SEISMIC RESPONSE EVALUATION OF WALL AND SLAB STRUCTURES

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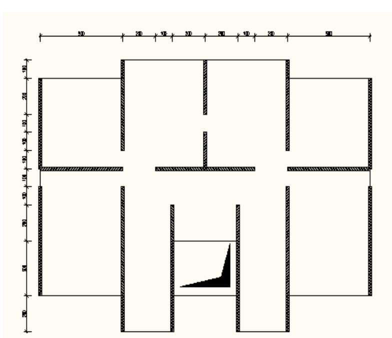
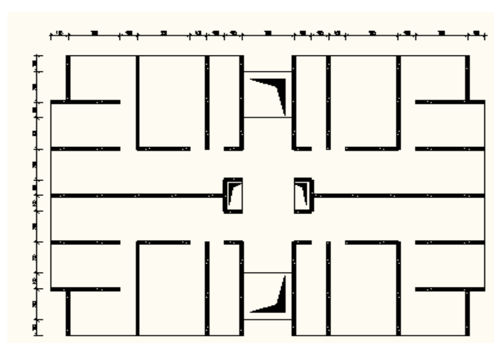
Wall and slab structural system (Tunnel form) is one of industrial systems that in spite of its widespread usage because of shorter construction time and economical aspects, no special seismic code is published for it. Having a load-carrying mechanism composed of reinforced concrete (RC) shear walls and slabs only, During recent earthquakes in 1985 Chili and 1999 Izmit and 2003 Bingol (Duzce Mw=7.1, Izmit Mw=7.4), the wall and slab structures exhibited better seismic performance in contrast to the damaged condition of a number of RC frames and dual systems (Bahadir et al., 2003). These buildings performed extremely well, and no damage was reported. Because of well seismic behavior, speed in construction and economical advantages of this system, it is wildly used in construction of multi-story buildings in regions high risk like Turkey, Chile, Japan and Italy (Bahadir et al., 2007).

There have been a few studies on seismic response of wall and slab structural systems that are composed of solely shear walls without accommodating any columns and beams and their performance is like box systems. This issue shows the need of a case study on this structural system.

In this study, the two chosen plans (Plan A, B) of the residential buildings, have been analyzed for five different building heights (story levels: 2, 5, 10, 12, 15). The structural system is composed of solely shear-walls and slabs having the same thickness as usual applications (Figure 1).



Plan A



Plan B

Figure 1: The chosen plans

In all models the shear-walls were modeled as sitting on the fixed base supports and soil effects were ignored. The reinforcements were modeled as discrete or embedded based on the criticality of their locations. The minimum amount of steel percentage taken in the analyses for shear-walls and slabs was 0.4 percent of the section area in accordance with the ACI 318 specifications.

In the analyses part, all structural elements including shear walls and slabs of 10 different plans are three dimensionally modeled by using finite-element modeling performed using SAP2000v.14.0.1 ADVANCED computer program. The horizontal loads have been defined in the form of push over (Figure 2).

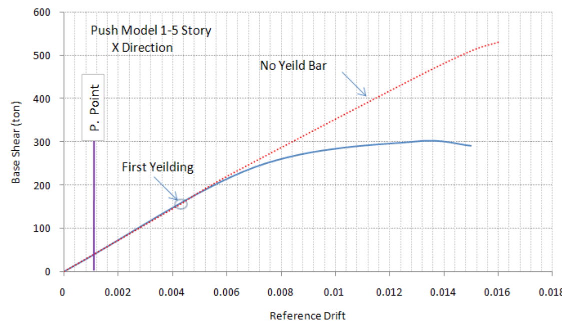


Diagram A

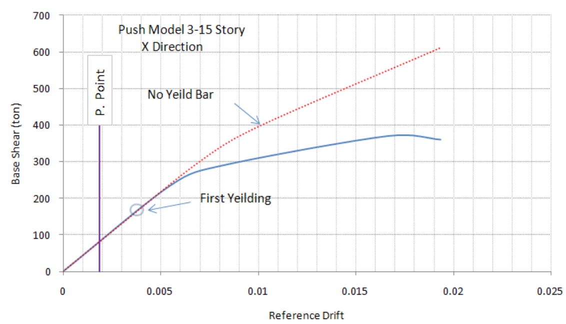


Diagram B

Figure 2. Reference drift vs. base shear

The development of a consistent R-factor based on inelastic static pushover analysis results of typical tunnel form buildings is presented. As the result, R-factor for this structural building is suggested to be considered 4.

REFERENCES

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