

Studi pemodelan Elevated Pile Cap Foundations pada tanah lempung berbasis analisis Pushover = Modelling study of Elevated Pile Cap Foundations in clay based on pushover analysis

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Abstrak

Elevated pile cap (EPC) foundations merupakan fondasi dengan sebagian badan tiangnya tertanam dalam tanah dan sebagian lainnya berada di atas permukaan tanah. EPC foundations memikul momen lentur yang lebih besar dari jenis fondasi lainnya. Perilaku EPC foundations perlu diteliti lebih lanjut guna memastikan kinerja non-linier yang memadai terhadap beban seismik. Peneliti melakukan studi pemodelan menggunakan software OpenSees terkait perilaku EPC foundations dengan konfigurasi 2 x 3 pada tanah clay dengan meninjau aspek kekuatan, kekakuan, serta interaksi tanah dan pile. Uji pembebanan pushover monotonik dilakukan untuk menganalisis keruntuhan sesimik dan perilaku daktail dari EPC foundations. Konsistensi tanah divariasikan guna mengidentifikasi pengaruh konsistensi tanah terhadap kekakuan struktur. Hasil penelitian menunjukkan bahwa konsistensi tanah tidak berpengaruh terhadap daktilitas suatu struktur, melainkan berpengaruh terhadap defleksi. Semakin stiff konsistensi tanah, maka semakin kecil defleksi yang dialami tiang. Aboveground height divariasikan guna mengidentifikasi pengaruh aboveground height terhadap lokasi sendi plastis. Seluruh model membentuk sendi plastis hanya pada leading row piles. Sendi plastis pertama terbentuk pada sambungan pile-cap dan sendi plastis kedua terbentuk pada badan pile yang berada di bawah permukaan tanah. Semakin tinggi aboveground height, maka semakin dangkal lokasi sendi plastisnya. Secara keseluruhan, konsistensi tanah, aboveground height, dan nilai p-multiplier berpengaruh terhadap perilaku inelastis struktur.

.....Elevated pile cap (EPC) foundations are foundations with part of the pile body embedded in the ground and the other part above the ground surface. EPC foundations bear greater bending moments than other types of foundations. The behavior of EPC foundations needs to be investigated further to ensure adequate non-linear performance against seismic loads. Researchers conducted a modeling study using OpenSees software related to the behavior of EPC foundations with a 2 x 3 configuration on clay soil by reviewing aspects of strength, stiffness, and soil and pile interactions. Monotonic pushover loading test was performed to analyze the seismic failure and ductile behavior of the EPC foundations. Soil consistency was varied in order to identify the effect of soil consistency on the stiffness of the structure. The results showed that soil consistency did not affect the ductility of a structure, but rather had an effect on deflection. The stiffer the consistency of the soil, the smaller the deflection experienced by the pile. The aboveground height was varied to identify the effect of the aboveground height on the location of the plastic hinge. All models form plastic hinges only on leading row piles. The first plastic hinge is formed at the pile-cap joint and the second plastic hinge is formed at the pile body which is below the soil surface. The higher the aboveground height, the shallower the location of the plastic hinge. Overall, soil consistency, aboveground height, and p-multiplier value affect the inelastic behavior of the structure.