

## Seismic Evaluation of Connected and Disconnected Piled Raft Foundations

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**Abstract :** Rafts may be used when a low bearing capacity exists underneath the foundation and may be combined by piles in some special circumstances; such as to reduce settlements or high groundwater to control buoyancy. From structural point of view, these piles could be both connected or disconnected from the raft and are to be classified as Piled Rafts (PR) or Disconnected Piled Rafts (DPR). Although the researches about the behavior of piled rafts subjected to vertical loading is really extensive, in the context of dynamic load and earthquake loading, the studies are very limited. In this study, to clarify these foundations' performance under dynamic loading, series of Shaking Table tests have been performed. The square raft and four piles in connected and disconnected configurations were used in dry silica sand and the model was experimented using a shaking table under 1-g conditions. Moreover, numerical investigation using finite element software have been conducted to better understand the differences and advantages. Our observations demonstrates that in connected Piled Rafts piles have to bear greater amount of moment in their upper parts, however this moments are approximately 40% lower in disconnected piled rafts in the same conditions and loading. Considering the Rafts' lateral movement which be of crucial importance in foundations performance evaluation, connected piled rafts show much better performance with about 30% less lateral movement. Further, it was observed on confirmed both through laboratory tests and numerical analysis, that adding the superstructure over the piled raft foundation the raft separates from the soil and it significantly increases rocking of the raft which was observed to be the main reason of increase in piles' moments under superstructure interaction with the foundation.

**Keywords :** Piled Rafts (PR), Disconnected Piled Rafts (DPR), dynamic loading, shaking table, seismic performance

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