



No. W.71/BR/Bridge Policy

Dated: 02-06-2021

Sr.DEN/Co-ord/BZA, GNT, GTL, SC, HYB, NED

Sub: Repairs to Spalling in RCC slabs – Reg.

Scrutiny of Annual Bridge Inspection records sent to Headquarters reveal a large number of RCC slab bridges having spalling of concrete and exposure of reinforcement under the slab bottom. Spalling under a RCC slab is a gradual process which if not attended immediately will lead to deterioration of the slab requiring premature replacement of the slab. It is generally observed that inspecting officials after noticing the rebar exposure are straightaway proposing for replacement of RCC slabs without properly understanding and analyzing the extent of damage, reparability and residual life of the slabs. No premature renewal of RCC slabs should be proposed unless there are compelling circumstances with proper justification. As the bridges are getting inspected at least twice a year (once by the SSE/Works during pre-monsoon inspection and once by ADEN as part of post monsoon inspection), timely identification of spalling and taking up their repairs expeditiously will extend the life of the bridge superstructure considerably.

In the market, there are special cementitious / epoxy chemicals of various brands available for repairing concrete damage in RCC caused by spalling. Following guidelines on attending to the spalling damages in RCC slabs are issued for adoption by all the divisions:

1. Whenever spalling is noticed under a RCC slab, entire bottom surface of the slab shall be examined in detail for hollowness, cracks, rebar separation, adequacy of cover etc., to determine the nature and extent of the problem. If the problem is confined to isolated patches, then these patches shall be attended using special cementitious repair mortar/concrete through trowel application.
2. If the spalling is extensive with rebar corrosion/separation along with hollowness in unaffected portions of the slab, a deflection test on the slab shall be conducted under fully loaded goods trains. If the maximum deflection observed is less than effective length/500 and if there is 100% recovery of the deflection after removal of load, then special repairs to slab surface with cementitious / epoxy plaster shall be undertaken. Where maximum deflections under load are found excessive or where recovery of deflection is not 100% or where transverse cracks spanning across the slab are observed, a detailed report on such slabs shall be sent to Headquarters for advising remedial action or for planning replacement.
3. Attention to the spalled surface of the slab with chemicals broadly involves the following steps:
 - a. Removal of loose concrete cover in the damaged/hollow locations of the slab bottom surface by tapping with a hammer. Usually, square or rectangular shaped areas are prepared for attending the repairs.

- b. Cleaning and removal of rust over the exposed rebar with wire brush and application of a *corrosion inhibitor chemical* over the rebar.
 - c. Removal of dust and loose particles from the exposed spalled surface of the concrete and application of an *epoxy bonding resin* over the surface for good bonding of applied mortar/concrete/epoxy based on manufacturer's specification.
 - d. Application of non-shrink *cementitious mortar/micro concrete* or *epoxy* material of approved brand over the spalled surface to the desired thickness in layers either by trowel or by spraying equipment as per manufacturer specifications and process.
 - e. Application by spray in layers will be required in cases where the spalling damage is extensive and the entire slab surface has to be covered. In case, there is reduction in existing rebar area by more than 20% due to corrosion, additional rebar may be added before application of the repair material.
 - f. Application of *membrane curing compound* over the attended surface if cementitious repair material is used to effect proper curing of the surface.
 - g. Application of *Epoxy phenolic-IPN coating / CECRI integrated 4 coat system* or any other similar coating for adequate protection of the repaired concrete surface (if cementitious material is used) against future damage.
4. There are several approved brands (issued by CE/Wks vide letter dated 06-03-2020), like *Fosroc, Ardex, Dr.Fixit, BASF* etc., in the market manufacturing the specialized concrete repair chemicals. Appropriate Chemicals of these brands shall be used for RCC slab repairs as per the manufacturer's specifications and method statements of usage. Attending the repairs with normal cement mortar should not be allowed under any circumstance as these repairs will not last long and will not prevent further spalling.

The above instructions shall be conveyed to all the ADENs and SSE/Wks for implementation in the field.

(K. Rama Krishna)
Chief Bridge Engineer

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