

## ENERGY DISSIPATION POOL DESIGN

**Note:** Energy dissipation pools are required for all closed-bottom culverts except those that are embedded.

The energy dissipation pool should be sized to ensure stability of the pool during peak flood flows. Figures 11 and 12 illustrate the design principles that should be followed for proper functioning of the energy dissipation pool.

In addition:

- The energy dissipation pool should be stabilized to prevent scour and erosion. This means that: (a) the size of riprap stone in the dissipation pool must be sufficiently large to withstand velocities produced by the 1:100 year flood event; (b) three boulders should be placed in the pool in a triangle pattern in order to further dissipate energy (see Figure 12). For culverts equal to or less than 1.5 m, the diameter of the boulders should be approximately 0.75 m. For culverts greater than 1.5 m the boulder diameter should be approximately 1 m.
- Do not use any filter fabric in the construction of the pool.
- The depth of the pool must be a minimum of 1 m.
- The width at the bottom of the dissipation pool is 2 times the culvert diameter/width (D).
- The length at the bottom of the dissipation pool is 3 times D
- At the downstream end of the dissipation pool (at 3D), the slope up to the existing elevation of the natural stream is to be constructed at no more than 1:2 (vertical:horizontal). This area of the pool is to have riprap scour protection to withstand a 1:100 year flood event (see Figure 12).
- A filtration layer of gravel Type 2 should be placed under the riprap to prevent erosion.
- Add the appropriate amount of fines to the rock mixture to ensure that water will not be lost through interstitial spacing. This can be achieved through the addition of fine granular material, gravel borrow or pit run material (20% fines, does not include clays). The pool will have to be "washed" thoroughly and the wash water pumped away prior to releasing the stream permanently into the culvert.

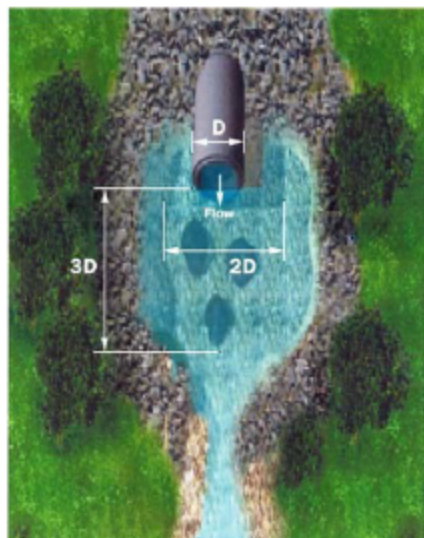
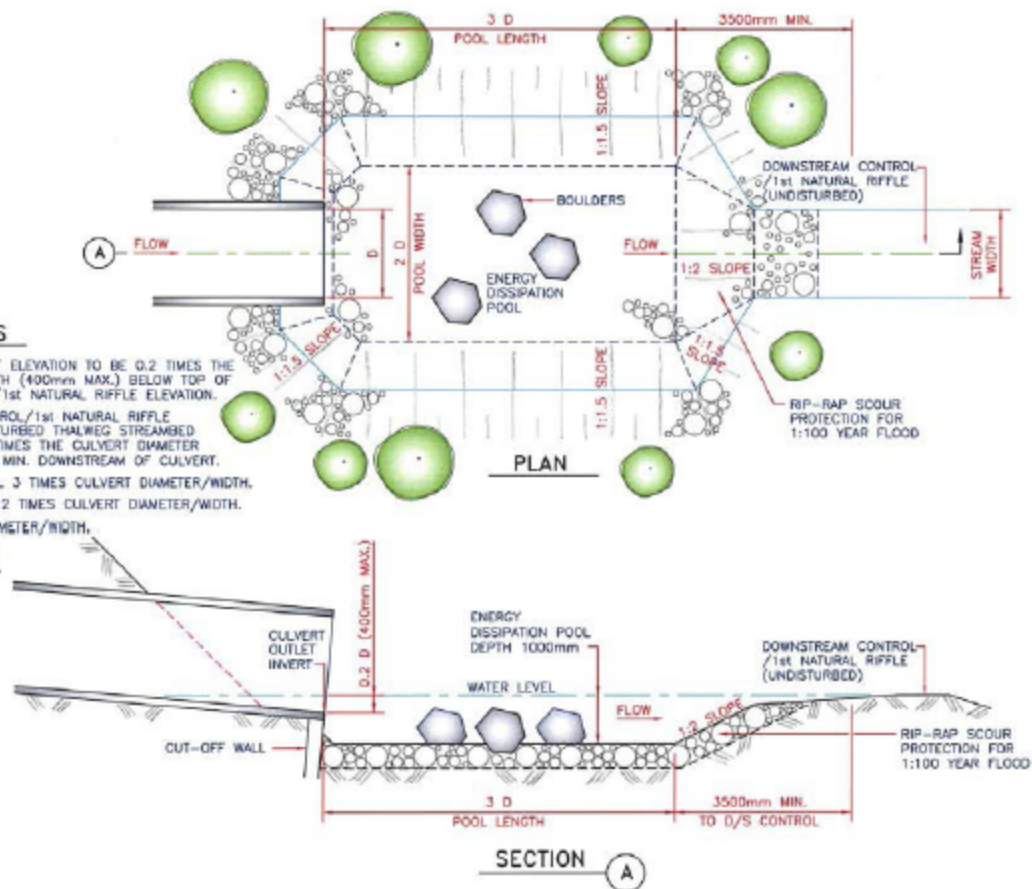


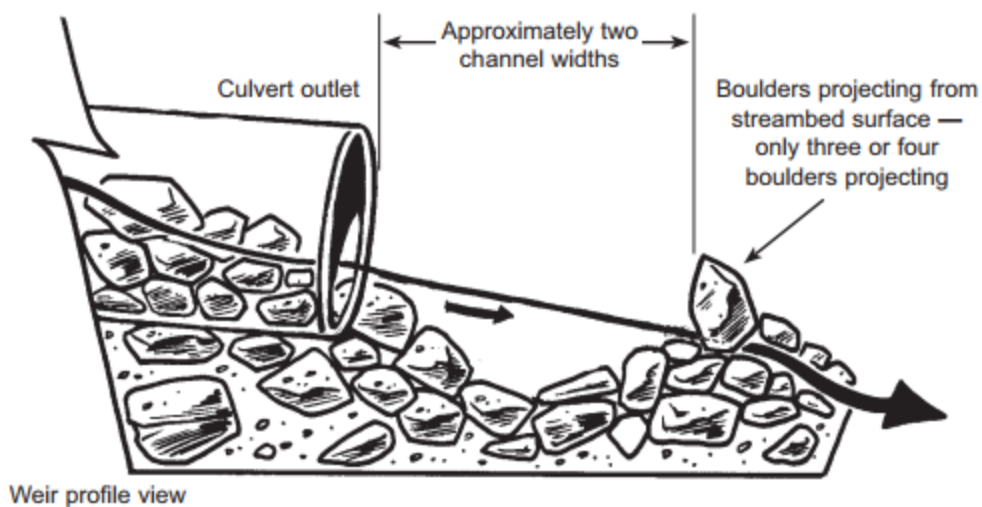
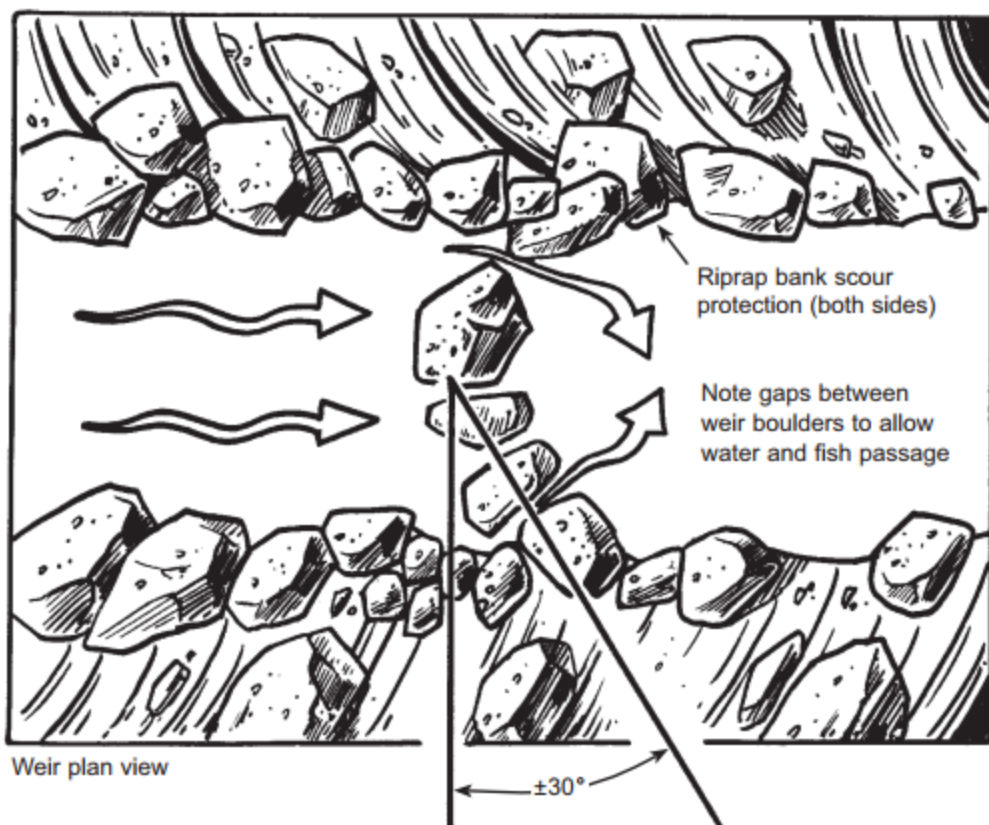
Figure 11. Energy Dissipation Pool Dimensions

Figure 12. Energy Dissipation pool design for a non-baffled culvert

### NOTES

1. CULVERT OUTLET INVERT ELEVATION TO BE 0.2 TIMES THE CULVERT DIAMETER/WIDTH (400mm MAX.) BELOW TOP OF DOWNSTREAM CONTROL/1st NATURAL RIFFLE ELEVATION.
2. THE DOWNSTREAM CONTROL/1st NATURAL RIFFLE IS THE EXISTING UNDISTURBED THALWEG STREAMBED ELEVATION LOCATED 3 TIMES THE CULVERT DIAMETER /WIDTH PLUS 3500mm MIN. DOWNSTREAM OF CULVERT.
3. POOL LENGTH TO EQUAL 3 TIMES CULVERT DIAMETER/WIDTH.
4. POOL WIDTH TO EQUAL 2 TIMES CULVERT DIAMETER/WIDTH.
5. D EQUALS CULVERT DIAMETER/WIDTH.
6. SLOPE EXPRESSED AS VERTICAL:HORIZONTAL.





**Figure 8.** Typical downstream weir.