

SPECIFICATION SECTION 04400 – MORTARED STONework

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SPECIFICATION SECTION 04400 - MORTARED STONEWORK

(STONE STABILIZED WITH CEMENT MORTAR)

1. DESCRIPTION

This Specification Section describes the requirements for the construction of Mortared Stonework. This work consists of; the lining of roadside ditches, cascade drops and construction of inlets and outlets to culverts.

2. MATERIAL REQUIREMENTS

2.1 Reference Standards

Mortared stonework shall comply with Vietnamese Standard TCVN 4085-1985

2.2 Stone

Stones shall; consist of field stone or quarry stone, be sound, tough, durable, dense, resistant to the action of air and water and suitable in all respects for the purpose intended.

Mortared Stonework: Unless otherwise indicated on the Drawings or directed by the Engineer the stone shall meet the gradation requirements shown in Table 1.

The quality and dimensions of the stones shall be approved by the Engineer prior to their use. Stones shall be as nearly rectangular in shape as practicable.

Table 1: Gradation Requirement for Stones ^(*)

Approximate Given Size		Equivalent Cubic Dimension (mm)	Total Size Smaller than Given Size (%)
Weight (kg)	Volume (m ³)		
45	0.018	250	100
27	0.011	225	80
11	0.005	165	50
2	0.0003	75	10*

* Material shall consist of spills and rock fragments graded to provide a stable compact mass.

2.3 Cement Mortar

Cement Mortar shall conform with the requirements of Specification Section 12100 Cement Mortar or as directed by the Engineer.

2.4 Submittals

The Contractor shall submit to the Engineer for his approval two representative 50 kg samples for each class of stone that he intends to use for Mortared Stonework. The Engineer shall retain one of these samples for reference. The Contractor shall use in the Works only the stone classes that have been approved by the Engineer.

3. CONSTRUCTION REQUIREMENTS

3.1 Shop Drawings and Schedule

3.1.1 Shop Drawings

The Contractor shall furnish shop drawings showing the construction details of Mortared Stonework. The shop drawings shall be included in the appropriate submissions to the Engineer for his approval for the mortared stonework included in Specification Section 04200 Ditches and Specification Section 04300 Catch Basins, Manholes, Inlets and Outlets. Construction of Mortared Stonework shall not begin until the Contractor's submissions have been approved by the Engineer.

3.1.2 Work Scheduling

The Contractor shall schedule the works based on the following main criteria:

- (i) Mortared Stonework shall be executed in such a way as to ensure that stones are placed only in fresh mortar at any time that this work is being performed; and
- (ii) Mortared Stonework in roadside drain linings shall be laid after contouring the formation to the required profile.

3.2 Tolerances, Rectification and Maintenance

3.2.1 Dimensional Tolerances

- a) The surface of each face stone shall not vary from the average profile of the surrounding stonework by more than 3 cm.
- b) The average surface profile for ditches lined in Mortared Stonework shall not vary from the specified or approved channel invert profile by more than 2 cm.
- c) The finished profiles for inlet and outlet structures shall not vary from the specified or approved profiles by more than 2 cm.

3.2.2 Rectifying Unsatisfactory Work

- a) The Contractor shall rectify, at his own expense, any Mortared Stonework that does not meet the tolerances given in this Specification Section or that was not completed as directed by the Engineer.
- b) The Contractor shall be responsible for the stability and integrity of all finished work. Unless otherwise determined by the Engineer, the Contractor shall replace at his own expense any Mortared Stonework that is damaged or displaced prior to the issue of the Taking-Over Certificate. No separate measurement or payment will be made for rectifying unsatisfactory work.

3.2.3 Maintenance of Accepted Work

The Contractor shall be responsible for routine maintenance and the care of all completed and accepted Mortared Stonework up to the issue of the Taking-Over Certificate. No separate measurement or payment will be made for such routine maintenance.

3.3 Work Preparation

3.3.1 Preparing Formations or Foundations

The Contractor shall prepare formations for Mortared Stonework to the lining of open ditches in accordance with the provisions of Specification Section 04200 Ditches.

The Contractor shall prepare foundations and trenches for cut off walls or other structures made of Mortared Stonework in accordance with the provisions of Specification Section 03200 Structural Excavation.

3.3.2 Preparing Stone

- a) The Contractor shall remove from the stones all loose materials that could impair the bond with the mortar.
- b) The Contractor shall thoroughly wet the stones long enough for the stones to absorb water to near saturation point prior to laying.

3.4 Placing Stone Lining

- a) Surfaces to receive mortar shall be free from oil or clay or other contaminants and thoroughly saturated before the mortar is applied. Free surface water shall be removed before application of the mortar.

- b) The Contractor shall place a bedding of fresh mortar at least 3 cm thick on the prepared formation. The Contractor shall construct this mortar bedding progressively by laying the surface stones in such a manner that the stones are always securely bedded in the mortar before it hardens.
- c) The Contractor shall place the stones firmly against each other to provide the required paving thickness measured perpendicular to the slope. The Contractor shall then place additional mortar to completely fill all spaces between the stones. The finished surface of the mortar shall be almost flush with the surface of the lining but the mortar shall not cover the stones.
- d) The work shall progress from the bottom of the slopes towards the top. The Contractor shall finish the surface immediately following the initial set of the mortar by sweeping the surface with a stiff broom.
- e) The Contractor shall trim and finish adjacent slopes and shoulders to ensure a tight and smooth interface with the Mortared Stonework. The interfaces shall allow unobstructed drainage and prevent scour at the edges of the work.

3.5 Constructing Mortared Stonework Structures

- a) The Contractor shall construct Mortared Stonework structures by covering the base of the foundation with mortar to a depth of 60% of the maximum dimension of the stones. The Contractor shall then immediately place the stones in the unset mortar. The Contractor shall add additional mortar and repeat the process until the structure is complete. The Contractor shall then add mortar to the top of the cut off until he obtains a screeded level top surface.
- b) The Contractor may construct Mortared Stonework without forms if the stone can interlock sufficiently and if he uses stiff mortar.
- c) The Contractor shall finish and cure exposed surfaces of Mortared Stonework structures in accordance with the requirements of Specification Section 07100 Concrete and Concrete Structures.
- d) The Contractor shall backfill around the finished and cured Mortared Stonework in accordance with the requirements of Specification Section 03200 Structural Excavation.

4. MEASUREMENT AND PAYMENT

4.1 Method of Measurement

4.1.1 Mortared Stonework

- a) Mortared Stonework used in ditches shall not be measured for payment in this Specification Section. The cost shall be incorporated in the unit rates of ditches as provided for in Specification Section 04200 Ditches.
- b) Mortared Stonework used in cascade drops (not applicable to Package A2) shall be measured for payment in this Specification Section. Excavation, backfill and stone blinding shall be measured for payment in Specification Section 03200 Structural Excavation.
- c) Mortared stonework in inlet and outlet structures for culverts shall be measured for payment in this Specification Section. Excavation, backfill and stone blinding shall be measured for payment in Specification Section 03200 Structural Excavation.
- d) Mortared Stonework in; embankment slope protection, toe of slope protection, river bed protection and river bank revetment shall be measured and paid in Specification Section 12400 Slope Protection.
- e) The mortar bed under Mortared Stonework is not measured for payment separately. The costs of this work shall be included in the unit rates for Mortared Stonework.
- f) The Mortared Stonework provisions, material requirements and construction requirements identified in this Specification Section shall be measured for payment in pay item 04400-01.
- g) Any Mortared Stonework Works not specifically identified in this Specification Section but which are necessary for the performance of the Works shall be deemed to be included in pay item 04400-01.
- h) Mortared Stonework in slope protection above the culverts shall be measured for payment in Specification Section 12400 Slope Protection

4.2 Basis of Payment

The work under this Specification Section shall be paid for in accordance with the applicable unit prices as indicated in the Bill of Quantities and given below. Payment shall constitute full compensation for performing the requirements of the Contract for the items of work specified including furnishing all necessary

labor, materials, tools, equipment and incidentals.

<u>Pay Item</u>	<u>Description</u>	<u>Unit</u>
04400	Mortared Stonework	
04400-01	Mortared Stonework	m3