CP Tech Center Update

National Concrete Consortium Fall Meeting
Saratoga Springs, New York
September 18, 2018

National Concrete Pavement Technology Center

Tech Center

Iowa State University
Institute for Transportation

Steven L. Tritsch, P.E.
stritsch@iastate.edu

Staff Update

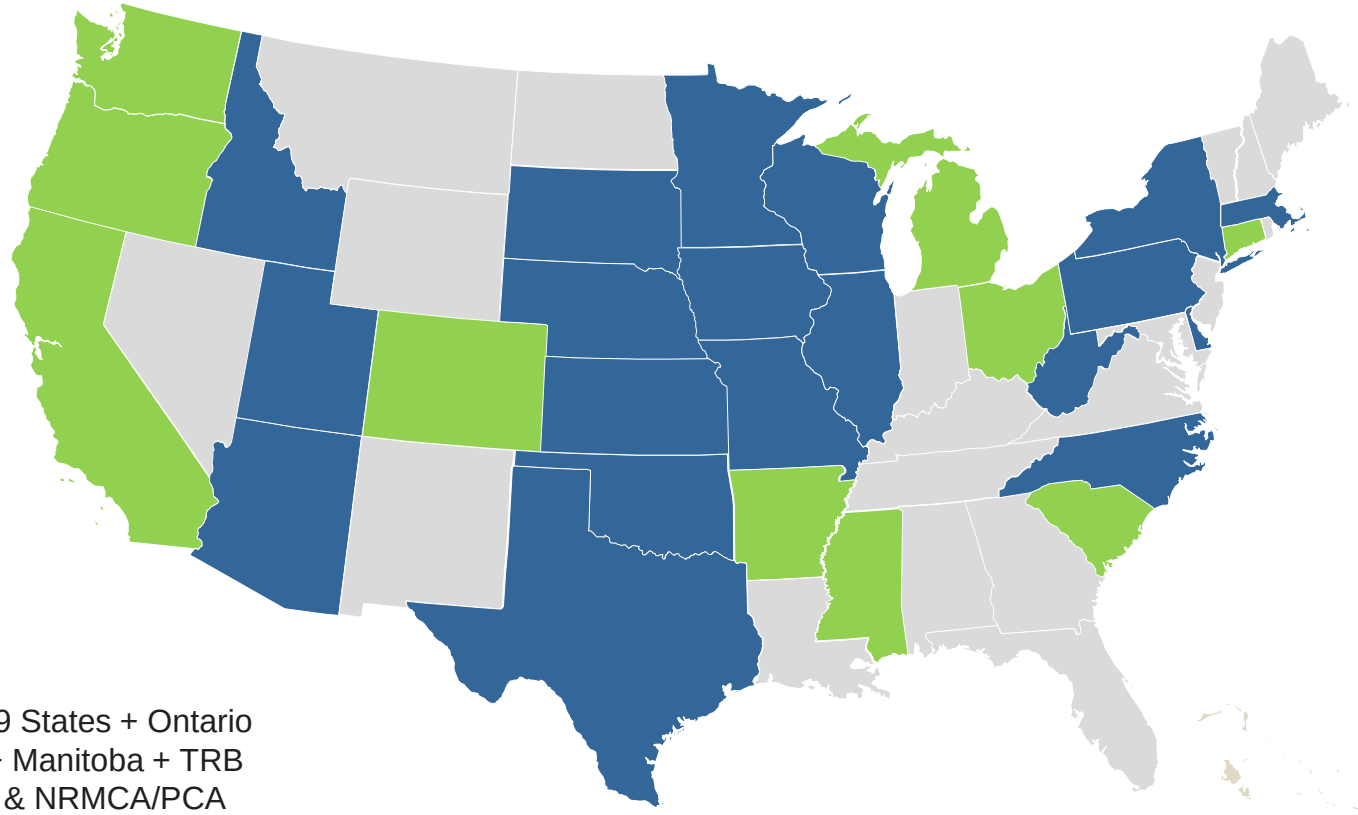
- Dr Hamed Sadati

  Replaces Dr Xuhao Wang
- Dr Yifeng Ling

  Postdoc
- John Adam, PE

  Bob Steffes retired

CPTech Center Travels/Presentations
January – September 2018



29 States + Ontario
+ Manitoba + TRB
& NRMCA/PCA

Unmanned Aerial Systems - Tech Brief Development

WJE, Missouri S&T, ADOJAM, Texas A&M, & 3 practitioners

4 Tech Briefs approximately 10 pages

- Construction Inspection - General Aspects
- Bridge Inspection
- Emergency Response - Flooding
- Construction Inspection - Surveying

Q&A Webinar for Tech Briefs

Participate in EDC-5 Regional Summits

- Baltimore Oct 18-19
- Albany Oct 24-25
- St. Louis Oct 29-30
- Portland Nov 8-9
- Orlando Nov 27-28

Completion Date 5/31/2019

Reassess and Update the FHWA Pavement Preservation Research Roadmap

ACPA and NCPP

Compare Original Roadmap (2008) with the TSP2* Research Database

Prioritize Research Needs Statements

Compare to Existing National Research

Recommend Timing of Updates and Process to Investigate Further Work if Current Research Has Remaining Questions

Process for Updating Roadmap

*Technical Services Program on Transportation System Preservation

Completion Date 1/1/2020

Advancing Building Information Modeling (BIM) for Infrastructure

University of TX, HDR, SpectrumAEC, Oregon State University, WSP, and InEight

Tech Brief, Flyers and Webinars to Advance BIM for Infrastructure

- Aimed at Executives
- Aimed at Technical Staff

1 ½ Day Workshop to Develop a Strategic Roadmap for the Deployment of BIM

Develop Case Studies

5 Minute Video

Completion Date 7/14/2019

Development & Facilitation of Peer-to-Peer Exchanges for Pavement Preservation

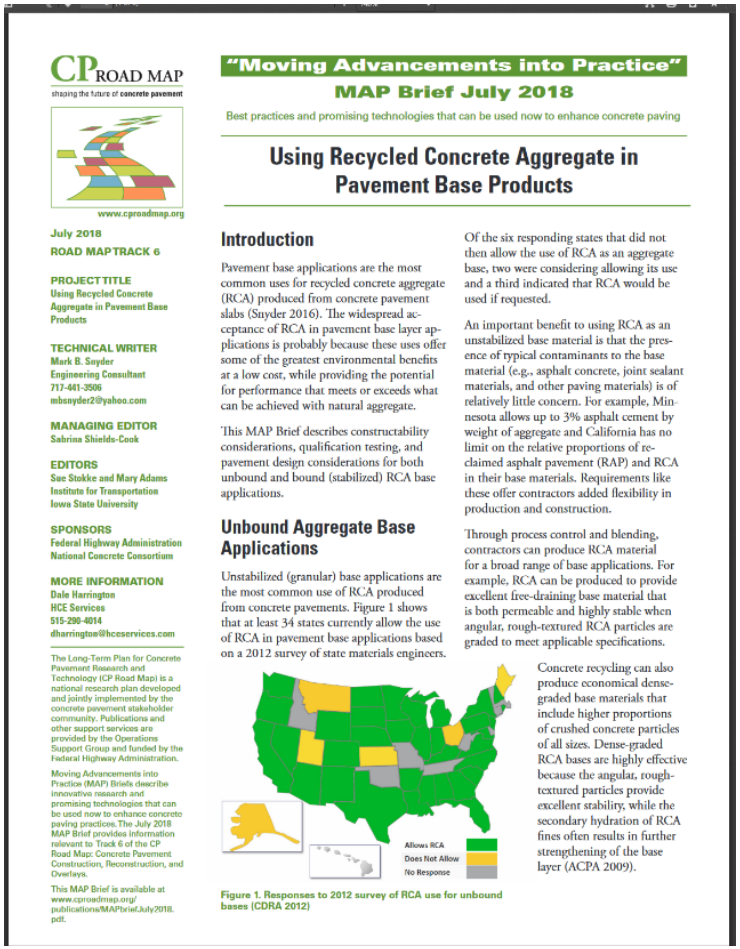
ACPA/IGGA, NCPP, and Snyder & Associates

- Update 10 HMA Inspector Checklist and Write 6 Additional
- Update 5 PCCP Checklist (Full Depth Repair, Partial Depth Repair, Diamond Grinding, DBR, and Joint Sealing) and Write 2 Additional (Cross Stitching and Grooving)
- Checklist Will Be App Based with Links
- 7 Workshops
  - NACE
  - 4 Regional Pavement Preservation Partnership Meetings
  - 2 NC^2 Meetings
- Conduct 10 Agency Peer-to Peer Meetings – Now “Regional Meetings” – 6 are Scheduled: DE, GA, KY, LA, ND, and NH

Completion Date 8/07/2019

http://www.cproadmap.org/publications/MAPbriefJul2018.pdf

http://www.cptechcenter.org/concrete-recycling/docs/RCA_in_unbound_aggregate_shoulders_TB5.pdf



CP ROAD MAP
shaping the future of concrete pavement

www.cproadmap.org

July 2018
ROAD MAP TRACK 6

PROJECT TITLE
Using Recycled Concrete Aggregate in Pavement Base Products

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The Long-Term Plan for Concrete Pavement Research and Technology (CP Road Map) is a national research plan developed and jointly implemented by the concrete pavement stakeholder community. Publications and other support services are provided by the Operations Support Group and funded by the Federal Highway Administration.

Moving Advancements into Practice (MAP) Briefs describe innovative research and promising technologies that can be used now to enhance concrete paving practices. The July 2018 MAP Brief provides information relevant to Track 6 of the CP Road Map: Concrete Pavement Construction, Reconstruction, and Overlays.

This MAP Brief is available at www.cproadmap.org/publications/MAPbriefJuly2018.pdf.

"Moving Advancements into Practice"
MAP Brief July 2018

Best practices and promising technologies that can be used now to enhance concrete paving

Using Recycled Concrete Aggregate in Pavement Base Products

Introduction

Pavement base applications are the most common uses for recycled concrete aggregate (RCA) produced from concrete pavement slabs (Snyder 2016). The widespread acceptance of RCA in pavement base layer applications is probably because these uses offer some of the greatest environmental benefits at a low cost, while providing the potential for performance that meets or exceeds what can be achieved with natural aggregate.

This MAP Brief describes constructability considerations, qualification testing, and pavement design considerations for both unbound and bound (stabilized) RCA base applications.

Unbound Aggregate Base Applications

Unstabilized (granular) base applications are the most common use of RCA produced from concrete pavements. Figure 1 shows that at least 34 states currently allow the use of RCA in pavement base applications based on a 2012 survey of state materials engineers.

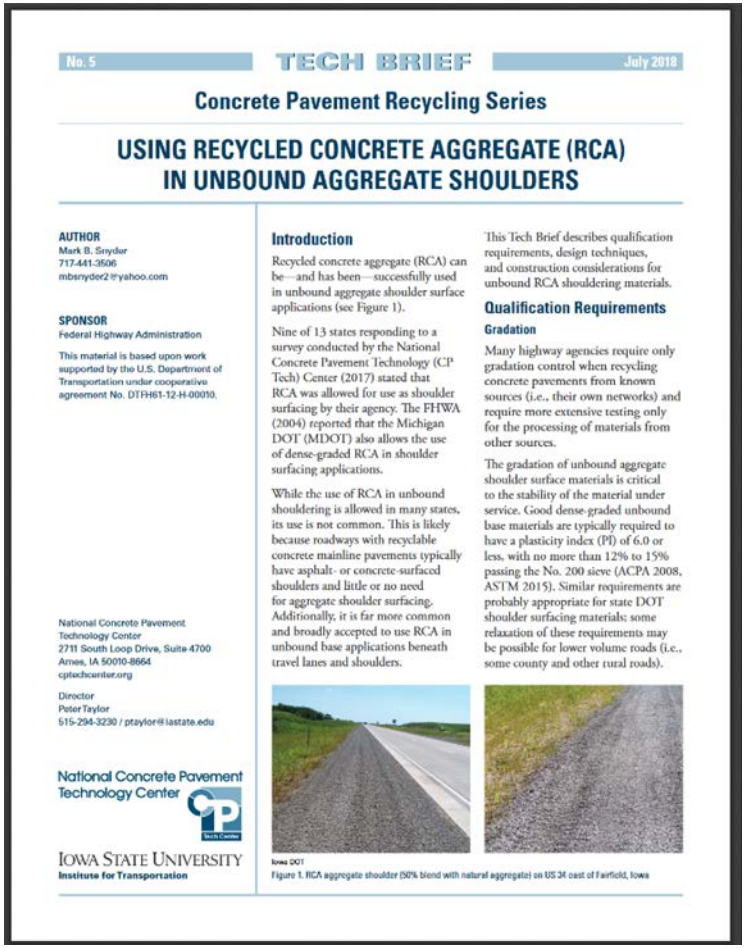
Figure 1. Responses to 2012 survey of RCA use for unbound bases (CDRA 2012)

Of the six responding states that did not then allow the use of RCA as an aggregate base, two were considering allowing its use and a third indicated that RCA would be used if requested.

An important benefit to using RCA as an unstabilized base material is that the presence of typical contaminants to the base material (e.g., asphalt concrete, joint sealant materials, and other paving materials) is of relatively little concern. For example, Minnesota allows up to 3% asphalt cement by weight of aggregate and California has no limit on the relative proportions of reclaimed asphalt pavement (RAP) and RCA in their base materials. Requirements like these offer contractors added flexibility in production and construction.

Through process control and blending, contractors can produce RCA material for a broad range of base applications. For example, RCA can be produced to provide excellent free-draining base material that is both permeable and highly stable when angular, rough-textured RCA particles are graded to meet applicable specifications.

Concrete recycling can also produce economical dense-graded base materials that include higher proportions of crushed concrete particles of all sizes. Dense-graded RCA bases are highly effective because the angular, rough-textured particles provide excellent stability, while the secondary hydration of RCA fines often results in further strengthening of the base layer (ACPA 2009).



No. 5 TECH BRIEF July 2018

Concrete Pavement Recycling Series

USING RECYCLED CONCRETE AGGREGATE (RCA) IN UNBOUND AGGREGATE SHOULDERS

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SPONSOR
Federal Highway Administration

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Institute for Transportation

Introduction

Recycled concrete aggregate (RCA) can be—and has been—successfully used in unbound aggregate shoulder surface applications (see Figure 1).

Nine of 13 states responding to a survey conducted by the National Concrete Pavement Technology (CP Tech) Center (2017) stated that RCA was allowed for use as shoulder surfacing by their agency. The FHWA (2004) reported that the Michigan DOT (MDOT) also allows the use of dense-graded RCA in shoulder surfacing applications.

While the use of RCA in unbound shouldering is allowed in many states, its use is not common. This is likely because roadways with recyclable concrete mainline pavements typically have asphalt- or concrete-surfaced shoulders and little or no need for aggregate shoulder surfacing. Additionally, it is far more common and broadly accepted to use RCA in unbound base applications beneath travel lanes and shoulders.

This Tech Brief describes qualification requirements, design techniques, and construction considerations for unbound RCA shouldering materials.

Qualification Requirements

Gradation

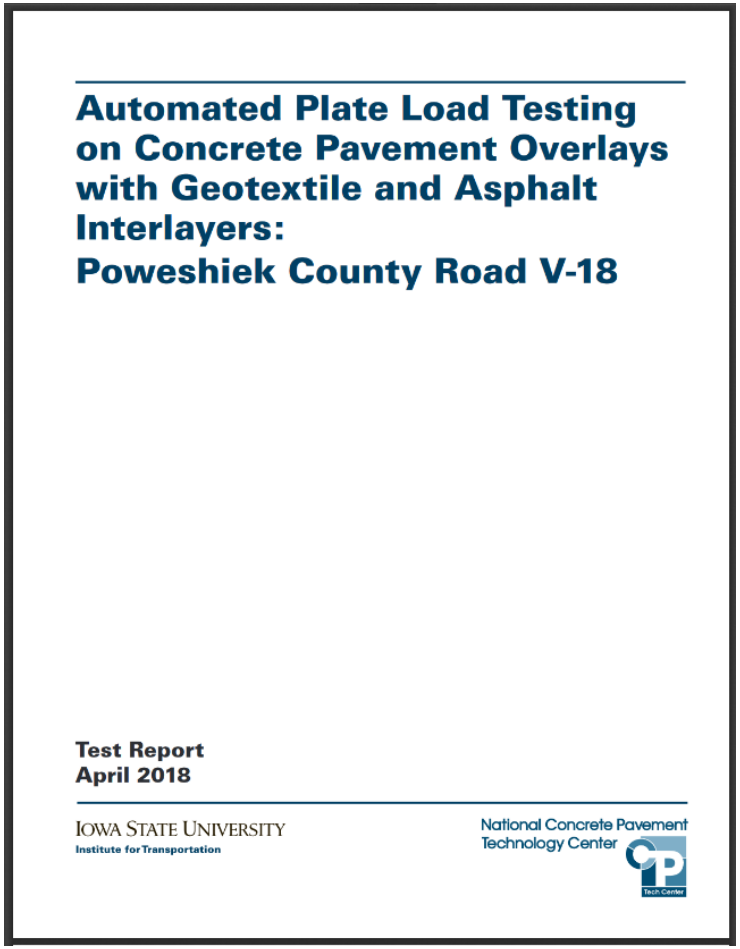
Many highway agencies require only gradation control when recycling concrete pavements from known sources (i.e., their own networks) and require more extensive testing only for the processing of materials from other sources.

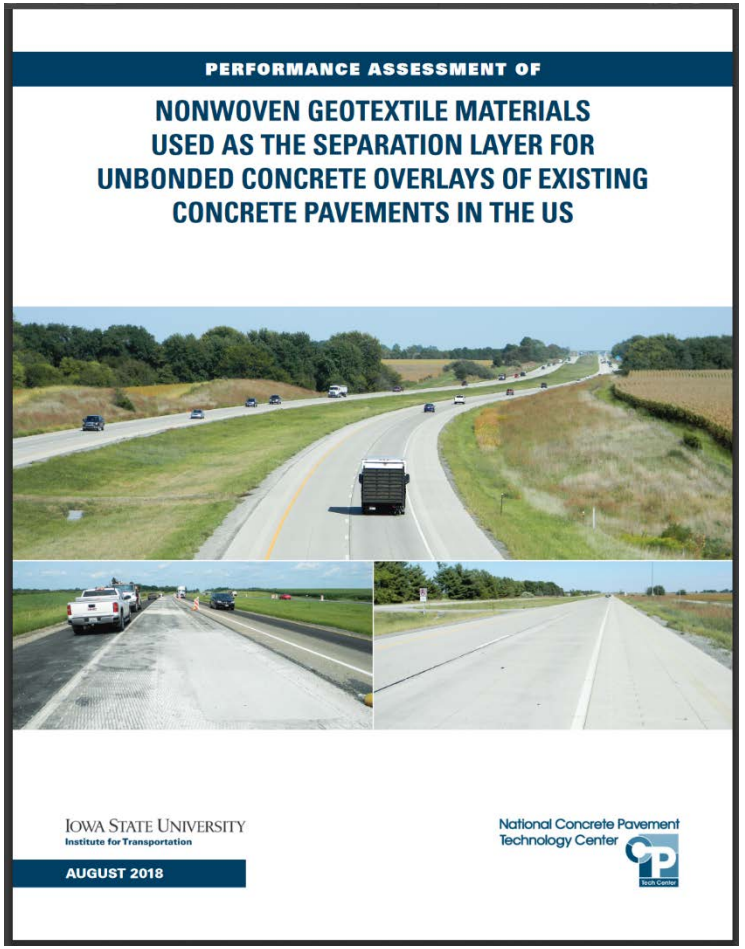
The gradation of unbound aggregate shoulder surface materials is critical to the stability of the material under service. Good dense-graded unbound base materials are typically required to have a plasticity index (PI) of 6.0 or less, with no more than 12% to 15% passing the No. 200 sieve (ACPA 2008, ASTM 2015). Similar requirements are probably appropriate for state DOT shoulder surfacing materials; some relaxation of these requirements may be possible for lower volume roads (i.e., some county and other rural roads).

Iowa DOT
Figure 1. RCA aggregate shoulder (50% blend with natural aggregate) on US 34 east of Fairfield, Iowa

http://www.intrans.iastate.edu/research/documents/research-reports/Powashiek_CR_V-18_APL_testing_w_cvr.pdf

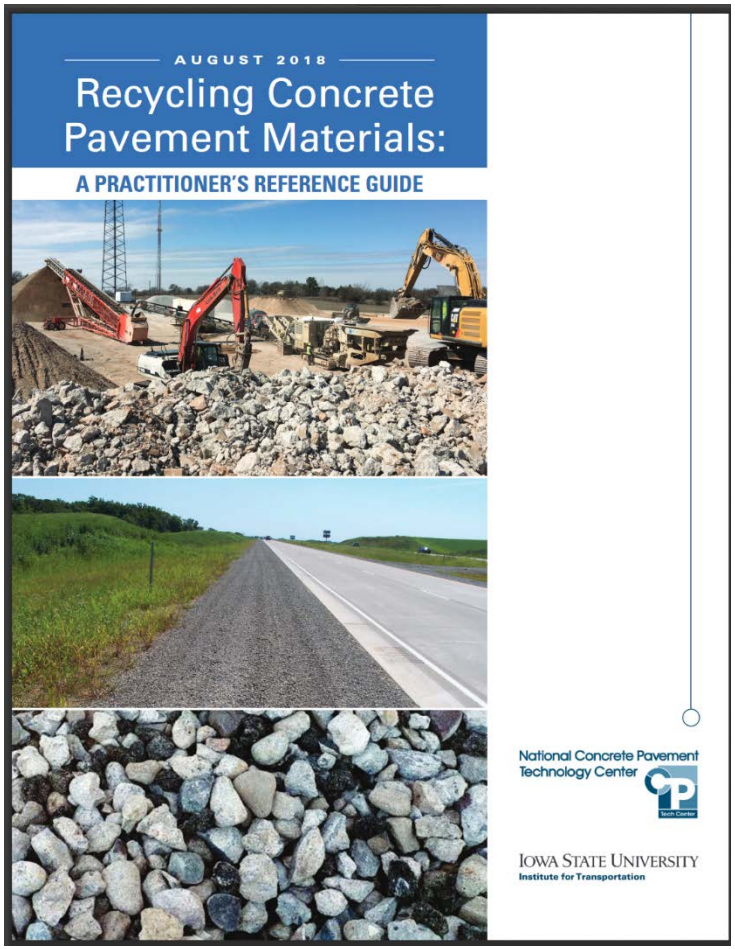
http://www.cptechcenter.org/technical-library/documents/US_geotextile_performance_w_cvr.pdf





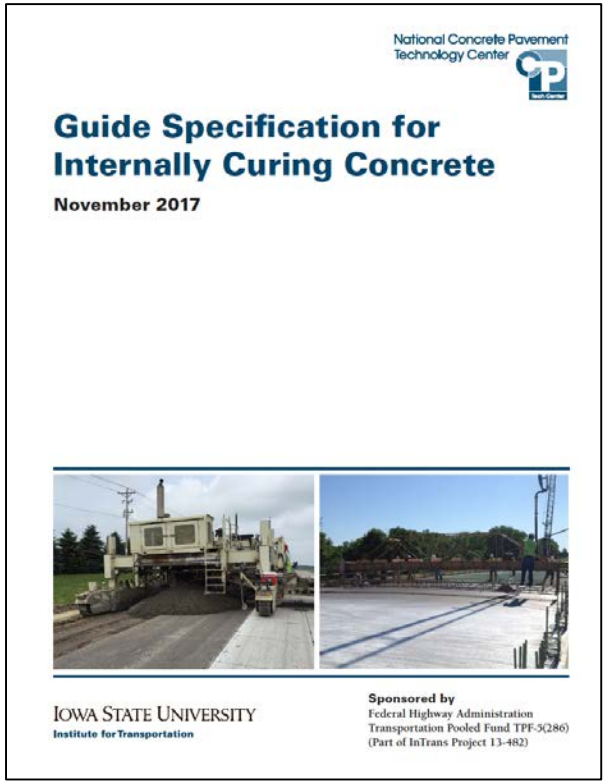
http://www.cptechcenter.org/technical-library/documents/RCA_practioner_guide_w_cvr.pdf

http://www.cptechcenter.org/technical-library/documents/overlay_construction_doc_dev_guide_w_cvr.pdf



IHRB Project TR-746 Impacts of Internally Cured Concrete Paving on Contraction Joint Spacing, Phase II

- Two ¼-mile test sections – Winneshiek County W34 and Washington County W61 paved this summer
- Mixtures developed based on control sections – 30% replacement by volume
- Instruments in abundance
- Paving was successful
- Monitoring for cracking and warping



IHRB Project TR-698 Optimized Joint Spacing With & Without Structural Fiber Reinforcement Phase II

Mitchell County Hwy 105, 2017

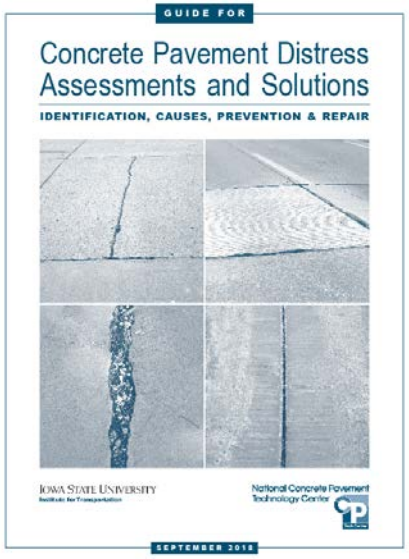
- Bonded concrete overlay of existing composite pavement
- 500 foot test sections constructed with different combinations of:
  - Overlay thickness (4- and 6-in.)
  - Macro-synthetic fibers (0 vs. 4 lb/cy)
  - Joint spacing (6'x'6, 12'x12', 15'x12' and 20'x12')

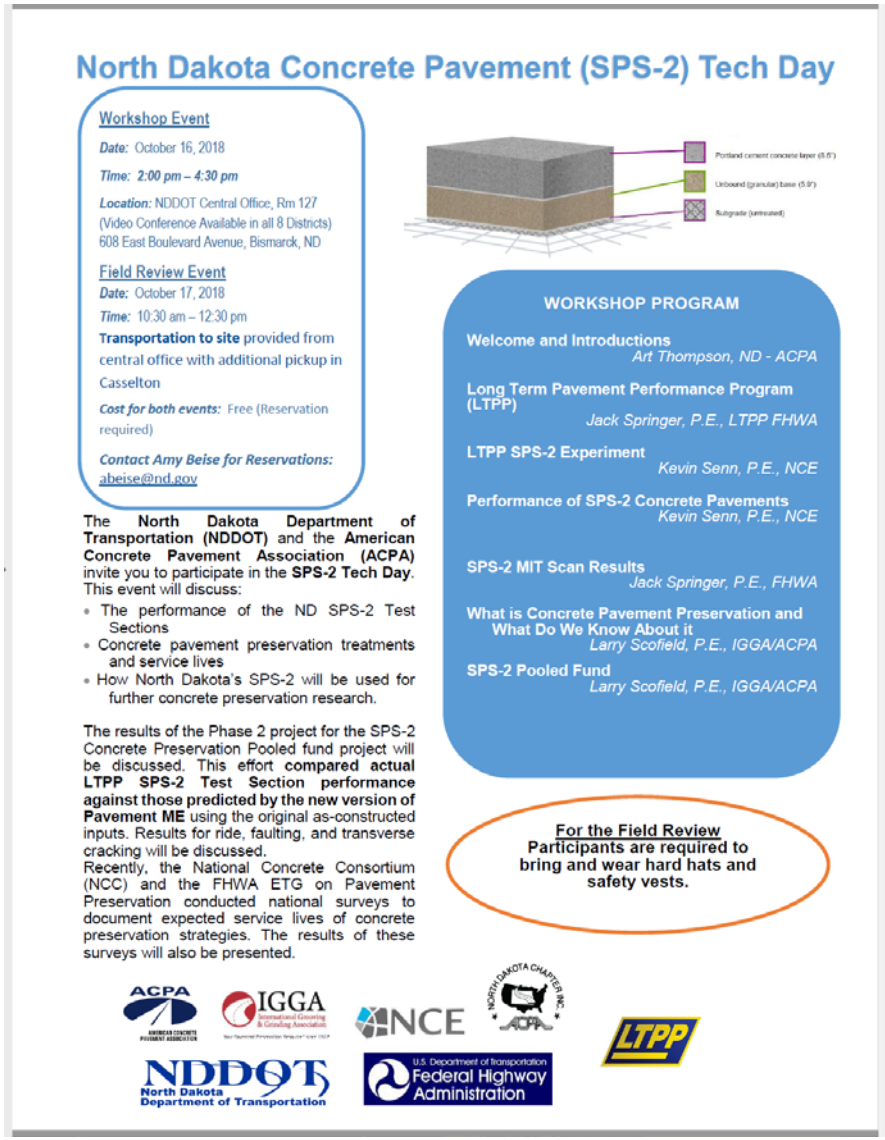
Buchanan County V62, 2018

- 6-in. unbonded concrete overlay with geotextile fabric interlayer
- 300 foot test sections constructed with different combinations of:
  - Macro-synthetic fibers (0 vs. 4 lb/cy)
  - Joint spacing (6'x6' up to 40'x12')

Manuals In Development - epubs

- Integrated Materials and Construction Practices for Concrete Pavement (IMCP)
  - Update 2007 document
  - Estimate 20% more pages w/changes
  - 10 Chapters
  - 5 Authors
  - 25 TAC members
  - Target December printing
- Concrete Pavement Distress Assessment and Solutions
  - 19 chapters
  - Target September printing





North Dakota Concrete Pavement (SPS-2) Tech Day

Workshop Event

Date: October 16, 2018

Time: ***2:00 pm – 4:30 pm***

Location: NDDOT Central Office, Rm 127 (Video Conference Available in all 8 Districts) 608 East Boulevard Avenue, Bismarck, ND

Field Review Event

Date: October 17, 2018

Time: 10:30 am – 12:30 pm

Transportation to site provided from central office with additional pickup in Casselton

Cost for both events: Free (Reservation required)

Contact Amy Beise for Reservations: abeise@nd.gov

The **North Dakota Department of Transportation (NDDOT)** and the **American Concrete Pavement Association (ACPA)** invite you to participate in the **SPS-2 Tech Day**. This event will discuss:

- The performance of the ND SPS-2 Test Sections
- Concrete pavement preservation treatments and service lives
- How North Dakota's SPS-2 will be used for further concrete preservation research.

The results of the Phase 2 project for the SPS-2 Concrete Preservation Pooled fund project will be discussed. This effort **compared actual LTPP SPS-2 Test Section performance against those predicted by the new version of Pavement ME** using the original as-constructed inputs. Results for ride, faulting, and transverse cracking will be discussed.
Recently, the National Concrete Consortium (NCC) and the FHWA ETG on Pavement Preservation conducted national surveys to document expected service lives of concrete preservation strategies. The results of these surveys will also be presented.

WORKSHOP PROGRAM

Welcome and Introductions
Art Thompson, ND - ACPA

Long Term Pavement Performance Program (LTPP)
Jack Springer, P.E., LTPP FHWA

LTPP SPS-2 Experiment
Kevin Senn, P.E., NCE

Performance of SPS-2 Concrete Pavements
Kevin Senn, P.E., NCE

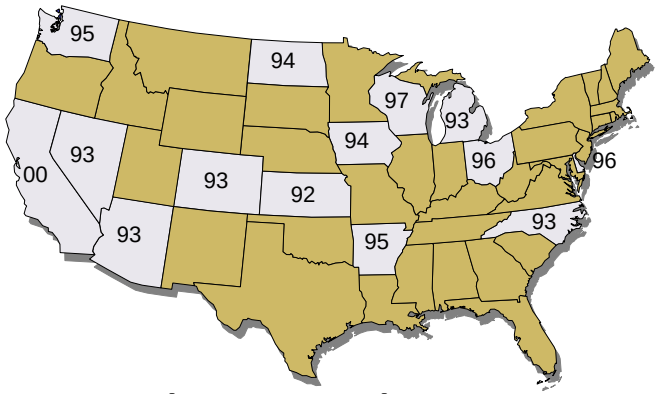
SPS-2 MIT Scan Results
Jack Springer, P.E., FHWA

What is Concrete Pavement Preservation and What Do We Know About it
Larry Scofield, P.E., IGGA/ACPA

SPS-2 Pooled Fund
Larry Scofield, P.E., IGGA/ACPA

For the Field Review
Participants are required to bring and wear hard hats and safety vests.

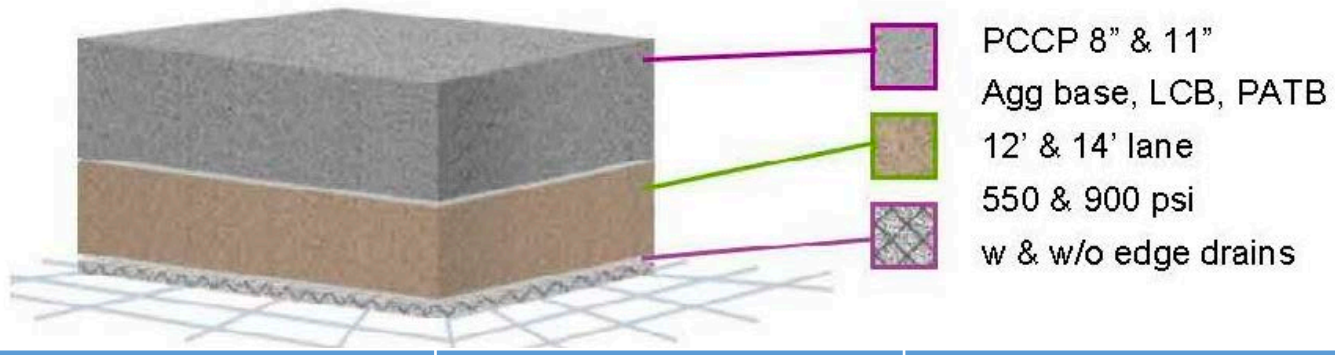
ACPA · IGGA · NCE · North Dakota Chapter ACPA · LTPP · NDDOT North Dakota Department of Transportation · U.S. Department of Transportation Federal Highway Administration



Information (as of 2016)

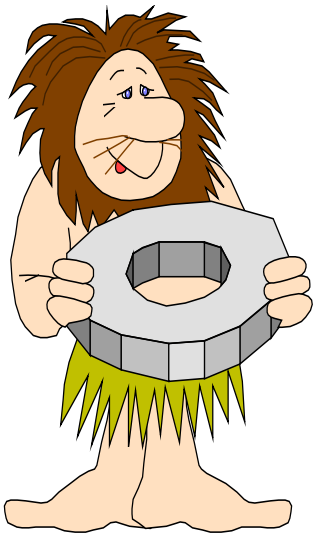
- Of the original 144 SPS-2 core test sections constructed, 83% (119) of the test sections are still in service.
- Of the original 40 SPS-2 State Supplemental test sections constructed, 90% of them are still in service.
- The experiment has outperformed all other LTPP experiments providing evidence of concrete pavement's long-life characteristics.
- Of the original 192 SPS-1 (New AC Pavement Experiment) only 6% are still in service.

SPS-2 Pavement Preservation Experiment Pooled Fund TPF-5(291)



State	Tech Day Date	Year Constructed
Arizona	Feb 21	1993
Colorado	Mar 23	1993
Washington	May 2	1995
Iowa	May 30	1994
Kansas	Oct 2-3	1992
North Dakota	Oct 16-17	1994

Thanks for your time



Spring Meeting
April 2-4, 2019
Sheraton Denver West Hotel
360 Union Blvd
Lakewood, Colorado

Fall 2019 Meeting in Montana

www.cptechcenter.org