Scientific Journal of Impact Factor (SJIF): 4.14
e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 3, Issue 2, February -2016

Comparison study of RC structure with different arrangement of rcc bracing system

Mr. Mehul M. Kanthariya [1], Haresh P. Vaghasiya [2], Harsh C. Vagadiya [3] Chirag R. Akoliya [4], Mitesh H. Patel[5]

[1] *Faculty in Vidhyadeep Institute of Engineering & Technology Surat, India*
[2,3,4,5] *Student in Vidhyadeep Institute of Engineering & Technology Surat, India*

Abstract — *In general the structure are analysis as RC structure. Rcc high rise building of G + 10 Storey is used for bracing system to improve seismic resistance using various type of r.c.c. bracing system such as single diagonal bracing, Double diagonal bracing in seismic zone III using IS-1893: 2002 for RC structure. Compare base shear, bending moment, deflection of a structure analysis by using Staad Pro V8i.*

Keywords- *Base Shear, Bending moment, Seismic Analysis, R.c.c. Bracing, Deflection, Staad Pro etc.*

I. INTRODUCTION

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. Braced systems exhibit high lateral stiffness and strength under moderate-to-large magnitude earthquakes.

II. ADVANTAGES

- *Stiffness is more.*
- *Storey drift is less.*
- *Base shear is more.*
- *More earthquake resistance.*

III. TYPES OF BRACINGS

There are two types of bracing systems.

1) Concentric Bracing System
2) Eccentric Bracing System

3.1. Concentric bracing

Concentric bracings increase the lateral stiffness of the frame thus increases the natural frequency and also usually decreases the lateral Storey drift. However, increase in the stiffness may attract a larger inertia force due to earthquake. Further, while the bracings decrease the bending moments and shear forces in columns and they increase the axial compression in the columns to which they are connected.

3.1.1. Eccentric Bracing

Eccentric Bracings reduce the lateral stiffness of the system and improve the energy dissipation capacity. The lateral stiffness of the system depends upon the flexural stiffness property of the beams and columns, thus reducing the lateral stiffness of the frame. The vertical component of the bracing forces due to earthquake causes lateral concentrated load on the beams at the point of connection of the eccentric bracings.

The various type of bracing are mentioned below

- Single Diagonal Bracing
- Double Diagonal Bracing
- Chevron Bracing
- Inverted Chevron Bracing
- Chevron Bracing
- Braced Chevron Bracing
- Knee Bracing

IV. DESIGN PREPARATION

The RC building used in this study are eleven storied (G+10).
The size of beam is 300x600mm and size of column is 600x600mm.
The size of bracing is 230x230mm in Single Diagonal bracing and Double diagonal bracing.

The Storey height is ground floor + 3.2m, above floor 3.0m for all the stories. The live load taken has 3 KN/m 2 and dead load is as per member for all floors while the floor finish load is taken as 0.1 kN/m2 on all other floors Finish.

Thickness of slab is taken as 0.125 m. The unit weight of reinforced concrete is 25kN/m3 and brick masonry is taken as 20 kN/m3. The compressive strength of concrete is 25 N/mm2 and yield strength of steel reinforcements is 415 N/mm2.

All the above mentioned building frames are analyzed as per requirement of IS-1893: 2002. Seismic analysis is carried out on building models using the software Staad pro V8i. The load cases considered in the seismic analysis are as per IS 1893 – 2002

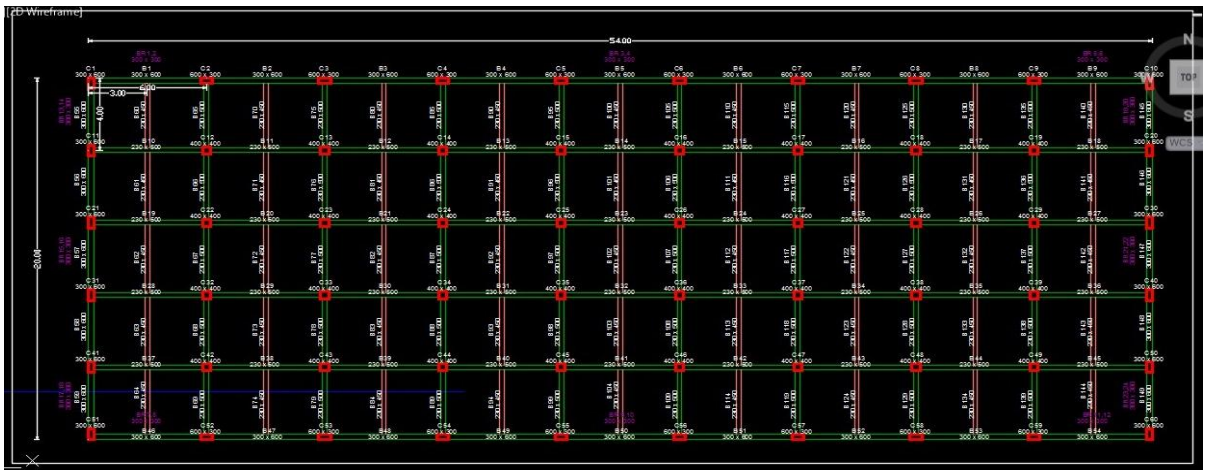

FIGURE – 1 Plan

Making a model in Staad pro software. Also analysis single diagonal and double diagonal bracing system.

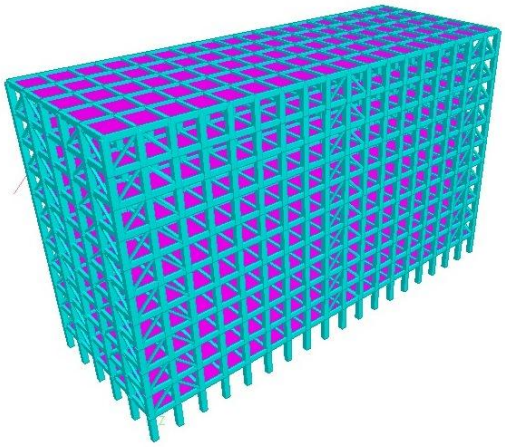

FIGURE – 2 Model of single diagonal bracing system.

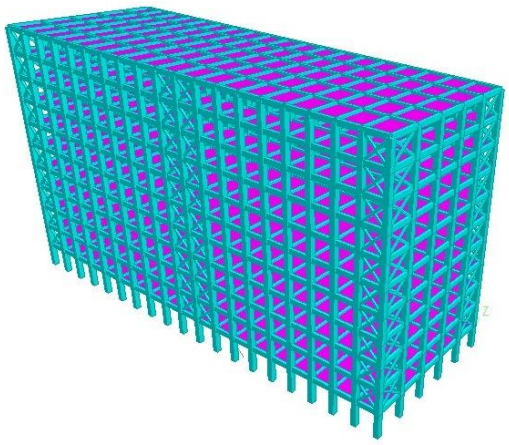

FIGURE – 3 Model of Double diagonal bracing system.

V. RESULTS AND DISCUSSION

TABLE - 1 Results of deflection in both bracing systems.

Storey	Single Dia. Bracing	Double Dia. Bracing
1	2.70	2.16
2	2.79	2.17
3	2.93	2.11
4	3.02	2.06
5	3.09	2.03
6	3.10	2.00
7	3.06	1.97
8	2.90	1.95
9	3.11	1.94
10	2.14	2.07

TABLE - 2 Results of Shear force in both bracing systems.

Storey	Single Dia. Bracing	Double Dia. Bracing
1	2.21	1.89
2	2.19	1.90
3	2.18	1.92
4	2.17	1.94
5	2.16	1.96
6	2.15	1.99
7	2.14	2.01
8	2.13	2.03
9	2.12	2.06
10	2.11	2.08

TABLE - 3 Results of Shear force in both bracing systems.

Storey	Single Dia. Bracing	X Bracing
1	0.408	0.347
2	0.586	0.496
3	0.746	0.630
4	0.888	0.749
5	1.012	0.852
6	1.117	0.939
7	1.203	1.001
8	1.268	1.064
9	1.314	1.102
10	1.340	1.124

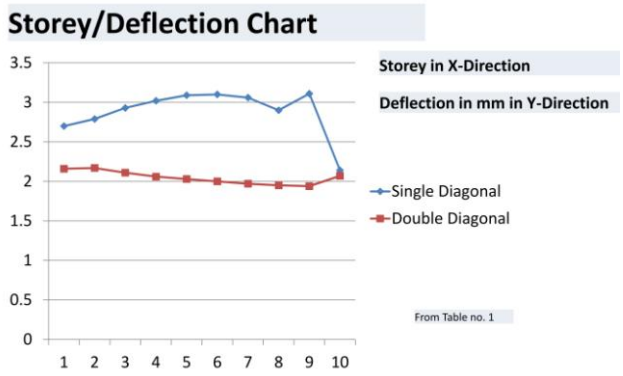

CHART - 1 Comparison of deflection of both bracing systems.

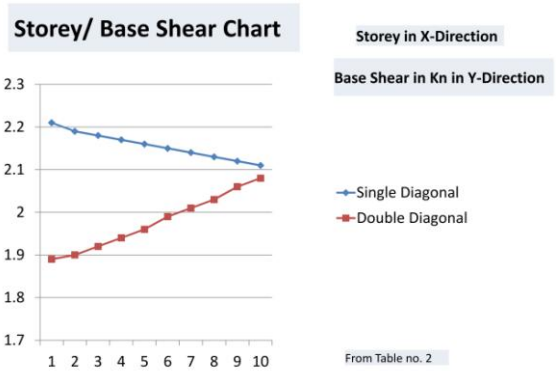

CHART - 1 Comparison of deflection of both bracing systems.

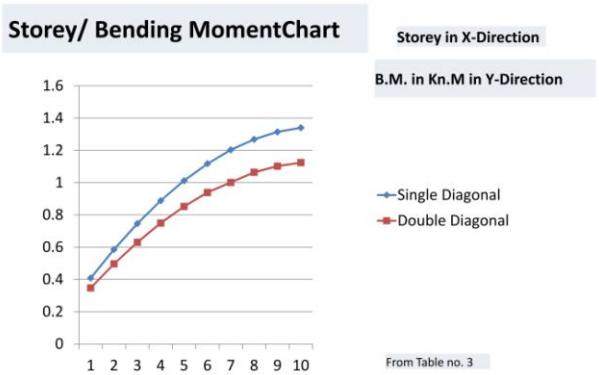

CHART - 3 Comparison of bending moment of both bracing systems.

- From the table-1 and chart-1 is represented deflection in single and diagonal bracing systems. Deflection in single diagonal system deflection is more compare to double diagonal bracing system and produce jerk in single diagonal system.
- From the table-1 and chart-1 is represented shear force in single and diagonal bracing systems. In this chart shown very clearly base shear is high in top in single diagonal bracing system and average decrease to floor to floor. Now in double diagonal bracing system shear force is increase to respect of floor height and becoming to near equal to single diagonal bracing.
- From the table-1 and chart-1 is represented bending moment diagram in single and diagonal bracing systems. From the chart single and double diagonal bracing systems shoes slight curve. But in single diagonal bracing moment is high to double diagonal bracing system and double diagonal bracing system try stable at a some height of building.

VI. CONCLUSIONS

- From the table and chart I am conclude in a double diagonal system more effective to compare single diagonal bracing system.
- Both bracing systems are increase base shear in building and provide more stiffness compare to without bracing system structure.
- In a earthquake resistant system bracing system more effectively and provide more resistance during a earthquake.
- Bracing system is less costly and complex compare to damping system and other earthquake resistant techniques.

VII. REFERENCES

[1]. Suresh P1, Panduranga Rao B2, Kalyana Rama J.S3, "Influence of diagonal braces in RCC multi-storied frames under wind loads: A case study", INTERNATIONAL JOURNAL OF CIVIL AND STRUCTURAL ENGINEERING Volume 3, No 1, 2012, pp 214-228.

[2]. Manish S. Takey,Prof. S.S.Vidhale," SEISMIC RESPONSE OF STEEL BUILDING WITH LINEAR BRACING SYSTEM (A Software Approach)", International Journal of Electronics, Communication & Soft Computing Science and Engineering, pp 17-25.

[3]. Z.A. Siddiqi1, Rashid Hameed2, Usman Akmal3," Comparison of Different Bracing Systems for Tall Buildings", Pak. J. Engg. & Appl. Sci. Vol. 14, Jan., 2014, pp 17-26.

[4]. Shrikant Harle," Analysis and Design of Earthquake Resistant Multi-Storied Braced R.C.C. Building using NISA Software", INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY, pp 45-48.

[5]. Aparna S. Patil 1, G R. Patil 2,' Seismic Evaluation Of RC Building By Using Steel Bracing With And Without Shear Panel', International Journal of Informative & Futuristic Research, pp 2106-2115.

[6]. Nauman Mohammed1, Islam Nazrul2," Behaviour of Multistorey RCC Structure with Different Type of Bracing System (A Software Approach)", International Journal of Innovative Research in Science, Engineering and Technology, pp 7465-7478.

[7]. Ashik S. Parasiya1 Paresh Nimodiya2," A REVIEW ON COMPARATIVE ANALYSIS OF BRACE FRAME WITH CONVENTIONAL LATERAL LOAD RESISTING FRAME IN RC STRUCTURE USING SOFTWARE",International Journal of Advanced Engineering Research and Studies, pp 88-93.

[8]. Mohammed Idrees Khan1, Mr.Khalid Nayaz Khan2, "SEISMIC ANALYSIS OF STEEL FRAME WITH BRACINGS USING PUSHOVER ANALYSIS", International Journal of Advanced Technology in Engineering and Science, pp 369-381.

[9]. Mr.Choudhari, Dr. T. K. Nagaraj, "ANALYSIS OF MOMENT RESISTING FRAME BY KNEE BRACING", INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY, pp 11-29.

[10]. K r i s h n a r a j R . C h a v a n 1 , H . S . J a d h a v 2, "Seismic Response of R C Building With Different Arrangement of Steel Bracing System", Int. Journal of Engineering Research and Applications, pp 218-222.

[11]. Nitin N. Shinde, R. M. Phuke, "Analytical Study of Braced Unsymmetrical RCC Building", International Journal of Science and Research, pp 485-489.

[12]. Jagadish J. S [1], Tejas D. Doshi [2], "A Study On Bracing Systems On High Rise Steel Structures", International Journal of Engineering Research & Technology, pp 1672-1676.

