

Note: A Hydraulic Project Approval ([Chapter 77.55 RCW](#)) and an Army Corps of Engineers permit may be required for any work within the ordinary high water mark. Other provisions of the RCW or the Hydraulic Code Rules ([Chapter 220-660 WAC](#)) may also apply. Contact the appropriate regional office of the State Department of Fish and Wildlife.

Table V-1.7: Rock Protection at Outfalls

Discharge Velocity at Design Flow in feet per second (fps)	Required Protection Minimum Dimensions				
	Type	Thickness	Width	Length	Height
0 - 5	Rock lining ⁽¹⁾	1 foot	Diameter +6 feet	8 feet or 4 x diameter, whichever is greater	Crown + 1 foot
5+ - 10	Riprap ⁽²⁾	2 feet	Diameter +6 feet or 3 x diameter, whichever is greater	12 feet or 4 x diameter, whichever is greater	Crown + 1 foot
10+ - 20	Gabion outfall	As required	As required	As required	Crown + 1 foot
20+	Engineered energy dissipater required				

Footnotes:

1. **Rock lining** shall be quarry spalls with gradation as follows:

- Passing 8-inch square sieve: 100%
- Passing 3-inch square sieve: 40 to 60% maximum
- Passing 3/4-inch square sieve: 0 to 10% maximum

2. **Riprap** shall be reasonably well graded with gradation as follows:

- Maximum stone size: 24 inches (nominal diameter)
- Median stone size: 16 inches
- Minimum stone size: 4 inches

Note: Riprap sizing governed by side slopes on outlet channel, assumed to be approximately 3H:1V.