A Review: Time History Analysis of Multistory Building By Using Bracing System

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Abstract- *In this study, design, analysis and comparison of the different brace layout has been carried out.A several buildings of various storey's have been taken up to compare the response of braces. Buildings are conventionally designed. X brace, diagonal brace, inverted V brace and Buckling Restrained Braced (BRB) are considered for the study of building. The finite element software ETABS 2016 has been used for modelling and analysis. A building model was considered to analyse the behaviour of a structure with and without brace. Non-linear time history analysis has been performed to study of storey drift, storey stiffness, storey displacement, base shear, acceleration and velocity. The bracing systems in this study is applied to its basement only to increase its cost effectiveness. Low rise and high-rise building category is selected i.e. G+3 and G+9 for various time history data. Input file in ETABS are applied in Time vs Acceleration form readings are recorded the data selected from earthquake zone III and IV.*

Keywords- BRB, Time History Analysis, Bracing, Soft storey.

I. INTRODUCTION

Buildings around the world are subject to various loading conditions. During the design of a building, the designer must estimate the loads related to the building itself, for example the static forces due to connections. However, the building would also possibly be affected by external excitations, such as earthquakes. These disturbances induce undesired vibrations in the building, make people uncomfortable, cause damage to the structure and the equipment, and reduce the life of the building. Because the disturbances are dynamic in nature and highly uncertain with respect to magnitude and arrival times, the uncertainties make the design challenging at times. Earthquake can be classified based on its size and occurrence into minor, moderate and strong depending on the severity of ground shaking during the earthquake event.

To satisfy strength and serviceability limit state, lateral stiffness is a major consideration in the design of multi storey buildings. The simple parameter that is used to estimate the lateral stiffness of a building is the drift index defined as the ratio of the maximum deflections at the top of the building to the total height. Different structural forms of multi storey buildings can be used to improve the lateral stiffness and to reduce the drift index. In this, study is conducted for braced frame structures. Bracing is a highly efficient and economical method to laterally stiffen the frame structures against wind loads. Bracing is efficient because the diagonals work in axial stress and therefore call for minimum member sizes in providing the stiffness and strength against horizontal shear. Thus, it is an important priority for a good structural design engineer to select the best and economical bracing system for the multi storey structures.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

In recent studies have shown that most of soft story analysis is carried by changing the soft story position. Further another research is carried on seismic analysis of RCC building by providing shear wall and bracing system.

Generally, studies shown that different type of bracing system is provided to RCC building from bottom to top, particular bays and middle bays or corner bays. Equivalent static analysis, response spectrum analysis and time history analysis are done on RCC building.

Effect of Soft Story on Structural Response of High Rise Buildings

F. Hejazi11,2 S. Jilani,1,2, J. Noorzaei1,2, C. Y. Chieng1, M. S. Jaafar1,2, A. A. Abang Ali1 (2011): in this paper, investigation study on adding bracing in various arrangements to structure in order to reduce soft story effect on seismic response of building. six models are prepared for analysis with different position of bracing.

Structural Response of Soft Story High Rise Buildings Under Different Shear Wall Location

Misam A, Mangulkar Madhuri N (2012): in this paper, investigation study on adding shear wall in various arrangements to structure in order to reduce soft story effect

on seismic response of building. Analysis is made by SAP software. It was found that location and numbering of shear wall acts an important factor for the soft story structures to displace during earthquake. Also, the soft story has been eliminated as the shear wall is added to the consider floor, the horizontal and vertical movements of building with shear wall installed in most bays are much reduced during earthquake compare with other models. So, it shows that the use of shear wall is effectively reduced effect of soft story on structure response in earthquake excitation.

Comparative Study on Seismic Analysis of Multistorey Building Stiffened with Bracing and Shear Wall.

Mohd Atif1, Prof. Laxmikant Vairagade2, Vikrant Nair3 (2015): in this paper, comparison of seismic analysis with bracing and shear wall. with different type of bracing with different position. In zone 2,3,4, and 5 by using STAAD Pro software. They conclude that Shear wall elements are very much efficient in reducing lateral displacement of frame as drift and horizontal deflection induced in shear wall frame are much less than that induced in braced frame and plane frame. Steel bracings reduce flexure and shear demands on beams and columns and transfer the lateral loads through axial load mechanism.

Study on Effective Bracing Systems for High Rise Steel Structures

Adithya. M1, Swathi rani K.S2, Shruthi H K3, Dr. Ramesh B.R4 (2015): in this psper, different types of bracing systems are analysed by using ETAB software. They conclude that using steel bracing is one of the advantageous concepts which can be used to strengthen or retrofit the existing structures.

The lateral storey displacements of the building are greatly reduced by the use of single diagonal bracings arranged as diamond shape.

Analysis and Strengthing of Soft Storey Building with Equivalent Diagonal Strut at Center Under Earthquake and Wind Load

Abdul Juned Siddiqui1, Prabhat Soni1, Aslam Hussain2(2016): in this paper, G+5 storey building is taken for analysis and analysis is done by changing soft storey position. Two models are prepared for analysis by using STAAD Pro software. They conclude that while providing equivalent diagonal struts at corner will reduces moment, shear force, displacement and storey displacement. Equivalent diagonal struts provide better stiffness to the building.

Comparative Analysis between Bare Frame, Infill Frame and Braced Frame with Soft Storey

R.M. Vinayak and Yogeendra R. Holebagilu (2016): in this paper, response spectrum analysis is carried out for bare frame, masonry infill frame and braced frame with three different soil types. Three models of G+5 RC building are prepared and analysis is done by ETAB software.

Seismic Analysis of High Rise Building Using Inverted V Bracings with ETABS Software

B.Naga Niranjan Kumar,1, Dr.M.Ashok Kumar2 (2016): in this paper, analysis of inverted v bracing with zone 3 and 5 with three soil types. Analysis is done with two models with bracing and without bracing. They conclude that by providing the bracings the stiffness of the structure is increased and storey shear is decreased with increase in height of structure. Time History analysis is performed for all the models i.e. without bracings & with bracings. Base Shear is increased with respect to time for the models with bracings. By providing lateral systems in the framed structures the reduction in the displacement, drift, storey shear, thereby increasing the stiffness of the structure for resisting lateral loads due to earth quakes.

Effective Study of Bracing Systems for Irregular Tall Steel Structures

Narasimha Murthy K1, Darshan SK2, Karthik AS3, Santosh R4, Shiva Kumar KS5 (2016): in this paper, different type of bracing systems investigated for the lateral stiffness. Equivalent static analysis method is used and for analysis STAAD Pro software is used. They conclude that braced model has least nodal displacements with respect to storey height when compared to un-braced reference model.

Nonlinear Seismic Analysis of Masonry Infill RC Buildings with Eccentric Bracings at Soft Storey Level

Danish Khana,, Aruna Rawatb (2016): in this paper, RC building is analysed with eccentric bracing at soft story. Nonlinear seismic analysis is done with seven storey building. They conclude that large displacements occur at first storey level in soft storey building compared to other type of buildings i.e. bare frame and infill frame. It is also observed that large portion of displacement concentrates in first storey and hence other storeys are undamaged.

Response Spectrum Analysis of Bottom Rigid Beam Storey and Intermediate Soft Storey Having Moment Transfer Beams

Sujeet Patil1, Prof. Vishwanath B Patil2 (2017): in this paper, 10 different models of 21 storey with different type of shear wall are prepared for analysis. by using ETAB software response spectrum analysis is done. They conclude that the presence of masonry infill and shear wall in the structure reduces the Story drifts. Story displacements are more for the bare frame model and the inclusion of shear wall reduces the displacements. Providing shear wall at all end corners of the building in X and Y direction significantly improves all parameters in the analysis. Seismic base shear is considerably more for masonry infill and shear wall models as compared with bare frame model. The storey masonary infill and also with swasthika type shear wall has got highest value of storey acceleration along X & Y direction.

Effect of Shear Wall and Bracing on Seismic Performance of Vertical Irregular Reinforced Concrete Buildings

Avadut A. Patil1, Yogesh T. Jadhav 2, Sumit B. Raut3, Shrikant S. Baravakar 4, Eknath B. Mane 5 (2017): in this paper, study of different techniques for resisting lateral forces acting on structure by use of shear wall and bracing arrangement by using SAP software. They conclude that Base shear has been increased because of bracing and shear wall indicating increased resistance to lateral loading. Shear wall and bracings are the effective modes of increasing the resistance to lateral loads. Story drift and displacements have been reduced due to shear walls and bracing and hence reduced lateral forces and bending moments in the elements
Seismic behavior of concentrically braced frames designed to AISC341 and EC8 provisions

Sina Kazemzadeh Azad a, Cem Topkaya a,, Abolhassan Astaneh-Asl b(2017): in this paper, study of similarities and differences between the practise in united states and Europe for seismic design of CBFs with x bracin and v bracing.
Seismic performance of concentrically braced frames with and without brace buckling

Jay Shen a, Onur Seker a, Bulent Akbas b, Pinar Seker a, Seyedbabak Momenzadeh a, Mahmoud Faytarouni (2017): in this paper, analytical study on seismic performance of special concentrically braced frames with and wthout vrace buckling is done. Six story building is analysed using x and inverted v bracing.

III. WRITE DOWN YOUR STUDIES AND FINDINGS

The aim of the research is to study the behaviour of soft story of multi storey buildings under seismic excursions. The present work is focused to study and find the different parameter of RCC framed structure using braces, i.e. base shear, velocity, acceleration. Multi-storey RCC building low rise and high rise i.e. G+3 and G+9 will be studied with cross bracing, diagonal bracing, inverted v bracing and BRB bracing under the action of Konya, Bhuj and Uttarkashi earthquake record. All the response quantities of RCC structures will be investigated with and without the application of braces.

IV. CONCLUSION

From the literature study it is found that the research is done on seismic analysis of soft storey by changing soft storey position. And another research is done on seismic analysis of soft storey by adding shear wall and different bracing system. But in this study shear wall and bracing are provided throughout to the building. Pushover analysis, response spectrum analysis and static analysis methods are used for analysis. Results are collected in terms of max. moment, max. storey displacements, max. shear force, max. axial force and max. drift. But it is notice that the research is not carried on bracing provided only in soft storey. Therefore, decided to work done on cross bracing, diagonal bracing, inverted v bracing and BRB bracing in soft storey.

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