

EFFECT OF EARTHQUAKE FORCE ON DIFFERENT TYPE OF BRACING IN FRAME STRUCTURE

Prof. Nilesh More, Abhyuday More, Chatur Omkar, Badhe Saurabh, Pawar Janhavi
Department of Civil Engineering
Sanghavi COE, Nashik, Maharashtra, India

Abstract— A Bracing is a system that is provided to minimize the lateral deflection of the structure. The use of braced frames has become more popular in high rise structure and also in seismic design of structure. So, this Study aims to investigate the effect of earthquake on structure with different shapes of bracings. In this project a concrete frame is modeled by using Etabs Software with different type of bracing and effect of these different bracing on earthquake affected structure is studied for different parameter like storey drift and bending moment in column and story displacement. Among these numbers of trials which type of bracing at critical storey is more suitable in seismic areas would be selected for the structure from the observed results.

Keywords— ETABS, Bracings, Earthquake, Deflection, Drift

I. INTRODUCTION

Ground motion during an earthquake creates complex horizontal displacement patterns in the structures. It is

impractical to trace this lateral displacement at each time-step. The response of building is in terms of lateral displacement and large storey drift, which decreases lateral strength and stiffness of building. The total seismic base shear as experienced by a building during an earthquake is dependent on its natural period, the seismic force distribution is dependent on the distribution of stiffness and mass along the height.

As the lateral stiffness is a major consideration in the analysis of tall buildings, it is necessary to reduce this response. So, it is at most important to safe guard the Building against Lateral loading. The need for a bracing system arises that can increase the lateral strength and stiffness of building and reduces lateral displacement and storey drift. Along with that it is also very important to study the effect of diff bracing systems on the seismic performance of the building to enhance the seismic performance of building

Different researches have suggested to implement bracing system in a building, so that the building will be strengthen and can sustain during seismic response.

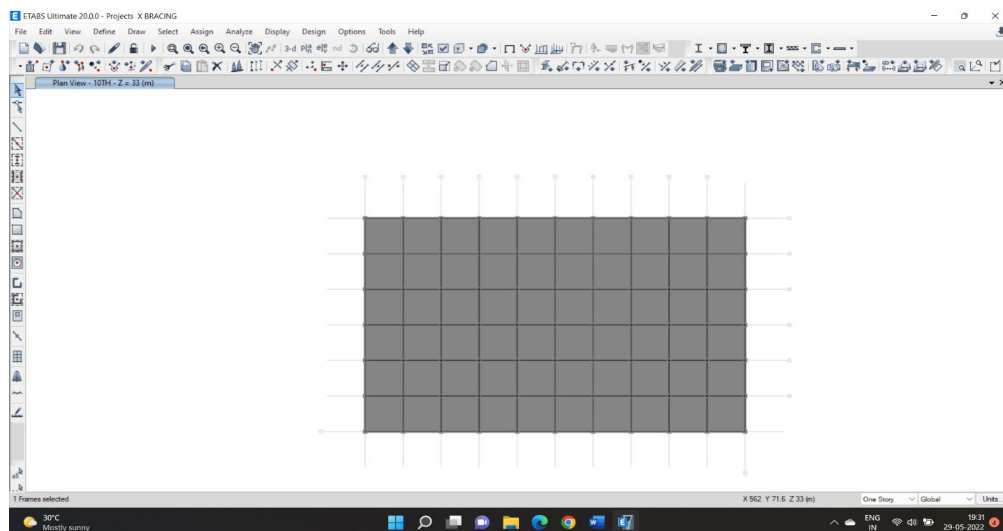


Fig. 1. Plan View of Structure

II. METHODOLOGY

The methodology worked out to achieve the above-mentioned objectives is as follows:

- i) Review the existing literatures
- ii) Select a building model for the study in E-tabs Software. (2013 Version)
- iii) Model the selected building with three different types of bracings. i.e., Diagonal, V Type & Cross Model 1: Normal building without bracing. Model 2: Building with diagonal
- iv) Seismic analysis of the selected building model and a comparative study on the results obtained from the analyses in E-tabs Software.
- v) Observations of results and discussions.

Model 3: Building with cross bracing at particular location in Earthquake Zone 1. Model 4: Building with V Type bracing at particular location in Earthquake Zone 1

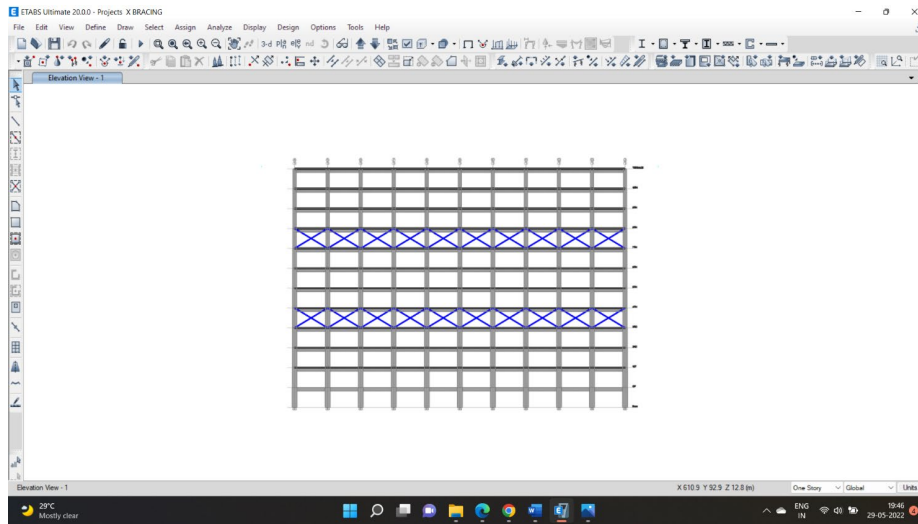


Fig. 2. Elevation View of Cross Type of Bracings Model

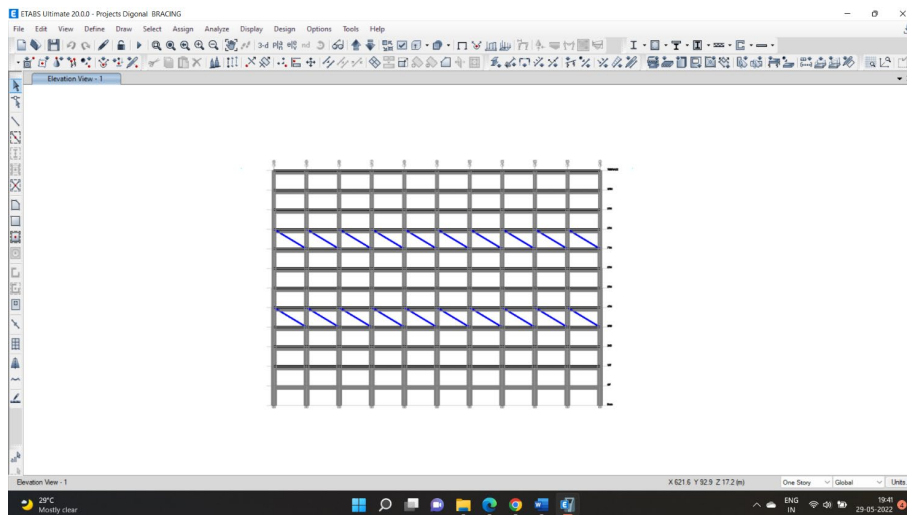


Fig. 3. Elevation View of Diagonal Type of Bracings Model

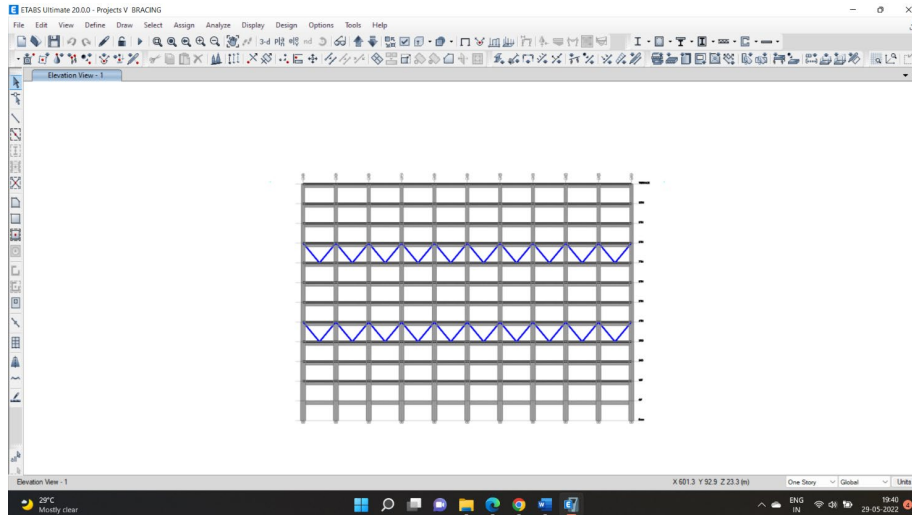
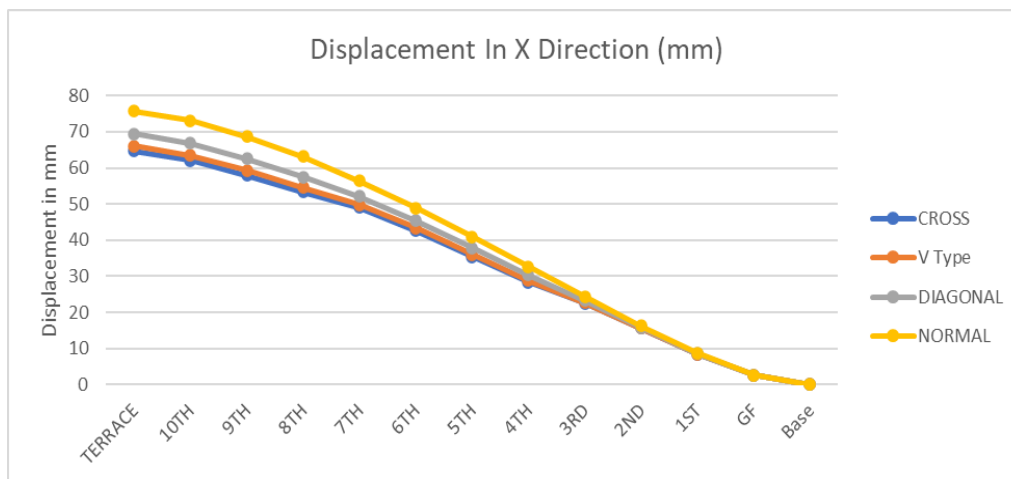
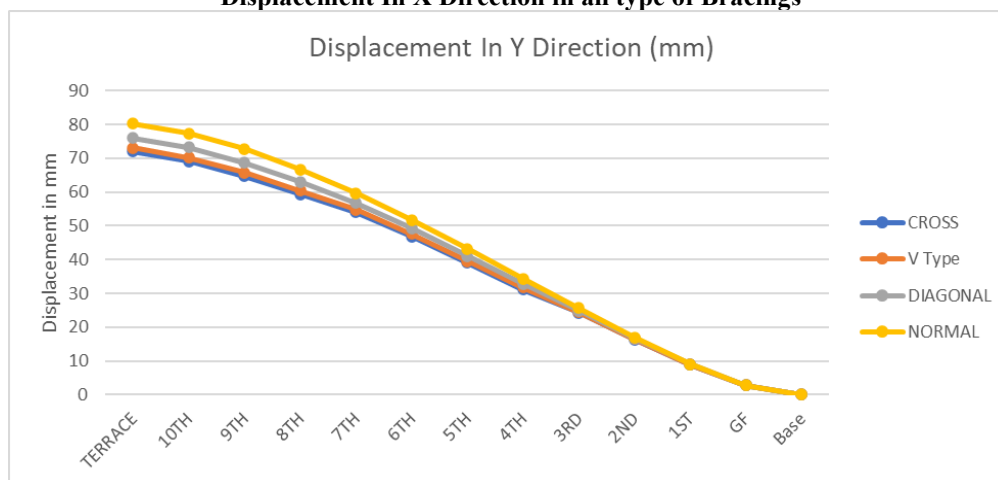


Fig. 4. Elevation View of V Type of Bracings Model

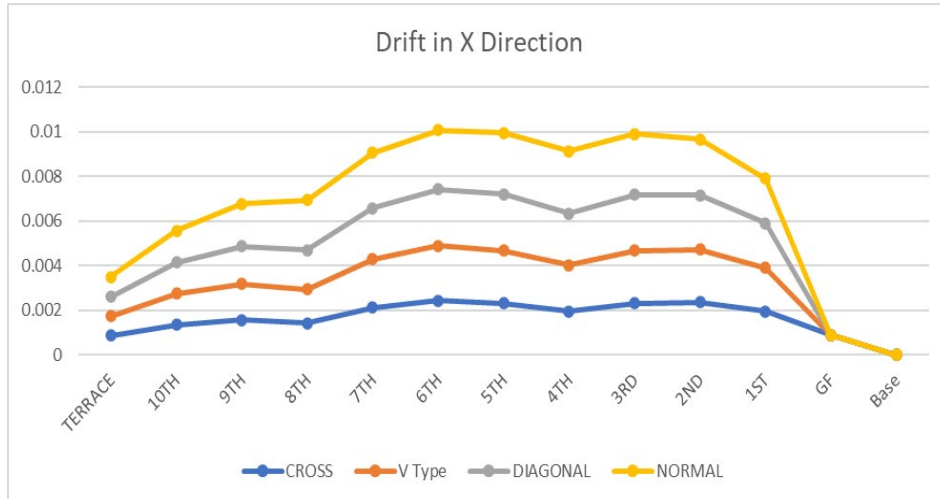
III. EXPERIMENT AND RESULT



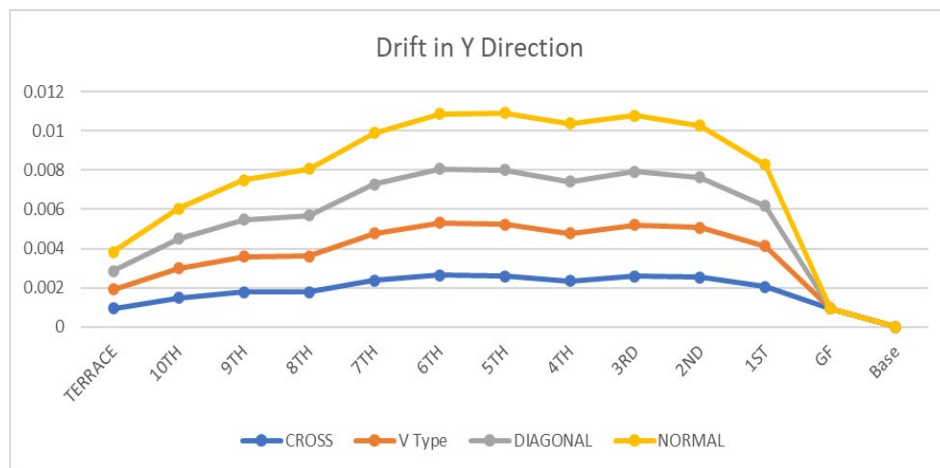
Displacement In X Direction in all type of Bracings



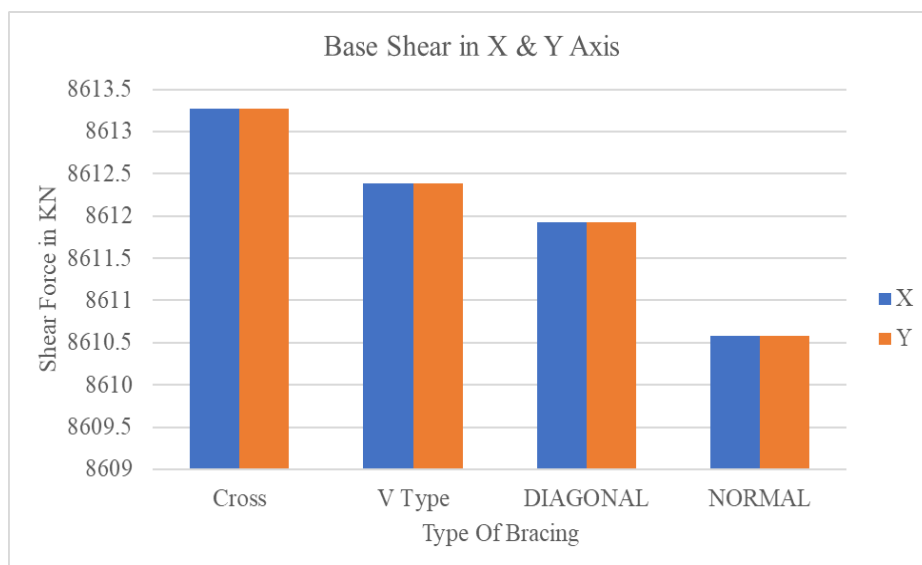
Displacement in Y Direction in all type of Bracings



Drift in X Direction in all type of Bracings



Drift in Y Direction in all type of Bracings



Shear Force in X and Y Direction in all type of Bracings



IV. CONCLUSION

- Deflection in model with no bracing is more compare to the Model with Bracings
- The Model with Cross bracing is less deflected than the Model with other two type of Models i.e., V or Diagonal
- To minimize the lateral displacement in normal Model there is need to put the bracing as the extra member to stabilize the structure
- Since the Center of mass of Structure is in the Core Deflection and Drift over there is more compare to other portion of the Structure. Hence, we have Provided braces to the H/3 level of the Model.
- We also took results of Shear Force, but there is no major difference in all the models, (almost Same).

V. REFERENCE

- [1]. Tafheem Zasiah, Shovona Khusru "Structural behavior of steel building with concentric and eccentric bracing: A comparative study" Volume 4, No 1, 2013 ISSN 0976 – 4399
- [2]. Sangle .K , Bajoria K.M. and Mhalungkar V. 2012 "Seismic analysis of high rise steel frame building with and without bracing " 15WCEE LISBOA
- [3]. Jagadish J. S, Doshi Tejas D. July - 2013 "A Study on Bracing Systems on High Rise Steel Structures" International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 Vol. 2 Issue 7, July - 2013
- [4]. Takey Manish S. Prof. Vidhale S.S. "Seismic response of steel building with linear bracing system (a software approach)" International Journal of Electronics, Communication & Soft Computing Science and Engineering ISSN: 2277-9477, Volume2, Issue 1
- [5]. M. Adithya., K.S Swathi rani, H K Shruthi and Dr. B.R Ramesh " Study On Effective Bracing Systems for High Rise Steel Structures February 2015" SSRG International Journal of Civil Engineering (SSRG-IJCE) – Volume 2 Issue 2 "
- [6]. Kulkarni Y.U.and Prof. Joshi P. K. November 2014 "Analysis and design of various bracing system in high rise steel structures." International Journal of Advance Research in Science and Engineering JARSE, Vol. No.3, Issue No.11, ISSN-2319-8354(E)
- [7]. A Jesumi, M.G. Rajendran "Bracing System for Steel Towers" April 2013 International Journal of Engineering Research and Applications Vol. 3, Issue 2, March -, pp.729-732
- [8]. IS: 875(Part-2)- 1987 "Code of Practice for Design Loads (Other than Earthquake) buildings and structures", Part-2 Imposed loads, Bureau of Indian Standards, New Delhi
- [9]. IS:1893-2002, "Criteria for Earthquake Resistance and Construction of Buildings", Bureau of Indian standards, New Delhi.
- [10]. Ghosh Rabindranath 1, Khan Wamiq 2, Khan Aamir Zaman 2 , Wahab Mariya A Study on Review of Literature of Comparison of Lateral Displacement in a Building with and Without Bracings Journal of Recent Activities in Infrastructure Science e-ISSN: 2582-3124 Volume 4 Issue 3
- [11]. Sangle K.K.,Bajoria K.M, Mhalungkar V. 2012 SEISMIC ANALYSIS OF HIGH RISE STEEL FRAME BUILDING WITH A ND WITHOUT BRACING WITH AND WITHOUT BRACING , LISBOA 2012
- [12]. Kumar Rahul Meena1 , Awadhiya G P 2, Paswan Abhishek Prakash 3 and Kuma Harshit r 2017 Effects of Bracing System on Multistoried Steel Building IOP Conf. Series: Materials Science and Engineering 1128 (2021) 012017 IOP Publishing doi:10.1088/1757-899X/1128/1/012017