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Investigation allowable bearing capacity of deposits in Mahshahr Special Economic Zone and Bandar-e Imam for surface foundations

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Abstract

One of the subjects of geotechnical engineering is soil bearing capacity, which is a function of the engineering properties of subsurface deposits and foundation characteristics. In this study, the results of 78 exploratory boreholes drilled in Mahshahr Special Economic Zone and Bandar-e-Imam were used to produce engineering geological maps with the aim of determining the soil bearing capacity in that area. The result from the boreholes shows that the sediment of the area is mainly clay and to a lesser extent silty clay and silty sand. After determining the soil classification, engineering parameters were determined based on laboratory test results. Then by using Hansen's formula and considering the allowable settlement of the foundation, bearing capacity was calculated for square foundation (1×1) and (2×2) meters, strip foundation with buried unit depth and a mat foundation (10×20) meters with buried depth one and two meters. By using the ArcGIS software, the load capacity map of the study area was produced and result shows that the allowable bearing capacity in this area varies between 0.40 to 0.98 (kg /cm^2) and the northern area has higher load capacity than other area.

***Keywords**: Bearing capacity, ArcGIS, Surface foundation, Mahshahr economic zone and Bandar-e Imam*

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Extended Abstract

1. Introduction

Production of geological maps is one of the practical aspects of engineering geology that can be used in urban development programs and initial assessment of structure location of these areas. Mohammadi et al. (2020) suggested seven areas with different engineering geological characteristics in Isfahan city. They emphasized the benefits of engineering geological maps with special use in urban development planning. They showed that the geotechnical characteristics of coarse-grained sediment do not change significantly with increased depth. Kim et al., (2020) suggested a three-dimensional model of subsurface material based on point data obtained from boreholes located in central part of South Korea. Palacios et al. (2014) suggested the bearing capacity map for Holocene sedimentary in the Granada city, Spain based on geotechnical data. They suggested that southeastern sediments have a higher bearing capacity than other areas. Al-defae, et al. (2020) based on 164 boreholes drilled data in Wasit province of Iraq, produced the bearing capacity map and physical and mechanical parameters for this area. Andriamamonjisoa, et al. (2019) used geomorphological and geotechnical data, for zoning in terms of bearing capacity and land use in the city of Antananarivo, the capital of Madagascar.

In this research, mechanical and physical soil parameters in Mahshahr Special Economic Zone and Bandar-e Imam area extracted from the results of 78 boreholes drilled and many laboratory tests. Based tese results allowable bearing capacity maps for this area produced.

2. Methods

In the present study, the drilling and laboratory test results of 78 boreholes in Mahshahr Special Economic Zone and Bandar-e Imam areas were collected. Then the maps of physical and mechanical parameters required to determine the allowable bearing capacity according to the interpolation technique were generated using ArcGIS software. After than , with the data obtained from exploratory boreholes and laboratory test based on Hansen formula (Hansen, 1970) the allowable bearing capacity maps for different foundations were produced.

3. Conclusion

According to the exploratory drilled data in the Mahshahr Special Economic Zone and Bandar-e Imam, the sediments of the area is mainly clay and a lesser amount of silty clay and silty sand up to a depth of 16 meters. Also, the amount of clay sediments decreases in deeper layers while the amount of sandy sediments increases. Groundwater depth of the study area varies between zero and 382 cm and mainly the groundwater depth of the area is less than 150 cm. the sediments are saturated or wet depending on the geographical location and conducted trials. The bearing capacity of different foundations varies between 0.40 to 0.98 (kg / cm^2) and the bearing capacity in the northern areas is higher than other area. It is suggested that allowable bearing capacity of the study area is between 0.40 to 0.60 (kg / cm2) are considered. Hence, due to low allowable load capacity in the study area, soil improvement is required for the construction of important structures such as large oil and gas reservoirs.

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