Gypseous Soils are distributed in many regions in the world including Iraq, which cover more than (31%) of the surface area of the country. Existence of these soils, sometimes with high gypsum content, cause difficult problems to the buildings and strategic projects due to dissolution and leaching of the gypsum caused by the action of water flow through soil mass. In this research, the performance of model pile in terms of ultimate bearing capacity and percentage of load carrying capacity by the pile shaft and the end bearing are investigated. The model pile is constructed in gypseous soil, and once regarded as floating pile when it was embedded in gypseous soil only, and once as end-bearing pile when dense sand underlined the gypseous soil. The gypseous soil with 42% gypsum content was brought from Bahr Al-Najaf, Al-Najaf Governorate which is located in the middle of Iraq. The model pile is aluminum circular solid section whose its diameter and length dimensions are 2 and 30 cm, respectively. Compression axial model pile load tests have been carried out on floating pile embedded in gypseous soil at different initial degrees of saturation (7, 25, and 50) % before and after soil saturation. Dense sand was chosen to represent the end-bearing stratum in end-bearing pile load tests. In this research study a comparison is made between different criteria for evaluation of the bearing capacity of a model pile. It was found that Shen's method gives almost an acceptable result in all model pile load tests. Large draw down in bearing capacity was observed when floating and end-bearing piles have been loaded after they were subjected to soaking for (24) hours. When the initial degree of saturation increases from 7% to 50%, the percent of reduction (Rd %) in the bearing capacity due to soaking effect was increased from 45% to 56%, and 47% to 61% for floating and end-bearing piles, separately. It was clearly obvious that the gypseous soil settles more quickly than the pile at the same time during soaking process. So, negative skin friction is induced along the pile shaft. The relative movement between soil and pile reduces when the initial degree of saturation increases, and it makes the effect of negative skin friction on model pile becomes lesser. Small total soil settlement leads to increasing the length of the transitional zone and decreasing the value of the negative skin friction.
friction along the pile shaft. However, effect of negative skin friction in end-bearing piles was more observable than the floating piles.
In this research other parameters were studied such as effect of different degrees of saturation and collapse potential on the adhesion factor and bearing capacity factors.