2300

Concrete Superstructure

2301. DESCRIPTION

The work shall cover furnishing and providing of concrete superstructure in accordance with the drawings as per these specifications or as directed by the Engineer.

2302. MATERIALS

Materials shall conform to Section 1000 of these Specifications.

2303. GENERAL

2303.1. 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 the construction of superstructure :

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

2303.2. Dimensions, lines and levels shall be set out and checked with respect to permanent reference lines and permanent bench mark so that the final product is in accordance with the drawings or as directed by the Engineer.

2303.3. The work shall conform to the following sections besides stipulations in this section with regard to specific type of construction:

i)	Formwork	Section 1500
ii)	Steel Reinforcement	Section 1600
iii)	Structural Concrete	Section 1700
iv)	Prestressing	Section 1800

Additionally, some of the common types of superstructure construction shall have features as discussed in this Section.

2304. REINFORCED CONCRETE CONSTRUCTION

2304.1. Solid Slabs

Where adjacent span of slab has already been cast, the expansion joint and filler board shall be placed abutting the already cast span which

shall form the shutter on that side of the new span to be cast. The whole of the slab shall be cast with reinforcement embedded for the road kerb and railings. No other construction joint shall be allowed except with the express permission of the Engineer.

Where wearing coat is required to be provided, after the deck slab has been cast, the surface of the slab shall be finished rough, but true to lines and levels as shown on the drawings, before the concrete has hardened. The areas of construction joints shall be treated in the prescribed manner.

The top of the slab shall be covered with clean moist sand as soon as the top surface has hardened. Curing shall be carried out as per Section 1700.

Where the slab is resting on bearings, the same shall be placed in position in accordance with the drawings, before casting of deck slab.

2304.2. RCC T-Beam and Slab

Provision of construction joint shall conform to the drawings or as per directions of the Engineer. No construction joint shall be provided between the bottom bulb and the web. If not indicated on the drawing, construction joint may be provided at the junction of the web and the fillet between the web and the deck slab with the permission of the Engineer.

The portions of deck slab near expansion joints shall be cast alongwith reinforcements and embedments for expansion joints. For this purpose, the portion of deck slab near expansion joints may be cast in a subsequent stage, if permitted by the Engineer.

The surface finish of the deck slab shall be finished rough but true to lines and levels as shown on the drawings before the concrete has hardened. Care shall be taken for setting of bearings as indicated on the drawings.

2305. PRESTRESSED CONCRETE CONSTRUCTION

2305.1. PSC Girder and Composite RCC Slab

PSC Girder may be precast or cast-in-situ as mentioned on the drawing or as directed by the Engineer. Girders may be post-tensioned or pre-tensioned . Where precast construction is required to be adopted, selection of casting yard and details of methodology and of equipment for shifting and launching of girders shall be included in the method statement.

In case of cast-in-situ construction, the sequence of construction including side shifting of girders, if applicable, and placing on bearings shall be in accordance with the drawings.

The PSC girder constituting the top flange, web and the bottom flange shall be concreted in a single operation without any construction joint.

The portions of deck slab near expansion joints shall be cast alongwith reinforcements and embedments for expansion joints. For this purpose, the portion of deck slab near expansion joints may be cast in a subsequent stage, if permitted by the Engineer.

The surface finish of the deck slab shall be finished rough but true to lines and levels as shown on the drawings before the concrete has hardened. Care shall be taken for setting of bearings as indicated on the drawings.

2305.2. Box Girder

Box girders may be simply supported or continuous. Simply supported box girders shall have minimum construction joints as approved by the Engineer. In the case of continuous box girders the sequence of construction and location of construction joints shall strictly follow the drawings.

The box section shall be constructed with a maximum of one construction joint located in the web below the fillet between the deck slab and web. If permitted by the Engineer, one additional construction joint may be permitted and this construction joint shall be located in the web above the fillet between the soffit slab and web.

The portions of deck slab near expansion joints shall be cast alongwith reinforcements and embedments for expansion joints. For this purpose, the portion of deck slab near expansion joints may be cast in a subsequent stage, if permitted by the Engineer.

The surface finish of the deck slab shall be finished rough but true to lines and levels as shown on the drawings before the concrete has hardened. Care shall be taken for setting of bearings as indicated on the drawings.

2305.3. Cantilever Construction

Continuity of untensioned reinforcement from one segment to the next must be ensured by providing full lap length as necessary.

The design of the superstructure shall take into account the following aspects which form an integral part of the construction operations :

a) Stability against over-turning for each statical condition through which the assembly passes, shall be checked.

b) Stresses at each preceding segment joint with the addition of every segment or change of statical conditions shall be checked. The load of equipment as well as construction live load shall be taken into account.

c) Precambering of the superstructure during construction shall be done in such a manner that the finally constructed structure under permanent load attains the final profile intended in the drawings.

2306. TOLERANCES

2306.1. Precast Concrete Superstructure

Variation in cross-sectional dimensions :

a)	upto and including 2m	:	± 5 mm
	over 2m	:	± 5 mm
b)	Variation in length overall and length between bearings	:	shall not exceed ±10 mm or ±0.1 per cent of the span length, whichever is lesser
c)	Permissible surface irregularities when measured with a 3 m straight edge or template	:	5 mm

2306.2. Cast-in-Situ Superstructure

a)	Variations in thickness of top and bottom slab for box girders, top and bottom flange for T-girders or slabs	:	-5 mm to +10 mm
b)	Variations in web thickness	:	-5 mm to +10 mm
c)	Variations in overall depth or width	:	± 5 mm
d)	Variation in length overall and length between bearings	:	shall not exceed ±10mm or ±0.1 per cent of the span length, whichever is lesser
e)	Permissible surface irregularities when measured with a 3 m straight edge or template	:	5 mm

2307. 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.

2308. MEASUREMENTS FOR PAYMENT

Concrete in superstructure shall be measured in accordance with Section 1700, based on the quantity ordered or as shown on the drawings.

Steel reinforcement (untensioned) in superstructure shall be measured in accordance with Section 1600, based on the quantity ordered or as shown on the drawings.

High tensile steel (prestressing) in superstructure shall be measured in accordance with Section 1800, based on the quantity ordered or as shown on the drawings.

2309. RATE

The contract unit rates for concrete, steel reinforcement (untensioned) and high tensile steel (prestressing) shall include all works as given in respective sections of these specifications and cover all incidental items for furnishing and providing superstructure as mentioned in this section.