Construction Specification SR -04	W-WEIR

1. Description

W-Weirs are in-stream structures constructed for the purpose of reducing shear stress on streambanks, controlling the grade of the streambed and establishing fisheries habitat. W-Weirs are constructed as shown in ***Standard Drawing SR-04a*** and as set forth in the plans for the project. W-Weirs shall consist of both Footer Rocks placed below the invert of the proposed channel as well as Weir Rocks.

2. Materials:

W-Weirs shall be constructed of angular, flat or cubed rock obtained from a source that is approved by the Contracting Officer prior to execution of a contract for the project. When possible, consideration should be given to obtaining rock that is similar in color and texture to the native stone in the project area. Rock should be of sufficient hardness to resist weathering and shall be free of cracks and other blemishes. Porous rock, such as some limestones, and soft rock, such as shales ,are not allowed. In some cases, native rock present on the site may be authorized for use by the Contracting Officer. In no instance will concrete or other "debris" rock be allowed. All rock under this specification shall meet the conditions of material specification **MS-01 Rock**.

3. Rock Size

Rock used for the construction of W-weirs will meet the following size requirements. All units are shown in feet (ft) and pounds (lbs). Rock sizes apply to both Footer Rocks and Weir Rocks

3.1 Rock Size

	A-axis	B-axis	C-axis
Minimum Size	4'	3'	2'
Maximum Size	8'	6'	5'

3.2 Rock Weight - The dry unit weight of each rock shall be 150 lbs/cuft or greater.

4. Source of Materials

Prior to execution of a contract, the Contractor will locate potential sources of rock. The Contractor and Contracting Officer will jointly visit the site(s) to determine whether the rock meets the requirements as set forth in these specifications. A site visit may be waived by the Contracting Officer when rock will come from a source that has been approved in the past.

5. Construction Methods:

5.1 W-Weirs shall be installed according to the Project Drawings, Standard Drawings SR-04a, the following specifications, and as directed by the Contracting Officer.

5.2 W-Weirs shall be constructed with two (2) Rock Vanes on opposing sides of the stream channel forming the outside legs of the W-Weirs and two opposing vanes in the center of the channel to complete the W-Weir . W-Weirs may be staggered, such that one leg of the W-Weirs is offset either upstream or downstream of the opposite leg. The "W" shape is seen when viewing the W-Weirs from upstream looking downstream.

5.3 The outside Rock Vane components shall extend to the streambed invert in an upstream direction forming the outside legs of the W-Weir. The inside legs of the W-Weir shall be constructed similar to a Rock Vane with the exception that the apex (joining point) of the inner legs is at an elevation that does not exceed one-half (½) of the bankfull elevation.

5.4 The W-Weirs shall be constructed so that adjoining rocks taper in an upstream direction (outside legs) from the bankfull elevation to the stream invert. The inside legs shall extend from the streambed invert in a downstream direction and shall be tapered to a point one-half (½) the bankfull elevation. The elevation of the apex of the W-Weir may be adjusted as required or as directed by the Contract Officer/Project Engineer. The upstream end of the outside legs of the W-Weir is set at an angle of 20^{o}-30^{o} tangent to the curve.

5.5 The downstream end of the outside legs of the W-Weir shall be keyed into the streambank at the bankfull elevation. The W-Weir shall be keyed a minimum of eight feet (8') into the streambank. The upstream end of the outside legs as well as the upstream end of the inside legs, will be keyed into the streambed at the invert elevation. The W-Weir legs shall be installed with a slope of 4% to 7% from the streambed invert to the bankfull or apex

elevation.

5.6 Footer Rocks shall be installed as shown in the Plans and Details and shall be firmly keyed into the streambed. All W-Weir rocks shall be placed behind footers. On larger streams, double footer rocks may be required to insure that the footer extends below the final invert of the plunge pool associated with the W-Weir.

5.7 Rocks placed to construct the legs of the W-Weir shall be placed in a linear fashion so as to produce a sloping surface. Rock shall be placed with a tight, continuous surface contact between adjoining rock. Rock shall be placed so as to have no significant gap between adjoining rock.

5.8 Rock shall be placed so as to have a final smooth surface along the top plane of the W-Weir. No rock shall protrude higher than the other rock in the W-Weir leg. A completed W-Weir has a smooth, continuous finish grade from the bankfull elevation to the streambed, and from the streambed to the apex.

5.9 Upon completion of the W-Weir, the Contractor shall place stabilizing vegetation as shown in the Vegetation Plan and Specifications.

5.10 The Contractors shall upon completion of the work reshape the slopes and stream bottom to the specified elevations. All unsuitable and surplus rocks will be removed from the site.

6. Measurement and Method of Payment

6.1 W-Weirs will be measured and paid for at the Contract unit price for each W-Weir installed.

6.2 The Contract unit price shall be full compensation for the transport of all materials, excavation, installation, and maintenance of W-Weir, and for all materials, labor, equipment, tools and incidentals necessary to complete the work as specified in the Contract Documents.

7. Special Conditions

7.1 Prior to the start of work, the Contracting Officer and Project Engineer shall designate representatives authorized to observe the Contractors construction of the W-weir. The Contractor shall construct all W-weirs in the presence of an authorized GCSWCD representative.

7.2 Placement of Footer Rocks is critical to the success of W-weirs. To insure proper placement, the Contractor shall provide a portable pump to de-water excessive ground water from the excavation.

7.3 The construction of W-weirs requires equipment which can place rock in precise locations. An excavator of a suitable size, and containing a thumb is suggested.

7.4 The GCSWCD has estimated that the W-Weir will require approximately 160 cuyds of rock. Estimated rock volumes found in the ACOE permit section shall not be used for calculating total rock volume requirements. It shall be the responsibility of the Contractor to verify all required rock volumes.