

No. WIII-58 (2)/57-LR

*Dated the 17th June, 1967*

To

All State Chief Engineers

Sub : Strength of Concrete in Bridges on National Highways

It has come to notice that in the construction of Bridges the concrete cubes tested from some of the beams did not attain the specified strength. The cubes and the beams had not been marked properly and proper records were not maintained with the result that it was not possible to identify the beams, which had weak concrete. Obviously, this is not a desirable state, and Departmental instructions should be issued to ensure that proper records are kept which would enable the site engineers to identify the portions of the structures containing concrete which does not comply with the prescribed standards, especially in the case of bridges on National Highways. The following suggestions are offered for adoption as the basis of suitable instructions, but these can be modified or amplified as you consider fit.

2. Whenever test cubes are cast, they should be suitably numbered and there should be corresponding markings on the individual components, or portions of the components, to enable the identification of the unit from which the sample for test cubes was obtained. Alternatively, a detailed description of the structural member or the portion thereof from which the sample of concrete was taken, should be entered in a register. Also, the sampling of concrete and testing of cubes should be done with the full knowledge of the contractor and this fact should be clearly noticeable from the records.
3. Whenever the results of the cube tests carried out after three or seven days show a strength which is not satisfactory, the Engineer in charge of the bridge work should draw the attention of the contractor in writing to the possibility of the concrete not attaining the prescribed standards at the end of 28 days. He may also be warned that it may be inadvisable to proceed further with the work as the 28 day strength of concrete may show sub-standard results, entailing the work done becoming liable to rejection. As soon as the 28 day results are available another notice should be given to the contractor if the prescribed standard strength has not been attained. The unit of which the sub-standard work forms part should normally be rejected.
4. When cube tests persistently point to a concrete strength lower than that specified, a change in the preparations of concrete for subsequent batches must be given serious thought.
5. In case, however, the concrete strength falls below that demanded in the contract but its use can be permitted under Clause 303.3.7 of the I.R.C., Bridge Code Section III, the unit may be accepted at the discretion of the Chief Engineer, and the information that it complies with the Code should be placed on record. A copy of the decision should also be sent to this office so that on any future date when evaluating the strength of the bridge, this fact may be given due consideration.
6. It may be difficult to lay down specifically at the time of issuing the tenders a scale of charges which would enable the reduction in prices to be worked out for any substandard work which is accepted. The reduction in price will have to be determined by the Chief Engineer according to the circumstances of the case, and, if necessary, in consultation with the concerned Financial Adviser of the State. The contractor has always the option of replacing the concrete if he does not agree with the price reduction offered.
7. It should be made clear to the site staff as also to the contractors that the sampling of concrete and making, curing and testing of cubes should be done most carefully and that it will not be permissible to attribute the low strength of concrete obtained on cube test, to defects in the method of sampling and testing cubes.
8. The Notice Inviting Tenders should be so framed that it is impossible to give effect to the procedure suggested above without any difficulty.
9. A copy of the instructions on the subject that you might issue may please be sent to this office for information.