

Fight Erosion With Sacked Sand-Cement Riprap

Sacked sand-cement riprap is limited only by the imagination of the individual using the material

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Erosion of ditches and abutments is a never ending problem for highway construction and maintenance officials. Some solutions for these problems, such as slope or ditch paving, are expensive and require the use of specialized equipment and highly trained personnel. Stone riprap is also expensive and may not be readily available. Sacked sand-cement riprap may be one alternative for some of the erosion problem.

Either natural or manufactured sand, portland cement, cotton or burlap sacks, a mixing hoe and a shovel, along with a few gallons of water, are all that is needed to produce sacked sand-cement riprap. A local agency can produce satisfactory sacked sand riprap with a hand mix operation when only a few bags are needed.

Step 1 - Five shovels of sand for each shovel of Portland cement are placed on a mixing platform which may be a sheet of plywood, a truck bed, or a section of the roadway. One bag of cement when combined with approximately 500 pounds of sand should produce enough mix for six (6) sacks of sand-cement riprap.

Step 2 - Mix sand and cement until well blended and of uniform color. In some cases it may be possible to mix the sand and cement in the equipment yard in a cement or mortar mixer. If dry sand is used and the resulting mix is kept under cover, it may be stockpiled for short periods.

Step 3 - Place the mixed material in approximately one (1) cubic foot cotton jute, or burlap bag. Leave space at the top to permit the bag to be tied, stapled or stitched. Bags of woven plastic are satisfactory; however, **DO NOT** use plastic lined bags as they will not permit the water to penetrate the mix during the soaking step.

Step 4 - Place the filled bags with the tied ends against the bank or covered by

the bottom end or the side of another bag. There should be no tied ends visible when the bags are placed.

Step 5 - The soaking of the in-place sacks is an important step that is most often overlooked or not properly done. Enough water should be sprinkled on the sacks to completely soak all of the sand-cement material. If no water was wasted, a gallon or so should be adequate. However, to be certain that the sack is soaked, three or more gallons should be applied slowly.

Three uses of sacked sand-cement riprap will be discussed briefly. The first will be the roadway ditch, the second the protection of abutments, and the third the protection of pipe ends.

(1) Erosion in roadway ditches is usually caused by steep grades which result in the high velocity of the flowing water. Figure 1 shows a typical 3% profile ditch. Individual 8-inch sacks of sand-cement can be placed at 25-foot intervals effectively reducing the grade to less than 1%, thus substantially reducing the erosion potential. Figure 2a illustrates the placement of a single sack across the ditch. In some cases it

may be desirable to place additional sacks as shown in Figure 2b & c.

(2) The repair of an eroded bridge abutment is illustrated in Figure 3. Note the use of a cut off or toe wall at the bottom of the sacked sand riprap slope. Also, note that the material placed behind the riprap is to be compacted. Some of the sacks are placed at 90 degrees to the slope to help provide additional stability. The soil should be placed so that the compacted layers are about the same depth (about 8-inches) as the sacked riprap.

(3) The erosion at the ends of drainage pipe can be prevented by using sacked sand-cement riprap as shown in Figure 4.

There are no standards for many of the uses that may be made of sacked sand-cement riprap. It is limited only by the imagination of the individual using the material. But in all cases -- the in-place sacks **must be** completely soaked. In some cases water from nearby streams can be carried to the site or an old fuel drum can be used to haul water.

After the sacked sand-cement is placed and soaked, and a few days of curing is completed, the protection should last for many years.

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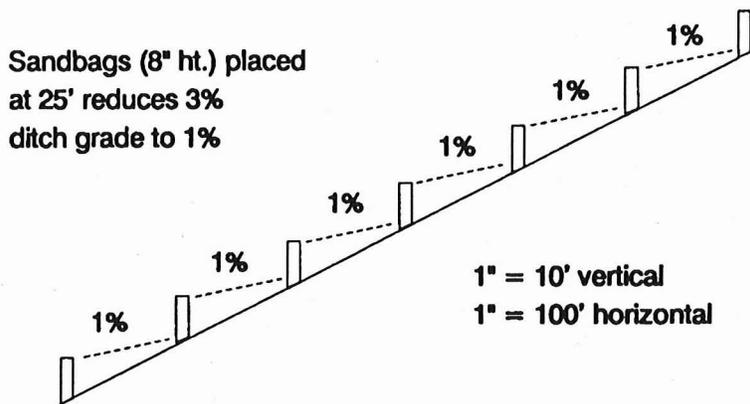


Figure 1 Roadway Ditch

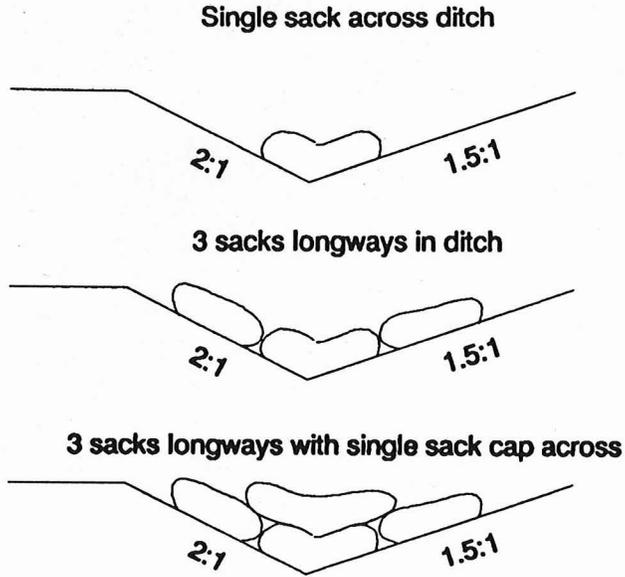


Figure 2 Ditch Blocks

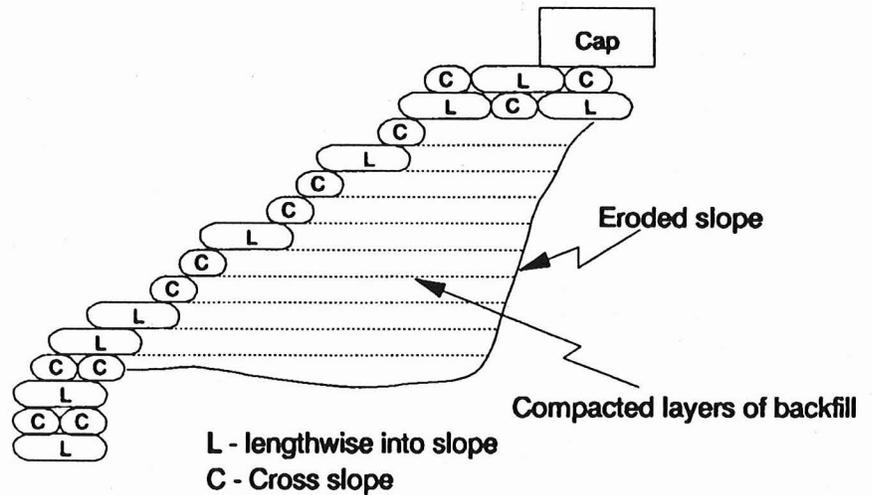


Figure 3 Sacked Riprap to Correct Abutment Erosion

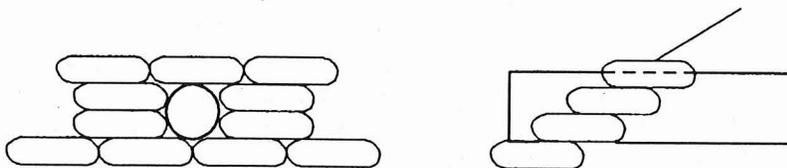


Figure 4 Protection of Pipe with Sacked Riprap