

3.15 RIPRAP



Figure 3.27. Riprap (Source: Department of Civil, Construction, and Environmental Engineering, Iowa State University)

Overview

Description: A permanent, erosion-resistant ground cover of large, loose, angular stone.

Problem identification: The surface of the soil needs to be protected from the erosive forces of concentrated stormwater runoff.

Design purpose: To provide a protective, non-erosive cover and to slow the velocity of concentrated runoff.

Associated practices: This control measure is used at the outlet of drain pipes, in areas of high velocities and concentrated flow, or where waterway bottoms are eroding. Riprap may also be used as revetment.

Installation: Stone weight is approximately 165 lbs/cu ft. Riprap should be well-bedded in a stable channel bottom for a depth of 1.5 to 3.0 ft, depending on the size of the stone. The channel side slopes shall be prepared to the required lines and grades. Riprap should be placed over filter fabric. The stone shall be hand-placed around structures. The riprap should extend up the slope to the point at which vegetation will provide adequate protection. The stone should be reasonably well-graded.

Maintenance/inspection: Inspect after severe precipitation events and make repairs immediately. In some cases, riprap may be undersized.

Design life: Permanent.

Estimated cost: Riprap costs \$32.20 per ton (2004).

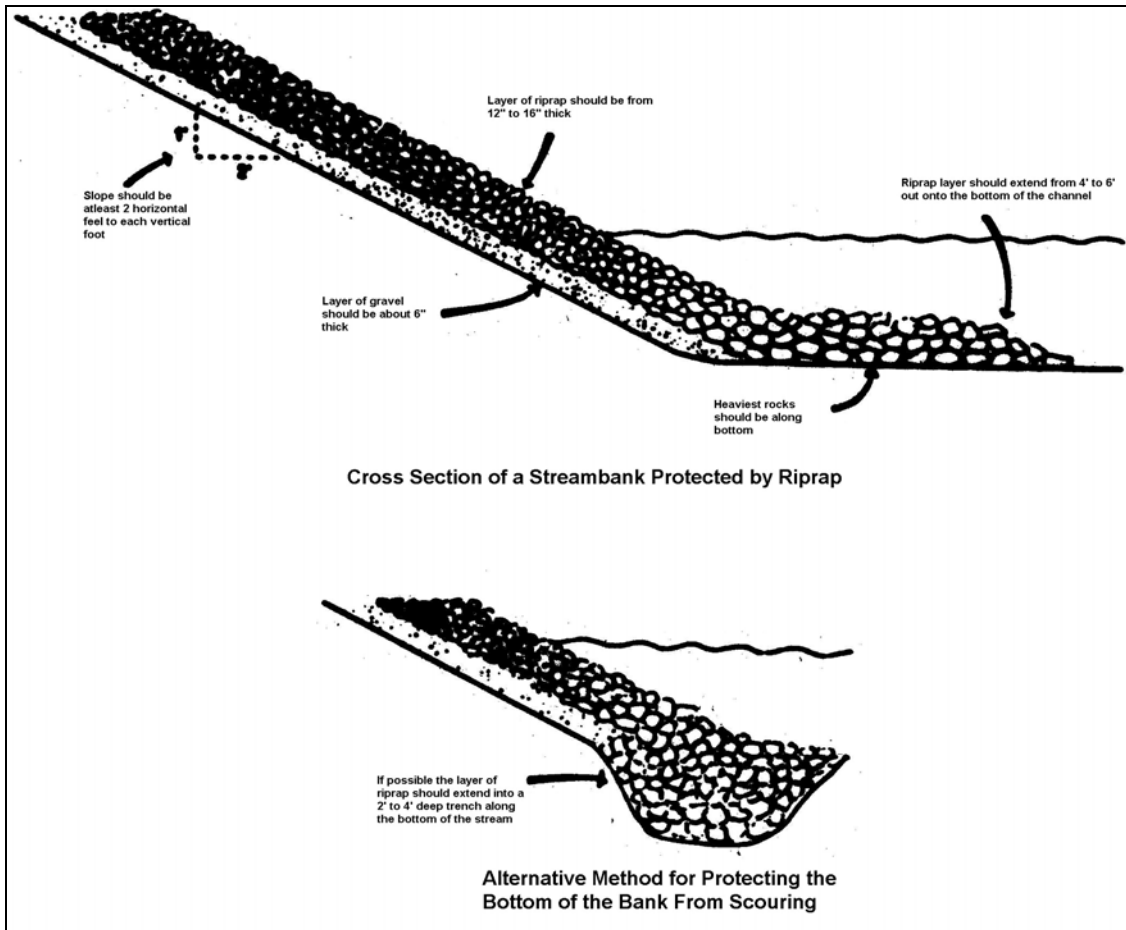


Figure 3.28. Use of riprap to protect streambanks and bottoms (Source: Department of Civil, Construction, and Environmental Engineering, Iowa State University)

Table 3.2. Size of riprap stones

| Weight (lbs) | Mean spherical diameter (ft) | Rectangular shape | |
|--------------|------------------------------|-------------------|-------------------|
| | | Length (ft) | Width/height (ft) |
| 50 | 0.8 | 1.4 | 0.5 |
| 100 | 1.1 | 1.75 | 0.6 |
| 150 | 1.3 | 2.0 | 0.67 |
| 300 | 1.6 | 2.6 | 0.9 |
| 500 | 1.9 | 3.0 | 1.0 |
| 1000 | 2.2 | 3.7 | 1.25 |
| 1500 | 2.6 | 4.7 | 1.5 |
| 2000 | 2.75 | 5.4 | 1.8 |
| 4000 | 3.6 | 6.0 | 2.0 |
| 6000 | 4.0 | 6.9 | 2.3 |
| 8000 | 4.5 | 7.6 | 2.5 |
| 20000 | 6.1 | 10.0 | 3.3 |