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Department	Civil Engineering
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Thesis Title	EFFECT OF SOIL CONTAMINATION ON THE BEHAVIOR OF DRIVEN PILES SUBJECTED TO LATERALLY CYCLIC LOADING
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Abstract	<p>This thesis focuses on studying the effects of industrial wastewater on the geotechnical properties of clayey soil and the behavior of piles subjected to lateral cyclic loads. The intact clayey soil samples, disturbed and undisturbed had been obtained from countryside city of Alexandria, which is located to the north of Babylon Governorate (UTM: 32N515276, 44E28102). The industrial wastewater is a product disposed from Al-Musayyib Thermal Electric Power Station, which includes solutions of acidic, alkaline and hydrocarbons. The clayey soil samples has been artificially contaminated with four percentages of (10, 20, 40 and 100) % from weight of water used in soaking process. The soaking process was continued for 30 days. Chemical, physical, and mechanical tests were conducted on intact and contaminated soil samples to investigate the effect of industrial wastewater on geotechnical soil properties of clayey soil.</p> <p>Mechanical model had been manufactured to study the behavior of single and piles group subjected to laterally cyclic loading embedded in intact and contaminated soils. All tests were performed on a free head pile subjected to one way lateral cyclic loads with two ratios of eccentricity to embedded length <math>e/L = 0.25</math>, and <math>0.5</math>; and one hundred cycles.</p> <p>Based on the results of tests, the following observations were obtained: the different percentages of contaminants have slight effects on the chemical and physical properties of soil, but have significant effects on the mechanical properties such as shear strength parameters, where the shear strength parameters decreased by (6-30) % with increasing the percentage of contamination; and consolidation properties, where the coefficient of vertical consolidation increased by (7-38) % in comparison with the properties of intact soil. The modulus of subgrade reaction decreased by (4-27) % with increase the concentration of industrial waste water.</p> <p>The soil contamination affects the behavior of single and piles group non-linearly, where the lateral resistance of soil decreased with increasing the concentration of contamination in the soil. The difference in the total lateral displacement for (<math>e/L=0.5</math>) is larger than (<math>e/L=0.25</math>) by (22-30) % for single pile</p>

	<p>and by (23-25) % for piles group under the same loads. The efficiency of piles group was (83-87) % from the single pile. The ultimate lateral load was calculated by using two line slopes intersection method for single and piles group. The ultimate lateral load of single and piles group for (<math>e/L=0.25</math>) decreases due to effect of contamination on resistance of soil by (6-35) %, while with (<math>e/L=0.5</math>) decreases by (8 -33) %. Depending on the analytical calculations of the ultimate lateral load by using the modified degradation model, it was found that <math>P_u</math> (analytical)/<math>P_u</math> (experimentally) ranges (86-90)% of single pile, and (97-120)% for piles group.</p>
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