SOUTH CENTRAL RAILWAY

OFFICE OF THE PRINCIPAL CHIEF ENGINEER

5TH FLOOR, RAIL NILAYAM, SECUNDERABAD - 500071

W.416/Unified/SS/SSR/Vol.IV Dt: 21.03.2022.

CAO/SC
Sr.DEN/Co-ord/ SC, GTL, BZA, GNT, HYB & NED
Dy.CE/EWS/LGD, Sr.DEN/LGDS, Dy.CE/TM/Lines/BZA & Dy.CE/CPOH/RYP

Sub: System improvement guidelines for Concrete mix design - Reg
Ref: This office letter of even no. dated 09.02.2022

* * *

Vide this office letter cited above, the instructions on usage of cement while approving design mix for various grades of concrete have been issued. It is noticed that, divisions and construction organizations are not following uniform procedure on concrete design mix.

In this connection, Special tender conditions on Concrete Mix Design along with the proforma has been framed. It is therefore advised to incorporate the same in all the Tenders/Contracts as a special condition.

This issues with the approval of PCE.

Encl: 1) Special Tender conditions on Concrete Mix Design
2) Proforma in Annexure-A

23/3/22

(A.Achuta Rao)
Chief Engineer/Works

Copy to: CPD/SD,CPD/BW,CTE,CBE,CGE,CE/P&D,CE/TP,CE/TM,CE/RSW, CE/SD – for kind information.
DRMs/SC, HYB, BZA, GTL, GNT & NED – for kind information.
CVO/Engg/SC - w.r.t. his Lr. NO.G.265/PC/2022/01/01130 Dt. 16.02.2022 – for kind information.

Signature Not Verified
Digitally signed by ROLLAKUPPASWAMY KISHORE
Date: 2026.11.11 12:12:20 IST
Reason: IREPS-CRIS
Location: New Delhi

Special conditions for Concrete Mix Design

The Contractor shall be guarantor of quality of concrete used in construction. It shall be obligatory on the Contractor to carry out the mix design and obtain approval of the Engineer before use in permanent work. Without in any way limiting the generality of the foregoing, the procedure shall include the following:

a) The Engineer shall advise the Contractor the ruling design parameters for each grade of concrete. Contractor shall carry out the mix design (through Govt. Engg. Colleges/NITs/IITs only), following all appropriate codes (IS: 10262, IS: 456, IS: 383, IS: 9103, IRS Concrete Bridge Code and all other Codes referred therein) /specifications/guidelines in selection of suitable constituent material and it's proportioning for preparing design mix for prescribed strength and durability, and obtain approval of the Engineer. The mix proportion shall be prepared keeping in view the required strength, long term durability in the intended exposure condition and with sufficient workability to place in intended position of the structure uniformly in well compacted condition without any segregation or bleeding.

b) The mix proportion so designed shall be checked by means of trial batches. Workability of the 1st Trial Mix shall be measured and the mix shall be carefully observed for freedom from segregation and bleeding and its finishing properties.

c) If the workability of the 1st trial mix is as stipulated, two more Trial Mixes shall be made with the water content same as initial Trial Mix and varying the free water-cement ratio by ±10 percent of the preselected value. From all three trial mixes, at least three test cubes shall be made, cured and tested at 28 days in accordance with IS: 516.

d) If the measured workability of 1st Trial Mix is different from the stipulated value, the water and/or admixture content shall be adjusted suitably. With this adjustment, the mix proportion shall be recalculated keeping the free water-cement ratio at the pre-selected value and procedures in para no. "b" and "c" above may be followed.

e) If the test results of the samples at three variable water cement ratios are valid (for each sample, the individual strength of all specimen are within ± 15% of average of three specimens) and more than target strength, Graph between three water-cement ratio and their corresponding strength shall be plotted and mix proportion for field trial should be worked out.

f) Above details of test and mix proportion duly authenticated by approved institution/lab should be submitted in a prescribed Proforma (Annexure – A) for approval of Engineer for field trial.

g) On receipt, the Engineer shall expeditiously scrutinize the proposed design mix for field trial. Apart from all other aspects, it should be specifically observed that the quantity of cement content should be minimum possible for meeting the due requirement and is within the limit prescribed vide letter no.W.416/Unified/ SS/SSR/Vol. IV dt.09.02.2022 for all types of works. If it is more, and there is possibility to bring it within limit by redesigning the proportion, the same should be returned to the Contractor with remarks to submit the mix design with reduced cement content. If the cement content is marginally on higher side and the Engineer is convinced that in the specific circumstances there is no possibility for further reduction even after use of plasticizer/super plasticizer, he will forward the mix design for approval of the Competent Authority.

h) After review of the design mix received with recommendation of the Engineer, the Competent Authority shall either approve the Design Mix for field trial or return the same to Engineer to get fresh design mix for approval.

i) On approval of mix design in field trial, again cube samples should be made with the concrete produced by method of actual concrete production.

j) Test cubes (specimens) will be tested for compressive strength at 28 days. The results are considered valid only if the average compressive strength of the sample (3 specimens make one sample) is not less than the Target mean strength and variation among individual specimens is within +/- 15% of average strength. The concrete mix design shall be allowed by Engineer for use in actual execution, if the test results of samples are valid.

k) Above approval by the Engineer shall not relieve the Contractor of any of his responsibilities under the Contract.

l) For Bridge works, concrete design mix shall be designed as per para no 5.5.1.2 and 5.5.2 of IRS Concrete Bridge Code: 1997. Minimum cementituous material and exposure condition shall be as per table 4(c) of IRS Concrete Bridge Code: 1997.

4-22/3/22

(A.Achuta Rao)
Chief Engineer/Works

Annexure-A

CONCRETE DESIGN MIX

1. Name of the work: _____
2. Agency: _____
3. Agt. No./Acceptance letter details: _____
4. Type of work - ***Bridge** / Other than Bridge***** _____

*(** strike whichever is not applicable)*

A.	Basic Data	
A-1	**To be specified by Engineer**	
1	Concrete grade* (Min*/Max* cement content Kg/Cum)	
2	Workability (Slump)*	
3	Cement Grade*	
4	Exposure Condition*	
5	Nominal size of Coarse Aggregate (CA)*	
A-2	**Other Details**	
1	Source of CA	
2	Results of sieve analysis of CA	
3	Specific Gravity of Coarse Aggregate	
4	Grading Zone of fine Aggregate	
5	Source of FA	
6	Results of sieve analysis of FA	
7	Plasticizer / Super Plasticizer *(brand name, qty used etc)*	
8	Water absorption of Fine aggregate	
9	Water absorption of Coarse aggregate	
B	**MIX PROPORTION:**	
1	Cement	Kg
2	Water	kg
3	FA	Kg
4	CA	Kg
5	Plasticizer/Super plasticizer	Kg

C	CUBES CASTING DETAILS:	
1	Date of casting of cubes	
2	Officials present at the time mixing & casting of cubes	
3	Workability of trial mix was as per design	
D	**CUBES TESTING DETAILS:**	
1	Date of testing of cubes	
2	Testing done at	
3	Officials present at the time of testing,	
4	Is test results and Strength vs. Water cement ratio enclosed?	
5	Does the test result comply with design requirements	

* to be specified by Engineer depending upon the specific requirement.
** strike whichever is not applicable

Signature of the Designer: _____
Name of Designer: _____
Name of the Lab/Institute: _____
Stamp: _____

Signature of the Contractor: _____

Remarks of the Engineer: _____