

**DOUBLE COUNTING, OVER CONSERVATIVE AND MISAPPLYING SAFETY  
FACTORS  
FOR STREAM SCOUR ANALYSES**

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**EXTENDED ABSTRACT**

Scour analyses are required for stream projects such as utility crossings, bridges, streambank protection, levees and floodwalls. In lieu of sophisticated numerical models, simplified approaches are often utilized. Neglecting local scour such as at bridges, the total scour using these simplified techniques is comprised of long term, general, bend, dune formation, and thalweg formation. There are no specific guidelines for application of safety factors for each of these components. Some techniques have safety factors inherently built into them but are not evident, often resulting in over conservative answers when additional safety factors are added. Some general scour methods include combinations of bend, dune and thalweg formation. These additional inclusions are often not evident or well documented, resulting in the unintended addition of these components and thus “double counting.” In some cases, the computed scour depth is small (or zero) and the safety factor (often by adding an arbitrary scour depth) is applied to this small scour depth whereas the safety factor should have been applied to important variables that produced the total scour depth.

The safety factor is often applied only to the sum of the scour components thus giving equal “uncertainty” weighing to all the scour components. In most cases, with the use of engineering judgment, historic perspective, examination of how the scour techniques were developed, and the evaluation of the risks involved as a result of possible failure, one can estimate the appropriate safety factor for each scour component to come up with the total scour.

This presentation gives information on which techniques have safety factors inherently in them and what components are already included in the techniques. The presentation also gives guidelines on which variables should be used for application of safety factors and a suggested procedure to assure that scour components are appropriately combined.