Concrete Pavement Preservation Webinar 2 – Questions and Answers

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

Additional resources are available at https://cptechcenter.org/pavement-preservation/

1. Which states use PCI (Pavement Condition Index) most for maintaining highways? Texas?

   It is believed that many states, local agencies and airports also use PCI.

   https://www.fhwa.dot.gov/pavement/preservation/pubs/perfeval/chap06.cfm

   https://www.fhwa.dot.gov/asset/pubs/hif11035/hif11035.pdf

2. When a deteriorated pavement section is repaired by a full depth patching, Contractor prefers flowable fill, lean concrete in lieu of aggregate base because it is easier to compact corners, is that right?"

   Flowable fill is essentially self-consolidating so it is a correct statement that it is easier to compact the corners. It's often used for utility repairs. For supporting a full depth repair slab, either flowable fill or lean concrete should be adequate. However, the weaker concrete in the substrata may bond with the FDR slab and be susceptible to a fracture stress point, which emanates as a crack through the monolithic slab.

3. Are there any standards that guide through the process of pavement condition evaluation using techniques such as GPR, magnetic, and ultrasonic tomography?

   Concrete Pavement Preservation Guide and Guide for Concrete Pavement Distress Assessments and Solutions: Identification, Causes, Prevention, and Repair both provide additional guidance.
   https://intrans.iastate.edu/app/uploads/2018/08/preservation_guide_2nd_ed_508_final.pdf

   https://intrans.iastate.edu/app/uploads/2019/01/concrete_pvmt_distress_assessments_and_solutions_guide_w_cvr.pdf

4. Do you recommend sealing the joint?

   There are caveats to this question that influence the decision

   - Joint spacing as well as joint width
   - Base and subgrade type and permeability
   - Precipitation levels and climate (freeze/thaw)
   - Potential for incompressibles
   - Traffic volume and speed

   Some states do not seal joints where high speed traffic is the norm and the joints are narrow. In urban areas where slower traffic is typical, the joints are sealed as

incompressibles have been observed on those roadways. PCCP overlays with short joint spacing, such as 6' x 6' with single saw cuts, are not normally sealed.

In Missouri, we generally only seal joints if they open a ¼" or more, in order to prevent infiltration of incompressibles. Each DOT should base this decision on their experience and engineering judgment.

5. For partial depth repair, what type of tool is used to remove loose material to minimize damage to the adjoining concrete that may fail in future?

   Two procedures are used: use of a small milling machine; or a perimeter saw cut is made with the interior chipped out with small lightweight chipping hammers (to mitigate the potential to break thru the slab). Generally, a light (~ 35-lb) jackhammer should be sufficient for concrete removal w/o damaging the adjacent area.

6. How do we quantify/measure incompressible materials in unsealed transverse joints and sealed joinst that have their sealant damaged?

   The following is from the Guide for Concrete Pavement Distress Assessments and Solutions: Identification, Causes, Prevention, and Repair, p. 268: https://intrans.iastate.edu/app/uploads/2019/01/concrete_pvmt_distress_assessments_and_solutions_guide_w_cvr.pdf

   "Assess Joint Sealant Condition—…if there are any signs of joint sealant damage, or if any other treatment alternatives have caused the effectiveness of the joint sealant to be compromised to a significant extent (e.g., 25 percent or more of the seal length has adhesion or cohesion failures or contains incompressible material), joint resealing should be considered."

7. Do incompressible materials cause JPCP buckling?

   They can be a contributing factor.

8. How do you differentiate between load transfer or void problems when looking at FWD data for a plain dowelled concrete pavement?

   Poor load transfer and voids under slab edges often occur together in the same location, but are not completely dependent on each other. Voids can be detected by plotting load versus deflection for three FWD drop heights and determining where the trend line intercepts the deflection axis. Typically, an intercept of ~ 5 mils or higher is indicative of a void under the edge. Load transfer efficiency (LTE) is simply the ratio of the unloaded and loaded slab edge FWD deflections. The defining ratio for poor load transfer varies, but is usually between 60 and 70 percent. LTE testing should be performed when the slab temperature is below ~ 60º F to avoid joint lockup.

9. It is not practical to inspect each and every slab during field distress evaluation. What are some practical guidelines to go about distress survey sampling?

   Correct, it is not practical to test every slab for nearly any DOT. One workaround is a statistical sampling, such as performing load transfer testing every tenth joint, which can determine probable sections within the project limits that require undersealing and/or dowel bar retrofit (DBR) quantities. Another option is visually identifying

symptoms of poor load transfer, such as pumping of fines on the shoulder, and limiting FWD testing to those zones.

10. John: is JRCP still constructed in Missouri?,

    The last JRCP in Missouri was completed in the early 1990s.

11. Network level deflection data is being collected and has been collected for a decade in other countries. It isn't just project level.

    Noted

12. States of had up to 15 years performance from full depth repairs.

    Noted

13. Thought that GPR is affected by the presence of rebar or WWF that prevents penetration of the waves beneath the steel inclusions?

    From p. 445 Guide for Concrete Pavement Distress Assessments and Solutions: Identification, Causes, Prevention, and Repair:

    GPR uses the amplitude and time of a radio pulse to analyze the slab thickness, location of embedded steel, detection of voids under the slab, location of defects, or changes in the overall pavement structure… The presence of contrasting materials within the concrete are more readily discernible with GPR.

14. What mechanism of grinding is used for concrete pavement with reinforcement?

    Same operation as with any other pavement. Just have to know if there will be sufficient cover over the steel once grinding is complete.

15. You can also do edge drain inspections with a camera. This should be done every 5 years or so to ensure they haven't been silted up or rooted. Damage can also be detected after construction for crushed drains.

    Noted