Case Studies PCCP Overlays
- SR 161 & 55

PCCP Workshop
February 11, 2016
What are we talking about??

• Concrete overlays over old concrete

• Concrete overlays over old asphalt pavements

• Concrete overlays over old composite pavements
Types of Concrete Overlays

- **Bonded Overlay System**
  - Bonded Concrete Overlay of Concrete Pavements
  - Bonded Concrete Overlay of Asphalt Pavements
  - Bonded Concrete Overlay of Composite Pavements

- **Unbonded Overlay System**
  - Unbonded Concrete Overlay of Concrete Pavements
  - Unbonded Concrete Overlay of Asphalt Pavements
  - Unbonded Concrete Overlay of Composite Pavements

**Bond is integral to design**

**Old pavement is subbase**
Concrete Overlays

A VERY LONG History of Performance and Cost Effectiveness
Widely Used Across the Country
Historically – Unbonded Used
... but Bonded is Increasingly Common!
Historically, Mostly on Concrete

- On Concrete: 55%
- On Composite: 5%
- On Asphalt: 40%
... but More and More on Asphalt
INDOT Overlay – Bonded over Asphalt

- SR 161 – SR 64 to Freeman - 6”
- Overlay over milled existing HMA pavement
- Joints sawed at 10’ – 10’x12’ panel
- No Dowels – No tie bars
- Road closed to thru traffic
- Local traffic maintained one way
- Access maintained to residents
- 77,000 sys – bid at $14.00/sy
- Built 2010
SR 161 Concrete Overlay
SR 161
INDOT Overlay – Bonded over Asphalt

- SR 55 – SR 2 to US 231 - 4”
- Utilized Structural Macro fibers
- Overlay over milled existing HMA pavement
- Joints sawed at 7’ – 7’x6’ panels
- No Dowels or tie bars
- Road closed to thru traffic
- Local traffic maintained one way
- Access maintained to residents
- 151,000 sys – bid at $21.00/sy
- Built 2015
SR 55 Concrete Overlay
SR 55
Evaluation results can provide information on the stiffness of the asphalt pavement, subgrade support conditions, and variations of these properties over the length of the project, thereby identifying localized areas of weakness requiring strengthening.

Milling can remove a number of asphalt surface distresses.
Bonded Resurfacing of Asphalt or Composite Pavements

- Use when existing pavement is in fair or better structural condition with surface distress.
- Use to eliminate any surface defects; increase structural capacity; and improve surface friction, noise, and rideability.

4”–6” thickness
Evaluations of Existing Pavements for Overlays

• An evaluation of the existing pavement is necessary to ensure it is a good candidate for resurfacing and structurally sound to carry the anticipated traffic loads.

• Information gathered through the evaluation is used to determine required repairs where needed and to establish the concrete overlay design thickness.

• Strongly suggest – **take cores of existing pavement**

• Concrete material condition can be obtained through analysis of cores taken from the existing pavement.
Also Evaluate/Core Shoulders
Pavement Evaluation:

On high-volume roads, falling weight defectometer (FWD) testing can provide subgrade k-values and variability, concrete modulus, load transfer efficiency, and presence of voids.
Jointing Different for Some Overlays

- Joint spacing depends on bond, stiffness of support, etc.

- Bonded Concrete Overlay of Concrete Pavements
- Bonded Concrete Overlay of Asphalt Pavements
- Bonded Concrete Overlay of Composite Pavements
- Unbonded Concrete Overlay of Concrete Pavements
- Unbonded Concrete Overlay of Asphalt Pavements
- Unbonded Concrete Overlay of Composite Pavements
Longitudinal Joint Layout

- 2 ft x 2 ft (0.6 m x 0.6 m)
- 3 ft x 3 ft (0.9 m x 0.9 m)
- 4 ft x 4 ft (1.2 m x 1.2 m)
- 6 ft x 6 ft (1.8 m x 1.8 m)

Traffic direction:

- Up and down arrows indicating traffic flow.
Surface Preparation
Cleaning the Surface to Prepare for Bonding

- Sweeping surface followed by compressed air cleaning in front of the paver.
- Air blasting or water blasting is only necessary to remove material that cannot be removed any other way.
- Water or moisture should not be on the surface prior to paving or de-bonding can occur.
Milling: Bonded and Unbonded Resurfacing of Asphalt or Composite Pavements

- The amount of asphalt removal depends on the types and severity of distresses and the thickness of the asphalt pavement.

- The objective of removing material is not to obtain a perfect cross section. It is not necessary to completely remove ruts. Usually 1”–2” of asphalt is removed.

- A minimum of 3”–4” of asphalt should be left after milling because of the reliance on the asphalt pavement to carry a significant portion of the load.

- Profile mill helps achieve desired PCCP thickness
Too Much Preplacement Repairs
HMA Overlay Mindset
Traditional Construction
Traditional Construction
Placement
Placement

SR 55
Placement
Finishing
Finishing – SR 161
Finishing – SR 55
Tined Surface
Pay attention to finishing & its impact on smoothness
Curing

- Curing is especially critical to concrete resurfacing because their high surface area to volume ratio makes them more susceptible to rapid moisture loss.

- Apply ASAP

- Coat all exposed edges.

- Avoid extreme weather.

- Avoid contact of cure with prepared surfaces because it is a bond breaker
Curing – Be Prepared!!

- Paving operation moves quickly on overlays
- Need curing crew on site ready to apply as paving starts
- Keep curing operation up close behind finishing operation
Curing – desired uniform coverage
Sawing – Be Prepared!!

- Paving operation moves quickly on overlays
- Shorter joint spacing = lot of joint to cut
- Need multiple saws
Sawing
Traffic Control – Lessons learned

- Can manage traffic through the project
- Closed to thru traffic – local access only appears to work best
  - One way thru work zone
  - Contractor needs to aggressively manage
  - Need adequate signage
  - Need cones & warning tape
  - Aggressive flaggers

- Can manage local access to home & businesses
  - Requires regular communication with locals – discuss schedule & options
Local Traffic – one-way thru project
Access to local drive – SR 161
Access to local drives – SR 55
Safety Focus – A MUST!!

Traffic
Tight – restricted workzone
Freshly Cured PCCP – looks a lot like hardened PCCP traffic driving on
CONCRETE OVERLAYS

Payment

Cubic Yard

Square Yard

Divided payment - most equitable and economic
Summary - What Have Learned

- Numerous PCC overlay applications
- Evaluate existing pavement
  - Suggest FWD
  - Core old existing pavement & shoulders
- Cost competitive applications
- Don’t need dowels on bonded overlays
- Don’t need tie bars
- Keep panels sized properly
- Joints – single cut – unsealed
Summary - What Have Learned

- Don’t make too complex
- Built with traditional construction practices
- Traffic control plan on projects is very manageable
- Must be attentive to signage & public communications
- Pay attention to safety
- Good finishing practices = smooth pavement also for overlays
Questions?

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