

**DIVISION 4**

**MASONRY**

**BUILDING WORK**

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**MASONRY**

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**SECTION 04810****UNIT MASONRY ASSEMBLIES****PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes concrete masonry units. This work should consist of the supply of all materials and the execution of all concrete block and partition construction, including the forming of all openings for doors, windows, etc., in accordance with the Drawings, Specifications and Bill of Quantities.

**PART 2 PRODUCTS**

- 2.1 **UNIT MASONRY ASSEMBLIES** The cement, lime, water, sand and aggregate used shall meet the same requirements as for Concrete Work (Section 3050 hereto) and shall comply with the following grading:

<u>Sieve designation</u>	<u>Percentage Passing by Weight</u>
1/8 inc.	95 – 100
No. 7	75 – 100
No. 14	55 – 90
No. 25	35 – 59
No. 52	8 – 30
No. 100	0 – 100

**2.2 MANUFACTURE OF BLOCKS AND BRICKS**

Blocks and bricks, whether solid or hollow, shall be of precast concrete and may be manufactured on or off the Site under the supervision of the Engineer. Blocks or bricks from an approved manufacturer may be accepted at the discretion of the Engineer.

The casting of all blocks or bricks shall be made in approved moulds and to the required dimensions, and thoroughly rammed and consolidated by mechanical tamping and vibration. All blocks shall be sound, square-edged, true to shape and size, and free from cracks and other defects.

**2.3 COMPOSTING AND MIXES**

The composition of the blocks shall be of ordinary or white Portland cement as specified, and of approved quality of fine and coarse aggregates graded to a maximum size of 10 mm.

The strengths of the following types of cement blocks shall be not less than 35 kg./cm.

- A Wall Blocks:

Blocks for walls shall be made of 1:2:4 mix. The quantity of cement shall not be less than 225 kg. for one (1) cubic meter of concrete, and shall be made in the following dimensions and used as shown on the Drawings:

<u>Dimensions</u>	<u>Block Type</u>
40 x 20 x 20 cm. wide	Hollow
40 x 20 x 15 cm. wide	Hollow
40 x 20 x 10 cm. wide	Hollow or solid
40 x 20 x 7 cm. wide	Solid

#### 2.4 CURING

After casting, blocks shall be kept well wetted with water for a period of ten (10) days, and are not to be used before thirty (30) days from their manufacture. After building, concrete walls shall be kept well wetted for a period of seven (7) days.

#### 2.5 MORTAR

The mortar for concrete block shall be as follows:-

- A The sand for mortar shall meet the same standards as mentioned in Item 2.1 hereto.
- B The mortar for building block walling shall be of 1:4 mix (one part of ordinary Portland cement to six parts of sand).
- C The mortar for building external walling shall be of 1:4 mix (one part of white Portland cement to four parts of sand).
- D Mortar, if not mixed by a mechanical mixer, shall be thoroughly mixed two times when dry and two times after adding water on a clean watertight platform. Mortar will be mixed in small quantities and used fresh. Mortar which has begun to set or has been mixed for more than 30 minutes shall not be used or remixed.

#### 2.6 LAYING OF CONCRETE BLOCKS

All blocks or bricks for walling shall be thoroughly soaked with water before use, and shall be well-bedded in a full mortar and hammered down to squeeze out joints.

Any blocks or bricks which fracture shall be replaced with whole blocks. Vertical and horizontal joints are not to exceed 1 cm. in thickness. Walls and partitions shall be well-toothed and bonded at ends into walls, and tightly pinned in cement mortar against slabs and beams at heads. The ends of every third course of block and brick work shall be properly bonded into abutting walls to a depth of 10 cm. in accordance with the Detail Drawings.

Where the structure is of reinforced concrete frame with block or brick filling walls, the Contractor shall at his own expense provide for each wall at least one (1) tie every 40 cm. (two courses) made of steel ties 3.0 mm. thick, shot at the column and protruding at least 50 cm. along the mortar bed. Ties shall be as specified in Item 4.09 hereto.

Concrete block shall be laid plumb, true to line, with level and accurately spaced courses (each course breaking joints with the next course below it).

Walls shall be constructed course by course in a uniform manner. All block and brick surfaces to be plastered are to have joints raked out to a depth of 1 cm. to form key, and those block and brick surfaces which must remain unplastered shall be pointed flush in a neat manner while building.

All perpend, quoins, joints, etc., shall be kept strictly true, square and plumb, and courses shall be truly horizontal.

Bats, broken blocks or bricks shall only be used where strictly required for good and proper bonding.

All openings above doors and windows shall be made with reinforced concrete lintels 40 cm. high, and of the reinforcement shown hereunder, unless otherwise indicated on the Drawings: 3 dia. 16 bottom, 2 dia. 14 top, dia. 8 at 20 cm. stirrups.

## 2.7 ELECTRO-GALVANISED STEEL CRAMPS AND DOWELS

Cramps or dowels shall be electro-galvanized (zinc-plated) as described in this Item.

Galvanizing of the metal shall be zinc by electroplating, so as to provide a thin, uniform and ductile protective coating. Small holes and threads shall be satisfactorily coated. The ductility of the zinc coatings shall be such as to allow for bending of the components without causing any damage. The galvanizing gauge and process shall be in compliance with BS 1706: 1960.

### A Marble to Brickwork or Concrete Cramps:

This shall be a stainless steel cramp 10 cm. long and 2.5 cm. wide, 3 mm. thick, with a half-twisted at 1/3:2/3 distance and fish tail back, and including a dowel made of stainless steel 5 mm. diameter x 4 cm. length. This item shall be as manufactured by Harrison Edgar or an approved equivalent.

### B Block to Column Tie:

This shall be electro-galvanized steel ties laid along courses 10 cm. long, bent at the column edge to a 90 degree angle with a hole for expanding bolt fixation to column. The total length of the tie shall be 25 cm., i.e. 15 cm. along the course and 10 cm. along the column, with a fish tail 2.5 cm. wide x 3 mm. thick.

### C Block to Concrete Wall Ties:

This shall be electro-galvanized steel ties laid between block courses to face of concrete walls.

The total length of the ties shall be in accordance with space between the block and concrete walls bent at the concrete wall face to a 90-degree angle with a hole for expanding bolt fixation to concrete wall.

Width of ties shall be 10 cm. x 3 mm thick.

Ties to be laid every 3 meters horizontally and every four courses vertically.

This Item shall be according to Catnic Products or equivalent.

**END OF SECTION**

**SECTION 04853****STONE ASSEMBLIES****PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes stone works for exterior and interior walls.

**1.2 SUBMITTALS**

A. Samples:

1. 500-mm minimum square samples of each type of material proposed for use.
2. Submit samples in sufficient quantity to show extreme variation which may reasonably occur in each kind of stone, regarding color, texture and quality. Engineer reserves the right to approve more limited range of variation. Samples must be submitted by the contractor to the Engineer for approval within 30 days of the commencement of the contract.
3. Samples of each type of anchor proposed.

- B. Complete shop and setting Drawings.

**PART 2 QUALITY ASSURANCE**

- 2.1 Perform work in accordance with The **General Specifications** issued by the “Ministry of Public Work and Housing”.

**PART 3 PRODUCTS**

- 3.1 Stone shall be “Class-A” as per clause 503.1 of the General Specifications and shall be of locally sources known as:

1. “Ma’an Sateh” for white stone.
2. “Karak Black Stone” and “Karak Basalt” for black color stone.
3. “Hebroun Yatta” marble thresholds and sills .
4. “Karak” for big stone pieces of observation point as mentioned in the B.O.Q.
5. “Ajloun acid itched” for Museum tiling.

- 3.2 Stone shall be obtained from the best quarries in Ma,an , Karak, Hebron -Yatta or Ajloun as detailed in the drawings and in the BoQ which have and not restricted to the following properties:

- A. Sound and free from defects that would materially impair strength, durability or appearance.
  - B. Uniform in texture, free from freak coloration's.
  - C. Non-absorbent, free from reads rifts, seams, spalls, chips and minerals which by weathering would tend to discolor, deteriorate, streak or stratify.
- 3.3 Product Delivery, Storage and Handling:  
During transport and storage, separate units from one another by wood strips or wedges, rest units on wood or other approved types of material.  
Stone are not allowed to be rest on earth at any time and should be handled carefully.  
Store should be done in vertical position, so that markings corresponding to setting drawings are easily discernable.
- Stone should be covered with waterproof covering and protect from weather and dirt.

#### **PART 4 EXCUTION**

- 4.1 Stone cutting, forming and fixing shall follow the "Special category" designated in subsections 504, 505, 507, 508 & 511 of the General specifications.
- 4.2 Stone cutting and forming shall only be done at the mill using mechanical sawing conforming to the allowable dimensional tolerances as given in subsection 504 of the General specifications.
- 4.3 Stone forming on site shall be limited to the making of stone face patterns, roughening of sawn surfaces and drilling of inserts holes and slots.
- 4.4 Dressing:
- A. Stone shall be mechanically fine or rough bushammered (Matabeh).
  - B. Make arises sharp and true with edges slightly eased.
  - C. Perform cutting, dressing, drilling, fitting and other preparations of stone.
  - D. Include work as required to accommodate or fit work of other trades, such as cutting and fitting for pipes, conduits, structural work, etc.
  - E. Do not cut stone until shop drawings are approved.
  - F. Completely cut and finish before delivery to site except as necessary for fitting.
  - G. Cut accurately to shape and dimensions with butt joint. Joints shall be straight, at right angles to face.
  - H. Except as otherwise indicated, saw or dress backs parallel to wall face.

- I. Where bonding occurs, arrange backs to fit lay of masonry backing.
- J. Shape beds for stone resting on structural work to fit support.
- K. Back check stone coming in contact with structural steel solidly.
- L. Do not impair strength of stone bearing capacity.
- M. Cut holes and sinkages in stone for anchors, dowels or cramps specified or required executing work properly.

#### 4.5 Laying:

- A. When ready for setting, clean all stones, removing any dirt or foreign matter from all edges and surfaces. Do not use wire brushes.
- B. Securely place all anchors.
- C. Embed anchors in mortar filled holes or saw cut channels 18 mm deep in edges of veneer slab and hook into recesses cut or drilled in backing wall.
- D. Take care to avoid soiling or defacing stone surface, immediately remove any mortar from face and wash stone clean.

#### 4.6 Protection and Cleaning:

- A. Box and maintain projecting stone sills and stone work.
- B. Just before project is completed, remove boxing and clean with fiber brushes, mild detergent and water.
- C. Remove and replace units having stains that cannot be removed by cleaning.
- D. Remove and replace units requiring patching or repairing.

#### 4.7 Stone Cladding:

- A. The contractor shall submit method statement shop drawings and any structural calculations for stone cladding and fixing system, according to drawings and details to be approved by the Engineer.
- B. Stone cladding shall be fixed on fair face concrete walls or solid block walls by using stainless steel L-strap anchor with dowels, anchor bolts and shims.
- C. L-strap anchors with dowels should be placed horizontally at joint faces between stone units with minimum two anchors for each stone unit, and two stainless steel

pins vertically.

- D. Stone units shall satisfy the following dimensions:
1. Minimum thickness of 5 cm.
  2. Uniform height of 50 cm.
  3. Uniform length of 100 cm except in restricted or limited areas.
  4. Stone angle length not less than 200 mm.
- E. Stone cladding shall be constructed without pointing and cement mortar between joints or behind stone units.
- F. First stone coarse shall be fixed either on structural concrete beam or by using special anchors and straps.

#### 4.8 Stone Tiling:

A. Joint Filler Mortar:

A water-repellent additive approved by the Engineer shall be used in the mix of joint filler mortar. A colour pigment (white colour) shall be used in the joint filler mortar to obtain a colour of mortar consistent with the colour of Stone.

B. Stone Tiling:

- (a) Stone used in floor tiling shall be classified as "Class A" as per clause 503.1 of the General Specifications and shall be of "Ajloun acid itched" for the Museum, "Ma'an Sateh" dressed "Matabbeh" for the observation point and the Visitor Center and Karak Basalt.
- (b) Stone face pattern shall be type (a) MATABBEH as specified in Clause 504.2 of the General Specifications. The Matabbeh pattern shall be of the fine texture.
- (c) The dimensions of stone tiles shall be as shown on the drawings and B.O.Q.
- (d) The workmanship of stone tiling shall be in accordance with "Special Category" as given in the same sub-clause of the General Specifications.
- (e) Isolation joints shall be provided along the ends of tiled floor areas where tiles are discontinued at vertical surfaces of walls, parapets ... etc. Such isolation joints shall be 20 mm wide and shall be filled with clean sand for the full depth down to the gravel bedding and shall be sealed with a white colour polysulphide sealant to a depth of 15 mm from the top.
- (f) Stone floor tiling shall be laid to the slopes shown on the drawings.

Isolation joints shall be provided along the ends of tiled floor areas where tiles are discontinued at vertical surfaces of walls parapets ... etc. Such isolation joints shall be 20 mm wide and shall be tiled with clean sand for full depth down to the gravel bedding and shall be sealed with a white color two-part polysulphide sealant to a depth of 15 mm from the top.

Stone floor tiling shall be laid to the slopes shown on the drawings.

C. Stone Steps:

Stone shall have minimum thickness of 50 mm for treads and 30 mm for risers, steps shall be constructed according to the drawings.

4.9 Mock-Up:

The Contractor shall following the Engineer's approval of Stone samples and source and at least (4) weeks prior to the start date of Stone fixing prepare for the approval of the Engineer a 2x2 meter mock-up wall to be executed out of the building's limit and within the building site.

The mock-up shall demonstrate the following work items and only approved Stone shall be used in the execution of the mock-up:

- a. Mechanical fixation method and accessories.
- b. Stone face patterns.
- c. Overall stone cladding workmanship.

This mock-up once approved by the Engineer shall represent a reference for all stone work in the project.

**END OF SECTION**