INVESTIGATING THE EFFECT OF TORSION IN NONLINEAR BEHAVIOR OF COMMON RC BUILDINGS WITH SHEAR WALL

Abouzar AHMADI
Aryan Institute of Science and Technology, Babol, Iran
Abouzar_ahmadi90@yahoo.com

Hamed HAMIDI JAMNANI
Faculty of Civil Engineering, Babol University of Technology, Babol, Iran
h_hamidi@iust.ac.ir

Gholamreza GHODRATI AMIRI
School of Civil Engineering, Iran University of Science and Technology, Tehran, Iran
ghodrati@iust.ac.ir

Kewwords: Torsion, Nonlinear Analysis, Common RC Buildings, Shear Wall

Shear wall is one of the competent structural factors against the earthquake, which is used in most of the present concrete or strengthened buildings. Sometimes because of architectural limits and difficulties in forming, we need to locate shear wall with different forms and cases for a structure and this makes a difference in the distance of center of mass and center of stiffness and so that it makes torsion in the structure. To study the impacts of this torsion, two random concrete buildings with eight and twelve floors, in which the arrangement of shear walls is located in different cases, have been used. The rigidity and flexibility of the floor diaphragm, the location of shear wall beside the stairs and the elevator and its behavior in any different performing areas which change the distance between the center of stiffness in any case are studied. It is obvious that these changes will lead to creating torsion in the structure. To study the effect of torsion in mentioned structures, the nonlinear analysis in 3D model is used.

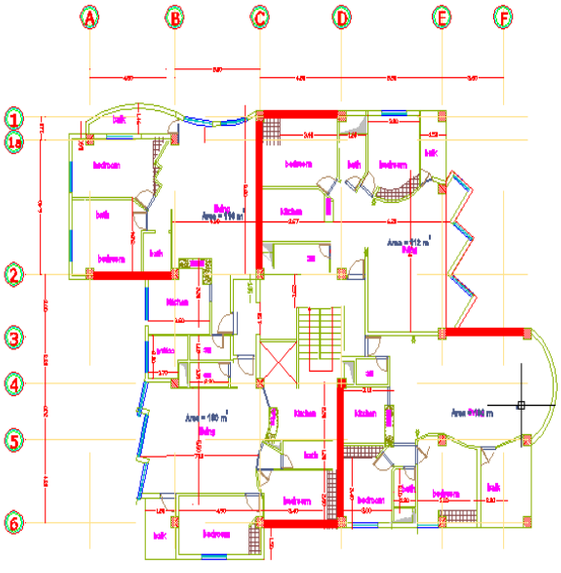

Figure 1. The shear wall in the shell and far from the stair case and the elevator

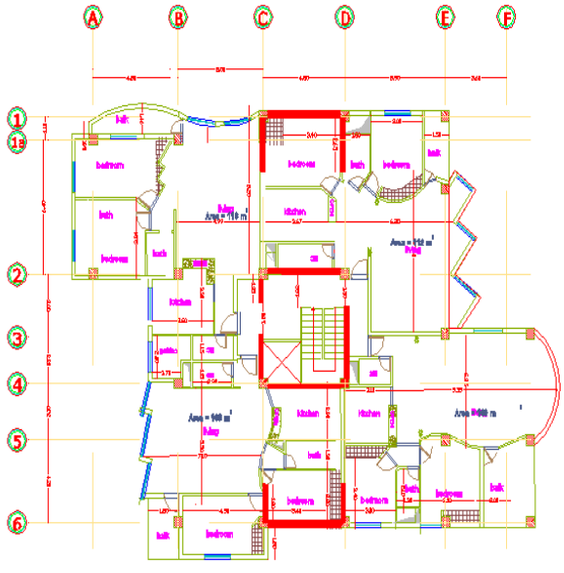

Figure 2. The shear wall in the core and around the stair case and the elevator

Although the analysis and design of shear wall have been used for a long time, but the study of the effects of torsion for a specific structure and considering several cases of locating shear wall in that structures, have (never) been studied in the past. This research is going to study these effects concerned the locating walls and shear walls beside stair case (the bridgeboard of the stair case can act as a rigid factor as well) and locating walls beside the way led to elevator, which is floor free, by means of nonlinear dynamic analysis.

It is also studied that if this structure will be with or without rigid diaphragm, what would be the reply and how it would be controlled, in different performance levels, and how would be the behavior of the structure. The results show that implementing the shear wall in the core and around the stair case and the elevator will lead to worse responses in most cases the critical story occurrence at middle story.

REFERENCES

Building Seismic Safety Council (BSSC) (1997) NEHRP Guidelines for the Seismic Rehabilitation of Buildings, FEMA-273, Federal Emergency Management Agency: Washington

De-la-Colina J (2003) Assessment of design recommendations for torsionally unbalanced multistory buildings, *Earthquake Spectra*, 19:47– 66

Perus I and Fajfar P (2005) On the inelastic torsional response of single-storey structures under bi-axial excitation, *Earthquake Engineering and Structural Dynamic*, 34(8): 931-941

Poursha M, Khoshnoudian F and Moghadam AS (2010) A Consecutive Modal Pushover Procedure for Nonlinear Static Analysis of One-way Unsymmetric-plan Tall Building Structures, resubmitted to *the Journal of Engineering Structures* for re-review

Stathopoulos KG and Anagnostopoulos SA (2002) Inelastic earthquake induced torsion in buildings: results and conclusions from realistic models, *Proceedings of the 12th European Conference on Earthquake Engineering*, London, Elsevier: Oxford, Paper no. 453