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Developing a Family of Curves for the HEC-18 Scour Equation

PDF (Size: 434KB) PP. 297-302 DOI: 10.4236/ijg.2012.32031

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ABSTRACT

Accurate pier scour predictions are essential to the safe and efficient design of bridge crossings. Current practice uses empirical formulas largely derived from laboratory experiments to predict local scour depth around single-bridge piers. The resulting formulas are hindered by insufficient consideration of scaling effects and hydrodynamic forces. When applied to full-scale designs, these formula deficiencies lead to excessive over prediction of scour depths and increased construction costs. In an effort to improve the predictive capabilities of the HEC-18 scour model, this work uses field-scale data and nonlinear regression to develop a family of equations optimized for various non-cohesive soil conditions. Improving the predictive capabilities of well-accepted equations saves scarce project dollars without sacrificing safety. To help improve acceptance of modified equations, this work strives to maintain the familiar form of the HEC-18 equation. When compared to the HEC-18 local pier scour equation, this process reduced the mean square error of a validation data set while maintaining over prediction.

KEYWORDS

Scour; Piers; Bridges; Erosion; Estimation; Failures; Bridge Foundations

Cite this paper

T. Calappi, C. Miller, D. Carpenter and T. Dahl, "Developing a Family of Curves for the HEC-18 Scour Equation," *International Journal of Geosciences*, Vol. 3 No. 2, 2012, pp. 297-302. doi: 10.4236/ijg.2012.32031.

References

- [1] H. Nassif, A. O. Ertekin and J. Davis, " Evaluation of Bridge Scour Monitoring Methods, F," United States Department of Transportation, Federal Highway Administration, Trenton, 2002.
- [2] D. Mueller and C. R. Wagner, " Field Observations and Evaluations of Streambed Scour at Bridges," United States Department of Transportation, Federal Highway Administration, Mclean, 2005.
- [3] G. R. Hopkins and R. W. Vance, " Scour around bridge piers," Washington, DC, 1980.
- [4] R. Ettema, B. W. Melville and B. Barkdoll, " Scale Effect in Pier-Scour Experiments," *Journal of Hydraulic Engineering*, Vol. 124, No. 6, 1998, pp. 639-642. doi:10.1061/(ASCE)0733-9429(1998)124:6(639)
- [5] P. Johnson, " Comparison of Pier-Scour Equations Using Field Data," *Journal of Hydraulic Engineering*, Vol. 121, No. 8, 1995, pp. 626-629. doi:10.1061/(ASCE)0733-9429(1995)121:8(626)
- [6] E. V. Richardson and S. R. Davis, " Evaluating Scour at Bridges," 4th Edition, United States Department of Transportation, Federal Highway Administration, Washington, DC, 2001.
- [7] P. F. Lagasse, J. D. Schall and E. V. Richardson, " Stream Stability at Highway Structures HEC-20," FHWA, 2001, p. 260.
- [8] P. F. Lagasse, et al., " Comprehensive Bridge Scour Evaluation Methodology," 5th International Bridge Engineering Conference, Bridges, Other Structures, and Hydraulics and Hydrology, Transportation Research Board Natl Research Council, Washington, Vol. 1-2, 2000, pp. A204-A208.

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- [9] G. Brunner, " River Analysis System Hydraulic Reference Manual," D.o. Defense, Davis, 2008.
- [10] M. Landers, D. Mueller and G. Martin, " Bridge-Scour Data Management System User' s Manual," United States Geologic Survey, Reston, 1996.
- [11] R. Ettema, G. Constantinescu and B. Melville, " Evaluation of Bridge Scour Research: Pier Scour Processes and Predictions," N.C.H.R. Program, 2011.
- [12] D. Froehlich, " Analysis of Onsite Measurements of Scour at Piers," National Hydraulic Engineering Conference. New York, 1988.