SPECIFICATIONS OF CONTROLLED CONCRETE:

1. The agency shall indicate the source of supply of materials viz., course aggregate, fine aggregate, steel, ordinary Portland cement and cement conforming to IS applicable at the time of submitting the tender document to the Railways. All the materials shall conform to relevant standard specifications.
2. The TOR steel is purchased from TISCO, IISCO, SAIL, Vizag steel plant or any other source approved by the Engineer-in-charge. The steel shall not be re-rolled variety. The agency shall produce necessary vouchers in original in support of the purchase of steel and cement from the suppliers along with certificates to relevant standards from the manufacturers before the commencement of work.
3. The agency shall submit samples of course/fine aggregate along with necessary cement, required for mix design. The Engineer-in-charge at site shall forward the samples to a reputed concrete laboratory for carrying out mix design duly specifying the various parameters as per IRS bridge code, provision and correction slips and Engg. Standard order No: 11/2000 and RDSO's A&C slip no. 8, dt. 15/22-02-2006 The following parameters shall be specified for the mix design by the Engineer-in-charge.

a) Grade of concrete required as per IRS bridge code.
b) Type of cement sent for mix design.
c) Minimum and maximum cement content prescribed as per the environment condition prescribed in the IRS concrete bridge code 1997. Corrections slip No: 8 dt. 15/22-02-2006. The environment condition to be decided as per Engg. Standing order No: 11 dt: 23-10-2000/7-11-2000.
d) Maximum water cement ratio to be adopted as per environmental condition. The agency shall arrange for mix design at their own cost including movement of materials to laboratory. During the execution of work if there is any change in the materials forming concrete, mix design shall be carried out again and work to be carried out accordingly.
The following are extracts of IRS concrete bridge code 1997, Correction slip No: 8 dt. 15/22-02-2006

Amend the following clauses as follows.
i) Clause 5.1.1: Table 2 is revised as under.

Table 2: Grades of Concrete (Clause 5.1)

Grade designation	Specified characteristic compressive strength at 28 days (N/mm2)
M10	10
M15	15
M20	20
M25	25
M30	30
M35	35
M40	40
M45	45
M50	50
M55	55
M60	60

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Date: 2026.11.10 18:50:01 IST
Reason: IREPS-CRIS
Location: New Delhi

ii) Clause No.5.2.2.1: Table is revised as under.

Grade of concrete (N/mm2)	Modulus of Elasticity (KN/mm2)
M10	18
M15	22
M20	25
M25	26
M30	28
M40	31
M50	34
M60	36

iii) Clause No. 5.3.1:
Following note to be added below table given for workability of concrete.
Suitable plasticizers/admixtures may be used to achieve workability of the order of 150-200mm.
Plasticizers/admixtures should confirm to clause 4.4.
iv) Clause No.5.4.1:
The word “low water cement ratio” appearing in fourth sentence should be replaced by “adequate water cement ratio.”
v) Clause No.5.4.3:
The Table 4(a) is revised as under:

TABLE 4(a) : Maximum water cement ratio: (Clause No.5.4.3:)

Environment	Maximum water cement ratio.		
	Plain cement(PCC)	Reinforced concrete (RCC)	Prestressed concrete (PSC)
Mild	0. 55	0. 50	0.45
	0. 50	0. 50	0. 40
Severe	0. 50	0. 45	0. 40
	0. 50	0. 45	0. 35
Extreme	0. 45	0. 40	0.35

vi) Clause 5.4.4
The Table 4(b) is revised as under:

TABLE 4(b): Minimum grade of concrete: (Clause 5.4.4)

Environment	Plain concrete (PCC)	Reinforced concrete (RCC)	Prestressed concrete (PSC)
Mild	M- 10	M- 15	M- 35
Moderate	M- 10	M- 20	M- 35
Severe	M- 15	M- 20	M- 45
Very severe	M- 15	M- 25	M- 50
Extreme	M- 20	M- 30	M- 50

The concrete of grades M-10, M-15 & M-20 are normally used in mass concrete work and usually mixed by volumetric batching also. The mix for this work would be

M-10 - 1:3:6
M-15 - 1:2:4
M-20 - 1:1.5:3

vii) Clause 5.4.5
Table 4 (c) is revised as under

TABLE: 4 (c) :Minimum cementitious material content: (Clause 5.4.5)

Environment	Minimum cementations material content in Kg/cum		
	Plain concrete (PCC)	Reinforced concrete (RCC)	Prestressed concrete (PSC)
Mild	210	300	350
Moderate	250	300	400
Severe	250	350	430
Very severe	300	400	440
Extreme	300	400	440

Max. Cementations material content shall be limited to 500 kg/cum vide No. 5.4. 5.

Note: For under water concrete 10 % extra cement should be added over and above the normal cement content of the concrete mix specified above.

viii) Clause 5.4.7
This clause is deleted along with its sub-clauses
ix) Clause 7.1.3.4
Replace this clause by clause as under:
Sufficient spacers shall be provided as shall in the opinion of the Engineer be necessary to maintain specified concrete cover to the reinforcement and preventing displacement before and during the placement of the concrete. Spacers should be of such material and designs as will be durable, will not lead to the corrosion of the reinforcement and will not cause spalling of the concrete cover. Spacer block made from cement, sand and small aggregate should match the mix proportions of the concrete as far as is practicable with a view to being comparable in strength, durability and appearance. The use of the pieces of wood, tile or porous material will not be allowed for this purpose.

x) Clause 7.1.3.5
This clause is deleted
xi) Clause 7.1.5 is replaced as below

Protective coatings: in order to offer adequate resistance against corrosion, reinforcement bars may be provided with suitable protective coatings depending upon the environment conditions. In aggressive environments (Severe, Very severe and extreme) application of cement slurry coatings after removal of rust and other loose materials from the surface of the reinforcement bar will generally be sufficient. However, specialist literature may be referred to in extreme exposure condition.

xii) Clause 15.9.2.3:
This clause is deleted.
Clause No. 15.9.2.4 and 15.9.2.5 should be read as 15.9.2.3 and 15.9.2.4 respectively.
4. The following are the extracts of Engg. Standing order No: 11 issued by S.C.Railway dt. 23-10-2000/7-11-2000.

i). Moderate: - All the bridges situated in area which are not exposed to severe rain or witch are continuously under water of where concrete is in contact with non aggressive soil/ground water will fall under this category. All sections of this Railway which are not listed under severe category below are classified under moderate category.

ii) Severe:- Structures which are situated in area which are exposed to severe rain, alternate wetting and drying or occasional freezing or severe condensation and also in locations where the concrete is exposed to aggressive sub soil ground water or situated in coastal environment.

The following sections of this railway have been identified to be classified under severe category.

a) Gudur -Visakhapatnam.
b) Gudur-Machilipatnam. ---- Vijayawada Division.
c) Bhimavaram-Narsapur.
d) Sialkot- Kakinada
e) Industrial areas as decided by the concerned Divisional Engineers, where corrosive action is severe.

iii) Very severe and extreme:- Classification of particular bridge in these categories of environment will depend on case basis as per the actual physical location and as decided by the Chief Bridge Engineer or concerned Chief Engineer/ construction.

All the requirements specified in the correction slip No:1 for the above categories should be strictly followed in accordance with the correction slip.

5. The agency shall keep minimum two Nos. of concrete pin vibrators of 25/40mm size in good working order during concrete operation. At no point of time, vibration of concrete should suffer for want of power or for any other mechanical problem any such concreting without proper compaction will be rejected and the agency shall redo the work at their own cost.
6. The contractor should prepare at his own cost standard cubes of concrete at suitable intervals, during concreting operations under the supervision of the Engineer or his representative and submit the same to the Railway for testing. The testing will be arranged by the Railway at the contractors own cost including freight charges for transporting the test cubes to the testing laboratory.
7. Protective coatings: In order to offer adequate resistance against corrosion reinforcement bars shall be provided with suitable protective coating for bridges depending upon the environment conditions. The recommended

TABLE (d): Protective coatings:

Aggressive Environment (severe)	Severe, very severe and (Extreme)	Non aggressive environment (Mild and Moderate)
Important and Major bridges	Minor bridges and structures	All structures
Cement polymer composite coating (or) Fusion bonded Epoxy coating.	Cement polymer composite coating (or) Indicated cement slurry coating.	Truncatevinlubited cement slurry coating.

Note: The binding wire should also be coated and GI binding wire without coating will not be permitted.

Signature of the Tenderer/Contractor.