PROPORTIONAL LOCATION OF BRACES TO REDUCE TORSION EFFECT AND WEIGHT OF STRUCTURES

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Keywords: Earthquake, Location of Braces, SDB

In this study, the optimal placement of X steel diagonal braces (SDBs) is presented to reduce the weight of structure by 30% approximately.

According to the fundamental role of lateral resistance elements in tall structures, to cope with the earthquake forces and sort the elements constrains, present research as for the asymmetric posture braces is performed in the steel structures. In this study, after reviewing the effect of eccentricity of center of stiffness towards the center of mass and torsion caused by it in a building that has been implemented in the past. Also by changing the arrangement of braces, the amount of steel consumption is an important economic indicator in each of the Items is analysed. Then the displacement parameter is the criterion used for the detection of structural damage was evaluated. Finally, the base shear changes according to eccentricity are examined.

It is well-known that the lateral drift of a frame, accordingly the total structural weight, can be drastically reduced by placing braces, provided that the stiffness and strength of the beams, columns and braces are appropriately distributed. Takewaki et al. (1990) optimized a frame with K-braces at the specified locations. Kameshki and Saka (2001) optimized frames with different kinds of braces, and compared the optimization results. Although the cross-sectional properties of beams, columns and braces are optimized for each optimization problem in their study, the types and locations of braces are not considered as design variables. Hence, the optimized braced frame may be overly stiffened, because of the limitation on the types and locations of braces.

Due to the size and geometry of the ground reality is such that makes have an irregular structure in plan that placed under torsion. In this study, we examine a building that has been implemented in the past, and we show that near the center of mass and stiffness, and reduce the eccentricity of the appropriate layout braces, how much base shear and structure weight (steel consumption) is reduced. And also we start type of analysis to the sensitivity of the irregular structure under torsion. In this study, two types of analysis included quasi-static and dynamic spectral analysis is studied.

Economic parameter of the project was the main objective of the present study and in addition to its criterion displacement and base shear variation are reviewed. Three structure of the sample were studied to determine the effect of asymmetric location of braces in steel structures. Plan of the structure shown in Figure 1.

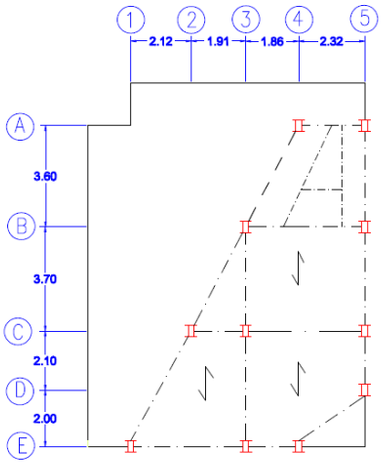
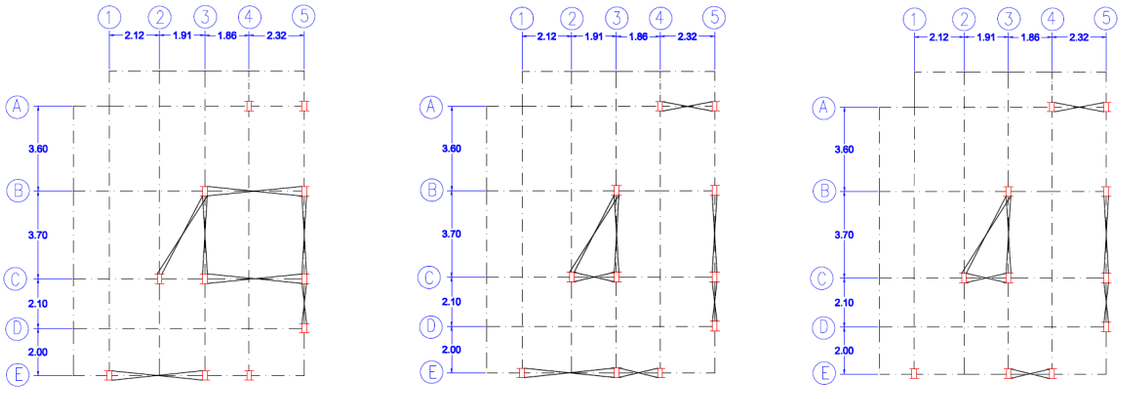


Figure 1. Plan of the structure

The structure located on soil type 2 and type of used steel is St-37. The structure was six-story that designed per Iranian building and seismic code for very high seismicity zone areas. Height of first story is 5.5 m and height of the other stories is 2.7 m.

The present study has tried to obtain the most economical state of the structure to close down the center of mass and stiffness with shift braces. Different arrangement of braces is shown in Figure 2.



Model 3 Model 2 (the model has been implemented) Model 1

Figure 2. Arrangement of braces

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