SECTION 611

EMBANKMENT PROTECTION

SECTION 611.10 BLANK

SECTION 611.20 BLANK

SECTION 611.30 ROCK BLANKET

611.30.1 Description. This work shall consist of constructing a protective blanket of rock or broken concrete on slopes or stream banks.

611.30.2 Material. The material for rock blanket shall be durable stone or broken concrete containing a combined total of no more than 10 percent of soil, sand, shale or non-durable rock. The material shall contain a large percentage of pieces as large as the thickness of the blanket will permit, with enough smaller pieces of various sizes to fill the larger voids. For Type 1 Rock Blanket, at least 40 percent of the mass shall be of pieces having a volume of one cubic foot (0.03 m^3) or more. For Type 2 Rock Blanket, at least 60 percent of the mass shall be of pieces having a volume of one cubic foot (0.03 m^3) or more. Acceptance of quality and size of material will be made by visual inspection at the job site.

611.30.3 Construction Requirements. A trench at the toe of the slope shall be excavated to the depth shown on the plans, or to a depth of 2 feet (600 mm) if not otherwise shown. The slopes shall be in accordance with the proper cross section and shall be compacted to a uniform density as required for adjacent material. The rock or broken concrete shall be placed on the slope, to the specified thickness, elevation and extent, and manipulated such that most of the flat sides are in contact, thereby eliminating large voids. The finished surface of the blanket shall present an appearance free from segregation and with a proportionate quantity of the larger pieces showing.

611.30.4 Method of Measurement. Measurement will be made to the nearest cubic yard (m^3) of material in place in the completed blanket.

611.30.5 Basis of Payment.

611.30.5.1 If shown on the plans that the material for rock blanket is to be obtained from the right of way or other source furnished by the Commission, the excavating, including all breaking, loading and hauling, regardless of distance to the site of the rock blanket, will be paid for and considered completely covered under such contract items as Class A Excavation, Class C Excavation, Unclassified Excavation, Excavation for Structures, or other applicable items. If payment is made under these conditions, separate payment for furnishing rock blanket will not be made.

611.30.5.1.1 If the plans show material for rock blanket to be secured from such sources and this material is made unsuitable or unattainable by the contractor's operations, the contractor shall provide suitable material and dispose of any surplus material at the contractor’s expense.

611.30.5.1.2 If the plans provide for obtaining material from the right of way or other source furnished by the Commission, but all or part of the required quantity of acceptable material is

not actually available, payment will be made under Sec 109 for the purchase and delivery of any additional rock blanket material that will be required.

611.30.5.2 If the plans do not provide for a source of the material, the contractor shall provide the material, and all costs of securing the source, quarrying, excavating, breaking and hauling the material to the site will be paid for and completely covered by the contract unit price per cubic yard (m^3) for furnishing rock blanket. If material suitable for rock blanket is encountered within the limits of the right of way or other sources furnished by the Commission, and the material is used in the construction of the rock blanket, then payment will be made in accordance with Sec 611.30.5.1.

611.30.5.3 Payment for placing rock blanket will be made at the contract unit price per cubic yard (m^3). No direct payment will be made for excavating the trench or for backfilling.

SECTION 611.40 BLANK

SECTION 611.50 REVETMENT

611.50.1 Description. This work shall consist of slope or bank protection of the type specified in the plans, constructed at locations shown on the plans or as directed by the engineer.

611.50.2 Material. Acceptance of quality and size of material will be made by visual inspection at the job site.

611.50.2.1 Stone for light stone revetment shall be sound, durable and free from cracks and other structural defects that would cause the revetment to deteriorate. The stone shall not contain any soapstone, shale or other material easily disintegrated. The stone shall be in blocks at least 7 inches (175 mm) thick perpendicular to the slope and shall have approximately rectangular faces 7 inches (125 mm) wide or more. All blocks shall weigh (have a mass of) at least 25 pounds (10 kg), and at least 75 percent shall weigh (have a mass of) no less than 50 pounds (20 kg).

611.50.2.2 Stone for heavy stone revetment shall be in accordance with Sec 611.50.2.1, except that the blocks shall be at least 12 inches (300 mm) thick perpendicular to the slope and all blocks shall weigh (have a mass of) no less than 50 pounds (20 kg), and at least 60 percent shall weigh (have a mass of) no less than 100 pounds (40 kg).

611.50.2.3 At the contractor's option, concrete blocks may be substituted for stone, provided the concrete blocks meet the size and weight (mass) specifications for stone. The blocks shall be made of either Class B concrete or concrete of a commercial mixture with material, proportioning, mixing, slump and transporting of concrete in accordance with Sec 501. Blocks may be precast and then laid in the required location, or the blocks may be cast in place on the slope, provided joints are spaced such that the joints will completely sever the concrete into blocks no larger than 2 x 4 feet (600 x 1200 mm) with the long dimension horizontal and with vertical joints broken. If cast in place, concrete shall be placed, finished and cured in accordance with Sec 703.

611.50.2.4 The contractor may use broken concrete as blocks for revetment provided minimum size and weight requirements for stone are maintained and the use is approved by the engineer.

611.50.3 Construction Requirements. Unless otherwise approved, the slopes upon which revetment are to be placed shall be in accordance with the section shown on the plans. The slopes shall be compacted to a uniform density as required for adjacent material. The

revetment shall be started in a trench below the toe of the slope shown on the plans and shall progress upward. Each stone or block shall be laid perpendicular to the slope, shall be firmly bedded against the slope and against adjoining stones or blocks, and shall be laid with well-broken joints. Only one layer of stone or blocks perpendicular to the slope will be permitted. After revetment has been placed, the voids shall be filled with spalls or small stones in such a manner that all revetment stones or blocks are tightly wedged. The finished surface shall present a uniform appearance true to line, grade and section.

611.50.4 Method of Measurement. Measurement of revetment will be made to the nearest square yard (1.0 m^2).

611.50.5 Basis of Payment. The accepted quantity of revetment will be paid for at the contract unit price for each of the pay items included in the contract. No direct payment will be made for excavating the trench or for any required backfilling.

SECTION 611.60 CONCRETE SLOPE PROTECTION

611.60.1 Description. This work shall consist of constructing a concrete slope protection by placing concrete on the finished earth slope as shown on the plans.

611.60.2 Material. Slope protection shall be of Class B concrete, with material, proportioning, mixing, slump and transporting of concrete in accordance with Sec 501. Concrete shall be placed, finished and cured in accordance with Sec 703.

611.60.3 Construction Requirements.

611.60.3.1 Concrete shall be placed on a prepared, compacted subgrade of uniform density, and shall be consolidated and struck off to the required thickness. Joints shall be the full depth of the concrete and shall consist of material in accordance with Sec 1057.6.

611.60.3.2 The surface of the paved slope shall have a broom or burlap drag finish and shall be cured in the same manner as required for concrete pavement, except that transparent membrane shall be used in lieu of pigmented membrane.

611.60.4 Method of Measurement. Measurement will be made to the nearest square yard (m^2).

611.60.5 Basis of Payment. The accepted quantity of concrete slope protection will be paid for at the contract unit price. No direct payment will be made for any excavating or for other work necessary in preparing the subgrade or for any backfilling required.

SECTION 611.70 GABIONS

611.70.1 Description. This work shall consist of installing welded wire fabric gabions and gabion mattresses, and twisted hexagonal mesh gabions and revet mattresses at locations shown on the plans or as directed by the engineer, and shall be of the size included in the contract.

611.70.2 Material.

611.70.2.1 The gabion baskets or mattresses shall be made of welded wire fabric or twisted hexagonal mesh. The baskets shall be in accordance with ASTM A 974 for welded wire fabric gabions and gabion mattresses and ASTM A 975 for twisted hexagonal mesh gabions and revet mattresses.

611.70.2 Rock used in the gabions or mattresses shall be crushed limestone with a maximum and minimum size according to the basket manufacturer's recommendation.

611.70.3 Construction Requirements.

611.70.3.1 The contractor shall follow the manufacturer's recommended procedures for installation.

611.70.3.2 Cut compaction shall be performed in all Class A material areas where the baskets are constructed. The exposed material, to a depth of 6 inches (150 mm), shall be manipulated and compacted to no less than the required density. The material above this compacted plane shall be spread in layers, each being wetted or dried as necessary and compacted to the specified density. The entire volume of material so handled and compacted, including the 6-inch (150 mm) layer compacted in place, will be considered as Compacting in Cut. All Class A material having a liquid limit of 40 or more, including the 6-inch (150 mm) layer compacted in place, shall be compacted at no less than the optimum moisture content.

611.70.3.3 Excavated material beyond the limits of the baskets shall be backfilled with gravel or crushed rock material meeting the approval of the engineer.

611.70.4 Method of Measurement.

611.70.4.1 The pay limits for excavation for gabions and mattresses will be a line coincidental with the bottom and non-exposed side of the baskets. Excavation quantities will be measured to the nearest cubic yard (m^3).

611.70.4.2 Measurement of gabions and mattresses will be made to the nearest cubic yard (m^3).

611.70.5 Basis of Payment.

611.70.5.1 The quantity to be paid for gabions and mattresses will be the number of cubic yards (m^3) of gabions and mattresses measured in the final position. Job conditions and availability will determine the actual size of baskets to be used. Any costs that might occur will be included and paid for in the cost per cubic yard (m^3) of gabions and mattresses.

611.70.5.2 Gabions and mattresses will be paid for at the contract unit price per cubic yard (m^3).

611.70.5.3 Excavation quantities will be paid for under the appropriate classified excavation items.