

## SECTION 720 BANK AND CHANNEL PROTECTION

### 720.1 DESCRIPTION

This work consists of furnishing, assembling and filling woven wire “baskets” or “gabions” with stones as specified in the contract in conformance with the dimensions, lines and grades shown on the plans, or established by the Engineer.

### 720.2 MATERIALS

Materials shall conform to the following requirements or Sections.

- A. **Stone:** The stone shall be durable field or quarry stone, free of seams, cracks, and defects. Slabby stone pieces will not be acceptable. The stone shall range in size from a minimum of four inches (100 mm) to a maximum of eight inches (200 mm) in the greatest dimension. The majority of the stones shall be in the 5 to 6 inch (125 to 150 mm) range and cubical or rounded in shape. Stone shall not have an L.A. Abrasion of more than 40 percent.
- B. **Baskets:** Baskets shall conform to the details specified in the plans.
- C. **Gabions:** Gabions shall conform to the plans and/or Section 1030.
- D. **PVC Coating:** When specified, the wire used in the fabrication of the bank and channel protection shall be PVC coated. After zinc coating, the PVC coating shall be extrusion bonded on the wire. The PVC coating shall have a nominal thickness of 0.02165 inches (0.55 mm) and a minimum thickness of 0.015 inches (0.38 mm). The lacing wire shall also be PVC coated.  
  
The PVC coating shall not crack, peel, blister, split, or have any other defects. The coating material shall be resistant to the effects of weather and exposure to ultraviolet rays.
- E. **Drainage Fabric:** Drainage fabric shall conform to Section 831.
- F. **Lacing and Internal Connecting Wire:** Lacing and internal connecting wire shall be 0.0866 inch (2.20 mm) diameter steel wire ASTM A461 Class 3 soft temper measured after galvanizing and for PVC coated baskets shall be 0.0866 inch (2.20 mm) diameter steel wire measured after galvanizing but before PVC coating.
- G. **Interlocking Fasteners:** Interlocking fasteners shall conform to Section 1030.
- H. **Substitutions:** When neither “baskets” nor “gabions” are specified, either may be furnished. When PVC coated bank and channel protection is specified, gabions will be required and no substitutions will be allowed.

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### 720.3 CONSTRUCTION REQUIREMENTS

Slopes to be protected by gabions shall be free of brush, trees, stumps and other objectionable material and shall be dressed to a smooth surface. Soft or spongy material shall be removed to the specified depth and replaced with suitable material. Filled areas shall be thoroughly compacted.

The bank and channel protection shall be assembled individually by erecting the sides, ends and diaphragm(s) with all creases in the correct position and the tops of all sides satisfactorily level. Lacing wire and/or fasteners shall be used to assemble the units and to join the units together.

**A. Lacing:** The lacing procedure is as follows:

1. Cut a length of lacing wire approximately 1½ times the distance to be laced but not exceeding 5 feet (1.5 m).
2. Secure the wire terminal at the corner by looping and twisting.
3. Proceed lacing with alternating single and double loops at a spacing not to exceed 6 inches (150 mm).
4. Securely fasten the other lacing wire terminal.

**B. Interlocking Fasteners:** Interlocking fasteners may be used for basket assembly as final construction of gabion structures. Spacing of fasteners during all phases of assembly and construction shall not exceed 6 inches (150 mm).

**C. Alternate Fasteners:** The use of alternate fasteners shall be permitted in lieu of lacing wire provided the following has been demonstrated.

1. The ability of the alternate fastener to contain a minimum of four selvedge wires while remaining overlapped a minimum of one inch (25 mm) for overlapped type or in a locked and closed condition.
2. The proposed fastener system can consistently produce a four selvedge wire joint with a strength of 1400 pounds per linear foot (2100 kg/m) for a galvanized joint and 1200 pounds per linear foot (1800 kg/m) for PVC coated gabion joints.
3. The proper installation can be readily verified by visual inspection.

When drainage fabric is specified, the surface to be covered shall be smooth, free of obstructions, and shall conform to plan shown dimensions prior to placement of the drainage fabric.

The drainage fabric shall be placed under and along all sides of the bank and channel protection that is in contact with earth, unless otherwise shown on the plans. Lapped joints in the drainage

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fabric shall be placed transverse to the direction of flow with the overlap in the direction of flow. All lapped joints shall be lapped a minimum of 12 inches (300 mm). Vehicles and equipment shall not be operated directly on the drainage fabric.

A standard fence stretcher, chain fall, or iron rod may be used to stretch the bank and channel protection and hold alignment. The units shall be filled with stone carefully placed by hand or machine to assure alignment and avoid bulges with a minimum of voids. To allow for settlement, overfilling of two to three inches (50 to 75 mm) is required. After each unit has been filled, the lid shall be stretched tight over the stone fill using only an approved lid closing tool, until the lid meets the perimeter edges of the front and end panels. Using crowbars or other single point leverage bars for lid closing shall be prohibited.

After the units are filled, the lid(s) shall be folded over to meet the sides and edges and secured with lacing wires and/or fasteners. When PVC coated bank and channel protection is specified, special care shall be taken during the filling operation to avoid damaging the coating. Bank and channel protection on which the PVC coating has been damaged shall be repaired or replaced.

Whenever a structure requires more than one tier, the upper empty baskets shall also be connected to the top of the lower tier along the front and back edges of the contact surface using the same connecting procedure described above using internal connecting wire and/or fasteners.

Internal connecting wires shall be installed in multi-tied structures as follows:

- 1. 36" (900 mm) High Gabions:** 36" (900 mm) high gabions shall be filled in three layers, one foot (300 mm) at a time. After the placement of each layer, that is at one foot (300 mm) high and two feet (600 mm) high, connecting wires shall be placed according to the manufacturers recommendations to connect the exposed face of a cell to the opposite side of the cell. An exposed face is any side of a cell that will be exposed or unsupported after the structure is completed.
- 2. 18" (450 mm) High Gabions:** 18" (450 mm) high gabions do not require connecting wires unless the baskets are used to build vertical structures. In some cases, these units shall be filled in two layers, nine inches (225 mm) at a time. After the placement of each layer, connecting wires shall be placed according to the manufacturers recommendations to connect the exposed face of a cell to the opposite side of the cell. An exposed face is any side of a cell that will be exposed or unsupported after the structure is completed.

### 720.4 METHOD OF MEASUREMENT

Bank and channel protection will be measured to the nearest 0.10 cubic yard (0.10 cubic meter). If a substitution is made, the dimensions of the bank and channel protection installed shall be equal to or greater than the dimensions specified. Payment will be based on plans quantity, unless changes are ordered in writing by the Engineer.

## 720.5 BASIS OF PAYMENT

Bank and channel protection will be paid for at the contract unit price per 0.1 cubic yard (0.1 cubic meter). Payment will be full compensation for materials, equipment, labor, **excavating**, **shaping** and incidentals required.