

## FHWA Indefinite Delivery Contract

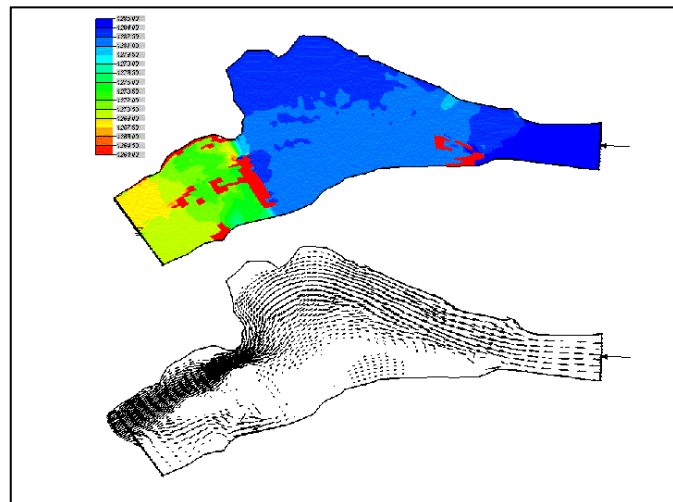
Field surveys have been conducted for geometric input to bridge hydraulics using the U.S. Army Corps of Engineers' HEC-RAS code. Contraction and pier scour were then computed using FHWA HEC-18 procedures for 36 bridges in Mount Rainier and Olympic National Parks, during the 1998 season, and another 37 bridges on federal lands in California and Arizona during the 1999 season.



During the floods of February 1996, the central pier of the Tom Music bridge over the Cispus River in Washington was undermined, and the bridge fell about six feet. As the bridge is on Forest Service lands, the Federal Highway Administration is designing a replacement bridge. To examine the hydraulics of various bridge openings, perform a scour evaluation for the proposed bridge configuration, and design riprap protection for the north (right, viewed downstream) bank, WEST Consultants, Inc. was asked to develop one- and two-dimensional models of the bridge reach.

A flood frequency analysis, using HEC-FFA, was performed using data from a gage just downstream, and indicated that the February 1996 flood exceeded the 100-year peak flow. The one-dimensional model, HEC-RAS, was used to simulate (1) a replacement bridge at the same location as the existing bridge, with roughly the same hydraulic opening, and (2) a replacement bridge at the same location with twice the hydraulic opening, achieved by removing a levee along the south (left) bank. These simulations indicated that there was little to be gained by increasing the hydraulic opening, and a clear-span replacement bridge was recommended without the central pier of the existing bridge.

A two-dimensional model, using the FHWA's FESWMS model, was developed for the bridge reach, and used to simulate flows ranging from the 2-year to 500-year events. The model required careful attention because the bridge reach is quite steep with high Froude numbers. The final model was used to provide information for contraction scour analyses and to evaluate bank stabilization options along the north (right) bank, which was heavily eroded during the February 1996 event.



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