

RUPAYAN SAHA and SEUNGH HO HONG, Dept of Civil & Environmental Engineering, West Virginia University, Morgantown, WV, 26505. Prediction of maximum scour depth using scaled down bridge model in laboratory.

Recently, United States faced catastrophic flooding in West Virginia, Texas, Louisiana, Oklahoma, Arkansas, and the flooding resulted in several bridge failures. Among them, bridge scour is one of the main causes behind many bridge failures and financial losses as well as loss of life. Since 1960, a lot of scour research have been done and the several estimation methods were already in the hand of hydraulic engineers. Currently, the issues of scour are once again rising topic because the occurrence of extreme weather events are expected to worsen in frequency. Furthermore, current practice of scour estimation shows over-prediction and sometimes, under-prediction. One possible reason is adding separate estimates of contraction and local scour when in fact these processes occur simultaneously. Another possible reason is these equations are based on the experiments using free-surface flow in idealized-rectangular flumes even though extreme flood event can cause bridge overtopping flow in combination with submerged orifice flow. In this study, experiments were carried out in a compound shape channel using scaled down bridge model in different flow conditions (free, submerged orifice and overtopping flow). Based on the findings from laboratory experiments coupled with widely used empirical scour estimation methods, such as CSU pier scour equation, Melville-Sheppard equation and Ambient pier scour method, we will present a comprehensive way of predicting design scour depth which overcomes problem regarding separate estimation of different scour depths. In addition to develop a procedure for estimating of design scour depth, the mechanism and characteristics of scour process will be investigated and a comparison of these equations will be presented.