

# Analytical Study of Seismic Behavior of Precast Concrete Shear walls

## **Abstract:**

Nowadays, with growing population and the need of rapid methods for construction, using precast concrete structures is attended. Also, these structures have better quality in comparison with in-site ones. Past earthquakes have shown high damages applied to the precast concrete structure have been occurred in their connections. So the seismic behavior of a precast concrete structure depends significantly on the behavior of connections between the precast segments. Despite of the advantages of precasting, using precast concrete shear wall is limited in low seismic regions due to the lack of knowledge about this type of construction performance under seismic loading conditions. Therefore, the use of precast concrete shear walls needs further studies on seismic behavior of their connections. Due to the high cost of experimental studies, using comprehensive and efficient numerical methods that could predict the seismic behavior of this type of structures can be very effective. In this study, by using the finite element software ABAQUS, several precast concrete shear walls with different heights were modeled and effect of horizontal connections types that are used between precast concrete shear wall panels (Sleeve & Plate Connectors) was investigated. Finally, a comparison in terms of strength, ductility and energy absorption between similar monolithic and precast walls under seismic loading was done. The results indicate that precast concrete shear walls show lower resistance and initial stiffness in comparison with similar monolithic walls. Since the main difference between monolithic and prefabricated concrete systems is their connections, so this difference in stiffness and ultimate strength can be assigned to precast concrete wall connections. Therefore, more attention should be considered in the design of precast concrete shear walls connections. Also, the strength & the stiffness of precast walls can be improved by fortifying their connections. The sleeve connector shows better behavior in comparison with plate connector. Ultimate displacement of precast walls was reduced with plate connection. This is because of early concrete crushing failure due to increase panel rotation that is due to further plate deformations in comparison with sleeve. Although flexural cracks develop in monolithic walls, shear crack patterns is observed in precast walls.

**Keywords:** Precast concrete shear wall, precast connections, seismic behavior, strength, ductility.