

SCOUR AT COMPLEX PIERS

PROBLEM STATEMENT

The prediction of sediment scour depths at bridge piers is a necessary input to the design of the pier foundations. Most of the larger piers are complex in shape, in that they are usually composed of a column, a pile cap, and a pile group. The methodology and the accuracy of design scour depth prediction for complex piers need to be improved. Existing methods and equations are based strictly on clearwater scour laboratory data. There is a need to see if these methods could be applied in the high velocity, live bed scour range. Improved design scour depth prediction results in foundation cost savings in most cases and in safer bridges for those situations in which existing methods underpredict scour depths.

OBJECTIVES

The objectives of this research were to (1) obtain more laboratory data (and extend the range of the important parameters) about sediment scour generated by the components of complex piers, and (2) improve the accuracy of and simplify the methodology for predicting design scour depths at complex piers.

FINDINGS AND CONCLUSIONS

The data shows that, if anything, the methods and equations based on clearwater scour data are conservative in the live bed scour range, i.e., the equations overpredict the scour depths measured in the live bed scour range of velocities. The additional data obtained during this study allowed the methods for predicting equilibrium scour depths to be both improved and simplified, which will (1) make it easier for the practicing engineer to apply the equations with fewer mistakes and (2) improve the accuracy of the predictions.

BENEFITS

The results of this research will be incorporated into the Florida Department of Transportation Scour Manual for use in designing new bridges and evaluating the vulnerability to scour of existing bridges. This will result in significant cost savings to the State and eventually to the nation, since, by necessity, the existing equations are conservative for most flow, sediment, and structure conditions.

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