ABSTRACT

Indonesian is located in earthquake risk area. Earthquake disaster causes many disadvantages, like destroying the building especially the citizen’s house. This situation compelled the government to rebuild the citizen’s house quickly, so that the citizen can do their daily activities normally. Therefore, the concrete precast system is recommended for the solution, because concrete precast has good quality control and fast build.

The design of earthquake resistant house with precast concrete is divided in several parts (design of beam, column and beam-column connection). This research are about designing and analyzing the behavior of precast concrete beam (curvature ductility control with minimum requirement=16, crack control and displacement control) of seismic resistant house with infilled-frame structure that consider the contribution of infill panel in resisting the lateral load. The house that have been designed are one-story house (36 m²) and two-stories house (66 m²) in earthquake zone 4 (moderate) and 6 (high). Furthermore, pushover analysis is conducted to check the displacement ductility with minimum requirement = 4 and evaluate the inelastic behaviour of structure in several variation like dimension variation of connection between frame and wall (steel plate) and bracing that placed in column’s foundation. First pushover modelling : using 2x1 cm steel plate, second modelling : using 4x1 cm steel plate, third modelling : using 3x1 cm steel plate, fourth modelling : addition of wall brace on column’s foundation and fifth modelling : addition of column brace on column’s foundation.

The flexure and shear reinforcement’s result for precast concrete beam of earthquake resistant house in each zone 4 (moderate) and 6 (high) are same, that is because the beam’s moment result is not too different. So, it is concluded that there are 2 dimension of beams, 150×150mm (2D10), stirrups =φ8-25mm and φ8-50mm and 150×200 mm (2D13) stirrups= φ8-40mm and φ8-80mm which are satisfied with curvature ductility control crack control and displacement control requirement. From pushover analysis, it is concluded that all modeling are satisfied with displacement ductility requirement, dimension of connection between frame and wall affect the structure failure and for house on soft soil, it is better to add brace on column’s foundation in order to avoid soft-story effect. For the house on hard soil, it is unnecessary to add brace on column’s foundation because there is only few of plastic hinges on the column’s foundation and there is no significant damage.

Keywords: Precast beam, Seismic resistant house, Infilled-Frame