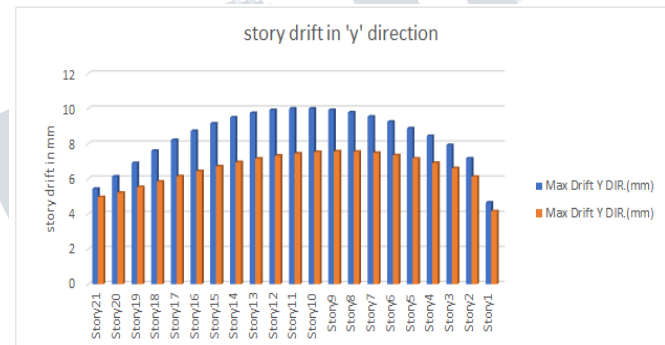
STORY STIFFNESS FOR 14 STORY IN X DIRECTION



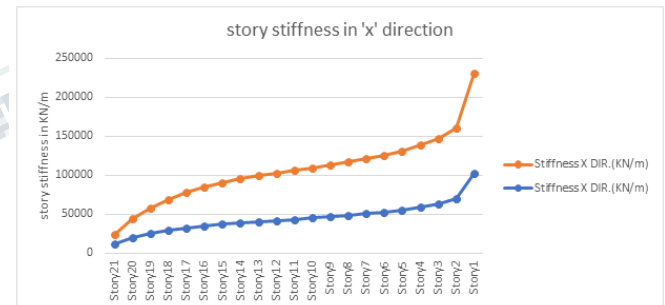
STORY STIFFNESS FOR 14 STORY IN Y DIRECTION



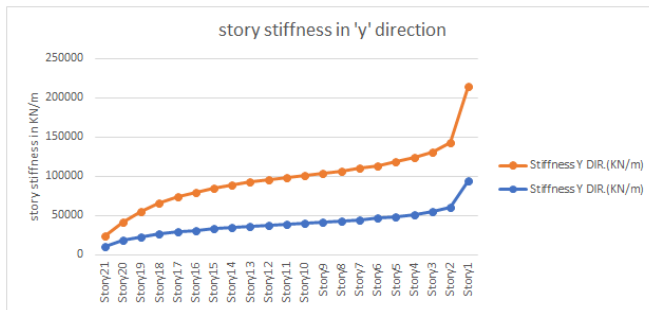
STORY DRIFT FOR 21 STORY IN X DIRECTION



STORY DRIFT FOR 21 STORY IN Y DIRECTION



STORY STIFFNESS FOR 21 STORY IN X DIRECTION



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STORY STIFFNESS FOR 21 STORY IN Y DIRECTION

CONCLUSION:

The study concludes that the decrease in link length along the story height is better energy dissipater as compared to constant link length in eccentric braced steel frame system.

The decrease in link length along the story height provides less story drift and more stiffness as compared to constant link length in eccentric braced steel frame.

The sufficient ductility should also be provided for upper stories.

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