

913 BANK PROTECTION

The area designed to receive bank protection should be studied to see that the design is proper and adequate to meet field conditions. One area of scrutiny should be the direction of flow. Water should be directed toward the center of the streambed in order to avoid losses of property or structures downstream. Do not hesitate to recommend extension or modification of the riprap if there is doubt concerning the adequacy of the plans design.

Riprap will be one of the types specified on the plan, and described in Specification 913 and in the standard drawings. Often the size of riprap is designated as D50, which means the effective size of rock would be 50% on the grain size curve. In other words, D50 is the median size of rock in a mix where 50% of the material, by weight, is finer particles. The purpose of riprap is to prevent erosion, so considerable care should be taken for proper placement of each section.

While riprap is designed and built to perform a very important function, the Resident Engineer should not lose sight of the need to make each installation pleasing to the eye. The cross section should be uniform and the lines and grades should be in reasonably close conformity with the standard drawings.

The Construction Standard Drawing (C-17.10, C-17.15 and C-17.20) depicts 9 different types of rail bank protection. Types 1 through 6 are all similar in design. The major difference is the length and spacing of the rails. Types 4, 5 and 6 are specifically designed to protect banks at bridge abutments.

When constructing types 1 through 6, rails should be driven as specified in the standard drawings. Wire mesh should be securely fastened to the rails, placed in the trenches and laid on the slopes. The wire mesh must entirely enclose the rock backfill. The rock backfill should then be placed so as not to disturb or displace the mesh or rails. The completed rock fill should be to the lines and grades specified and should be pleasing in appearance.

Type 7 and 8 are similar in design and are usually used for directing flow of water to a bridge. Type 9 is used to cause deceleration of the stream and deposition of aggregate particles principally behind the bank protection.

It should be noted, riprap and bank protection designs provide for the rock, etc., to be placed below the stream level. This portion of the design is crucial since most failures in riprap occur as a result of storm water undercutting the rock protection which leads to eventual collapse.

Special care should be exercised to construct all types of protection at the proper stream elevation. Inspections downstream should be made for possible problems which could later contribute to scour or silting conditions. If problems are evident, a check with the Drainage Design Services is advisable before plans grades are changed.

The specifications say the rock shall be sound and durable which leaves a broad area subject to personal interpretation. It is advisable to have the District and, if needed, the Materials Section inspect rock sources proposed by the Contractor. This inspection should be arranged for as soon as possible so that any testing or prospecting will not cause undue delay or expense.

It is important to maintain a uniform grading of dumped rock riprap. The uniform grading is necessary to assure proper filling of the voids in the riprap. Properly filled voids will lend stability by keying the mass and to protect the underlying filter material.

It is also important that filter fabric be installed properly. Holes in the fabric will permit fine particles in the bank to erode and pass through the riprap. The protect structure can fail as the bank erodes away even if the riprap remains intact. A layer of bedding material is required to protect the fabric when the maximum rock size is greater than 18 inches (450 millimeters).

The specifications call for two 5 ton (4.5 metric ton) samples of the graded rock to be used in judging the acceptability of gradation. Frequent reference to the sample rock pile will help to maintain uniform grading. Uniformity of grading is especially important in untied or ungrouted riprap. These types of riprap need good distribution of the coarse and fine rocks to provide interlock and keying which gives the riprap enough rigidity to resist erosion.

The grout specification states that retempering will not be permitted. Retempering is defined as adding water to grout to restore workability.