UPLIFT PRESSURES UNDER WEIRS WITH THREE SHEET PILES.

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Introduction.

In a series of papers published in these Proceedings\(^1\) and in the Memoirs of the Punjab Irrigation Research Institute,\(^2\) the results of extensive investigations on uplift pressures under simple floors, under weirs with one sheet pile\(^3\) and under weirs with two sheet piles\(^4\) have been reported. In the present paper, the investigation has been extended to the case of weirs with three sheet piles. This case is of considerable practical importance, as many of the weirs constructed in India and abroad have three or even four sheet piles.

Experimental.

The technique of the method employed is essentially the same as that described in the first paper of the series.\(^1\) In all the cases investigated, the impervious floor BF in the model (Fig. 1) was 12" long. Each of the two sheet piles \(l_1\) and \(l_3\) at the heel and the toe, was 2" long and their position and length were not altered throughout the investigation. The varying factor was the intermediate sheet pile \(l_2\), the length and position of which was altered.

In the first set of observations, the sheet pile \(l_2\) was fixed half way between the heel and the toe sheet piles and seven cases were investigated, the length of \(l_2\) in each case being 0·5", 1·0", 1·5", 2·0", 3·0", 4·0" and 5·0". In the second set of observations, the sheet pile \(l_2\) was shifted by 1·5" towards the heel sheet pile \(l_1\), and the effect of varying its length on the uplift pressures was investigated as before. Two similar sets of observations were taken by shifting the intermediate sheet pile \(l_2\) towards the heel sheet pile \(l_1\) in two equal steps of 1·5". The four positions of the sheet pile \(l_2\) are shown...
by the lines CD, C1D1, C2D2 and C3D3 in Fig. 1. Thus a total number of twenty-eight cases was investigated. Equi-potential lines were plotted for decrements of 5% of pressure. One set of pressure contours is shown in Fig. 2,

as an illustration. For the purpose of design it is sufficient to know the hydraulic gradient under the floor and the pressures at certain points A, B, C, D, E, F and G (Fig. 1) which are reference points in connection with design. These pressures are shown below in the results.

Results.

The pressures at the points A, B, C, D, E, F and G are given in tables I–IV and the variation of pressure from point to point under the floor in Figs. 3–6.