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Graduation Year:	2001

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Title	Simplified Method for Estimating Future Scour Depth at Existing Bridges
URL	http://hdl.handle.net/1969.1/ETD-TAMU-2009-05-422
Publication Date	2010
University/Publisher	Texas A&M University

Abstract	Bridge scour is the term which describes the erosion of soil surrounding a bridge foundation due to water. Bridge scour can cause the reduction of the load carrying capacity of bridge foundations, excessive foundation settlements, and damage to bridge abutments. Bridges with foundations that are unstable for calculated and/or observed scour conditions are termed scour critical bridges. Approximately 25,000 bridges in the United States are classified as scour critical and about 600 of them are in Texas. This designation comes in part from the use of over-conservative methods that predict excessive scour depths in erosion resistant materials. Other methods have been developed to eliminate this over-conservatism but are uneconomical because they require site-specific erosion testing. The major contribution of this dissertation is a new method to assess a bridge for scour and erosion classification charts which categorizes the erodibility of geomaterials according to conventional engineering properties. The new method is a three level Bridge Scour Assessment (BSA) procedure which is relatively simple and economical. It does not require site-specific erosion testing and eliminates the over-conservatism in current methods. The first level, BSA 1, uses charts that extrapolate the maximum scour depth recorded during the life of the bridge to obtain the scour depth corresponding to a specified future flood event. The second level, BSA 2, determines the maximum scour depth and is carried out if BSA 1 does not conclude with a specific plan of action for the bridge. The third level, BSA 3, determines the time dependent scour depth and is carried out if BSA 2 does not conclude with a specific plan of action. The scour vulnerability depends on the comparison between the predicted and allowable scour

	depths. The 11 case histories used to validate the new method showed good agreement between predicted values and field measurements. BSA 1 was then applied to 16 bridges. In this process, 6 out of 10 bridges classified as scour critical by current methods were found to be stable. These results show that the new method allows for more realistic evaluation of bridges for scour while not requiring site-specific erosion testing.
Subjects/Keywords	Bridge scour; soil erosion; erodibility; scour critical bridges; bridge scour assessment
Contributors	
Language	