

# HEC-11 Design of Riprap Revetment

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Publisher:	FHWA
Year:	1989
Links:	PDF, SI Version
Subjects:	Riprap, Revetments, Bank Protection, Gabions, Grouted Riprap, Riprap Design, Precast Concrete Riprap, Paved Linings



One of the hazards of placing a highway near a river or stream channel is the potential for erosion of the highway embankment by moving water. If erosion of the highway embankment is to be prevented, bank protection must be anticipated, and the proper type and amount of protection must be provided in the right locations.

This revised version of Hydraulic Engineering Circular No. 11 (HEC-11) represents major revisions to the earlier (1967) edition of HEC-11. Recent research findings and revised design procedures have been incorporated. The manual has been expanded into a comprehensive design publication.

This manual provides procedures for the design of riprap revetments to be used as channel bank protection and channel linings or larger streams and rivers. The information in the manual should be of interest to State and Federal Hydraulics engineers and others responsible for the design of riprap.

The revised manual includes discussions on recognizing erosion potential, erosion mechanisms and riprap failure modes, riprap types including rock

riprap, rubble riprap, gabions, preformed blocks, grouted rock, and paved linings.

Design concepts included are: design discharge, flow types, channel geometry, flow resistance, extent of protection, and toe depth. Detailed design guidelines are presented for rock riprap, and design procedures are summarized in charts and examples. Design guidance is also presented for wire-enclosed rock (gabions), precast concrete blocks and concrete paved linings.