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भारत सरकार – रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ – 226011
Government of India-Ministry of Railways
Research Designs & Standards Organisation
Lucknow- 226011

No. CBS/Code/A&C

Dated: 20.01.2015

Principal Chief Engineer:

1. Central Railway, Mumbai CST-400 001.
2. Eastern Railway, Fairlie Place, Kolkata-700 001.
3. East Central Railway, Hazipur-844 101.
4. East-Coast Railway, Bhubaneshwar-751 016.
5. Northern Railway, Baroda House, New Delhi- 110 001.
6. North-Central Railway, Allahabad-211 001.
7. North Eastern Railway, Gorakhpur-273 001.
8. North-Western Railway, Jaipur-302 001.
9. Northeast Frontier Railway, Maligaon, Guwahati-781 011.
10. Southern Railway, Park Town, Chennai-600 003.
11. South Central Railway, Rail Nilayam, Secunderabad-500 371.
12. South East Central Railway, Bilaspur-495 004
13. South Eastern Railway, Garden Reach, Kolkata-700 043
14. South-West Railway, Hubli-580 023.
15. Western Railway, Mumbai-400 020.
16. West-Central Railway, Jabalpur-482 001.

Sub: Addendum & Corrigendum slip No. 3 to IRS Concrete Bridge Code, Reprint 2014 (incorporating A&C 1 to 13).

Ref.: Railway Board's letter No. 2013/CE-III/BR/BSC/82/Seminar/Pt dated 20.01.2015.

As approved by Railway Board vide letter under reference above, Addendum & Corrigendum Slip No. 3 to IRS Code of Practice for Plain, Reinforced and Prestressed Concrete for General Bridge Construction (Concrete Bridge Code) Reprint 2014 (incorporating A&C 1 to 13) is enclosed herewith for information and necessary action please.

Encl: As above.


(Pradip Kumar)
Director/B&S/CB-II
For Director General

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(Railway Board)

INDIAN RAILWAY STANDARD

CODE OF PRACTICE
FOR PLAIN, REINFORCED AND PRESTRESSED CONCRETE
FOR GENERAL BRIDGE CONSTRUCTION
(CONCRETE BRIDGE CODE)

ADOPTED - 1936
FIRST REVISION - 1962
SECOND REVISION - 1997
REPRINT - SEPTEMBER 2014

ADDENDUM & CORRIGENDUM SLIP NO. 3 DATED 20.01.2015

(1) Clause 4.5.1 :

Insert note under clause 4.5.1 as below:

Note: For seismic zones III, IV & V; HYSD steel bars having minimum elongation of 14.5 percent and conforming to other requirements of IS: 1786 shall be used.

(2) Clause 14.9 :

Delete existing clause and insert as under :

Shrinkage and Temperature Reinforcement – For plain concrete members exceeding 2m in length and cast in situ it is necessary to control cracking arising from shrinkage and temperature effects, including temperature rises caused by the heat of hydration released by the cement. Reinforcement shall be provided in the direction of any restraint to such movement.

The area of reinforcement A_s parallel to the direction of each restraint shall be such that

$$A_s \geq K_r (A_c - 0.5 A_{cor})$$

where,

K_r is 0.005 for Grade Fe 415 and higher grade reinforcement and 0.006 for Grade Fe 250 reinforcement;

A_c is the area of the gross concrete section at right-angles to the direction of the restraint;

A_{cor} is the area of the core of the concrete section A_c i.e. that portion of the section more than 250mm from all concrete surfaces.

(3) Clause 15.9.4.1 :

Delete existing clause and insert as under :

Minimum area of main reinforcement - The area of tension reinforcement in a beam or slab shall be not less than 0.2% of $b_a d$ when using Grade Fe 415 and higher grade reinforcement, or 0.35% of $b_a d$ when Grade Fe 250 reinforcement is used,

where,

b_a is the breadth of section, or average breadth excluding the compression flange for nonrectangular sections ;

d is the effective depth to tension reinforcement.

For a box, T or I section b_a shall be taken as the average breadth of the concrete below the upper flange.

The minimum number of longitudinal bars provided in a column shall be four in rectangular columns and six in circular columns and their size shall not be less than 12mm. In a helically reinforced column, the longitudinal bars shall be in contact with the helical reinforcement and equidistant around its inner circumference. Spacing of longitudinal bars measured along the periphery of the columns shall not exceed 300mm. The total cross sectional area of these bars shall not be less than 1 % of the cross sections of the column or $0.15P/f_y$, whichever is the lesser, where P is the ultimate axial load and f_y is the characteristic strength of the reinforcement.

A wall cannot be considered as a reinforced concrete wall unless the percentage of vertical reinforcement provided is at least 0.4%. This vertical reinforcement may be in one or two layers.

(4) Clause 15.9.4.2:

Delete existing clause and insert as under :

Minimum area of secondary reinforcement - In the predominantly tensile area of a solid slab or wall the minimum area of secondary reinforcement shall be not less than 0.12% of $b_t d$ when using Grade Fe 415 and higher grade reinforcement, or 0.15% of $b_t d$ when Grade Fe 250 reinforcement is used. In a solid slab or wall where the main reinforcement is used to resist compression, the area of secondary reinforcement provided shall be at least 0.12% of $b_t d$ in the case of Grade Fe 415 and higher grade reinforcement and 0.15% of $b_t d$ in the case of Grade Fe 250 reinforcement. The diameter shall be not less than one quarter of the size of the vertical bars with horizontal spacing not exceeding 300 mm.

In beams where the depth of the side face exceeds 600mm, longitudinal reinforcement shall be provided having an area of at least 0.05% of $b_t d$ on each face with a spacing not exceeding 300 mm.

where,

b_t is the breadth of the section ;

d is the effective depth to tension reinforcement.

In a voided slab the amount of transverse reinforcement shall exceed the lesser of the following: -

- a) In the bottom, or predominantly tensile, flange either 1500 mm²/m or 1% of the minimum flange section;
- b) In the top, or predominantly compressive flange either 1000 mm²/m or 0.7% of the minimum flange section.

Additional reinforcement may be required in beams, slabs and walls to control early shrinkage and thermal cracking (see also 15.9.9)

(5) Clause : 15.9.9

Delete existing clause and insert as under :

Shrinkage and temperature reinforcement - To prevent excessive cracking due to shrinkage and thermal movement, reinforcement shall be provided in the direction of any restraint to such movements. In the absence of any more accurate determination, the area of reinforcement, A_s , parallel to the direction of each restraint, shall be such that :

$$A_s \geq K_r (A_c - 0.5 A_{cor})$$

where,

K_r is 0.005 for Grade Fe 415 and higher grade reinforcement and 0.006 for Grade Fe 250 reinforcement;

A_c is the area of the gross concrete section at right angles to the direction of the restraint;

A_{cor} is the area of the core of the concrete section A_c i.e. that portion of the section more than 250 mm away from all concrete surfaces.

Shrinkage & temperature reinforcement shall be distributed uniformly around the perimeter of the concrete section and spaced at not more than 150 mm.

Reinforcement that is present for other purposes may be taken into account for the purpose of this clause.

LUCKNOW
Dated: 20.01.2014

BY ORDER:



(H.L. Suthar)
Executive Director/Structures
B&S Directorate
R.D.S.O.