

Overlays – Questions and Answers (November, 2022)

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

1. You mentioned they did not use macro synthetic fibers to save money. Was the reduced saw cutting and joint sealer considered in cost decision? Where the benefits of fibers considered and understood? Georgia

No, the decision for the fiber removal was strictly an initial cost decision. This was a research project to focus on the accelerated construction focus, and the fibers were not a critical part of the timeframe. Additional costs for sawing and sealing reduced the savings of removing the fibers.

2. Did Iowa 3 have any subgrade issues (i.e. a wet subgrade, or settlement)? Kansas

This section of Iowa 3 has a rolling terrain with good drainage. There were some spot areas of settlement at crossroad pipes. The original roadway had been in place for many years and most of the settlement had happened. The result of some of the spot settlement showed up in the 2” nominal profile milling resulting in some holidays where the milling did not scarify the surface. Those areas ended up with slightly thicker concrete than the 6” design. This shouldn’t cause any concerns with long term performance.

3. How did you land at an opening strength of 325 psi? Kansas

325 psi was an educated guess based on work that Minnesota had done with early loading a new slab with loaded trucks at 200-250 psi. Considering that a concrete overlay will have good support from the pavement that is being overlaid, the risk of any critical failures was very low considering that Iowa has utilized 500 psi for any concrete pavement over any subbase for more than 30 years with no problems. Part of the research was to include the strain gauges and testing by the National CP Tech Center to analyze the stresses in the pavement when loading early. No concerns were noted and stresses were very low.

4. Was traffic ever driving on the milled surface during the project? Kansas

Yes. Iowa has the practice of allowing traffic to drive on a milled surface with consideration of edge drop off, elevation differences between lanes and transitions onto and off the milled areas. This project was no different and this was a key difference in the old philosophy of a concrete overlay vs the new test concept. Old philosophy would have completely closed the roadway and allowed local traffic on the milled surface. The new concept was to complete the profile milling under a lane closure with pilot car/flagger situation, just like the staging of an HMA overlay.

Additionally, on this project the contract required the contractor to collect a profile survey for construction via mobile lidar. Past philosophy had the contractor out collecting the profile survey information by physical surveyors, usually after the roadway was closed or during lane closures for surveying. Adding the mobile lidar,

not only increased the safety on the project, but added speed and efficiency to collecting the needed data.

5. What was the thickness of the unbonded overlay? Kansas

This concrete overlay design was a 24' wide, 6" overlay with 6', 9" paved shoulders for a total width of pavement of 36' wide. Also included was 4' of aggregate shoulders outside the pavement.

6. What were the actual incentives/disincentives used for this contract? Kansas

- a. 00 Late Start Date 06/06/2022 30 WORK DAYS \$2,000.00
 - i. *See Proposal Notes for description.
- b. 01 No Start Date Specified 24 CALENDAR DAYS \$15,000.00
 - i. *IA 3 Detour, see description in the Proposal Notes
- c. 02 No Start Date Specified 7 CALENDAR DAYS \$2,000.00
 - i. *K64 closure, see description in the Proposal Notes
- d. 03 No Start Date Specified 30 CALENDAR DAYS \$2,000.00
 - i. *Side road connections, see description in the Proposal Notes
- e. (*) - Indicates Cost Plus Time Site. See Schedule of Items for Cost Per Unit

*** Site ID 00 ***

- Working days are only charged when no other site is being charged
- Anticipated work includes profile milling, curb and gutter, removal of PCC curb and shoulders, rumble strips and final painting

*** Site ID 01, 02 and 03 with Incentive/Disincentive***

These 3 Sites are Incentive/Disincentive sites per Section 1111 of the Standard Specifications with the following conditions:

Site 01 – IA 3 detour (24 calendar/closure days, \$15,000/day Incentive/Disincentive/Liquidated Damages)

A calendar/closure day is charged for each day that IA 3 is on detour (Critical Closure Activity).

Site 02 – K64 closure (7 calendar/closure days, \$2,000/day Incentive/Disincentive/Liquidated Damages)

A calendar/closure day is charged for each day that K64 is closed to traffic (Critical Closure Activity).

Site 03 – all other side road connections (30 calendar/closure days, \$2,000/day

Incentive/Disincentive/Liquidated Damages). A calendar/closure day is charged for each day that any

- a. sideroad is closed to traffic (Critical Closure Activity).
 - b. There is no Maximum incentive for any of these sites.
 - c. The Incentive payment/Disincentive assessment will be paid/collected by an Extra Work Order/Change Order.
7. How did they deal with the drop off at the middle when they started at the other end? Maryland

Concrete overlay best practices have a full depth pavement transition into the overlay. This project had 100' of full depth transition pavement on each end. For traffic management purposes, this existing pavement removal was done the day before the concrete paving was started and the paving was continuous with the pavement overlay. Opening strength was achieved within 1 day and traffic was allowed when the pavement reached maturity (opening strength.) Regarding the drop off at the middle of the job when they moved to start paving on the other end, they used an aggregate wedge from the milled asphalt surface to the new overlay.

8. Did you have cracking issues with the 12 by 12'? Iowa

I will start by assuming you are referring to 12' by 12' concrete overlay. Each concrete overlay should be designed specifically for the conditions including traffic volume and amount of truck traffic. Interlayers, joint spacing, inclusion of fibers, fiber dosage rates, and other factors are some things that can be adjusted to find a concrete overlay design for the situation. A standard concrete overlay design is 6' by 6' panels 6" thick. These fit a lot of situations, but local experience, design inclusions, and traffic all play a part in the joint spacing decisions.

9. What is the difference between bonded and unbonded construction of concrete overlay over asphalt? California

Chapter 4 of the fourth edition of Guide to Concrete Overlays (https://intrans.iastate.edu/app/uploads/2021/11/guide_to_concrete_overlays_4th_Ed_web.pdf) covers this question in great detail. An unbonded concrete overlay of asphalt pavement is essentially equivalent to a new pavement construction where the existing asphalt pavement (or composite pavement) acts as a base layer and the concrete layer is the primary structural component. This is a good option when the existing asphalt or composite pavement has significant structural deterioration, inadequate foundation support, or stripping of asphalt layers. A bonded concrete overlay of asphalt results in a more integrated structure between the existing asphalt layer(s) and the new concrete layer. In this situation, the structural performance depends on the bond between the two layers. This is a good option when the existing pavement is in fair structural condition exhibiting typical distresses such as rutting, shoving, minor alligator cracking, and thermal cracking.