FHWA’s Concrete Overlays Program

– Joint Effort with the National Concrete Pavement Technology Center (ISU)

Supports the advancement of concrete overlays technology through research, technology transfer, innovation, and increased product knowledge.
Concrete Overlays Guide, 2nd Ed.
(Over 10,000 copies distributed)

- Overlay Types & Uses
- Project Evaluation & Selection
- Overlay Design
- Concrete Materials Section
- Work Zones under Traffic
- Overlay Construction
- Accelerated Construction
- Specification Considerations
Concrete Overlays Field Program

- Workshops for state highway agencies, and paving industry.

- Assistance with concrete overlay selection, design, specification, and construction process.

- Funding for demonstration projects.
Family of Concrete Overlays

Concrete Overlays

Bonded

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

Thinner

Short joint spacing

Bond is integral to design

Unbonded

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

Old pavement is base
Concrete Overlay Application

- Excellent
- Good
- Fair
- Poor
- Deteriorated
- Failed

Existing pavement condition

- Preventive maintenance
- Minor rehabilitation
- Major rehabilitation
- Reconstruction

Thinner (~ 4 to 6 in.)
Range of thickness (> 6 to 10+ in.)
Bonded
Unbonded

Time
Bonded Concrete Overlays

Resurfacing of existing PCC, AC & composite pavements.

Typical features –
- Thin concrete overlays
- Bonded to existing PCC, AC or Composite
- Smaller panels if bonded to AC surface
Bonded Overlays of Existing AC Pavements
Bonded Overlays of Existing AC

- Relatively Thin Slabs (4 to 6 in)
- Square Panels (6 by 6 ft)
- Milled Surface
- Existing Asphalt Pavement > 3 in.
Bonded Overlays of AC Pavements

Tie bars at centerline & shoulder joints.
No dowels (load transfer from aggregate interlock).

Mainline Panel Dimensions:
6 by 6 ft
7 by 7 ft (if widened lane).
Surface Preparation
(after pre-overlay repairs)

- Milling AC surface
  - Remove rutting
  - Restore profile
  - Enhance bond
- Minimum AC thickness remaining after milling: 3 to 5 in
- Surface cleaning
Completed Bonded Overlay Projects - Colorado

S.H. 119 – Longmont, CO

Parker Av. A, Denver, CO - 1997

Over existing AC pavements
North Dakota HfL Project
(Full closure)

Original AC pavement

Milled AC surface

Joint sawing in progress

Completed bonded concrete overlay
North Dakota HfL Project

- Bonded overlay over existing AC pavement
- Constructed mid-2008 – 2 westbound lanes of an 8.2 miles section along US 2
- Design:
  - 20 year service life
  - 7 in. thick concrete over 5 in. milled AC
  - 7 by 7 ft joint spacing (for the 14 ft outside widened lane)
- Full lane closure construction – two-way traffic routed on eastbound lanes
  - Reduced construction time in half – to 7 weeks
Unbonded Concrete Overlays of Existing AC Pavements
Concrete Placement & Finishing

- Same as conventional concrete paving
- Concrete placed directly on AC or on milled or leveled AC surface
- Conventional curing and sawing of concrete joints
Unbonded Concrete Overlays of Existing Concrete Pavements

- Separated from underlying PCC Pavement (independent behavior)
- Minimal surface preparation
  - Can be used over ASR-affected PCCP
Separator Layers – Old & New

- Required for good performance –
  - Isolate concrete overlay from existing PCCP
    - Prevent reflection cracking
    - Prevent bonding/mechanical interlocking
  - Provide a softer interlayer – lower curling stresses

- Recommended interlayer materials –
  - 1-2 inch dense-graded HMA
  - GEOTEXTILE / Fabric (Missouri Demo – Sept 2008)
Fabric Interlayer  (Missouri Route D - 2008)

(5 in. thick unbonded overlay; 6 ft by 6 ft joint spacing)
Unbonded Concrete Overlays of Existing Concrete Pavements
Alabama I-59 – MP 184 to MP 194
Alabama Unbonded Concrete Overlay
I-59 – MP 184 to MP 194

- Existing 10-in. JPCP; age @ 50 years
- Project awarded with ARRA stimulus funding
- Overlay: 11-in. jointed concrete; 15-ft joint spacing; doweled joints; PCC shoulders; 2-in. AC interlayer
- FHWA technical support:
  - Best practices workshops (2004, 2006)
  - Site review (2006)
  - Construction best practices workshop (Scheduled for September 2009)
Concrete overlays offer a broad range of applications for existing AC, PCC and composite pavements. Well-designed & well-constructed concrete overlays can provide 15 to 40+ years of low maintenance service life, depending on the application.