

Repair Method Of PQC In Rigid Pavements

With the increasing numbers of PQC Roads across the country, there are various issues in the PQC pavements which are cropping up and repair solution is the need of hour. In this direction STP Limited has come up with lot of new products in last few years for these repairs.

Repairs can be classified into following categories:

- Partial Depth repairs (Transverse as well as Longitudinal) of PQC.
- Repairs of longitudinal cracks by using U type anchorages / stitching.
- Repairs of the pavements especially for the areas where aggregates are exposed due to various reasons like after concreting sudden rain started or due to more tear & wear of concrete etc.
- Re-surfacing of Pavements by Fiber Reinforced Concrete / Mortar for betterment.
- Cross Stitching / stapling of panels / cracks: Repair the cracks by putting dowel bars with caps & tie bars so that it can have some space to have movements.
- Repairs of Potholes and corner spalls in concrete pavements etc

Repair Of Minor Cracks

These are very low (small) width cracks or hairline cracks. Such cracks generally do not affect the performance of road surface. Thus, these cracks, unless the severity level increases, need not be repaired. Further observe these cracks over a period of time for enlargement.

Medium Cracks (generally 1 to 5 mm wide)

If cracks are not moving then a very low viscosity epoxy resin may be used for its repair with or without fine sand to bond the crack faces.

- For crack up to 2 mm, clean the cracks using a compressor and pour the low viscosity epoxy resin in the cracks.
- For cracks larger than 2 mm, V shaped 'joint wells' are made with 3 to 5 mm saw blade. Also make 8 to 10 mm diameter grout holes at regular interval. Then pump the epoxy bonded into holes using a grout gun.

Partial Depth Repairs

The spalling of concrete occurs near the joints mainly due to adjacent slab load transfer related movement at the joint particularly in summer. The spalling will occur frequently in mid slab locations and other locations mainly due to high slump due to w/c ratio, poor construction or failure of earlier done repairs. Spalls are a localized problem and can be easily repaired with partial depth repair methods.

Full Depth Repairs

The full depth repairs are necessitated due to Transverse Crack in slab in full panel width. This crack may be in one lane or both the lanes. The reasons for such crack are:

- Locking of Transverse Joint.
- The joint does not function due to non-functioning of dowel bars. These dowel bars either get misaligned during construction or slurry gets into sleeves and prevents their movement.

- The intermediate crack may be caused due to too much resistance offered by rough surface of underlying DLC.
- The crack may also develop due to thermal changes coupled with large joint spacing.

In all such cases where cracks are more harmful, then the PQC Panel should be examined carefully, if the panel is to be repaired or removed. If it has to be repaired then use the technique of cross-stitching method. However, if that portion of panel is to be removed and then recast the panel as indicated by Removal of Existing Unsound Concrete.

Some Of These Repair Methods Are Described Here

- Repair by Grouting of Low Viscosity Epoxy Material (ShaliGrout EI)



a. Equipments For Repair

Depending upon the method of repair the following equipments may be used.

- Grouting Pump of capacity about 5-10 Kg/cm².
- Mechanical Grout Mixer
- Air Compressor
- Injection Ports.
- Hand Chisel, trowel, etc.

b. Preparation For Crack Repair

- On both sides of crack, the side edges are slightly chiseled to give a V-shape. If required do chiseling until a hard concrete is encountered.
- Remove loose material from crack area and blow out the dust and

debris from the gap of crack by using a compressor or air blower.

- Drill holes in PQC surface in the line of Crack up to depth of about 150mm & 10 mm diameter @ 300 – 400 mm c/c.

Fix Injection ports (Nipples) of plastic or similar material ie nozzles of 6-8 mm in diameter and 100mm length into the holes. Keep the projection of nozzle outside the PQC to about 20 mm.

c. Repair Procedure

- Surface to be repaired may be pre wetted.
- Apply a coat of Primer (ShaliSBR Latex) using brush after scrubbing it well on the prepared surface. Allow the primer to become tacky, which normally takes 10 – 15 minutes or as given in the manufacturer literature.
- Push the Compressed air into the crack to flush out the dust and all foreign material from the crack to the side or top.
- Fill the top of V-groove portion by appropriate Epoxy modified mortar (ShaliGrout EP 10).
- Use the epoxy repair compound (ShaliGrout EI) or free flowing epoxy resinous grouting material or similar product of very low viscosity.
- Pressure Inject the above material or appropriate ultra low Viscosity epoxy liquid first in the middle nozzle from one side of crack. Continue till it is forced out of next nozzle or from the side of PQC crack. Then shift the injection procedure to next nozzle.
- After the injection is complete, estimate the consumption of grouting material or find out the quantity of injected material. This may be compared with the estimated quantity.
- Apply the mix within the pot life of repair compound on the prepared crack.



d. Finishing Of Repair Surface Of Crack

- If sagging on surface occurs during application to PQC surface, then Surface Correction material(ShaliFix SC 40) may be applied by trowel in smaller thickness in one or two layers.
- The applied mortar shall be finished with wooden floats.
- When the injection operation is over then cut the projected portion of nozzles and sealing the portion by Epoxy Mortar(ShaliGrout EP 10)

e. Curing Of Repaired Surface

- The repaired surface shall be cured by curing compound or water curing, if required or as recommended by manufacturer.

II. Repair By Stitching Or Cross-Stitching Of Cracks:

Cross-Stitching is a repair technique mostly used for longitudinal cracks which are in reasonably good condition. The purpose of cross-stitching is to maintain aggregate interlock and provide added reinforcement for strength. The tie bars used in cross-stitching prevent the crack from vertical and horizontal movement or widening. This technique knits the cracked portions

of the slab together and reduces the chances of crack to grow further.

Cross-stitching uses deformed tie bars drilled across the crack at an angle of 30-40 degrees. Deformed steel bars of 10-12 mm diameter are sufficient to hold the crack tightly closed and enhance aggregate interlock. Full depth holes of 18-20 mm diameter are drilled at a pitch distance of 300 mm with offset of about 150 mm from the crack. The holes are drilled alternately from each side of the crack so that it passes through the crack from left to right, while the next from right to left. After drilling, the holes are flushed with high pressure air to clean out any residual dust. Then a high strength epoxy gel adhesive is injected into the hole. Immediately after injecting epoxy, deformed steel bars are inserted into each hole. The crack is sealed at the top with epoxy modified sealant.

III. Surface Repairs Of The Pavements:

especially for the areas where aggregates are exposed due to various reasons like after concreting, sudden rain started or due to more tear & wear of concrete:

- a. A suitable surface repair Mortar (ShaliFix SC 40) may be used followed by wetting of Surface and application of Primer (ShaliSBR Latex).
- b. Surface shall be cured using a suitable curing Compound/Water curing.

Material that are used in these repairs are:

- ShaliGrout EI
- ShaliGrout EP 10.
- ShaliPrime PUM
- ShaliSeal PS GG
- ShaliFix SC 40

For further details and live demo please get in touch with STP Limited's technical team. ■

For further information, visit: www.stpltd.com