

The Effect of the Side-Weir Crest Height to Scour in Clay-Sand Mixed Sediments

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Abstract : Experimental studies to investigate the depth of the scour conducted at a side-weir intersection located at the 1800 curved flume which located Hydraulic Laboratory of Yıldız Technical University, Istanbul, Turkey. Side weirs were located at the middle of the straight part of the main channel. Three different lengths (25, 40 and 50 cm) and three different weir crest height (7, 10 and 12 cm) of the side weir placed on the side weir station. There is no scour when the material is only kaolin. Therefore, the cohesive bed was prepared by properly mixing clay material (kaolin) with 31% sand in all experiments. Following 24h consolidation time, in order to observe the effect of flow intensity on the scour depth, experiments were carried out for five different upstream Froude numbers in the range of 0.33-0.81. As a result of this study the relation between scour depth and upstream flow intensity as a function of time have been established. The longitudinal velocities decreased along the side weir; towards the downstream due to overflow over the side-weirs. At the beginning, the scour depth increases rapidly with time and then asymptotically approached constant values in all experiments for all side weir dimensions as in non-cohesive sediment. Thus, the scour depth reached equilibrium conditions. Time to equilibrium depends on the approach flow intensity and the dimensions of side weirs. For different heights of the weir crest, dimensionless scour depths increased with increasing upstream Froude number. Equilibrium scour depths which formed 7 cm side-weir crest height were obtained higher than that of the 12 cm side-weir crest height. This means when side-weir crest height increased equilibrium scour depths decreased. Although the upstream side of the scour hole is almost vertical, the downstream side of the hole is inclined.

Keywords : clay-sand mixed sediments, scour, side weir, hydraulic structures

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