World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:19, No:08, 2025

Evaluation of the Impact of Infill Wall Layout in Plan and/or Elevation on the Seismic Behavior of 3D Reinforced Concrete Structures

Authors : Salah Guettala, nesreddine.djafarhenni, Akram Khelaifia, Rachid Chebili

Abstract : This study assesses the impact of infill walls' layout in both plan and elevation on the seismic behavior of a 3D reinforced concrete structure situated in a high seismic zone. A pushover analysis is conducted to evaluate the structure's seismic performance with various infill wall layouts, considering capacity curves, absorbed energy, inter-story drift, and performance levels. Additionally, torsional effects on the structure are examined through linear dynamic analysis. Fiber-section-based macro-modeling is utilized to simulate the behavior of infill walls. The findings indicate that the presence of infill walls enhances lateral stiffness and alters structural behavior. Moreover, the study highlights the importance of considering the effects of infill wall layout, as non-uniform layouts can degrade building performance post-earthquake, increasing inter-story drift and risk of damage or collapse. To mitigate such risks, buildings should adopt a uniform infill wall layout. Furthermore, asymmetrical placement of masonry infill walls introduces additional torsional forces, particularly when there's a lack of such walls on the first story, potentially leading to irregular stiffness and soft-story phenomena.

Keywords : RC structures, infll walls’ layout, pushover analysis, macro-model, fiber plastic hinge, torsion
Conference Title : ICACE 2025 : International Conference on Architectural and Civil Engineering
Conference Location : Montreal, Canada
Conference Dates : August 05-06, 2025