ABSTRACT

This research is a series of large research to study the model of fast built and seismic resistant house. In this study we only discuss the elements of the wall only, while other elements such as beams, columns, and plates are discussed in other theses which is a series of research. The selection of precast lightweight concrete because it has good durability, easy to predict their behavior (a more uniform concrete quality), lighter, easier in cutaneous unemployment and faster implementation in the field. The specific objective of this study is to analyze the behavior of precast walls, design dimensions, reinforcement, and the connection between the walls with beams and columns, and joints between walls.

There are two types of housing that is designed one floor houses (Type 36) and two floors houses (Type 72). Structural system used in the analysis frame is opened frame and infilled frame which became part of the wall stiffness of the structure stiffness. The material used is lightweight precast concrete with the quality of $f_c' = 18$ MPa, unit weight 1900 kg/m$^3$ and modulus of elasticity of 19,900 MPa. The house was assumed to be at Medium Risk (WG 4) and High Risk (WG 6) seismic zone with, and is calculated on soft ground and hard ground, so there are four conditions of the structure considered and for each of these conditions exist nine different types of wall dimensions because adapted to home design. Controls are made to the ductility of the wall element is the control over the moment-curvature diagram with the aid of Xtract program, crack control, the control structure performance through performance requirements for serviceability limit (KBL) and the ultimate performance (KBU) in SNI 1726-2002, and control ductility of the connections that are analyzed with the help of Lusas program.

Results of modeling for both types of structures is 10 cm thick walls and reinforcing two directions with a diameter ($\varnothing$) 8 mm and the spacing between 200 mm to 300 mm according to each type of wall. The results show that the ductility elements in all types of walls are greater than 16. While for the connection, there are two types of connection that is one for the column-wall connection type and with dowel welding on the side of each element, and the second type for the connection between the wall plate by welding embedded between the walls. From the results of the analysis for type 1, the connection ductility ($\mu_1$) is 4.86 (due to earthquake) and 4.83 (due to wind) equivalent to the reduction factor (R) equal to 7.6. Whereas for type 2, the connection ductility ($\mu_2$) is 5.0 (earthquake) and 3.64 (due to wind), which is equivalent to reduction factor (R) = 8.0 and 5.6 which indicates that the connection partially ductile structure capable of behaving.

Keywords: lightweight concrete, precast walls, seismic resistant, opened frame, infilled frames