



Study of the seismic behavior of eccentrically braced frame with vertical and horizontal link

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ABSTRACT

The design of an eccentrically braced frame is based on creating a frame which will remain essentially elastic outside a well define link. There are two type eccentrically braced frame, eccentrically braced frame with vertical link and horizontal link. One of the exclusion of plastic deformation from the main stricture result on no damage in the roof of the structures under severs earthquakes, easy and simple rehabilitation, and the replacement of link father earthquake. Use vertical link in the eccentrically braced frame prevent rotation mean beam and cause decreased damage in the main structure. In the study, 3-D steel building in 4, 8 and 12 story by short link beams was modeled. Short link beam considered to 0.5 m, 4, 8 and 12 numbers of stories. In paper, non-linear static analyses and non-linear dynamic performed. It was observed that use vertical link in the EBF prevented rotation mean beam. Also use vertical link in the EBF decreased base shear, relative acceleration and relative velocity in the structures. It was observed that eccentrically braced frame with vertical link yields less displacement and so the energy dissipation capacity increased.

KEYWORDS: Eccentrically Braced Frame, Vertical Link, Horizontal Link, non-linear dynamic

1. INTRODUCTION

Eccentrically braced steel frames are hybrid systems that combine frame stiffness of centrically braced frames with ductility and capability to dissipate seismic energy of moment resisting frames of which at least one end of the bracing is connected to the beam so as to form a segment in the beam called link beam .It is well know that link beam are usually designed to remain in elastic region during ordinary loading but withstand nonlinear deformation during sees The design of an eccentrically braced frame is based on creating a frame which will remain essentially elastic outside a well define link.

The critical factor which influences the inelastic behavior of the link is its length which is correlated to the capability to dissipate seismic energy and the collapse mechanism of the system. One of the advantages of vertical links over their horizontal counterparts is the exclusion of plastic deformation from the main structure result on no damage in the roof of the structures under sever earthquake ;easy and simple rehabilitation ;and the replacement of link after earthquake .using the vertical links for seismic rehabilitation of the existing buildings is possible with minor changes in the main structure ;however ,in large or tall building and also in strengthening of the existing structures ,due to limitation of dimensions of the existing components of the structures ,the application of the single vertical link has lots of obstacles. The transferred shear from the vertical links, especially in concrete structures, can limit the application of big vertical links. In such case, using double vertical links is recommended [5].

2.Eccentrically braced frame

In eccentrically braced frames, braces in each span are located with distance in longitudinal axis of beam or with distance by beam to column connections is illustrated in Figure1. In these systems lateral behavior of structure is the combination of axial forces, shears and moments of beam and columns in braced spans and the compressions and of braces.

These systems are expected to withstand significant inelastic deformation in the links whereas other segments of system (out of link beam segments) shall be designed to remain essentially elastic. Therefore, although it has convinced ductility, it has enough stiffness too. The EBFs ductility and stiffness change by its length of link beam and therefore