

Physical Modeling of Channel Maintenance Structures on Bends of the Rio Grande

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The U.S. Bureau of Reclamation has launched a maintenance and/or restoration program for a 29-mile reach of the Rio Grande, stretching from Cochiti Dam to New Mexico Highway 44. Due to the construction of the Cochiti Dam in 1975 the channel has experienced significant changes. Prior to dam construction the 29-mile stretch between the dam and New Mexico Highway 44 was an aggrading, relatively wide system with an overabundant sediment yield. Since the dam's construction the system has shifted from a straight and braided system to a meandering and pool riffle system. Due to the change in channel characteristics, critical riverside facilities such as levees, drains, and irrigation systems have become threatened. As part of the program a physical model study is being conducted at the Engineering Research Center to evaluate various native materials and rock weir techniques to stabilize bends in the study reach.

A 1:12 scaled model of two representative bends, in an S-shaped configuration, was constructed at the Engineering Research Center. Representing characteristics found in the study reach, the model bends represent a total of 1,000 ft in channel length, and a top width ranging from 150 to 230 ft. A 24-inch pipeline from Horsetooth Reservoir supplies flow to the model, capable of producing a prototype flow of up to 10,000 cfs in the channel. Instrumentation includes a three-dimensional velocity meter, a Preston tube for measuring shear stress, a complete data acquisition system equipped with pressure transducers, and 120 piezometer taps placed throughout the channel.

The model will be used to test the performance of native material and rock weir structures in the stabilization of meander bends. Native material and rock weir structures are intended to deflect flow away from the outer banks of a bend, as well as slow velocities and reduce erosion. Currently these types of stabilization techniques have only been used on small pool riffle channels. Because the Rio Grande is such a large system, design criteria for such techniques are in need of development.

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