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ANALYTICAL STUDY OF MULTISTORIED RCC BUILDING WITH VARIOUS BRACING SYSTEMS ON SEISMIC RESPONSE CONTROL

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Abstract: - Earthquake induces the lateral forces on the parent element of the building. Columns are the primary lateral load resisting element of building so to reduce the effect of earthquake on the building structure bracing systems are effectively used now a day as bracing system is lateral force resisting system. The lateral forces on column are transmitted to braces through beam column joint axially. Bracing member descend the lateral deflection of the building by buckling and yielding during axial compression and tension respectively. Braced can be installed within frame in various configuration like diagonal, X, V, Inverted V & K. The basic function to use the bracing in building is to reduce the displacement, moment in large extent.

Bracing system are of two types, Concentric bracing & Eccentric bracing. And both are used to reduce the lateral forces that are coming on any structure. In this project a G + 7 RCC building frame with ISMB 125 steel section as a bracing is used along with size of beam 300 X 400 mm & size of column 400 X 500 mm, with M20 grade of concrete & Fe415 grade of steel. Here the building is situated in zone number 4 which is highly seismic zone, to analysis the building a previously occurred earthquake time history analysis is directly applied to the base of the building in the form of Acceleration in X direction & the responses of the building is studied. Here North ridge, Imperial Valley, Kern & Loma Prita earthquakes are used. To analysis the structure time history & pushover analysis method is used. After the application of load that is dead load, live load, earthquake load the building is analysis for various types of bracing systems to study the effect of bracing systems and effect of structure is compared using four parameter as storey drift, storey shear, storey displacement & storey moment in SAP 2000 and the results are computed in the form of tables and graphs.

Keyword – time history analysis, pushover analysis, storey displacement, storey drift, shear force bending moment.

I. Introduction

The primary requirement the advancement in engineering practices, researchers developed systems which reduced the effects of seismicity on the engineered structures. One such evolution which is added to the buildings is bracing system.
Bracing system is nothing but the lateral force resisting system. Earthquake induces lateral forces on to the parent elements of building. Columns are the primary lateral load resisting element of any multi-storey. These columns alone cannot counter the attack of earthquake therefore bracing members were introduced inside the frames of multi-storey to

ascend the lateral stiffness of the relevant structure. The lateral force on columns is transmitted to braces through beam column joints axially. Bracing members descends the lateral deflection of the building by buckling and yielding during axial compression and tension respectively. Braces can be installed within frames in various configurations like diagonal, X, V (chevron), inverted V and K.

II. RESEARCH OBJECTIVE

1. Study the effect of bracing as metallic damper through Non Linear Dynamic Time History Analysis.
2. To study the response of building with and without bracing system.
3. To verify whether the passive energy dissipation used

III. METHODOLOGY

Step1: Modeling of Building Frame

RCC Building frame structure with steel as a bracing. The frame is analysed with dead load and live load for beam and columns in SAP 2000 IS Code _IS456:2000, IS 1893:2002, IS 875 part -2

Step 2: Analysis

Each type of frame is analyzed separately by using push over analysis method and time history analysis method by using STAB 2000.

Step 3: Comparison of results

a) The result acting is compare in term of theory displacement, theory drift shear force, bending moment etc.
b) Review the existing literature.
c) Selection of model for the case study.
d) Modeling the selected structures in different seismic zones 4.
e) Non Linear analysis of the selected structure model and a comparative study on the results obtained from the analysis.
f) Finally compare the result and observation

IV. NEED OF STUDY

a) Normal building is not stable in earthquake forces.
b) Bracing system is more effective then metallic damper.
c) Time history analysis gives the details about past earth quick intensity.

V. MODELING AND ANALYSIS

The RCC factor is modeled as three dimension using analysis software SAP 2000. The structure consider as G+ 7 storeys's building symmetric in both direction. The structure is analysis for time history analysis method and push over analysis.
Model analysis is used to determine the storey displacement, story drift, shear force bending moment

VI. PROPERTIES OF STRUCTURE

ASSUMED DATA

Building	G + 7 Storey
Slab Thickness	150 mm
Live Load	3 kN/m^2
Floor Finish	1 kN/m^2
Concrete Grade	M20
Concrete Density	25 kN/m^3
Steel Grade	Fe415
Steel Density	7850 kN/m^3
Earthquake Used	North Ridge, Imperial Valley and Loma Prieta Earthquake.

Column and Beam Sizes for Modeling of Building

Sr. No.	Element	Notation	Size (mm)
1	Column	C1	350 X 400
		C2	450 X 500
2	Beam	B1	300 X 350
		B2	350X400

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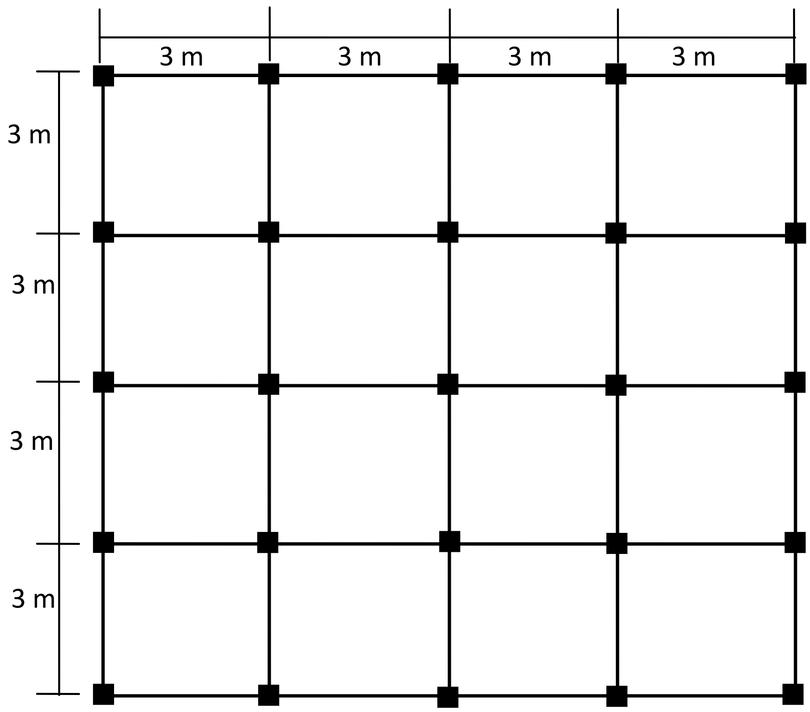
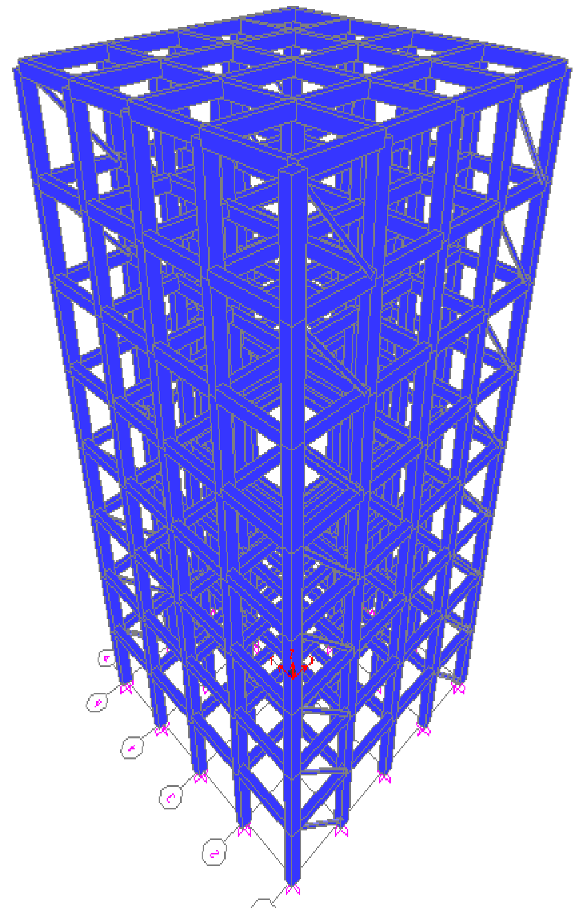
4.2.3 Description of Bracing

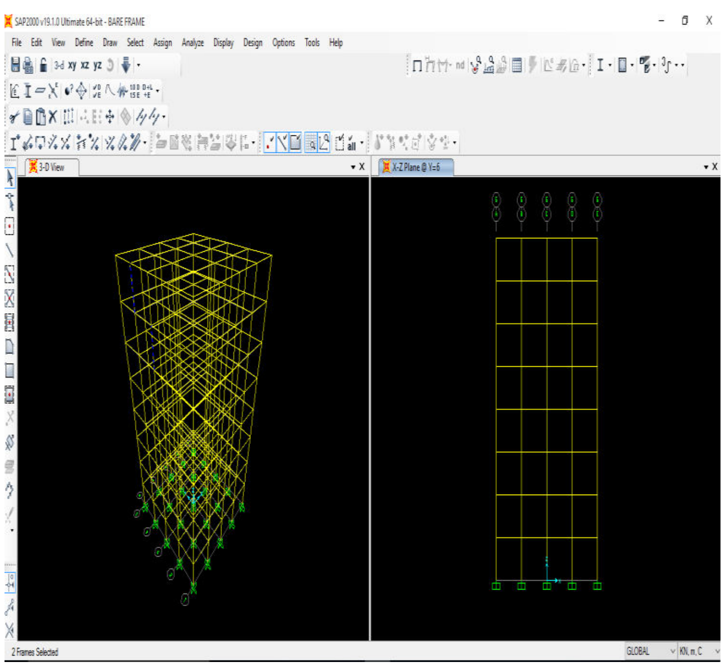
Section Used	ISMB125
Material Used	Mild Steel

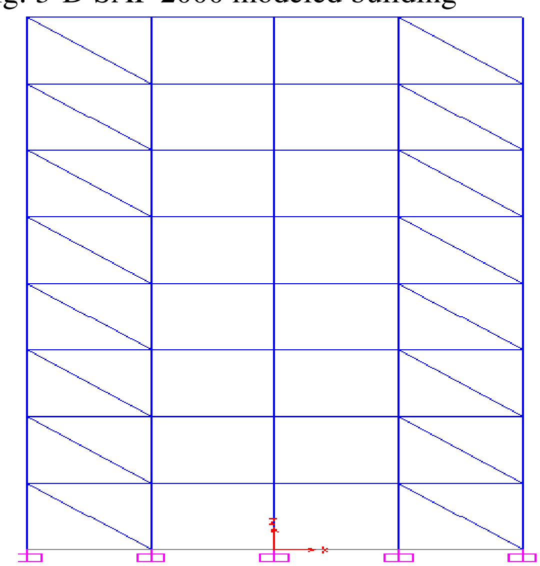


1. Figure: typical plan of modeled building



2. Fig: 3-D SAP 2000 modeled building





3. Figure 3-D and Elevation View of Eccentric Braced Frame Structure

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