
Image source: NAPA


Image source: ACPA

U.S. Department of Transportation
Federal Highway Administration

TOPS

Targeted Overlay Pavement Solutions

A solution for extending the life of an existing pavement investment.

Except for any statutes or regulations cited, the contents of this webinar do not have the force and effect of law and are not meant to bind the public in any way. This webinar is intended only to provide information to the public regarding existing requirements under the law or agency policies.

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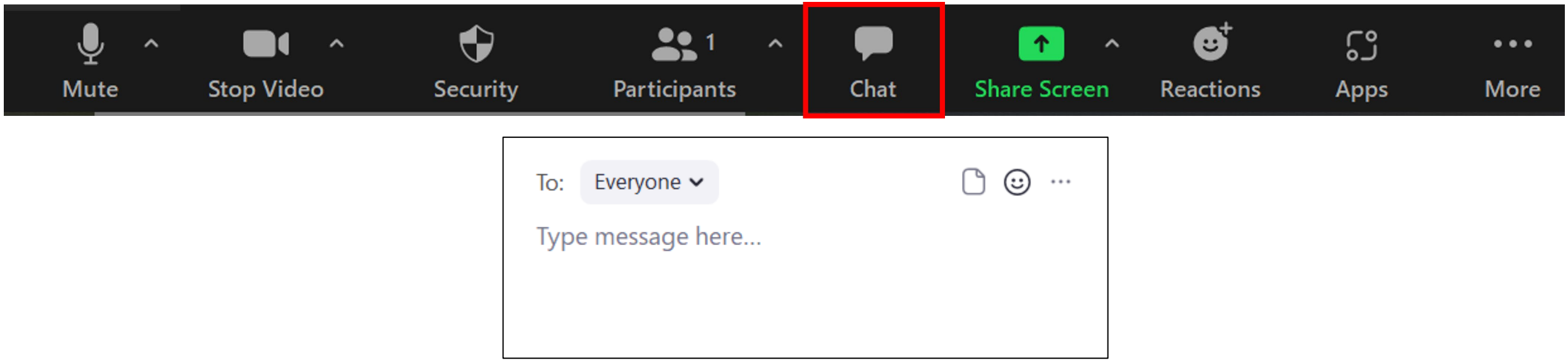
Submitting Questions

- To ask a question, send a message using the chat function.
- All questions from participants will be answered during the Q&A session at the end of the webinar.



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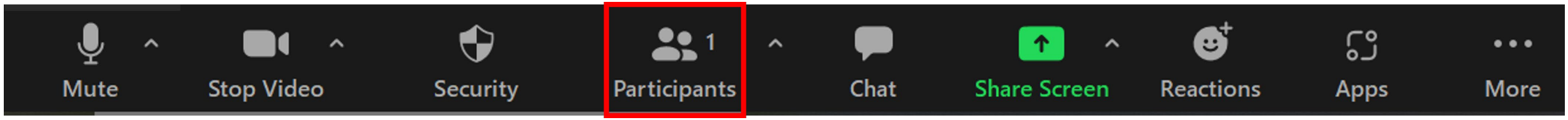
- To view a list of meeting participants, click the Participants button in the bottom panel.



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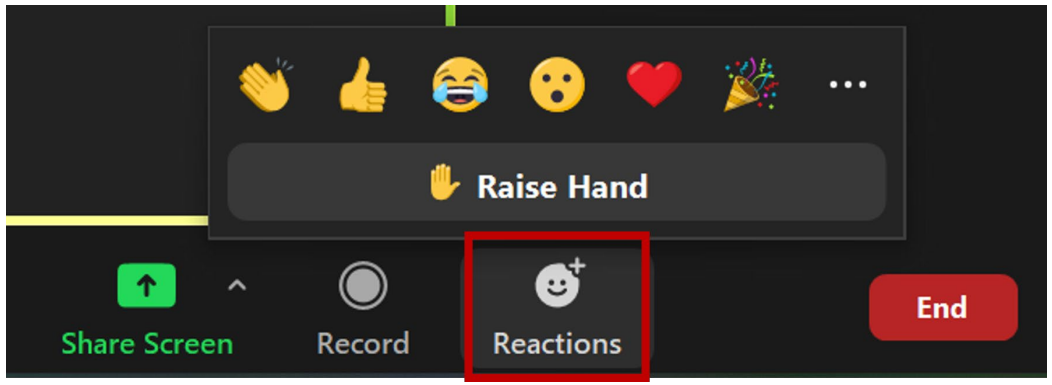

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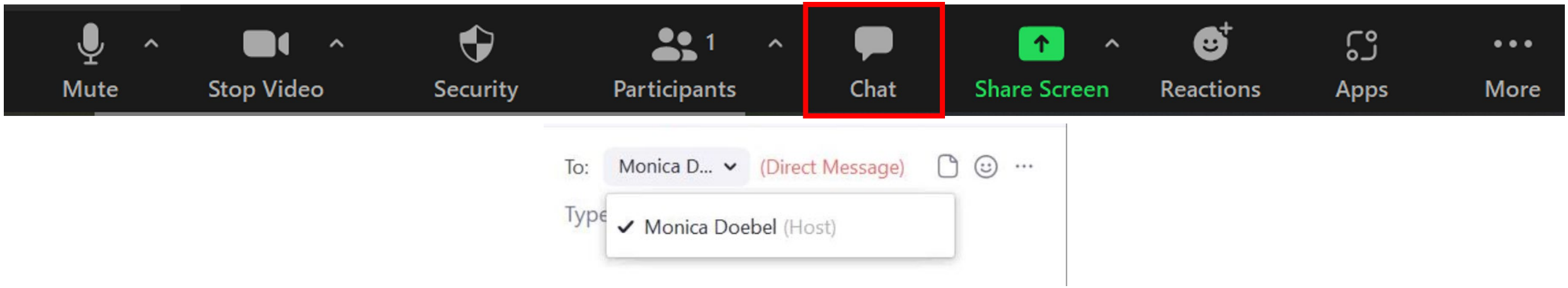

  - Email Monica Doebel and Eric Schulman.

Webinar Overview

- Introduction to EDC-6 TOPS: Sam Tyson, FHWA
- Concrete Overlays Overview
- Project Highlights
- Q & A

FHWA TOPS EDC-6 Team

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Background

- Over 25% of all State DOT infrastructure funds go to pavements overlays.
- State DOT manage 2.8 million miles of pavements.

- *Information source: FHWA (https://www.fhwa.dot.gov/innovation/everydaycounts/edc_6/targeted_overlay_pavement.cfm)*

Image source: Iowa State University

How is this different than typical overlays?

TOPS matches treatments to high-priority, high-need locations.

Image source: Georgia DOT

TOPS EDC Mission

Image source: iStock

Extend pavement life, increase load-carrying capacity, and improve safety, mobility, and user satisfaction in a cost-effective and sustainable manner by delivering targeted pavement overlay solutions to Federal, State, and local transportation agencies.

EDC-6 Goals

- Increase the number of participating agencies that demonstrate, assess, or institutionalize an additional TOPS technology not previously institutionalized.
- Build awareness and expand TOPS usage
  - Identify a champion at each State agency
  - Share information at conferences/workshops
  - Train people (webinars/peer exchanges)

What's in the TOPS concrete toolbox?

Concrete overlay products:

- Concrete on Asphalt – Bonded (COA-B)
- Concrete on Asphalt – Unbonded (COA-U)
- Concrete on Concrete – Bonded (COC-B)
- Concrete on Concrete – Unbonded (COC-U)

What's in the TOPS asphalt toolbox?

Asphalt overlay products:

- High-Performance Thin Overlay (HPTO)
- Crack Attenuating Mixture (CAM)
- Highly Modified Asphalt (HiMA)
- Enhanced friction overlay
- Stone matrix asphalt (SMA)
- Asphalt Rubber Gap-Graded (ARGG)
- Open-Graded Friction Course (OGFC)
- Ultra-thin Bonded Wearing Course (UTBWC)

TOPS Potential Benefits

- Improved Safety
- Improved Performance
- Retained Investments
- Cost Savings
- Environmentally Sound

Concrete Overlays A Proven Technology - Overview

U.S. Department of Transportation
Federal Highway Administration

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Concrete Overlays – A Proven Technology

- The Challenge
- The Value Proposition
- Addressing Barriers to Implementation
- Getting Started
- Project Highlights
- Resources

Image source: Iowa State University

The Challenge to Pavement Owners

- Existing infrastructure is continually deteriorating
  - Weather
  - Traffic
- Demands are increasing
  - Traffic
  - Ride quality
  - Continuous access
- Funding is decreasing
  - Maintenance costs may exceed Agency revenue

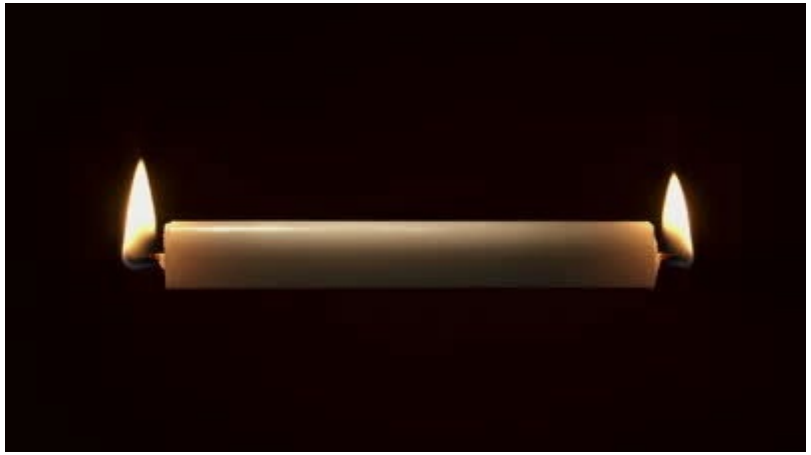


Image source: Shutterstock

Maintaining Existing Pavements

We can toss them out and start again

- A long-term solution
- Creates a disposal headache
- Loose equity of existing system
- Takes energy to move them out of the way
- Takes time = traffic delays

Image source: Iowa State University

Maintaining Existing Pavements

We can patch them – buy a few years

- Limited materials usage, energy and traffic impact
- Short term solution

Image source: Iowa State University

Maintaining Existing Pavements

We can overlay them with concrete

- Use existing equity
- Minimize sustainability impacts
- Long term solution
- Elevations / connections are tricky

Image source: Iowa State University

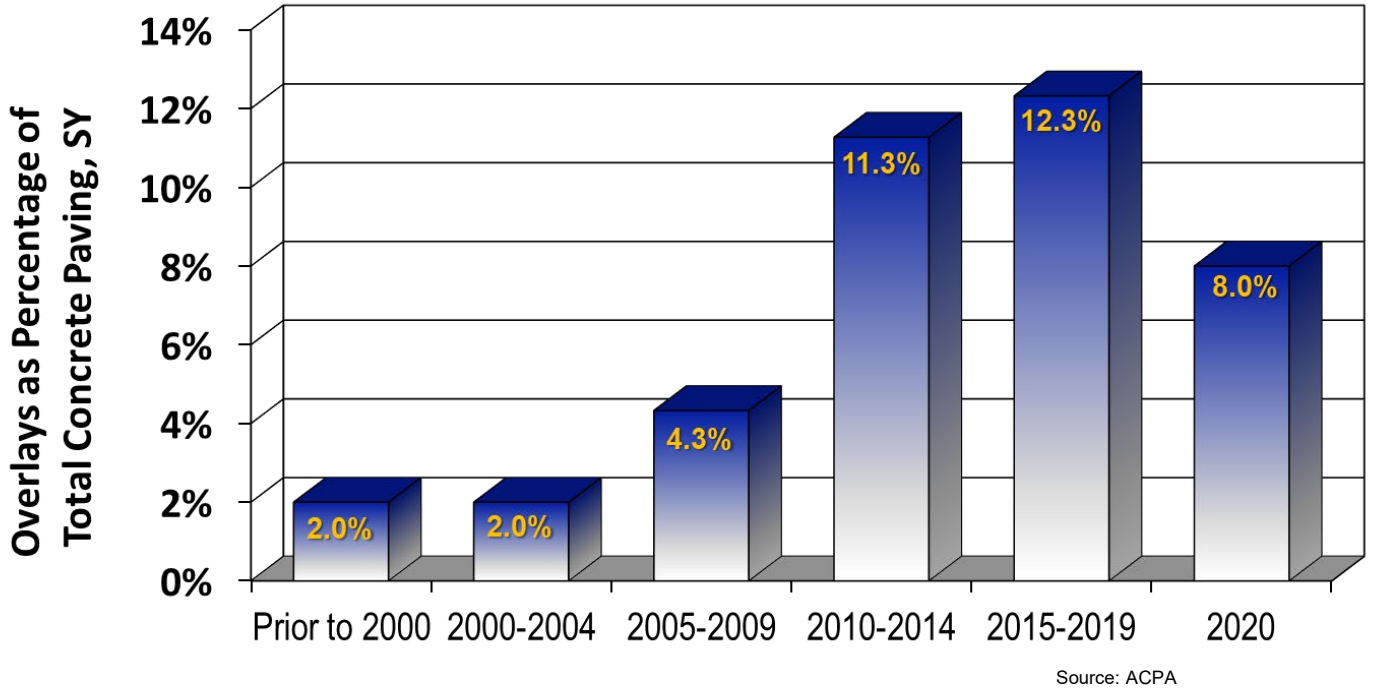
Another Tool in the Toolbox

- Concrete Overlays - Concrete placed over an existing surface to:
  - Extend life
  - Restore ride
  - Increase capacity

Image source: Iowa State University

The Value Proposition

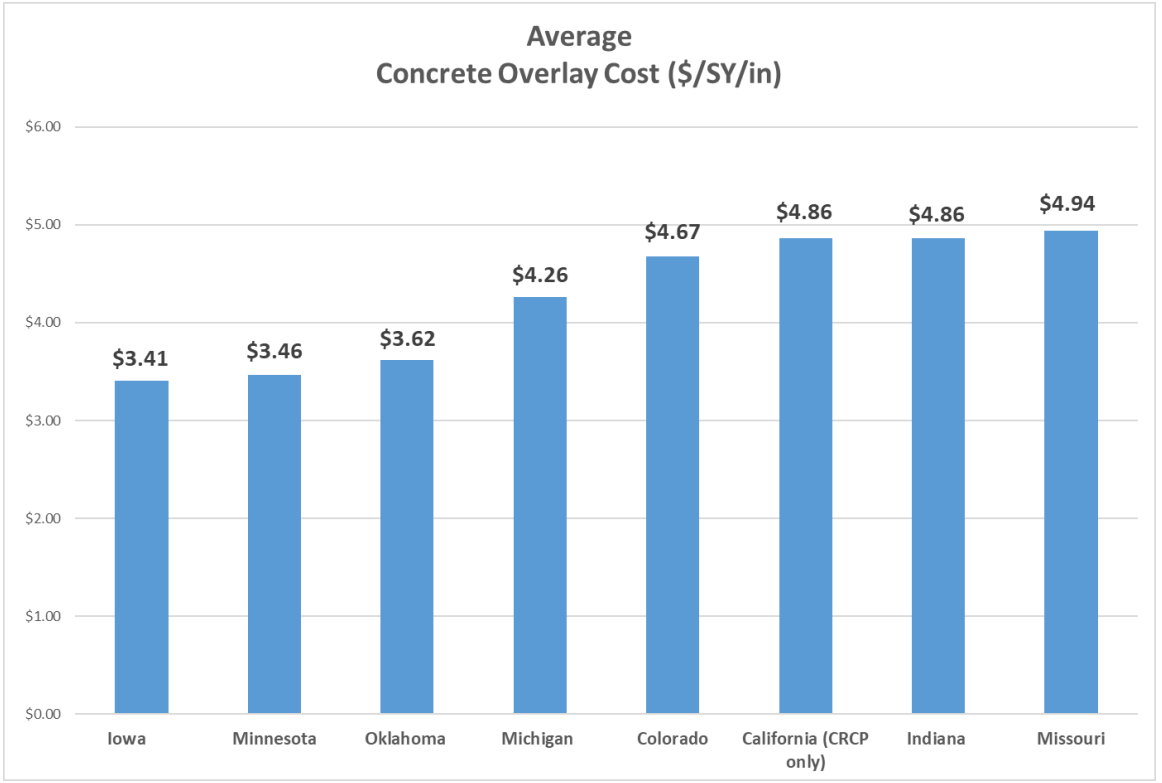
- Costs
- Performance
- Environmental impacts
- Resiliency
- Effectiveness



Source: ACPA

Costs

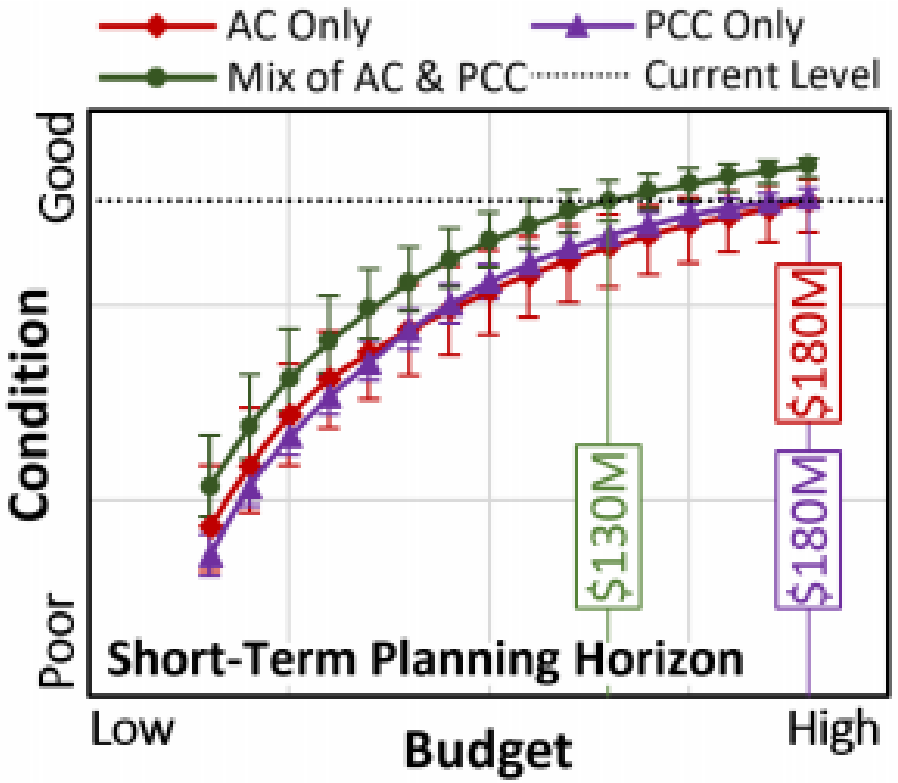
- Initial costs depend on
  - Competition
  - Local contractor experience
  - Local materials availability
- Can be competitive with other solutions



Source: Iowa State University

Costs

- Annual ownership costs are reduced
  - Longer life
  - Less maintenance
- Overall network condition is raised



Source: MIT Concrete Sustainability Hub

Environmental Impacts

- Long life and low maintenance reduces environmental impacts
- Improved fuel efficiency
- High albedo, reducing the heat island effect
- Concrete is 100% recyclable
- May absorb CO_2

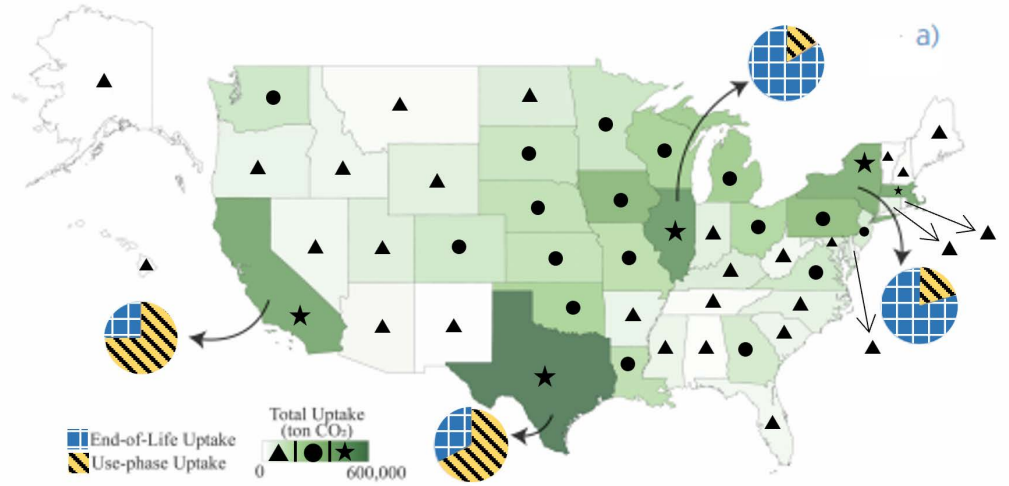
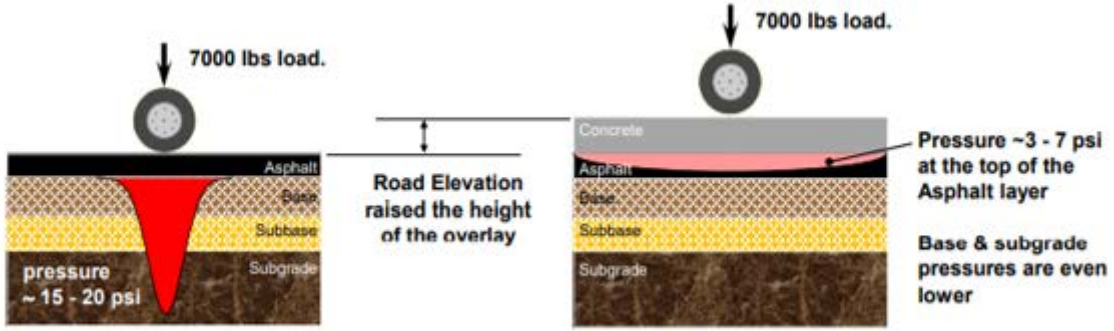


Image source: MIT Concrete Sustainability Hub

Resiliency

- Flooding saturates and weakens a pavement's foundation
- Concrete overlays reduce the stress in the asphalt layer
- Sensitivity to subgrade softening is reduced



Concrete overlay increases both the height and the structural strength of the roadway

Image source: FHWA

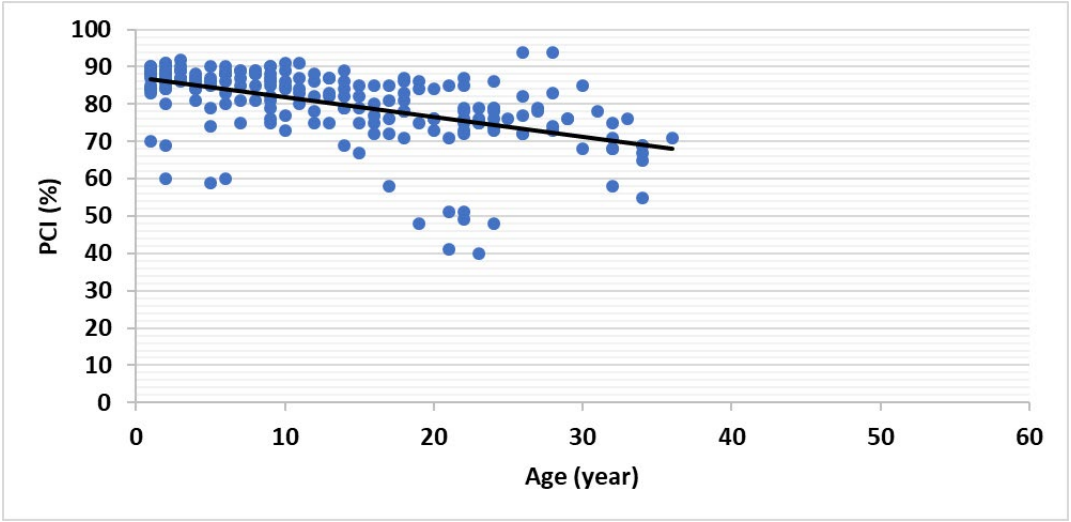
Effectiveness

- History
  - As early as 1901
  - 2000 miles in service in Iowa

Image source: Iowa State University

Effectiveness

- Performance depends on:
  - Thickness
  - Condition of existing layer
  - Detailing
- Can be
  - Unbonded from existing layer to prevent reflective damage
  - Bonded to make use of system in place
- Life can be up to 35 years



Source: Iowa State University

Effectiveness

- Versatility
  - Can be applied to all surface types
  - Many degrees of distress can be accommodated
  - Has been used for a range of applications
    - Roadways
    - Intersections
    - Parking lots
    - Airfields

Image source: Iowa State University

Effectiveness

- Rapid Construction
  - Depends on preparation effort required
  - Placement can be fast with thinner sections
  - Productivity can be less influenced by weather conditions
  - Traffic can be restored in a weekend

Image source: Iowa State University

Effectiveness

- Traffic Impact
  - Maintenance of traffic typically is simpler than reconstruction
  - Construction under traffic is possible
  - Early opening is possible

Image source: Iowa State University

Effectiveness

- New design methodologies
- Performance Engineered Mixtures (PEM)
  - Reduced CO_2 footprint
- Stringless control
- Large, adaptable paving machines
- Vibrator monitoring
- Real Time Smoothness
- Maturity monitoring

Image source: Iowa State University

Effectiveness

- Safety
  - Reduced frequency of closures

Image source: Iowa State University

Effectiveness

- Efficiency
  - Similar practices to conventional concrete paving
  - Simple plan sets are possible
  - Training and troubleshooting available
  - Visit the TOPS website for more information and links to resources such as case studies, one pagers, and reports

Image source: Iowa State University

Challenges

- Exclusion from Agency Project Management System
  - Most PMS reflect local institutional experience and practices
    - Innovation can be hard
    - Alternative solutions are not considered

Image source: Iowa State University

Challenges

- Agency Focus on Surface Condition Only
  - Pressure to “cover as much as possible”
    - Unsustainable short-term fixes
    - Ignores traffic disruptions and safety impacts
  - Diamond grinding can be a cost-effective surface treatment

Challenges

- Agency Difficulties with Identifying Candidate Projects
  - Suitable overlay type for the existing system
  - Elevation issues
    - Bridges
    - Connections
    - Services
- A range of possible solutions is available

Image source: Iowa State University

Challenges

- Traffic Management/Detour Options
  - An overlay can be built faster than a reconstruct
  - Construction under traffic is possible
- Communication and planning…

Suggestions for Getting Started

- Start with a simple project
- Get help
- Evaluate performance
- Build competency
- Integrate the process into the mix of fixes

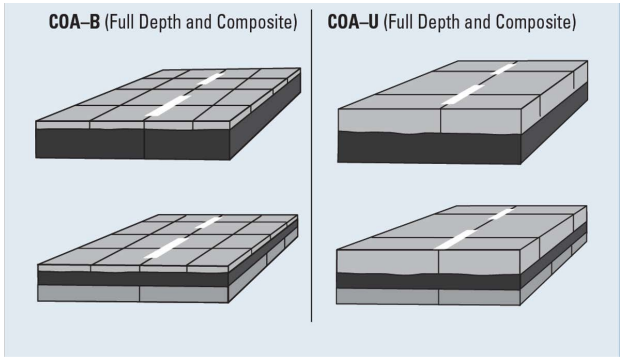
Image source: Iowa State University

The Process

- Identify the type of pavement to be overlaid
- Assess the condition of the existing pavement
- Design
- Build
- Repeat

Concrete on Asphalt (COA) can be designed to address a broad range of existing pavement conditions on both composite and full-depth asphalt pavements. Both bonded (COA-B) and unbonded (COA-U) options enable designs to cost-effectively match the condition of the existing asphalt—from deteriorated to good—as well as geometric parameters.

Concrete on Concrete (COC) can be designed for applications on both existing jointed plain concrete pavement (JPCP) and continuously reinforced concrete pavement (CRCP). The predominance of COC designs are unbonded (COC-U) systems; although, bonded (COC-B) applications can be successful, provided the existing pavement is in good condition.



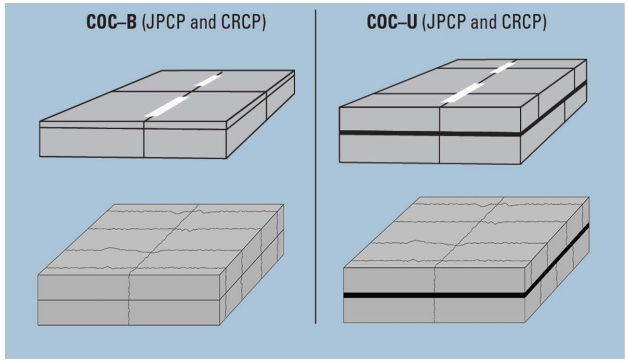


Image source: Iowa State University

Concrete Overlays A Proven Technology – Project Highlights

U.S. Department of Transportation
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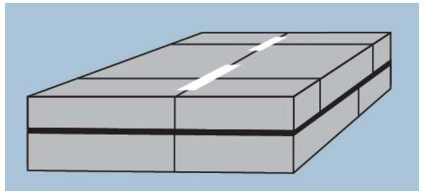
Project Highlights

State/Route	Year Constructed	Existing Pavement & Overlay Type	Functional Classifications	Traffic Volume	Maintenance of Traffic Strategy
North Carolina/I-77	2007-2008	COC-U on CRCP	Interstate	31,500 AADT with 25% trucks	Maintain two-lanes each direction
Colorado/SH13	2016	COA-B on HMA	Primary Hwy	1,400 AADT with 20% trucks	24-hour pilot car
Oklahoma/SH51	2016	COA-B on HMA	Primary Hwy	-	Closed to through traffic
Iowa/County Route S10/S14	2009	COA-U on HMA	County road	-	Closed to through traffic
Kansas/City of Salina	2012	COA-U on composite pavement	Urban intersection	32,000	Staged construction maintaining traffic

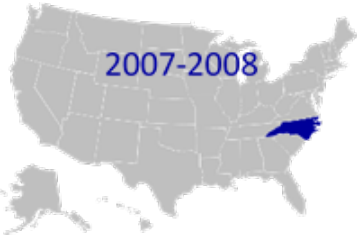
Yadkin County, NC I-77

COC-U (JPCP and CRCP)

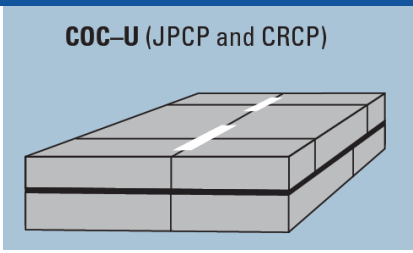


- Existing continuously reinforced concrete pavement (CRCP) circa 1964
  - Punchouts
  - Ruptured Steel
  - Faulting at cracks
- Design-build delivery method

Image source: Iowa State University

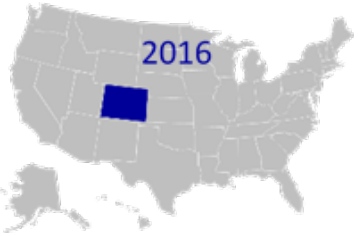


Yadkin County, NC I-77



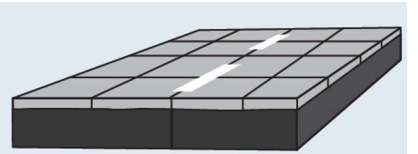
- Median detour with limited duration of one-lane operation
- 11-day closure limit for ramps
- 11-inch joint plain concrete pavement (JPCP) on 1 ½ inch asphalt separation layer
- Bridges were raised to match overlay elevation
- 100% grind

Image source: Iowa State University



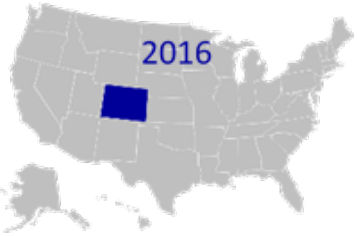
Moffat County, CO SH-13

COA-B (Full Depth and Composite)

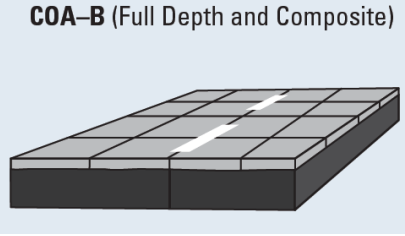


- Existing Asphalt
- Profile milled to optimize volume of concrete and final smoothness
- 6-inch thick JPCP, 6 ft x 6 ft slabs
- Alternate bid

Image source: Iowa State University

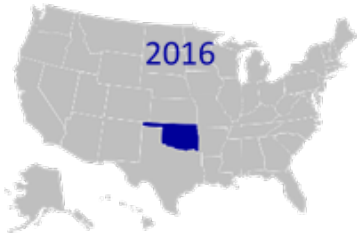


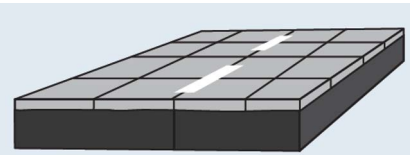
Moffat County, CO SH-13



- Two-way traffic maintained with pilot car
- Project length = 6 miles
- Average IRI < 45 in/mile

Image source: Iowa State University

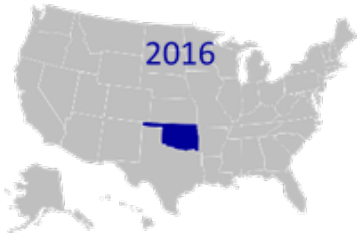




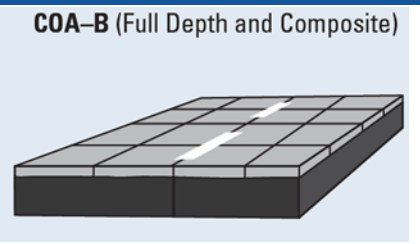
Blaine County, OK SH-51

- Asphalt bids rejected twice: Over budget
- 5-inch thick fiber reinforced JPCP, 6 ft × 7½ ft slabs
- Profile milled
- Roadway closed to through traffic (5½-mile project length)

Image source: Iowa State University

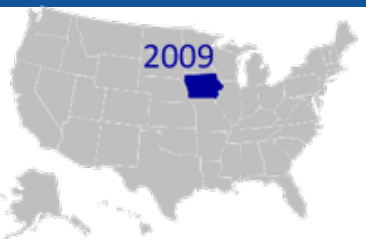


Blaine County, OK SH-51



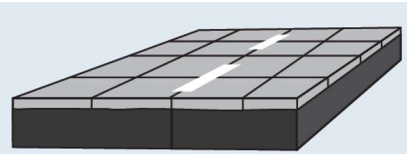
- Constructed in sections to allow access for adjacent property owners
- Project completed less than 90 days after bids were opened
- Drainage structures extended to accommodate a widened paved roadway

Image source: Iowa State University



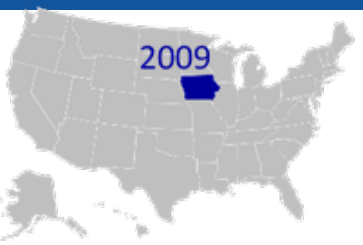
Worth County, IA S10/S141

COA-B (Full Depth and Composite)

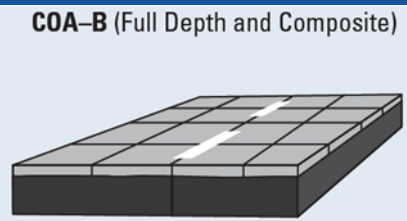


- Alternate bid
- 4-inch thick JPCP, 6-ft x 6-ft slabs
- 23-mile long project
- Plan set was 10 pages

Image source: Iowa State University



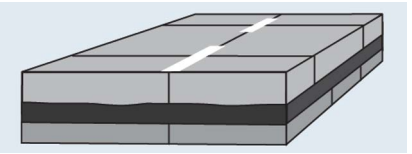
Worth County, IA S10/S141



- No preoverlay repairs
- Roadway closed to through traffic
- Entire project opened to unrestricted traffic in 110 calendar days

Image source: Iowa State University

Saline County, KS Crawford and Ohio Streets



- Busiest intersection in Salina, KS > 30,000 average daily traffic (ADT)
- Partial depth milling
- 8-inch thick JPCP, 12 ft x 12 ft slabs

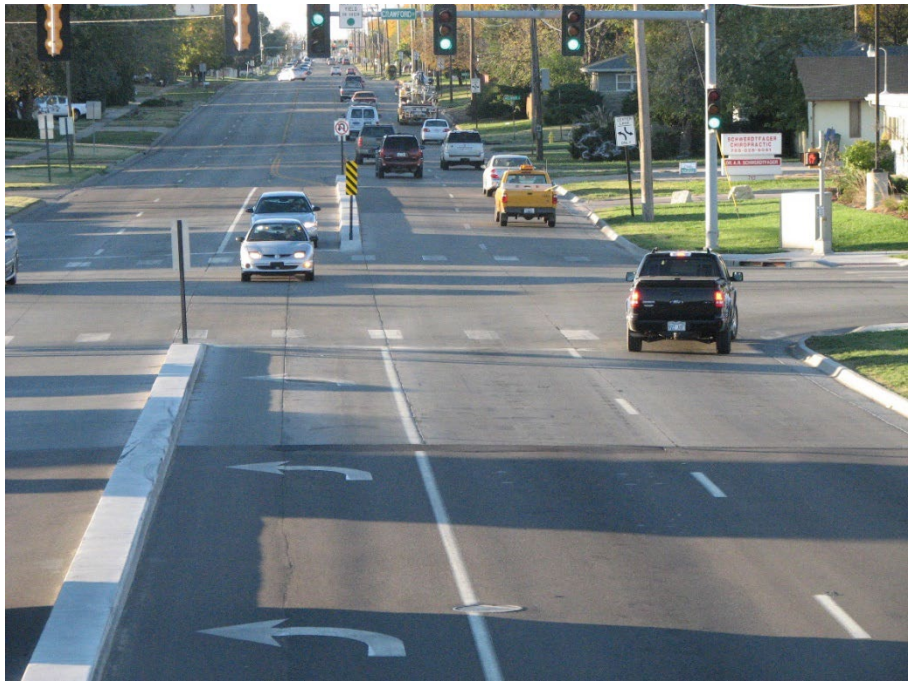
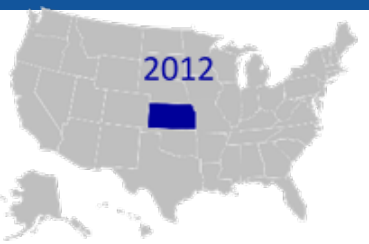
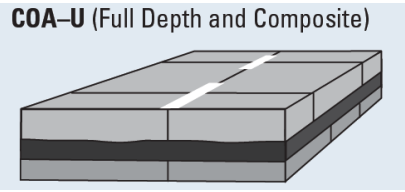


Image source: Iowa State University



Saline County, KS Crawford and Ohio Streets



- Staged construction kept the intersection open
- Completed in 45 days

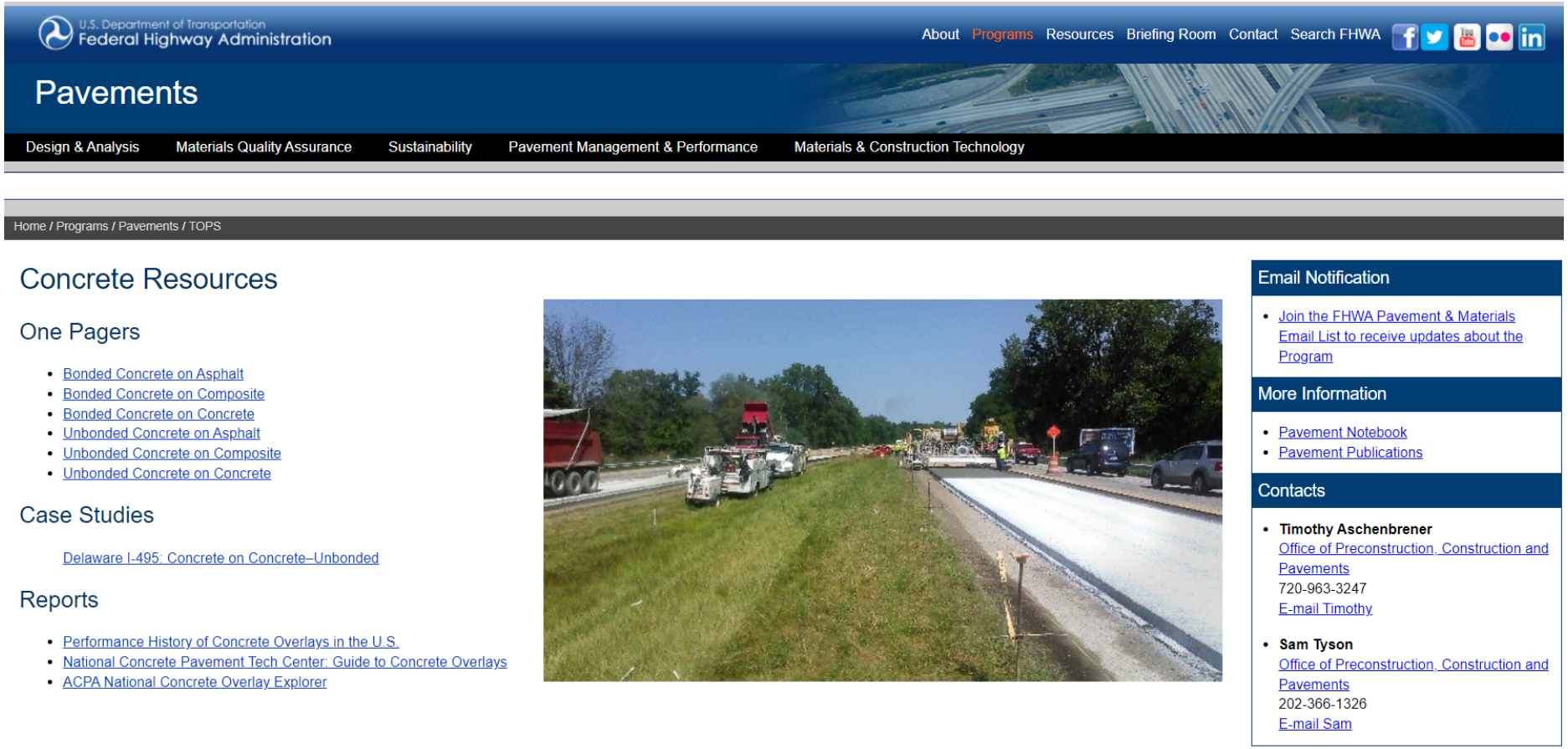
Image source: Iowa State University

Before

After

Resources

Visit the TOPS website for more information and links to resources such as case studies, one pagers, and reports



Concrete Overlays

Q & A

Please Register for Upcoming Webinars

Webinar 1: HPTO/CAM

Webinar 2: Concrete Overlays

Webinar 3: SMA/HiMA

Webinar 4: Concrete over Concrete Unbonded (COC-U)

Webinar 5: UTBWC/OGFC

Webinar 6: Concrete over Asphalt Unbonded (COA-U)

Webinar 7: ARGG/EFO

Webinar 8: Concrete over Asphalt Bonded (COA-B)

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