

Preservation Webinar – Questions and Answers – 5/9/2023

The questions submitted during the webinar follow with answers that our speakers have provided.

1. For slab stabilization, is there any longevity difference between poly and grout?
Iowa

We are not aware of any formal studies that have compared the longevity of polyurethane materials to cement grout materials, but over the years more agencies have gravitated to the use of polyurethane materials because of its durability, expansiveness, insensitivity to moisture, and rapid curing.

2. Repair suggestions for a 40' section of pavement that a delivery truck ran over a few hours after concrete placement (through barricades). Tracks were less than 3/8" deep in the concrete. Grind, remove and replace, other? Kansas

Based on the description, it doesn't sound like the tracks pose a concern to the structural integrity of the slab, and in that case removal and replacement should not be necessary. Depending on the exact depth of the tracks, where they fall relative to the wheel path, the type of facility and the amount of traffic, the tracks could be left in place if they are not too disruptive to traffic. Otherwise they could be diamond ground or filled with a rapid patch or epoxy-based material.

3. Do you recommend using Silane when grinding a PCC lightly affected by ASR?
Thanks! Tennessee

Applying a silane to reduce or prevent moisture ingress may be able to help slow down further development of ASR if it is not severe, although there is not necessarily a lot of historical data to indicate success. Care should also be taken to avoid using a sealer that can trap moisture within the concrete, which could potentially accelerate the development of ASR.

More information on the use of sealers on PCC pavements can be found in a recent CP Tech Center study, "Evaluation of Penetrating Sealers for Concrete," found here:

https://intrans.iastate.edu/app/uploads/2022/06/concrete_penetrating_sealers_eval_w_cvr.pdf

4. What testing do you recommend for determining a void under the pavement that can be repaired with slab stabilization? Is GPR the best? Iowa

A virtual examination for pumping is always a useful first indicator, and both the FWD and GPR can be to identify the presence of voids beneath a slab. The FWD is more widely used.

5. For full depth repairs using precast concrete, it is possible that the existing base will need addressed after panel removal. For example, if asphalt chunks come out from the base when the panels are removed, what type of material would you suggest be placed into the hole to provide a flat, stable, compacted base surface for the precast panels or cast-in-place concrete to be placed upon? Illinois

A variety of situations can occur that require repair and/or grade corrections to the existing base or subbase layers prior to installation of the precast slab. The most suitable repair materials and methods may vary depending on the existing base material, the precast system, bedding layer, etc. The National Precast Concrete Association's "Manual for Jointed Precast Concrete Pavement" has a great section discussing this topic in Chapter 8. The manual can be found at the following link:

https://precast.org/wp-content/uploads/2022/02/NPCA_JPrCP_Manual_2022_Web_Version.pdf

6. How do you determine if an area is fit for doing slab jacking? It seems like it could be searching for a needle in a haystack. California

These are clearly problem areas, and user complaints is often a first indicator, where a severe dip or depression is creating a rideability issue. Pavement roughness/profile information can also be used to identify these areas.

7. In your opinion, what is a safe opening strength for RSC? California

Opening strength requirements for rapid set concrete materials should generally match those of conventional Portland cement concrete. A safe opening strength may vary depending on the repair method (e.g. partial depth vs. full depth repair) and the size of the patch. In the CP Tech Center's "Concrete Pavement Preservation Guide: Third Edition," sample opening strength requirements for different repair methods are listed in Tables 5.1, 5.2, 6.8, 6.9, and 6.12. Many state agencies' requirements are considered conservative, and this topic is currently an active research area.

Link to the Preservation Guide:

https://intrans.iastate.edu/app/uploads/2022/08/concrete_pvmt_preservation_guide_3rd_edition_web.pdf

8. What is the specific failure mechanism associated with hot pour sealant with backer rod in cold climates? Is it just poor adhesion to the sides of the reservoir? Michigan

The primary concern with use of backer rod in wet-freeze climates is that if the hot pour sealant loses adhesion or fails, large quantities of moisture and de-icing chemicals can pond within the open reservoir area underneath the backer rod and potentially contribute to the deterioration of the concrete, especially if it is of marginal quality.

9. So why not use pre-cast? Kansas

Precast panels can be a great solution for full depth repair, but there are several potential tradeoffs or limitations to their use. First, they are generally more expensive (approximately \$300/SY to \$450/SY as of 2020) than cast-in-place full depth repairs. They also require more upfront planning and prep work, including defining a set of panel sizes that will be used in the project. Additionally, some projects may not be suitable for precast panels because of right of way or overhead restrictions that would preclude the use of a crane or other heavy equipment. Ultimately, agencies can weigh the costs and benefits of using a precast system according to their needs and priorities.

10. I have a project that is having joint failure due to increased truck traffic. What does dowel bar retrofit cost and is this the best option? Iowa

If the joint failure is a result of loss of load transfer between slabs, then dowel bar retrofit is likely the best option to correct the underlying issue. Unit costs on a few recent projects in Iowa have been around \$50-60 per bar (which includes costs for all labor, materials, and equipment), but costs may vary depending on the size of the project, region, local factors, etc. Diamond grinding is also frequently done after a dowel bar retrofit to restore the ride quality of the pavement.

11. How to choose the right strategy for the maintenance of concrete pavements in LCCA? Alaska

Chapter 10 of the CP Tech Center's Concrete Pavement Preservation Guide contains guidance and commentary on using established LCCA procedures used in new pavement design selection and other methodologies for developing maintenance treatment strategies for concrete pavements.

Link to the Preservation Guide:

https://intrans.iastate.edu/app/uploads/2022/08/concrete_pvmt_preservation_guide_3rd_edition_web.pdf

12. Please explain the basis for 8-16! years life extend for joint resealing process - it is extremely long time according to, for example, German experience (only 4-5 years) Alaska

The 8- to 16-year figure represents the life of the joint resealing treatment itself, which comes from a compilation of national and state-level surveys done in the United States, as documented in Chapter 10 of the CP Tech Center's Concrete Pavement Preservation Guide. The performance of a joint sealing treatment can vary considerably depending on the type of sealant material, the reservoir design, local climate, and quality of the installation process. Longer-lasting treatment lives are generally associated with the use of higher-quality sealant materials governed by ASTM D6690 and D5893.

Link to the Preservation Guide:

https://intrans.iastate.edu/app/uploads/2022/08/concrete_pvmt_preservation_guide_3rd_edition_web.pdf

13. Hi! Where I can find information related to the slurry from the grinding process. Mexico

A detailed discussion of slurry handling during diamond grinding can be found in Chapter 9, Section 6 of the CP Tech Center's Concrete Pavement Preservation Guide.

Link to the Preservation Guide:

https://intrans.iastate.edu/app/uploads/2022/08/concrete_pvmt_preservation_guide_3rd_edition_web.pdf

14. Does the diamond grinding will have additional design thickness? How much?
Pennsylvania

While diamond grinding involves removing a small portion of the slab thickness, past research has indicated that diamond grinding does not generally reduce the fatigue life of concrete pavements. It is likely that continued long-term strength gain of concrete offsets the slight decrease in thickness. Thickness may also become a more important consideration for relatively thin pavements, or for pavements that are receiving multiple diamond grinding treatments over their lifetime, and some agencies are increasing new PCC thickness to accommodate periodic grinding over the life of the pavement.

15. What is the source of the full depth repair tables showing good distress candidates for CRCP? I would like to look more into the footnotes that are marked on the tables.
Texas

Those candidate CRCP distresses for full repair come from Chapter 6, Table 6.2 in the CP Tech Center's Concrete Pavement Preservation guide, which you can find here:

https://intrans.iastate.edu/app/uploads/2022/08/concrete_pvmt_preservation_guide_3rd_edition_web.pdf

Another great resource on CRCP repair methods is FHWA's CRCP manual, which you can find here:

<https://www.fhwa.dot.gov/pavement/concrete/pubs/hif16026.pdf>

16. Is cross stitching an effective or common for CRCP? Also, is it effective as a pre-overlay repair? Texas

Yes, cross-stitching can be used on CRCP and can be done prior to an overlay, although care must be taken to avoid conflicts with the existing reinforcement. You can refer to the FHWA's CRCP manual for more information.

17. Are the slides available to download? Kansas

Yes, the slides are available at <https://cptechcenter.org/webinars-and-videos/>

18. What is considered a durable PCCP repair material? Any suggestions? Please advise.
Arizona

Some high early strength PCC mixes contain high amounts of straight Portland cement and certain admixtures which may combine to greatly increase shrinkage and produce a less-durable microstructure. Methods to ensure a more durable high early strength PCC mix can include reducing w/cm ratio, increasing aggregate volume, and using durable constituent materials and good construction practices. If setting time is not a concern, a conventional PCC mix is more than capable of providing good long-term durability following local best practices for mix design.

Alternative types of cementitious materials such as calcium sulfoaluminate (CSA) cements can combine high early strength gain with good long-term durability. There are also a number of proprietary repair materials that may be capable of achieving good long-term durability.

19. Can diamond grinding be done on areas that have got joint repairs? Should the partial depth repairs be skipped instead? Indiana

Yes, diamond grinding can be done over joint repairs, and diamond grinding can be a good way to provide a smooth, consistent surface to a pavement that has received various types of patches and other repairs. However, there are some potential issues that need to be accounted for when diamond grinding repairs constructed using certain types of polymer repair materials. Please see page 98 of the CP Tech Center's Concrete Pavement Preservation Guide for more guidance:

https://intrans.iastate.edu/app/uploads/2022/08/concrete_pvmt_preservation_guide_3rd_edition_web.pdf

20. For diamond grinding, does the grinder travel longitudinally or transversely? New Jersey

Diamond grinding is performed longitudinally.