

## ABSTRACT

Generally in highrise buildings there are shearwall and also opening for the needs of architects and plumbing in the floor plan. This has an effect on the behavior of the structure, especially the diaphragm which is the horizontal structure element which serves to distribute the lateral force to the vertical structural element. The distribution of lateral force in diaphragm that is concentrated on some area must be considered and reinforced to ensure the diaphragm can distribute the force properly. This is important for highrise building design and already presented on ACI 318-14 as one of the chapter. This research will analyze the effect of shearwall and opening on the distribution of force and also the location of diaphragm reinforcement to keep the diaphragm able to distribute the force without failure. Before conducting the analysis, several methods of analysis diaphragm were validated to determine method suitable to analyze building plan with shearwall and opening. The method used to analyze the force distribution by modeling the diaphragm as a strut and tie, with this concept of the flow of the force can be simplified into the compression force as concrete slab and the tensile force as reinforcement so that the location of reinforcement in the diaphragm can easily be obtained. The results of the analysis of some layout plan as parameters produce some conclusions, namely orientation shearwall affect the flow of the force on the diaphragm which makes the force distribution is uneven, causing the concentration of forces on beams and plates are aligned primarily to strong axis shearwall. Opening outside the collector path does not give a significant effect on the lateral force distribution but the opening located on the force path produces a stress concentration on the perimeter opening so it needs to be reinforced as well. Strut and tie model makes it easier to determine the location of the reinforcement such as beams and plates in line with the shearwall needs to be reinforced and the perimeter of the diaphragm on the building weak axis needs to be reinforced and also reinforced the perimeter opening located on the force path.

**Keywords :** diaphragm, diaphragm as strut and tie, lateral force distribution, diaphragm reinforcement location.