

Overlays Webinar 2 – Questions and Answers

The questions submitted during the webinar follow with answers that our speakers have provided. Please note that there are several references to CP Tech Center guides and reports that are available without charge in PDF format through the website:

<https://cptechcenter.org/concrete-overlays/>

1. Is there any experience with the use of zero clearance pavers in placing thin bonded thin concrete overlay?

One paver manufacturer developed a prototype zero clearance slipform paver in 1986, specifically looking at the overlay market potential. However, that venture never gained significant momentum. There are slipforms that will provide that advantage today, but they are not widely used.

2. Many existing roads may have a layer of asphalt over a concrete, so how do you evaluate the underlying concrete conditions for an overlay application?

The three most common approaches for evaluation are visual assessment, cores of suspect areas of the concrete, and FWD to understand support characteristics of the pavement system.

3. How is the dust controlled when saw cutting?

Paving contractors should follow the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) requirements, which require mitigation measures for dust. Wet sawing is common to minimize dust from sawing joints and vacuum attachments are now the common/preferred method for drilling for dowels/tie bar holes. Both methods are OSHA approved. Early-entry sawing is also a method that produces little dust since the concrete is green when sawed. (See ACPA Technical Bulletin TB022 V1.0 – "Understanding OSHA's Crystalline Silica Rule", Table 1)

4. Is it recommended to saw cut the existing concrete pavement and crack and seat existing concrete pavement prior to placing the layer of asphalt?

OR

If your concrete is bad enough to pulverize it, can you do that then put a thin layer of blacktop and then like 6" of a concrete overlay?

Pavements have been cracked and seated with overlays constructed thereon, however the success rate is variable. Significant structural support is sacrificed with this type of base pavement treatment.

5. What about dowel bars and tie bars for the unbonded overlays?

Dowel bars could be considered for thicker pavements if significant truck traffic is anticipated. Dowels in pavements less than 7 inches thick pose some constructability and performance challenges. Tie bars are common for longitudinal joints in conventionally jointed overlays. The practice varies as one moves toward short panels and thinner pavements due to cost and constructability.

6. Is matching joints feasible? Tolerance? Tips?

While matching transverse joints requires careful attention to marking/referencing joint locations in the existing pavement, this practice has proven successful on many of the bonded concrete overlays constructed on concrete.

7. Last week the presenter mentioned that drainage “under” an unbonded overlay was important especially when using a geotextile bond breaker. How do you address this issue in an urban situation with an existing curb and gutter section?

The “Guide to Concrete Overlays” shows a detail for drainage of the separation layer. (Page 74)

8. In regard to bonded overlay, how critical is the aggregate sourcing and gradations with respect to matching thermal movement of the substrate, and also in being appropriate in size for to thinner overlays. 57 stone ok for even the thinnest mix designs?

It is preferable that aggregates in both layers have similar CTE values – i.e. come from similar geological sources. Maximum nominal aggregate size should be no more than $\frac{1}{4}$ the thickness of the slab.

9. Should asphalt be crack filled after milling prior to concrete overlay whether bonded or unbonded?

The “Guide to Concrete Overlays” recommends that when crack width in the underlying pavement is equal to or greater than maximum coarse aggregate size, the crack/joint in the milled asphalt should be filled with asphalt or flowable fill. (Page 44, Table 7)

10. What is the maximum size of the planes that can be operated on a runway that has a concrete overlay over asphalt?

FAA Design Circular AC 150/5320 references the use of FAA pavement design program FAARFIELD. The design program is capable of producing concrete thickness sections of Unbonded Overlays of Asphalt for any aircraft weight. Within the Carolinas, our use of concrete overlays has generally been for business aircrafts up to 100,000 pounds. Thicknesses have ranged from 5-

inches for the lighter (12,500#) aircrafts all the way to 11-inches as they approach 100,000 pounds. Past issues of ACPA's Concrete Pavement Progress have captured project stories of concrete overlays used on various airports that accommodate all different sizes of aircrafts (light business and heavy commercial). I'll include a few links below in case you are interested in reviewing some of these overlay projects.

<http://www.associationpublications.com/flipbooks/acpa/2019/Q2/index.html>

<http://www.associationpublications.com/flipbooks/acpa/2017/Q1/files/assets/basic-html/page-I.html#>

11. I had a pleasure to visit the Governors Club project and I remember the contractor mentioned the color of the geo fabric and problems it caused during day time concreting. Did they switch geo fabric from black to white and if so did it make a big difference?

Fabric color (choice) remains the decision of the contractor provided he illustrates that he is capable of keeping it cool (prior to concrete placement) in the warmer months.

12. Do you recommend AGAINST matching the joints in an unbonded concrete over concrete overlay?

OR

It was mentioned that is not necessary or recommended to match existing joints on the unbonded concrete overlay. Is this intended to mean that it is bad if one of the new joints falls above the existing underlying joint?

The "Guide to Concrete Overlays" states that it is not critical to mismatch overlay joints to the underlying pavement joints. Many states do not intentionally mismatch joints and have not experienced any adverse effects. Some states, however, still intentionally mismatch joints, according to previous guidance, to maximize the benefits of load transfer. Unbonded plain jointed concrete

13. What size crack warrants a joint in the overlays (bonded & unbonded)?

Any crack wide enough to cause loss of load transfer in the existing pavement could be the source of reflective cracking in a bonded overlay.

14. What design method are you using in the Carolinas? 10" with 17,000 AADT seems thick.

Both NCDOT and SCDOT currently use AASHTO 1993 Design Methods, but have started shadowing these produced thickness designs with the latest AASHTO Ware DARWin-ME mechanistic-empirical pavement design procedure. Both states are actively doing calibration studies in order to move to the new PavementME procedure.

SCDOT uses a 30-year design for their rigid pavements. Although only 17,000 AADT at the time (2010), this Interstate corridor (I-385) will continue to grow because it connects the heavily industrialized (BMW located in Greenville) upstate SC region to Columbia and onto the Charleston area where the SC Ports are located. When this project was let, our state was still in the middle of a recession and concrete prices were comparatively low to other periods of time. It made sense to conservatively design the pavement thickness to take full advantage of the lower concrete costs at the time.

Per the former SCDOT State Pavement Design Engineer, based on the early (2008) national calibrations, the ME procedure indicated approximately a 70-year design life for the I-385 pavement structure. However, at that time, the '93 AASHTO procedure was the official method of the agency, which indicated a 10" thickness for a 30-year design. His recollection was that the two methods approximately agreed if an old-fashioned 20-foot transverse joint spacing is used in the ME procedure instead of the 15-foot spacing as-built. The "old" AASHTO empirical procedure is unable to account for a shorter joint spacing and was developed on the assumption of longer joint spacing used in SC prior to the 1990s.