

Chapter 4

Bridge Program Drawings

Section 4.05 - Riprap and Gabions

Introduction

Riprap is a layer of stones on an embankment slope used to prevent erosion and to protect the structure from the effects of stream flow. Riprap is used in various situations on ditch banks, channel bottoms, berm slopes, or any area where erosion is to be prevented. The most common types of riprap used are gabion baskets, machine placed riprap, wire enclosed riprap, or hand placed riprap. The type of erosion protection used can come from the Engineer's recommendations in the field, Hydraulic Section recommendations, Geology Program recommendations, or at the discretion of the Squad Team Leader.

Gabions can also be used as an earth retaining structure, as described in Section 4.21-Earth Retaining Structures.

A riprap detail sheet does not need to be included if the geometry and elevations of the riprap can be shown on the General Plan & Elevation sheet. However, the fabric under the entire length of riprap must then be shown on the elevation or noted on the GP&E or as a General Note.

Generally, the top of the riprap is located 1'-0" above design highwater.

Riprap Types

GABIONS are prefabricated wire enclosed structures laced together and filled with stones. Gabions are more massive than wire enclosed riprap but may be placed to form a layer similar to wire enclosed riprap. Rock size required for gabions is larger than the rock size required for wire enclosed riprap. The size of the enclosure segments are formed to the dimensions shown on the plans.

MACHINE PLACED RIPRAP consists of stones that are machine placed on an earth embankment or gravel bedding. Larger stones are placed in the toe course and on the outside surface of the slope protection. Bulldozers or other suitable

equipment may be used to dump or spread the layers of stone.

WIRE ENCLOSED RIPRAP, as the name implies, consists of wire enclosed segments that are fabricated on site, laced together, and filled with stones to provide an area of dense protection against erosion. The size of the enclosure segments are formed to the dimensions shown on the plans.

HAND PLACED RIPRAP consists of hand placed stones on an earth embankment or gravel bedding. Larger stones are placed first with close joints. Smaller stones are then placed to fill the voids as best as possible.

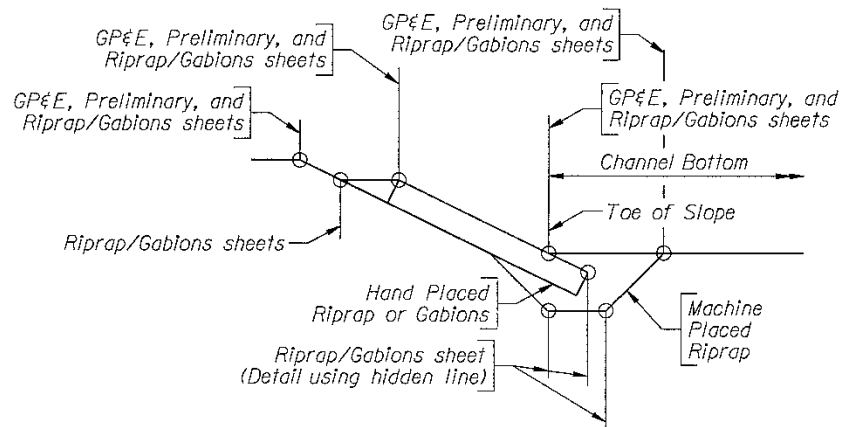
The Contractor may use wire enclosed riprap instead of gabions, in compliance with the Standard Specifications. The Standard Plan (Wire Enclosed Riprap and Gabions) should be included in the References on the General Notes sheet of the plans.

WRAP-AROUND RIPRAP is used primarily in large fill areas or in areas where soil erosion is likely to occur at the abutments. This technique is used at the discretion of the Squad Team Leader. The pivot points for wrap-around riprap are usually at the end of the wingwall at rear face for elephant ear wingwalls or the end of the abutment cap at rear face for sweptback wingwalls.

The **TOE OF SLOPE** is the intersection of the front face of riprap with the channel bottom.

CHANNEL BOTTOM is the clear distance between toe of slopes.

On the various sheets, riprap shall be projected to the plan from the following points.



General Design and Detail Information

EROSION CONTROL GEOTEXTILE is placed under the entire limits of the riprap and gabions to stabilize the embankment material. The Hydraulic Section may recommend the use of **FILTER GRAVEL**. If filter gravel is used, the thickness and length shall be shown on the plans.

WASH-OUT STOCK BERMS are earth berms that allow for stock passage at low water and can be washed out completely during high water or at flood stage. When the stock berm is washed out, it allows for the design volume of water to pass under the structure without causing any damage. The Engineer's Recommendations usually request wash-out stock berms, but they also may be placed at the discretion of the Squad Team Leader.

Standard Sheets

Name	Description
GABIONS	Gabions
RIPRAPMP	Machine placed riprap

Cells

Name	Description
GABIONS	Gabions Section
HPPLANS	Pile Plan Solid
RIPPT1	Corner Riprap Pattern
RIPPT2	Side Riprap Pattern
RIPRAPMP	Machine-Placed Riprap Section