# TIME HISTORY ANALYSIS OF FIXED BASE AND BASE ISOLATED REINFORCED CONCRETE BUILDING

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**Abstract –** *Base isolation is one of the most widely accepted seismic protection systems used in building structures in earthquake prone areas. The base isolation system separates the structure from its foundation and primarily moves it relative to the upper structure. The purpose of this study is to decrease the base shear, story acceleration, story drift and column and beam forces due to earthquake ground excitation, applied to superstructure of the building by installing base isolated devices at the foundation level and then to compare the different concerts between the fixed base condition and base isolated condition by using ETABS 2016v software. In this study, G+14 symmetrical RCC building is used as test model. Lead rubber bearing and high damping rubber bearing is used as base isolation structure in this study. Nonlinear time history analysis is used on both fixed and base isolated buildings. Comparative study is contains two portions. They are comparisons between fixed and base isolated buildings and comparative study of performance by two different time history data like El-Centro and Bhuj. Finally, base shear, displacement, acceleration, story drift and column and beam forces are compared from two time histories analysis between fixed and base isolated condition. It is found that displacement is increased with base isolated building. Base shear, acceleration, story drift and column and beam forces are decreased in base isolated than fixed base building.*

*Key Words***:** *Base Isolation, RC Building, Lead Rubber Bearing, High Damping Rubber Bearing, Nonlinear Time History Analysis.*

# 1. INTRODUCTION

During earthquake attacks, earthquake causes substantial loss of life and property especially to man-made structures. In last two decades considerable movement have been accomplished in the area of seismic protection of structures. But from last few years earthquake resistant design of structures has been largely based on ductility design concept. The performances of ductility design structures during major earthquake have been proved to be unsatisfactory. Now a day's there is most widely adopted and accepted seismic protection system is isolation.

The concept of isolation has become practice since it was used in the elementary school in Skopje, Yugoslavia by rubber isolation system to protect school from earthquake. At present multilayer isolation bearings are used which are made by vulcanization of sheets of rubber to thin steel reinforced plates. These bearing systems are very stiff in vertical direction and carry the vertical load of the structure, very flexible in horizontal direction to move in lateral direction under strong ground motion.

The earthquakes happen and are uncontrollable. So, in that sense, we have to accept the demand and make sure that the capacity exceeds it. The earth quake causes inertia forces as that ground accelerations increases, the strength of the building, the capacity, must be increased to avoid structural damage. In high seismic zones the accelerations causing forces may exceed one or even two times the acceleration due to gravity. It is easy to visualize the strength needed for the level of load, strength to resist; means than the building could resist gravity applied sideways, which means that the building could be tripped on its side and held horizontally without damage.

# 2. OBJECTIVES

- Modeling and analysis of fixed base and base isolated buildings using ETABS software and then study the effect of earthquake ground motions on these models.

- To design and study the effectiveness of lead rubber bearing and high damping rubber bearing which is used as base isolation system.

- To carry out comparison between fixed base and different types of base isolated buildings using different time history data's on the basis of their dynamic properties like maximum bending moment, maximum shear force, story displacement, story drift, story acceleration, base shear and time period.

- To study the behavior of earthquake resisting base isolated buildings.