

Interference of an upstream pier on local scour at downstream piers

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Abstract

In this study, three kinds of pier arrangements were tested. They are (i) two piers in tandem, (ii) two piers in staggered arrangement, and (iii) three piers in symmetrically staggered arrangements. In the arrangement of two piers in tandem, the equilibrium scour depth at downstream pier decreases with an increase in downstream distance up to approximately eight times pier diameter and then increases with further increase in downstream distance. However, the scour depth at downstream pier is always smaller than that at upstream pier. In the arrangement of two staggered piers, the scour depth at the downstream pier for $L/b = 4$, where L is the offset distance and b is the pier diameter, is the same as that of the upstream pier at $S = 8b$, where S is the streamwise spacing or distance between piers. Further, for three piers in staggered arrangement, as the lateral spacing between downstream piers increases, the equilibrium scour depth at downstream pier decreases.

Key words: bridge piers, erosion, local scour, pier interference, scour.

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