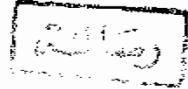


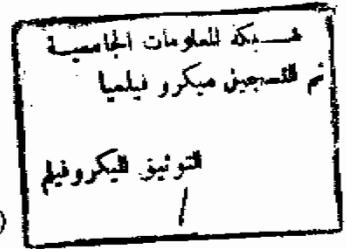
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FACULTY OF ENGINEERING
IRRIGATION AND HYDRAULICS DEPARTMENT

AN ADVANCED STUDY FOR SEEPAGE
UNDER
HYDRAULIC STRUCTURES WITH SHEETPILES



BY

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The work included in this thesis was carried out by the author in the laboratories of National Research Center, From November 1991 to November 1993.

No part of this thesis has been submitted for a degree or a qualification at any other University or Institution.

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ABSTRACT

Hydraulic structures founded on permeable soils are usually exposed to seepage. Many previous studies were carried out mainly to determine the optimum depth of the sheetpiles under the floor. However, this study determines the best ratio between the depth of sheetpiles at the two edges of the floor. Moreover, it finds the actual thickness of the effective seepage zone. It was found that, increasing of sheetpiles' depth ratio will decrease the exit gradient until sheetpiles' depth ratio is reached 0.4, but for decreasing the pervious layer thickness the exit gradient is constant until the pervious layer thickness becomes twice the heel sheetpile depth.

A formulae describing the uplift pressure at the key points and exit gradient was developed. The theoretical analysis has been obtained using conformal mapping and was formulated to solve the problem for different values of both the sheetpiles' depth ratio and the pervious layer thickness. A computer program was developed to compute the net uplift pressure at key points and the exit gradient.

An electrolytic model is also used to simulate the problem. Several runs covering a wide range of sheetpiles' depth ratio as well as a thickness of pervious layer are carried out. A comparison between the theoretical and experimental results shows a very well agreement. A design charts for computing the uplift pressure at key points and the exit gradient at the end of the floor were obtained.

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