

## SECTION 300 REINFORCED CONCRETE

### 301 GENERAL

Reinforced concrete design criteria shall be as specified in Section 8 of AASHTO except as clarified or modified in this manual.

#### 301.01 CONCRETE (AASHTO 8.2)

Concrete for highway structures shall have the following minimum cylinder strengths, unless otherwise directed by the Project Manager:

Decks except barriers	$f'c = 280 \text{ kg/cm}^2$
Abutments	$f'c = 210 \text{ kg/cm}^2$
Piers except footings	$f'c = 280 \text{ kg/cm}^2$
Drilled Shafts	$f'c = 280 \text{ kg/cm}^2$
All other	$f'c = 210 \text{ kg/cm}^2$

For Design Load use Concrete Weight = 2500 kg/m<sup>3</sup>

- **Class K 250 Concrete Design Parameters**

$$\begin{aligned} f'c &= 210 \text{ kg/cm}^2 \\ f_c &= 80 \text{ kg/cm}^2 \\ E_c &= 220\,000 \text{ kg/cm}^2 \end{aligned}$$

- **Class K 335 Concrete Design Parameters**

$$\begin{aligned} f'c &= 280 \text{ kg/cm}^2 \\ f_c &= 110 \text{ kg/cm}^2 \\ E_c &= 255\,000 \text{ kg/cm}^2 \end{aligned}$$

- **Class K 415 Concrete Design Parameters**

$$\begin{aligned} f'c &= 350 \text{ kg/cm}^2 \\ f_c &= 140 \text{ kg/cm}^2 \\ E_c &= 283\,000 \text{ kg/cm}^2 \end{aligned}$$

#### 301.02 DIAPHRAGMS (AASHTO 8.12.3)

Reinforced concrete box girder diaphragm criteria shall be the same as for post-tensioned box girders as specified under Diaphragms in Section 402.06 of this manual.

#### 301.03 DESIGN METHODS (AASHTO 8.14.1)

In accordance with the applicable provisions of AASHTO, the Strength Design Method (LFD) shall be used for the design of all reinforced concrete members except where such members are to be below grade or intended for water retention, then the Service Load Design Method shall be used.

#### 301.04 REINFORCEMENT (AASHTO 8.15.2.2)

Concrete shall be reinforced only with fusion bonded epoxy coated reinforcement steel conforming to AASHTO M 31M (ASTM A615M) Grade 400 as follows:

- **Deformed Round Steel Bar Reinforcement, AASHTO M 31M Grade 400**

$$\begin{aligned} f_y &= 4\,080 \text{ kg/cm}^2 \\ f_u &= 6\,120 \text{ kg/cm}^2 \\ f_s &= 1\,680 \text{ kg/cm}^2 \text{ T or C in beams} \\ E_s &= 2\,039\,470 \text{ kg/cm}^2 \end{aligned}$$

- **Spiral Reinforcement and Welded Wire Fabric**

Steel Bars used as Spirals, AASHTO M 31M Grade 400

Steel Wire used as Spirals, AASHTO M 32

Welded Wire Fabric used as reinforcement in concrete and mortar, AASHTO M 55

### 302 SLAB DESIGN

Slabs shall be designed in accordance with the criteria specified in Section 3 of AASHTO except as clarified or modified below.

All reinforcing bars are to be epoxy coated bars. All reinforcing bars shall be straight bars top and bottom. The use of truss bars will not be permitted.