



Concrete Overlay of Existing Asphalt Surfaced Streets and Parking Lots

Presented By:
National Ready Mixed Concrete Association



National Ready Mixed Concrete Association

- National Trade Association – Established in 1930
- HQ in Alexandria, VA
- 1,400+ Member Companies
- NRMCA Represents ~75% of North American Ready Mixed Production
- Mission - Serve Industry and Partners Through:

- Compliance and Operations

- Engineering

- Government Affairs

- *Local Paving: Pave Ahead™ Initiative* (PaveAhead.com)

- *Structures and Sustainability: Build With Strength™ Initiative*

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Your Instructors Today...

- Jon Hansen
 - Sr. VP-NRMCA Local Paving

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More information at paveahead.com/experts/



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What this IS NOT

(Google is not always right...)

People also ask

What is a concrete overlay?

Answer: A **concrete overlay** is a thin color **concrete** cement based products that go over existing **concrete** for repair or decorative reasons. **Overlays** can be applied as thin as a feather finish up to in most cases 3/4" depending on the desired finish.

Concrete Overlay Bag Mixes Designed for Walls and Floors ...

<https://www.surecretedesign.com/concrete-overlay-mixes/>

Search for: What is a concrete overlay?



How Long Has This Been Done?

Concrete Resurface on So. Seventh Street Road, Terre Haute, Indiana

THE county highway connecting at the city limits of Terre Haute, Indiana, with South Seventh Street was, prior to 1918, surfaced with a bituminous type of pavement which had a total thickness of nine inches. The surface wore into numerous depressions, which seriously interfered with traffic. One of the accompanying pictures shows the condition of the old pavement in 1918, when the officials determined to rebuild, and after

pared to require a layer of concrete from 3 to 4 inches thick, reinforced and proportioned 1 part cement, 1½ parts washed sand and 2½ parts washed pebbles under 1¼ inches maximum size. All of the depressions in the old surface were first filled with concrete and brought to a fairly uniform grade. As it was thought necessary to provide an effective separation between the old and new pavements, the old surface was carefully cleaned, sprinkled with



Condition of the old pavement before work of renewing the surface with a layer of concrete was started. The shadow of the barricade on the left shows how the old pavement was worn into waves by traffic.

careful investigation decided to resurface with portland cement concrete.

With the methods used on the Grand River Road in Wayne County, Mich., in mind, the specifications for the resurfacing were pre-

pared to require a layer of concrete from 3 to 4 inches thick, reinforced and given while still wet a hot application of Tarvia "X C." The hot Tarvia immediately spread out in a very thin layer (just as oil spreads when poured on water), and then on cooling, hardened, forming a complete plane of separation

THE problem of resurfacing roads and streets, which have substantial foundations but worn-out surfaces, has long interested engineers and property owners. The resurfaced pavement described in this pamphlet points the way to a solution of such problems at moderate cost, and shows how the value in good foundations may be conserved, and a non-skid, rigid, concrete hard-surface provided for the exacting requirements of modern traffic.

TERRE HAUTE, IND.
March 26, 1926

Under my direction, as County Supt. of Roads, Vigo County, the portion of the county highway connecting with South Seventh Street in Terre Haute was resurfaced with concrete in 1918, the minimum depth of concrete being 3 inches and varied to as much as 4½ inches at places where the old bituminous pavement had settled.

This pavement is today in excellent condition and has carried through the past years an ever-increasing traffic. It is located on Indiana State Road, No. 10, which is a direct route from Chicago to the South. In addition to this through traffic there has ever been the local traffic which includes heavy trucking of coal, etc., into the city, this being the main gateway from the South.

This pavement today more than fulfills our expectations and except for occasional filling of joints there has been practically no maintenance on it.

(Signed) ERNEST ALTEKRUSE,
1911 S. 8th St.

Resurfacing An Old Pavement With Concrete

Data supplied through courtesy of Ernest Altekruze, County Superintendent of Roads, Vigo County, Terre Haute, Ind.



South Seventh Street Road, Terre Haute, Ind., showing condition of concrete resurfacing after 8 years' service.

This pamphlet with the title above was first printed in 1921. Many miles of old base have been resurfaced with concrete since that date. South Seventh Street in Terre Haute is giving the same good service in 1926 that it did in 1921.

Published by
Portland Cement Association

PAVE AHEAD

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Review Concrete Overlay Options

- **Two families of overlays, each with 3 options:**
- **Bonded Family-3 Options**
 - Bonded on asphalt
 - Bonded on composite
 - Bonded on concrete
 - Get support from existing pavement
- **Unbonded Family-3 Options**
 - Unbonded over asphalt
 - Unbonded over composite
 - Unbonded over concrete
 - Overlay acts as new, independent pavement

Bonded Overlay Option

(Preventive Maintenance/Minor Rehabilitation)

In general, bonded resurfacing is used to eliminate surface distress when the existing pavement is in good structural condition.

Bonding is essential, so thorough surface preparation is necessary before resurfacing.

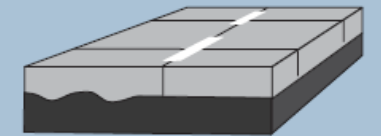
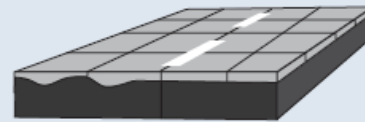
Unbonded Overlay Option

(Minor/Major Rehabilitation)

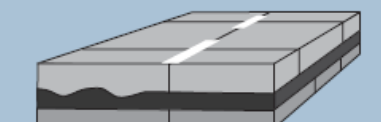
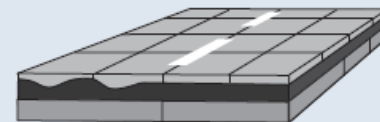
In general, unbonded resurfacing is highly reliable, with longer design life than rehabilitation with asphalt.

Minimal preresurfacing repairs are necessary for unbonded resurfacing.

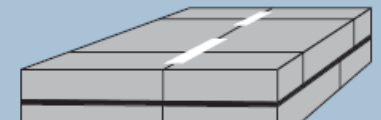
OVER ASPHALT



OVER COMPOSITE



OVER CONCRETE



Focus today and of the guide is...

- **Two families of overlays, each with 3 options:**
- **Bonded Family-3 Options**
- **Bonded on asphalt**
- Bonded on composite
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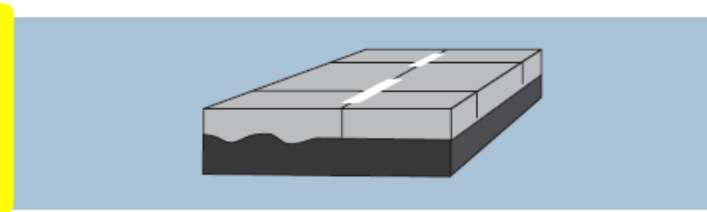
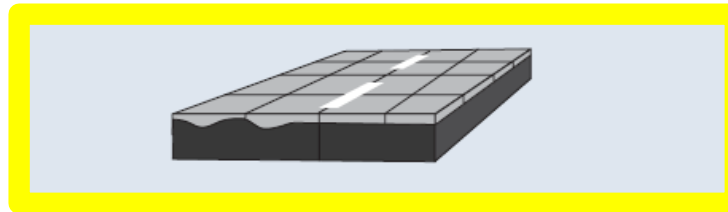
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(Minor/Major Rehabilitation)

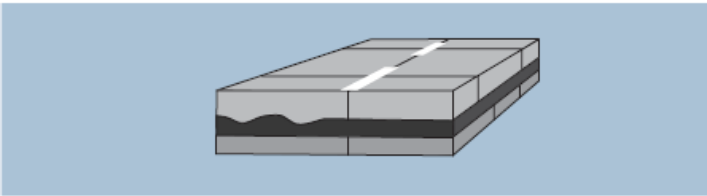
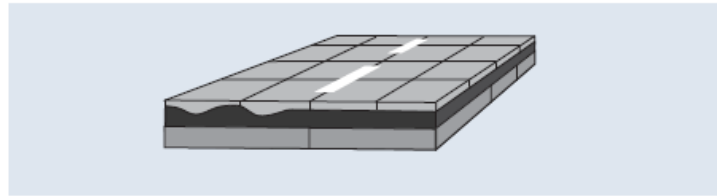
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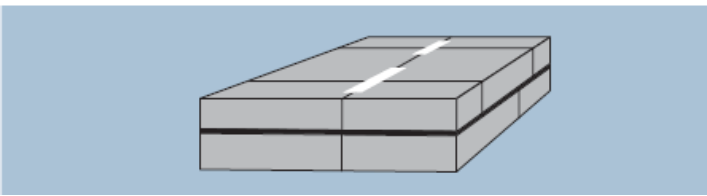
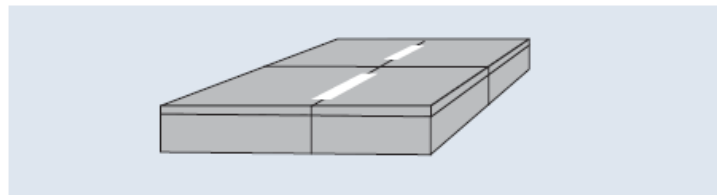
OVER ASPHALT



OVER COMPOSITE



OVER CONCRETE



Reference Material



Guide to

CONCRETE OVERLAYS

Sustainable Solutions for Resurfacing and Rehabilitating Existing Pavements



A practical approach to understanding and successfully using concrete overlays, from selection to opening

Second Edition September 2008



Guide to

CONCRETE OVERLAYS

of Asphalt Parking Lots



IOWA STATE UNIVERSITY
Institute for Transportation

September 2012



Guide to

CONCRETE OVERLAYS

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THIRD EDITION

May 2014



A practical approach to understanding and successfully using concrete overlays, from selection to opening




ACPA publication TB021.03P

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Additional Reference Material

TECHNICAL NOTE



BCOAME
University of Pittsburgh

Guidelines for Bonded Concrete Overlays of Asphalt:
Beginning with Project Selection and Ending with
Construction

Authors:
J. M. Vandenbossche
S. Sachs

August 2013

Bonded Concrete Overlays of Asphalt Pavements (BCOAME)

Understanding Concrete Overlays

ACPA WEBINAR- SEPTEMBER 4, 2014

Intersections



Rural secondary roads



Urban freeway/interstate



Urban arterial



Rural primary/interstate



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Who uses concrete overlays today?

- Federal Highway Administration (FHWA)
- Federal Aviation Administration (FAA)
- State DOT
- County DOT
- Cities
- Private Companies
 - Interstate Highway, Airport Runway, State Highway, Secondary Roads, Local Roads, Parking and Industrial Lots

Concrete overlays are a method to *resurface or rebuild* existing paving with these advantages.

- Renew the wear surface-black to white
 - Increase the load carrying capacity of the pavement by just adding concrete thickness
 - Improve lighting-reduce heat island
 - Eliminate perpetual asphalt maintenance
 - To give owners a *choice*
 - Proven alternative to full depth reconstruction
- ✓ Concrete overlays give support credit to the original construction for base and subgrade support of what is in place.

About the Course

Focus Today on the Learning Objectives

Learning Objectives

- Learn how to evaluate and assess an existing asphalt parking lot for a concrete overlay.
- Understand how to determine the thickness of concrete required to be placed over the asphalt.
- Learn the various construction techniques and how to determine the proper joint spacing.
- Discover which details and specification criteria are especially important for these projects.
 - **What can we do in an hour?**
 - **Steer you in the right direction of industry information.....**

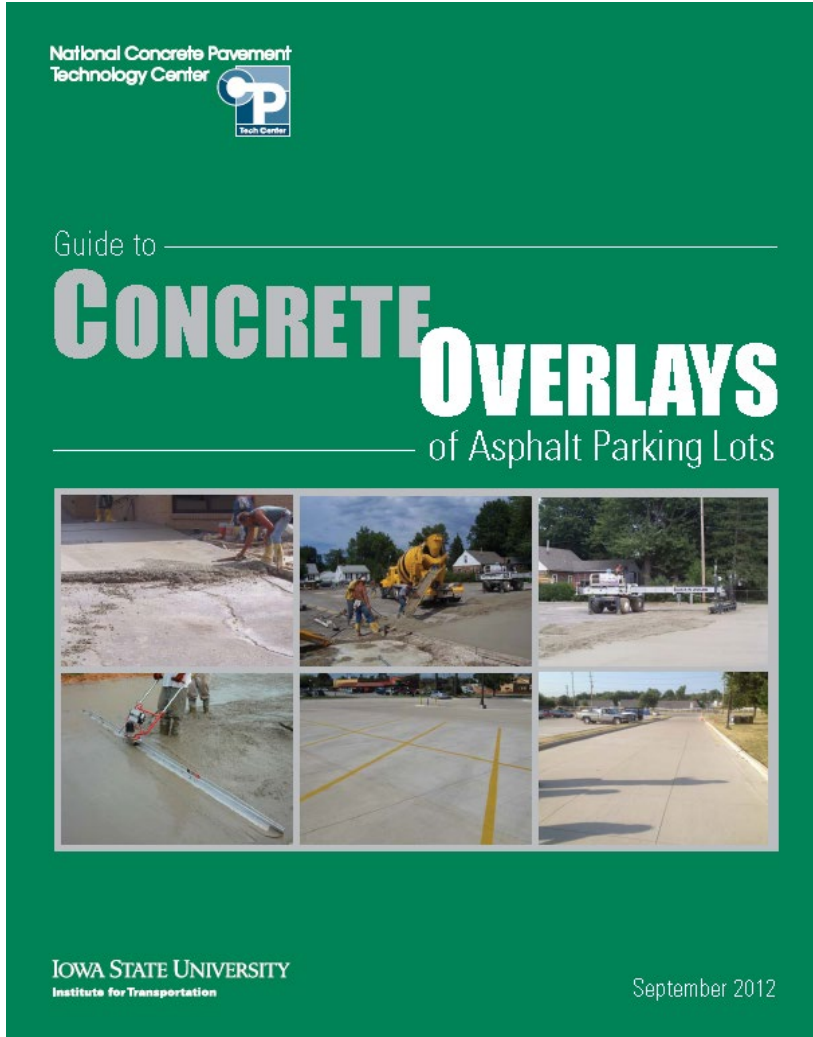


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Evaluating and assessing an existing asphalt parking lot for a concrete overlay... as per the Guide to Concrete Overlays of Asphalt Parking Lots



Investigation

1. Visual inspection-Walk Around

1. Elevations
2. Drainage
3. Working with fixed objects

2. Determining asphalt thickness

Core analyses

Pavement cores provide more details about the condition of the slab and subsurface. A 1-in. hammer drill can be used to quickly determine the depth of the existing asphalt in several locations and, together with visual inspection results, identify locations of potential subsurface problems where cores should be taken; see Figure 6.

Generally, 2-in. to 4-in. cores are taken from the asphalt and subbase, as shown in Figure 7. Note the lift layers in the asphalt.



Figure 6. Hammer drilling to check pavement thickness (Photo courtesy of David White, Iowa State University)



Figure 7. Typical core of asphalt parking lot with granular subbase

Cores can reveal the depth of distress(es), the pavement's support value, and the kinds/thicknesses/conditions of lift (or layer) materials. Cores that penetrate into the subgrade may show evidence of unstable conditions, such as the beginning of fine soil migration into open-graded subbase layers that can lead to plugging and instability. Cores also provide samples for further laboratory analyses if needed.

Support conditions—the ability of the subgrade/subbase to support loads uniformly through the pavement—affect both the design thickness of the concrete overlay and the overlay's performance; without uniform support, the life of the overlay will be diminished. It is important, therefore, to try to obtain cores that reveal the current condition of the subgrade/subbase support (relative bearing capacity) under the asphalt.

Without the detailed information provided by cores, problems can develop, such as those in Figure 8. According to the historical records, the existing asphalt in this parking lot was 6-in. thick. However, when 3 in. of the asphalt surface was milled off to accommodate a 3-in. concrete overlay, in some locations the granular subbase was exposed. After completion of the concrete overlay, those locations failed under the weight of trucks taking shortcuts through the parking area.



Figure 8. Failure of concrete overlay sections in locations where the existing asphalt pavement surface was entirely removed through milling because of lack of core information

Determining existing asphalt condition

- Photos to help identify current pavement condition

Alligator cracking



Figure 10a. Low- to medium-severity alligator cracking

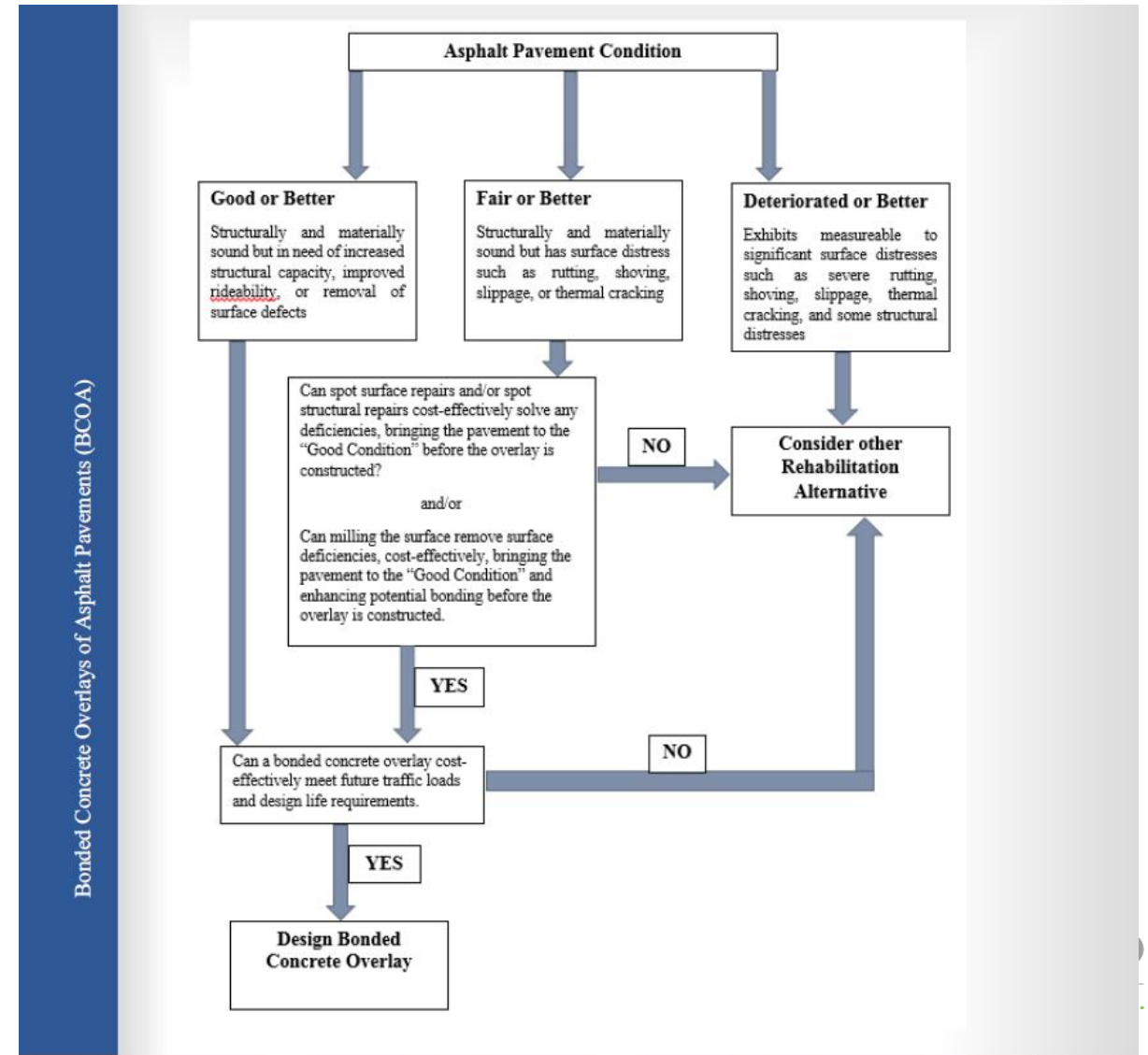
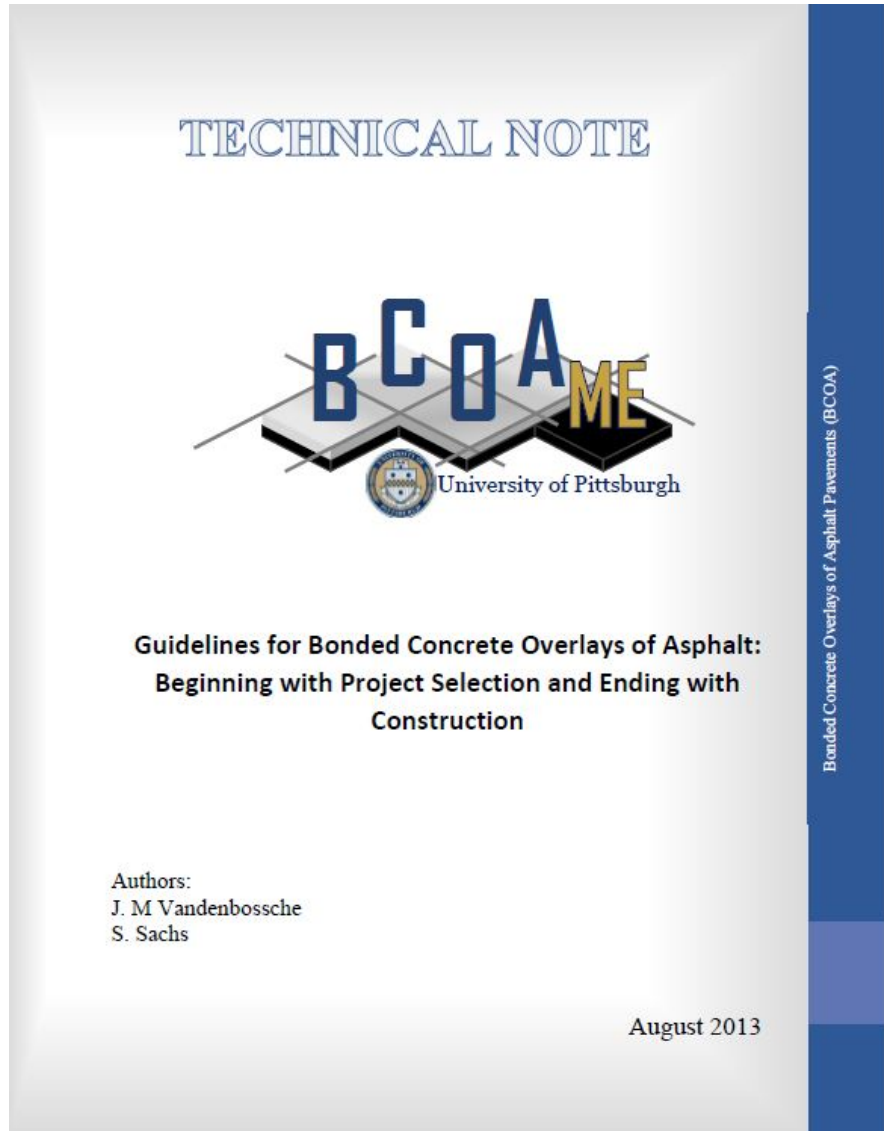


Figure 10b. High-severity alligator cracking

Table 2. Thumbnails of Asphalt Pavement Distresses

Low to medium severity	High severity	Low to medium severity	High severity
Alligator Cracking	Alligator Cracking	Thermal Cracking	Thermal Cracking
Block Cracking	Block Cracking	Random Cracking	Random Cracking
Potholes, Popouts	Potholes, Popouts	Access/Truck Lane Rutting	Access/Truck Lane Rutting
Raveling	Raveling	Access/Truck Lane Shoving (Slippage)	Access/Truck Lane Shoving (Slippage)

Evaluating and assessing an existing asphalt parking lot for a concrete overlay... as per the BCOA ME Technical Note



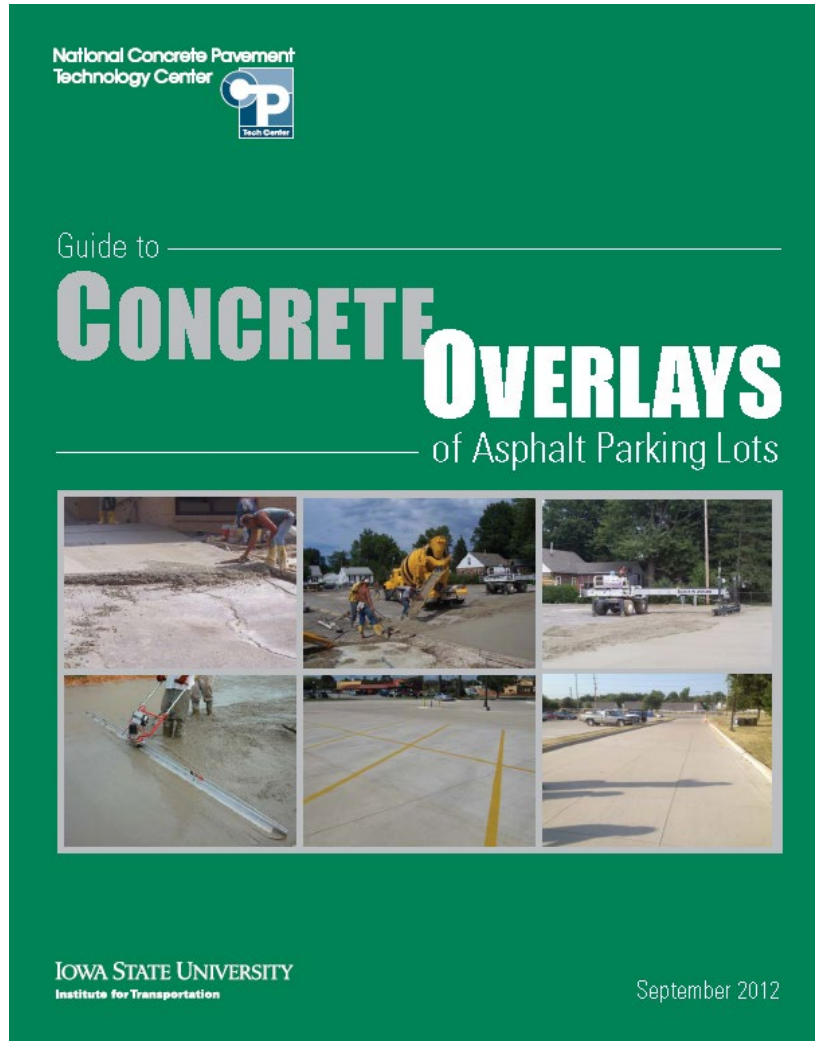
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Understand how to determine the thickness of concrete required to be placed over the asphalt ...

as per the Guide to Concrete Overlays of Asphalt Parking Lots (BCOA ME)



Concrete thickness charts on pages 23-25 based on:

- Existing asphalt thickness
- Concrete strength
- Joint spacing
- Inclusion of fibers

Charts for 3 zones of lot:

- Zone 1-Light Duty
- Zone 2-Medium Duty
- Zone 3-Heavy Duty

- ZONE 1 - PARKING LOTS
- ▨ ZONE 2 - ACCESS ROADS
- ZONE 3 - TRUCK LANES

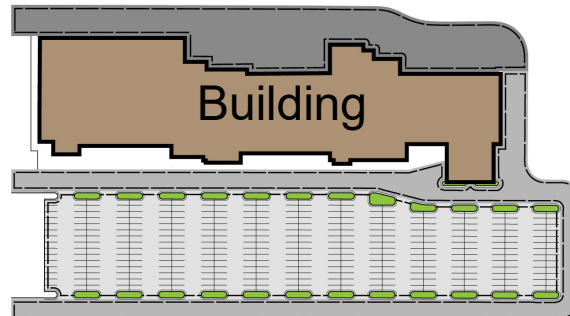
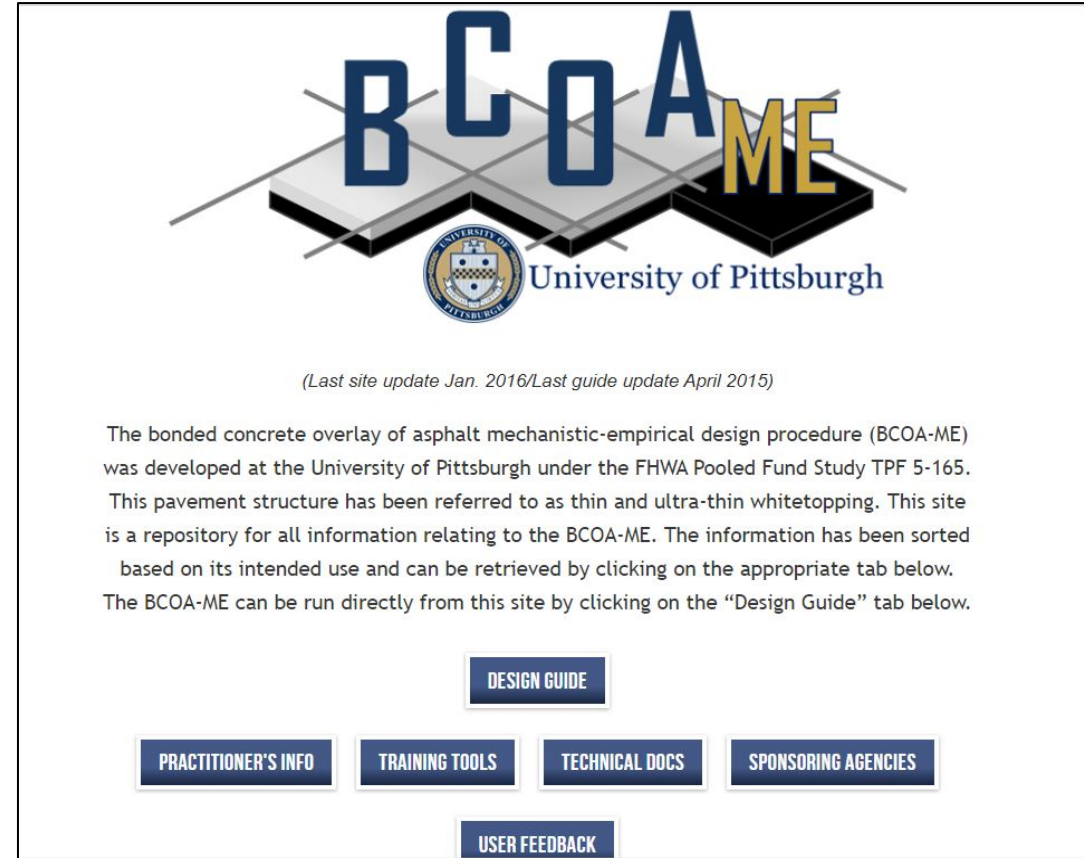
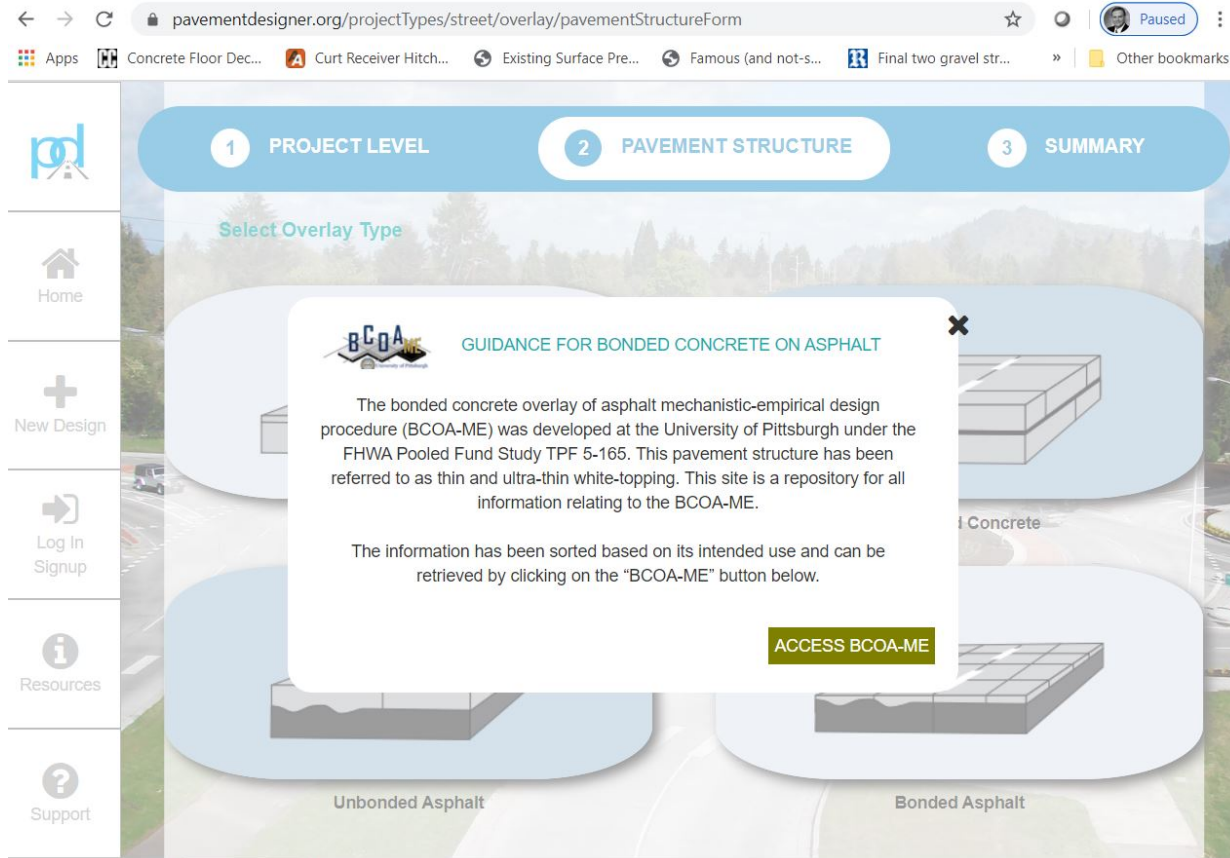


Table 6. Typical Bonded Concrete Overlay Thickness over Asphalt where Mean Annual Daily Temperatures are 45-50°F (e.g., Des Moines, IA)

Zone 1: Parking Lot Area (≤ 200 Light Vehicles/Day and ≤ 1 Truck (0.22 ESAL/truck)/Day)								
Existing Asphalt Thickness (in.)	Concrete Compressive Strength (psi) / Flexural Strength (psi) (third point)	4-ft Joint Spacing	5-ft Joint Spacing	6-ft Joint Spacing	4-ft Joint Spacing	5-ft Joint Spacing	6-ft Joint Spacing	
		Thickness (in.) (no fiber)			Thickness (in.) (with fiber)			
2.0	4,000 / 630	4.0	4.5	5.0	2.5	3.5	4.0	
2.0	4,500 / 670	4.0	4.5	4.5	2.0	3.5	4.0	
3.0	4,000 / 630	2.5	4.0	4.5	2.0	3.0	3.5	
3.0	4,500 / 670	2.5	4.0	4.5	2.0	3.0	3.5	
4.0	4,000 / 630	2.0	3.5	4.0	2.0	3.0	3.0	
4.0	4,500 / 670	2.0	3.5	4.0	2.0	3.0	3.0	
6.0	4,000 / 630	3.0	3.0	3.0	3.0	3.0	3.0	
6.0	4,500 / 670	3.0	3.0	3.0	3.0	3.0	3.0	
Zone 2: Access Road (≤ 1,000 Light Vehicles/Day and ≤ 10 Trucks (0.35 ESAL/truck)/Day)								
Existing Asphalt Thickness (in.)	Concrete Compressive Strength (psi) / Flexural Strength (psi) (third point)	4-ft Joint Spacing	5-ft Joint Spacing	6-ft Joint Spacing	4-ft Joint Spacing	5-ft Joint Spacing	6-ft Joint Spacing	
		Thickness (in.) (no fiber)			Thickness (in.) (with fiber)			
2.0	4,000 / 630	5.0	5.5	6.0	2.5	4.0	4.5	
2.0	4,500 / 670	4.5	5.0	5.5	2.5	4.0	4.5	
3.0	4,000 / 630	4.5	5.0	5.5	2.5	4.0	4.0	
3.0	4,500 / 670	4.0	4.5	5.0	2.0	3.5	4.0	
4.0	4,000 / 630	3.5	4.5	5.0	2.0	3.0	3.5	
4.0	4,500 / 670	2.5	4.0	4.5	2.0	3.0	3.5	
6.0	4,000 / 630	3.0*	3.0*	3.0*	3.0	3.0	3.0	
6.0	4,500 / 670	3.0*	3.0*	3.0*	3.0	3.0	3.0	
Zone 3: Truck Lane (≤ 1,000 Light Vehicles/Day and ≤ 25 Trucks (0.500 ESAL/truck)/Day)								
Existing Asphalt Thickness (in.)	Concrete Compressive Strength (psi) / Flexural Strength (psi) (third point)	4-ft Joint Spacing	5-ft Joint Spacing	6-ft Joint Spacing	4-ft Joint Spacing	5-ft Joint Spacing	6-ft Joint Spacing	
		Thickness (in.) (no fiber)			Thickness (in.) (with fiber)			
2.0	4,000 / 630	5.5	6.0	6.0	4.0	4.5	5.0	
2.0	4,500 / 670	5.0	5.5	6.0	4.0	4.0	4.5	
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3.0	4,500 / 670	4.5	5.0	6.0	3.5	4.0	4.0	
4.0	4,000 / 630	4.0	5.0	6.0	3.0	3.5	4.0	
4.0	4,500 / 670	4.0	4.5	5.0	3.0	3.0	3.5	
6.0	4,000 / 630	3.0*	3.0*	4.0	3.0	3.0	3.0	
6.0	4,500 / 670	3.0*	3.0*	3.0*	3.0	3.0	3.0	

Notes: k-value = 100 pci (or 100 psi/in.) (for the area below the existing asphalt and representing the composite value of the subgrade/subbase)
* = low-severity asphalt distress

Understand how to determine the thickness of concrete required to be placed over the asphalt ... as per the BCOA ME website via Pavement Designer.org



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Learn the various construction techniques and how to determine the proper joint spacing



Laser guided screed



Enough saws



Truss frame screed



Spinning roller screed

Learn the various construction techniques and how to determine the proper joint spacing



Hand placement half width

Slipform paver placement



Learn the various construction techniques and how to determine the proper joint spacing

“It is recommended that the length and width of joint squares in feet be limited to 1.5 times the overlay slab thickness in inches.”

(12-18x thickness range)

Page 27, Guide to Concrete Overlays-3rd Edition

Depth of cut: $T/3$ typ.

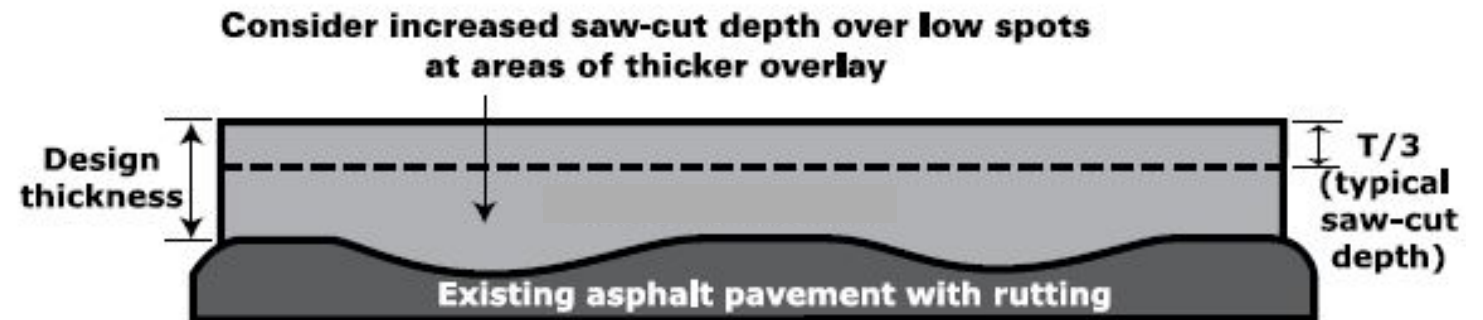


Figure 36. Consider asphalt rut depth when determining saw-cut depth (ACPA 1998)

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Discover which details and specification criteria are especially important for these projects.

Avoid placing concrete overlay on asphalt with visible/fresh sealcoat

If aggregate is not visible on the surface of the asphalt, abrade asphalt surface to remove sealcoat or wait until sealcoat wears/disappears with age.



Discover which details and specification criteria are especially important for these projects.

Asphalt surface must be clean and dry

A very simple field test to check for clean and dry is to place a 4 foot piece of duct tape on the surface of the asphalt, then pressing it down with your foot. If the tape sticks as you pull it off, the surface is clean and dry.



Discover which details and specification criteria are especially important for these projects.

Surface temperature should not exceed 120° F at time of placing concrete on top of asphalt

Measure surface temperature with an infrared temp gun. If temp exceeds 120° F, cool surface by fogging or delay paving until cooler time of day. DO NOT place concrete on saturated asphalt surface or ponded water.



Local Paving Division: State and Regional Assignments

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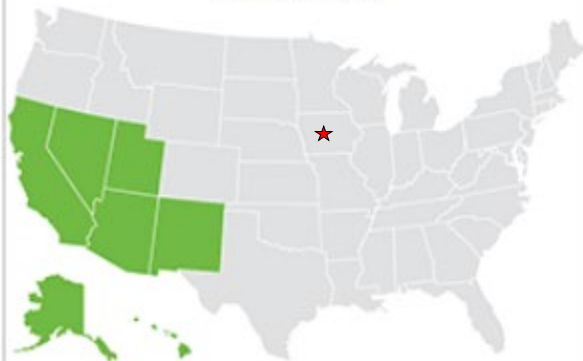
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- More **Concrete Pavement** professional development:
 - Designing Concrete Parking Lots and Streets
 - Designing Concrete Industrial Pavements
 - Soils 101: What to Know for a Successful Paving Project
 - Concrete Pavement Jointing and Details
 - Materials and Construction Specifications for Concrete Pavement Projects
 - Concrete Street and Parking Lot Maintenance and Repair
 - Concrete Overlays of Existing Asphalt Surfaced Streets and Parking Lots
 - Concrete Trail Design

Recordings available for all webinars!

- More **Concrete Pavement** professional development: Pervious Concrete
 - Designing Pervious Concrete
 - Specifying Pervious Concrete
 - Installing Pervious Concrete
 - Maintenance Guidelines for Pervious Concrete
- **Two Additional Concrete Paving Webinar**
 - Understanding the Guide to Concrete Overlays of Asphalt Parking Lots
 - Overview of the Guide to Concrete Trails
 - Partnering With Contractors & Engineers For Pursuit of Paving Projects

Concrete Webinar Series Recordings



Concrete Overlays of Existing Asphalt Surfaced Streets and Parking Lots

Questions.....

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