Experimental analysis of bridge pier scour

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Abstract

One of the main causes of bridge failure is the removal of bed material from around bridge foundations. Bridge piers that are located on highly erodible beds are subjected to failure due to scour caused by the structure obstructing flow. Flood flows in natural rivers causes scour around piers and creates large scour holes. Measurement of scour depth around the pier in the field is a difficult task but the same can be modeled in the laboratory on small scale with controlled conditions of flow, fluid, sediment parameters and structure geometry. Since bridge pier scour depth measurement is an important area of hydraulics and needs to be addressed. Its importance is clear from the fact that according to the National Highway Authority (NHA, 2009) report more than 70 % of bridges in Pakistan failed due to scour. Since in Pakistan no laboratory work has been carried out till date for measurement of pier scour depth around bridge pier, therefore the same was selected in this research.

In this research, the piers for two bridges including Motor Way Bridge on Kabul River and Khairabad Bridge on Indus River are modeled in the hydraulic laboratory of Civil Engineering Department, University of Engineering and Technology Peshawar and the scour depth is measured. In the same study the effect of pier shape and size on the bridge pier scour depth is also investigated. It was found that the scour depth for circular pier is always smaller than the scour depth for square depth keeping the other factors constant. Similarly it was found that the scour depth increases with the increase in size of the pier.