

**Sub-structure**

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**2200**

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**2201. DESCRIPTION**

The work shall cover furnishing and providing of masonry or reinforced concrete sub-structure in accordance with the drawings and as per these specifications or as directed by the Engineer.

**2202. MATERIALS**

Materials shall conform to Section 1000 of these Specifications.

**2203. GENERAL**

A method statement for construction indicating the following shall be submitted by the Contractor for approval of the Engineer, well in advance of the commencement of sub-structure :

- i) Sources of Materials
- ii) Design, erection and removal of formwork
- iii) Production, transportation, laying and curing of concrete
- iv) Personnel employed for execution and supervision
- v) Tests and sampling procedures
- vi) Equipment details
- vii) Any other point

Arrangements for execution under water wherever necessary, shall be included in method statement.

Dimensions, lines and levels shall be set out and checked with respect to permanent reference lines and permanent bench mark.

**2204. PIERS AND ABUTMENTS**

Masonry, formwork, concrete and reinforcement for piers and abutments shall conform to relevant sections of these specifications. In case of concrete piers, the number of horizontal construction joints shall be kept minimum. Construction joints shall be avoided in splash zones unless specifically permitted by the Engineer and provided they are treated in accordance with special provisions. No vertical construction joint shall be provided. The work shall conform strictly to the drawings or as directed by the Engineer.

In case of tall piers and abutments, use of slipform shall be preferred. The design, erection and raising of slipform shall be subject to special specifications which will be furnished by the Contractor. The concrete shall also be subject to additional specifications as necessary. All

specifications and arrangements shall be subject to the approval of the Engineer.

The surface of foundation/well cap/pile cap shall be scrapped with wire brush and all loose materials removed. In case reinforcing bars projecting from foundations are coated with cement slurry, the same shall be removed by tapping, hammering or wire brushing. Care shall be taken to remove all loose materials around reinforcements. Just before commencing masonry or concrete work, the surface shall be thoroughly wetted.

In case of solid (non-spill through type) abutments, weep holes as shown on the drawings or as directed by the Engineer, shall be provided in conformity with Section 2706.

The surface finish shall be smooth, except the earth face of abutments which shall be rough finished.

In case of abutments likely to experience considerable movement on account of backfill of approaches and settlement of foundations, the construction of the abutment shall be followed by filling up of embankment in layers to the full height to allow for the anticipated movement during construction period before casting of superstructure.

#### **2205. PIER CAP AND ABUTMENT CAP**

Formwork, reinforcement and concrete shall conform to relevant sections of these specifications.

The locations and levels of pier cap/abutment cap/pedestals and bolts for fixing bearings shall be checked carefully to ensure alignment in accordance with the drawings of the bridge.

The surface of cap shall be finished smooth and shall have a slope for draining of water as shown on the drawings or as directed by the Engineer. For short span slab bridges with continuous support on pier caps, the surface shall be cast horizontal. The top surface of the pedestal on which bearings are to be placed shall also be cast horizontal.

The surface on which elastomeric bearings are to be placed shall be wood float finished to a level plane which shall not vary more than 1.5 mm from straight edge placed in any direction across the area. The surface on which other bearings (steel bearings, pot bearings) are to be placed shall be cast about 25 mm below the bottom level of bearings and as indicated on the drawings.

### 2206. DIRT/ BALLAST WALL, RETURN WALL AND WING WALL

Masonry, concrete, and reinforcement shall conform to relevant sections of these specifications.

In case of cantilever return walls, no construction joint shall generally be permitted. Wherever feasible, the concreting in cantilever return walls shall be carried out in continuation of the ballast wall.

For gravity type masonry and concrete return and wing wall, the surface of foundation shall be prepared in the same manner as prescribed for construction of abutment. No horizontal construction joint shall be provided. If shown on drawing or directed by the Engineer, vertical construction joint may be provided. Vertical expansion gap of 20 mm shall be provided in return wall/wing wall at every 10 metre intervals or as directed by the Engineer. Weep holes shall be provided as prescribed for abutments or as shown on the drawings.

Formwork, reinforcement and concrete in dirt/ballast wall shall conform to relevant sections of these specifications.

The finish of the surface on the earth side shall be rough while the front face shall be smooth finished.

Architectural coping for wing wall/return wall in brick masonry shall conform to section 1300.

### 2207. TESTS AND STANDARDS OF ACCEPTANCE

The materials shall be tested in accordance with these specifications and shall meet the prescribed criteria.

The work shall conform to these specifications and shall meet the prescribed standards of acceptance.

### 2208. TOLERANCES IN CONCRETE ELEMENTS

(a) Variation in cross-sectional dimensions	:	+10 mm, -5 mm
(b) Misplacement from specified position in plan	:	10 mm
(c) Variation of levels at the top	:	±10 mm
(d) Variations of reduced levels of bearing areas	:	± 5 mm
(e) Variations from plumb over full height	:	±10 mm
(f) Surface irregularities measured with 3 m straight edge		
All surfaces except bearing areas	:	5 mm
Bearing areas	:	3 mm

**2209. MEASUREMENTS FOR PAYMENT**

Masonry in sub-structure shall be measured in cubic metres in accordance with Section 1300 or 1400, based on the quantities ordered or as shown on the drawing.

Concrete in sub-structure shall be measured in cubic metres in accordance with Section 1700, based on the quantity ordered or as shown on the drawing. No deduction shall be made for weep holes.

Steel in concrete of sub-structures shall be measured in tonnes, in accordance with Section 1600, based on the quantity ordered or as shown on the drawing.

Weep holes shall be measured as per Section 2700, based on the quantity ordered or as shown on the drawings.

**2210. RATE**

The contract unit rates for masonry, concrete, reinforcement and weep holes shall include all works as given in respective sections of these specifications and cover all incidental items for furnishing and providing substructure as mentioned in this Section.

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