

## **BOULDER PLACEMENT**

### **DESCRIPTION**

The work consists of placing boulders in stream channels to encourage riffles and pools to provide habitat and spawning areas for aquatic life.

### **EFFECTIVE USES & LIMITATIONS**

When properly utilized, boulder placements create small scour pools and eddies which can be used as rearing areas for salmonids and other fish. Additionally, they are sometimes used to restore meanders and pools in channelized reaches and to protect eroding streambanks by deflecting flow. Boulder placements are most effective when used in the following conditions:

- moderately wide, shallow, high velocity streams with gravel or cobble beds;
- stream reaches with pool densities less than 20 percent; and
- Rosgen stream types B3 and B4.

Boulder placements should be avoided in the following areas:

- channels which do not have sufficient particle size ranges to develop armor layers such as streams with fine, noncohesive bed material such as sand or small gravel that will scour deeply and rapidly, thereby undermining and burying boulder groups,
- channels with highly erodible embankment soils or soils with an extreme excess of one texture or size range unless measures are taken to adequately reinforce the banks;
- low-velocity streams with a mean velocity of less than about 2 feet (0.6 meters) per second, since sufficient scour pools cannot be developed;
- newly formed stream curvatures since boulder clusters can alter natural patterns of stream meander resulting in erosion and scour problems;
- and overwide streams or streams with large bedload.

### **MATERIAL SPECIFICATIONS**

Boulders should be chosen based upon stream size, flow characteristics, bed stability, desired habitat effects such size and position of resultant scour pools and eddies, and the capacity of available heavy equipment. Boulder diameters of 2 to 5 feet (0.6 to 1.5 meters) and volumes of 35 to 70 cubic feet (1 to 2 cubic meters) have been suggested for this restoration practice. It is recommended, however, that boulders be sized according to guidelines developed for riprap placement, and that footers be provided. However, boulders should not be more than 25 to 30% of bankfull depth after partial embedment. Blocky, angular rock should be used in place of round rock when feasible.

Boulder diameters should be no more than 1/8 the width of the stream. If a larger size is to be used, bank stabilization measures should be considered.

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### **INSTALLATION GUIDELINES**

All erosion and sediment control devices, including dewatering basins, should be implemented as the first order of business according to the approved plan. Boulder placement should proceed as follows (refer to Detail 3.1):

- 1) Complete the work during periods of low flow to ensure proper location within the stream channel and to facilitate the movement of heavy equipment.
- 2) Boulders shall be placed on top of footer rocks(s) so that the boulder is offset in the upstream direction.
- 3) Place clusters comprised of 3 to 5 boulders arranged in a triangular configuration in the downstream half of long riffles, sufficiently far from the associated pool, and embed them in the stream bed to increase the cluster's stability. The substrate in which boulders are placed should be competent enough to resist undercutting.
- 4) Space multiple boulder clusters constructed in the same stream section a minimum of 1/3 of a stream width apart. Avoid an overabundance of newly placed boulders since this can inhibit the natural process of sediment flushing.

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**Maryland's Guidelines To Waterway Construction  
DETAIL 3.1: BOULDER PLACEMENT**

