Asphalt Pavements - Your Best Value

ASPHALT PAVEMENT ASSOCIATION OF MICHIGAN

Uses for Asphalt

Highways

Intersections

Airports

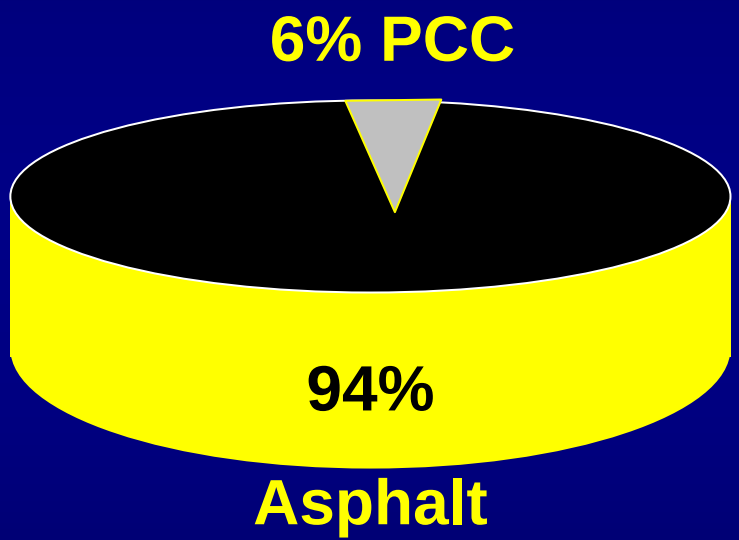
Recreational

Industrial

HMA – Your Best Value

SMOOTH | DURABLE | SAFE | QUIET

Paved Miles by Surface Type



There's a reason that

94%

of all paved surfaces are

ASPHALT!

Asphalt Pavements Are

- Smooth
- Quiet
- Economical
- Safe
- 100% recyclable
- Environmentally friendly
- Versatile
- State-of-the-art
- High-visibility markings
- Less user delay
- Easy to maintain at a high level of serviceability

Asphalt Pavements Are

SMOOTH

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Ride Quality

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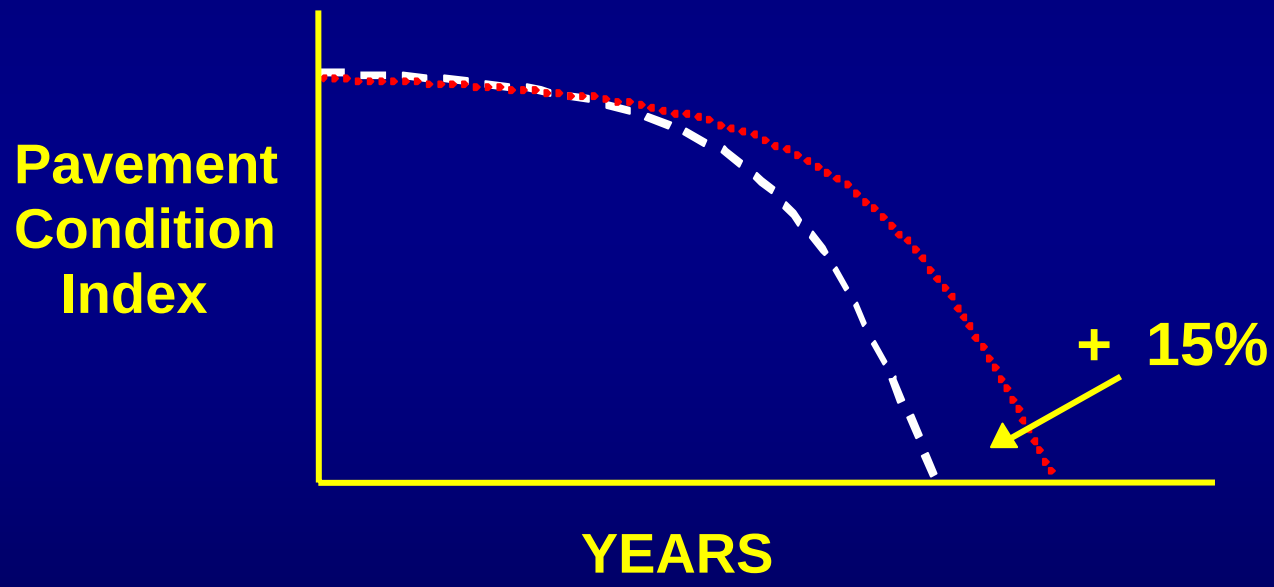
Asphalt Pavements are Smooth

The ability to pave uninterrupted and the absence of joints every 20 feet result in SMOOTH pavements

Pavement Condition Index

NCHRP 1-31 estimated 15% increase in pavement life for 50% increase in smoothness



Sheldon G. Hayes Award Winner

Smooth pavements, such as the recent Sheldon G. Hayes award winner last longer, are safe, save gasoline, decrease wear and tear on vehicles and are enjoyable to drive.

At WesTrack

The average IRI number decreased by 10%, resulting in a 4.5% increase in miles/gallon

Asphalt Pavements Are Safe

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SAFE

Asphalt Pavements are Skid Resistant

Inherently, some aggregates offer better skid resistance over a longer period of time. Asphalt pavements allow the specifying agency to choose a skid resistant aggregate based on traffic volume.

Asphalt Pavements

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Provide visibility of pavement markings

Asphalt Pavements Are

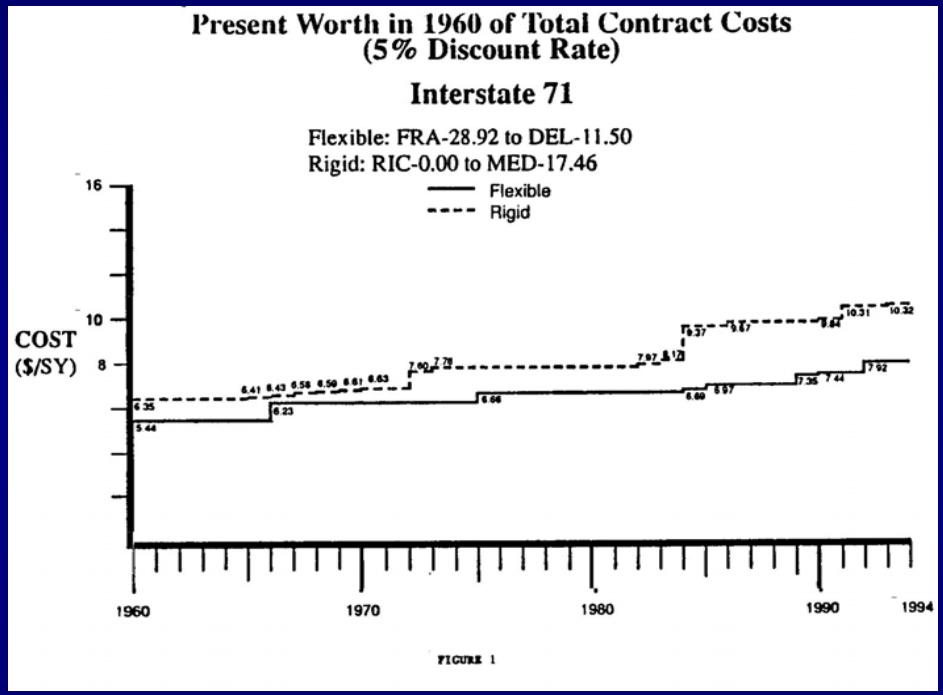
ECONOMICAL

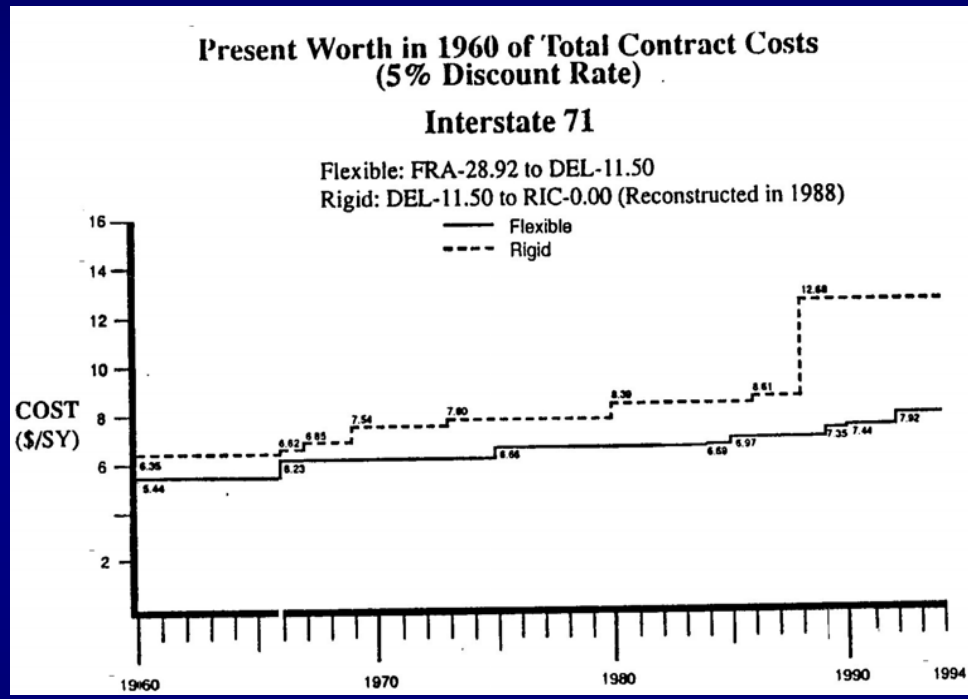
Asphalt Pavements are Economical

A review of Ohio's Interstate compared asphalt and pcc pavements ranging in age from 25 to 34 years old. The asphalt pavements were lower in initial costs with an ever widening gap throughout the life of the pavement.

An important note is the asphalt pavements have provided 25 to 34 years of service without the need for reconstruction or rehabilitation.

Ohio Compares HMA and PCC





HMA – Your Best Value

SMOOTH | DURABLE | SAFE | QUIET

Asphalt Pavements Are Economical

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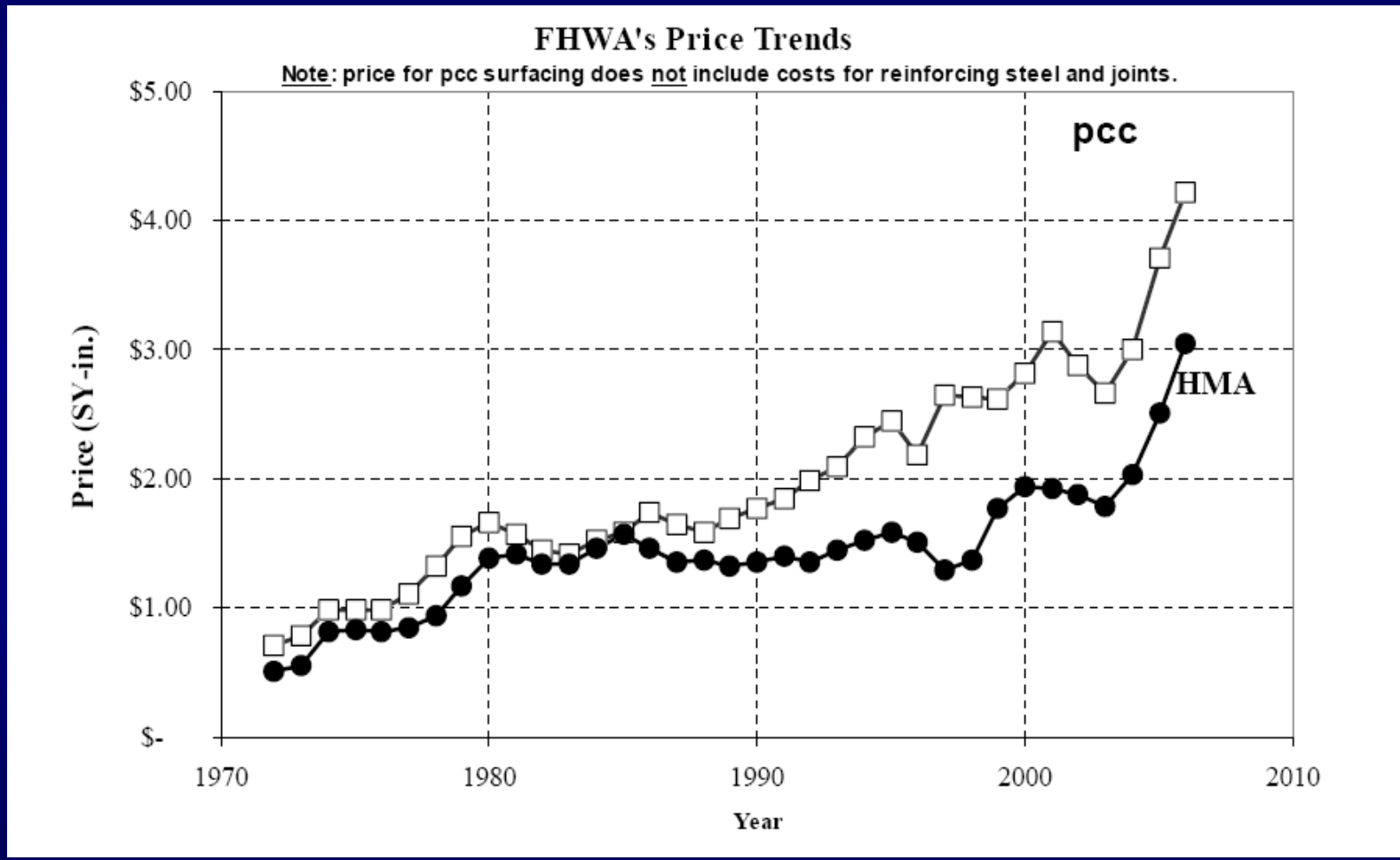
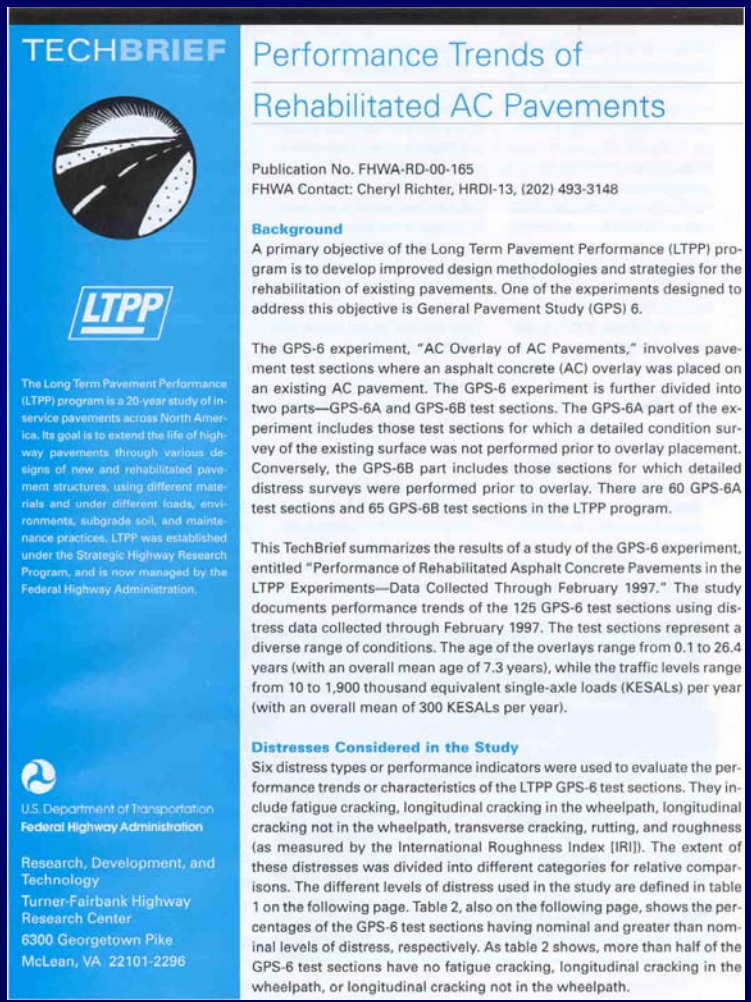


Source: FHWA Price Trends for Federal-Aid Highway Construction, Annual Average - 2006

HMA – Your Best Value

SMOOTH | DURABLE | SAFE | QUIET

Asphalt Pavements are Durable



TECHBRIEF

Performance Trends of Rehabilitated AC Pavements

Publication No. FHWA-RD-00-165
FHWA Contact: Cheryl Richter, HRDI-13, (202) 493-3148

Background

A primary objective of the Long Term Pavement Performance (LTPP) program is to develop improved design methodologies and strategies for the rehabilitation of existing pavements. One of the experiments designed to address this objective is General Pavement Study (GPS) 6.

The GPS-6 experiment, "AC Overlay of AC Pavements," involves pavement test sections where an asphalt concrete (AC) overlay was placed on an existing AC pavement. The GPS-6 experiment is further divided into two parts—GPS-6A and GPS-6B test sections. The GPS-6A part of the experiment includes those test sections for which a detailed condition survey of the existing surface was not performed prior to overlay placement. Conversely, the GPS-6B part includes those sections for which detailed distress surveys were performed prior to overlay. There are 60 GPS-6A test sections and 65 GPS-6B test sections in the LTPP program.

This TechBrief summarizes the results of a study of the GPS-6 experiment, entitled "Performance of Rehabilitated Asphalt Concrete Pavements in the LTPP Experiments—Data Collected Through February 1997." The study documents performance trends of the 125 GPS-6 test sections using distress data collected through February 1997. The test sections represent a diverse range of conditions. The age of the overlays range from 0.1 to 26.4 years (with an overall mean age of 7.3 years), while the traffic levels range from 10 to 1,900 thousand equivalent single-axle loads (KESALs) per year (with an overall mean of 300 KESALs per year).

Distresses Considered in the Study

Six distress types or performance indicators were used to evaluate the performance trends or characteristics of the LTPP GPS-6 test sections. They include fatigue cracking, longitudinal cracking in the wheelpath, longitudinal cracking not in the wheelpath, transverse cracking, rutting, and roughness (as measured by the International Roughness Index [IRI]). The extent of these distresses was divided into different categories for relative comparisons. The different levels of distress used in the study are defined in table 1 on the following page. Table 2, also on the following page, shows the percentages of the GPS-6 test sections having nominal and greater than nominal levels of distress, respectively. As table 2 shows, more than half of the GPS-6 test sections have no fatigue cracking, longitudinal cracking in the wheelpath, or longitudinal cracking not in the wheelpath.

LTPP

The Long Term Pavement Performance (LTPP) program is a 20-year study of in-service pavements across North America. Its goal is to extend the life of highway pavements through various designs of new and rehabilitated pavement structures, using different materials and under different loads, environments, subgrade soil, and maintenance practices. LTPP was established under the Strategic Highway Research Program, and is now managed by the Federal Highway Administration.

U.S. Department of Transportation
Federal Highway Administration

Research, Development, and Technology
Turner-Fairbank Highway Research Center
6300 Georgetown Pike
McLean, VA 22101-2296

"Clearly, the majority of the AC overlays included in the LTPP database have served for 15 years or more before the load related and non-load-related distresses became sufficient to require rehabilitation."

Asphalt Pavements Can Be

Constructed Quickly And Efficiently

Constructed Quickly and Efficiently

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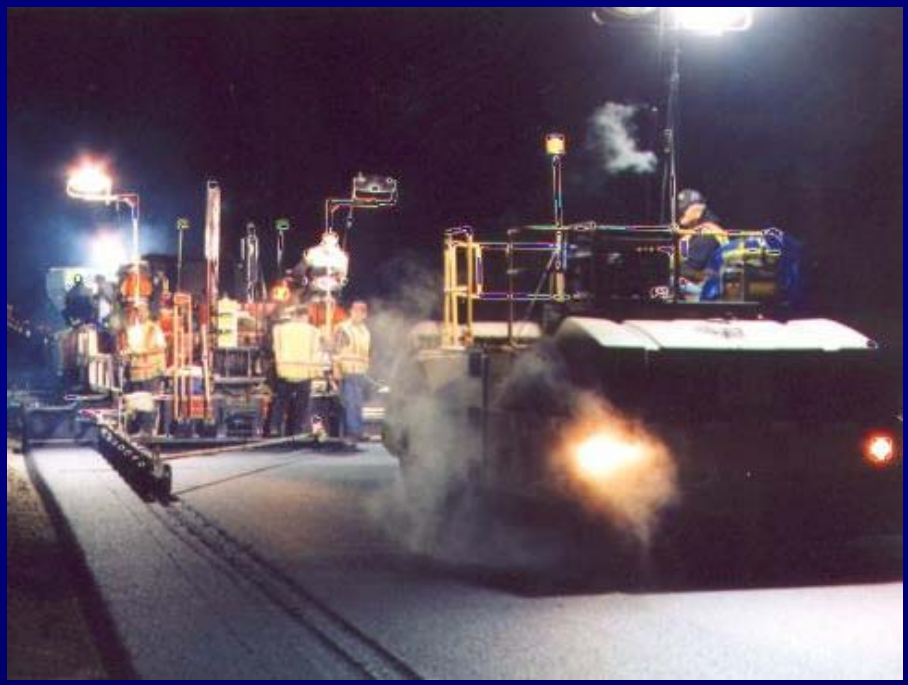
ASPHALT VS. CONCRETE



Constructed Quickly and Efficiently

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Arkansas Democrat-Gazette/RICK McFARLAND

With an 18-wheeler roaring past, a road crew with Southern Pavers of Pine Bluff works on laying a new concrete section in the left lane of Interstate 40 near Hazen on Tuesday. The approval of a $575 million bond issue will bring repairs and delays for motorists to interstates throughout the state.

Road work ahead — and so are barrels

Orange plastic drums can mean difference between life, death for highway crews

"As you travel, please be patient with the construction inconveniences they are forerunners of the better roads of tomorrow."
— Introduction in Arkansas highway map, 1957

BY NOEL E. OMAN
ARKANSAS DEMOCRAT-GAZETTE

To state and civic boosters, the orange barrels that line long segments of interstates in Arkansas can be signs of progress. To see them now is to see a better road later.

To motorists, they signal delay. The congestion, frustration and missed appointments they can portend belie the notion of the open road.

To Michael Offord, the 65-pound hollow, plastic drums represent the divide between life and death.

The 38-year-old Beebe resident is a highway construction worker. This summer, he spends long hours toiling within a few feet of many of the 30,000 cars and trucks racing past his work site on Interstate 40 near Carlisle each day.

Offord has been doing the work for two years. Before that, he was like anyone else on the other side of the orange divide: Why are the drums there, why so many?

"Now I know," Offord said one recent morning over the uninterrupted roar of traffic going past the work site of Southern Pavers of Pine Bluff. "It's kind of scary. You have to stay alert."

Thirty-two people were killed in 1997 in work zone related crashes in Arkansas, according to the National Highway Traffic Safety Administration. Nationwide, the death toll was 658 that year, the latest for which statistics are available. The 75,000 crashes reported nationally in traffic work zones

See **BARRELS,** Page 6A

Asphalt Can Reduce User Delay by 75%

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MDOT Hourly Distribution

Off-peak paving
(Urban Interstate)

12	- 1	**1.8**	12	- 13	6.2
1	- 2	**1.5**	13	- 14	6.7
2	- 3	**1.2**	14	- 15	8.0
3	- 4	**1.2**	15	- 16	8.4
4	- 5	**1.4**	16	- 17	8.4
5	- 6	**2.1**	17	- 18	5.8
6	- 7	3.6	18	- 19	4.8
7	- 8	3.7	19	- 20	**4.2**
8	- 9	4.1	20	- 21	**3.6**
9	- 10	4.6	21	- 22	**3.3**
10	- 11	4.9	22	- 23	**2.6**
11	- 12	5.8	23	- 24	**2.1**

25%

Can Reduce User Delay by 75%

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Ability to Mill and Pave in Off-Peak Hours

Asphalt Pavements are Quiet

NCHRP 268

Conclusions: **“In general, when dense-graded asphalt and PCC pavements are compared, the dense-graded is quieter by 2 to 3 dB(A)”**

A 3dB(A) reduction corresponds to:

- **doubling the distance (line source)**
- **reducing the traffic volume by 50%**
- **reducing the traffic speed by 25%**

Roads & Bridges – Jan. 1989

"Where traffic noise is just loud enough to justify building noise barriers to protect adjoining homes and businesses, the substitution of an open-graded wearing course can reduce the noise to an acceptable level. The cost is about **1/8 of a noise barrier** on one side of the highway, or **1/16 on both sides of the highway**. Not only does this technique **save tax dollars**, but the road is **environmentally** and **aesthetically superior**."

Asphalt Pavements Are

Environmentally Friendly

Environmentally Friendly

California has been specifying asphalt liners for water containment facilities since the 1950s

After 18 months in the asphalt-lined pond the salmon are released. In Oregon they have "had good results rearing quality fish in the asphalt-lined ponds"

Environmentally Friendly

Ludington Pumped Storage Facility

Porous asphalt Pavements

- Conserves water
- Allows for better use of land
- Reduces runoff
- Promotes infiltration
- Cleans stormwater
- Replenishes aquifers
- Protects streams

What are Porous Pavements?

Asphalt Pavement Association of Michigan

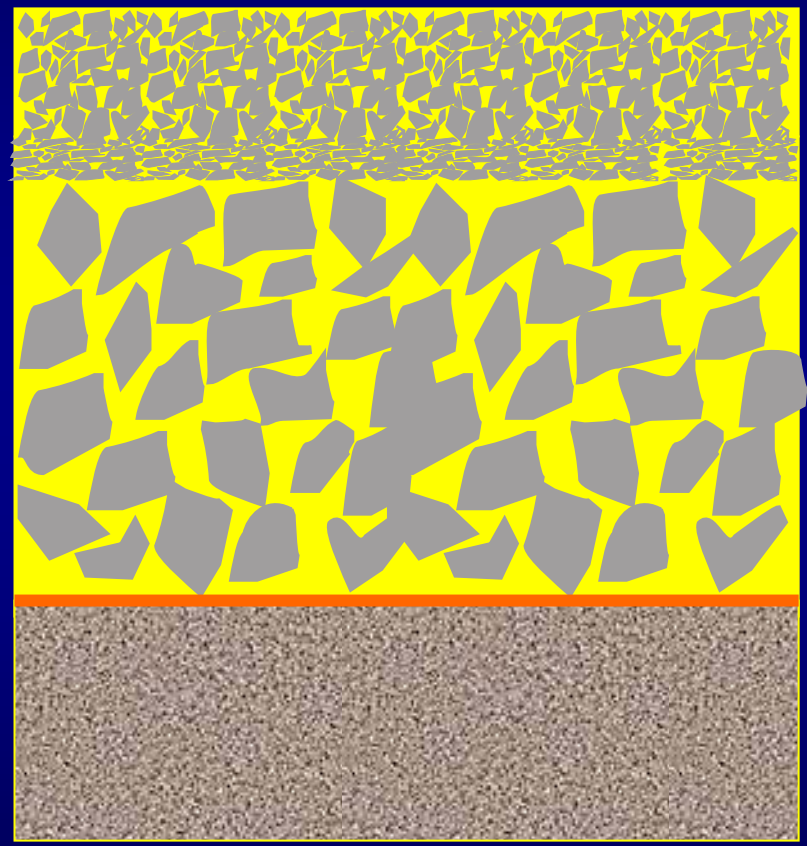
Open-Graded HMA ~ 2 ½”

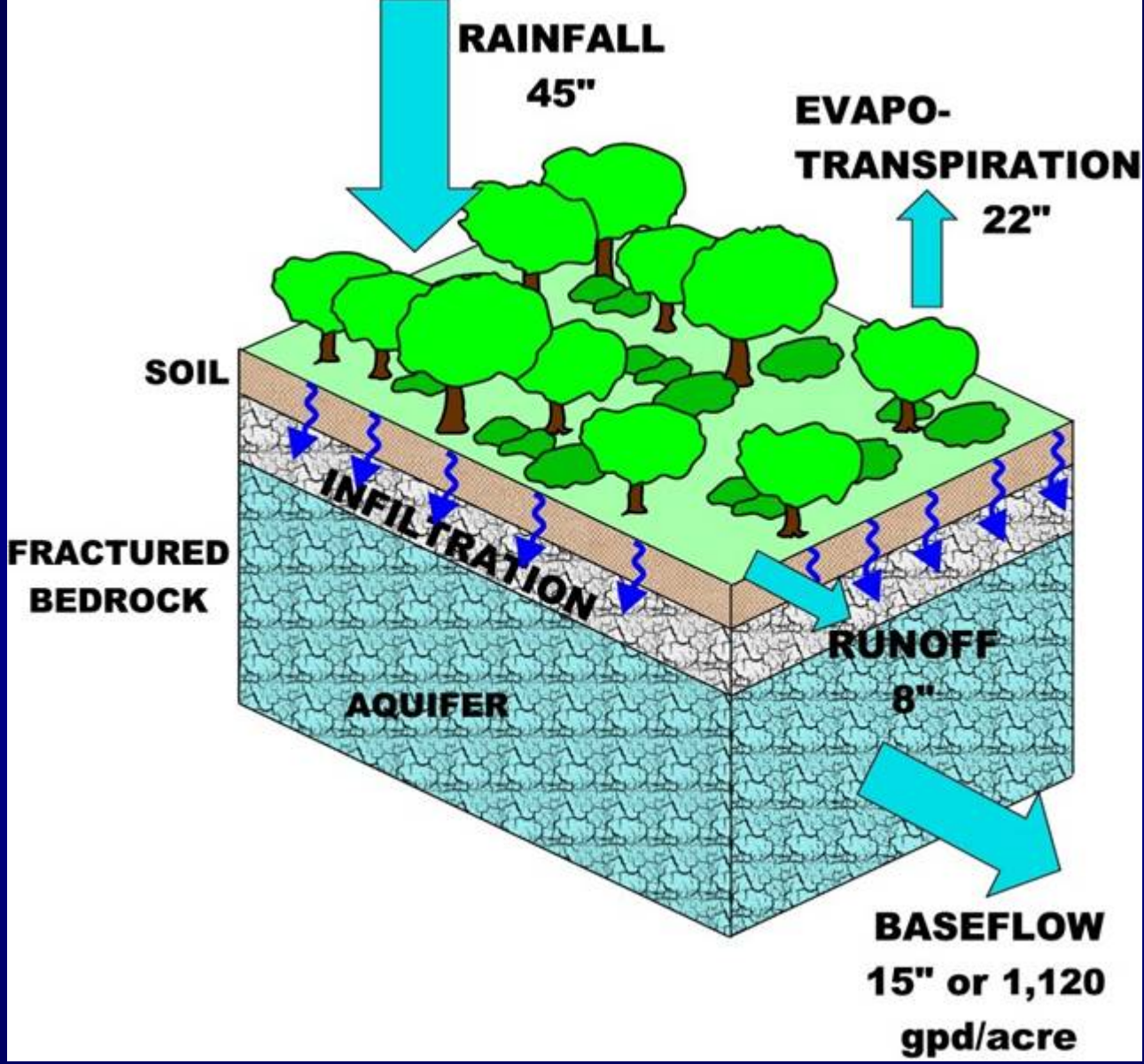
½” Agg. (#57) ~ 1 – 2” Thick

Clean Uniformly Graded 2”-3”
Crushed Agg. (#2) – 40% Voids

Non-Woven Geotextile

Uncompacted Subgrade





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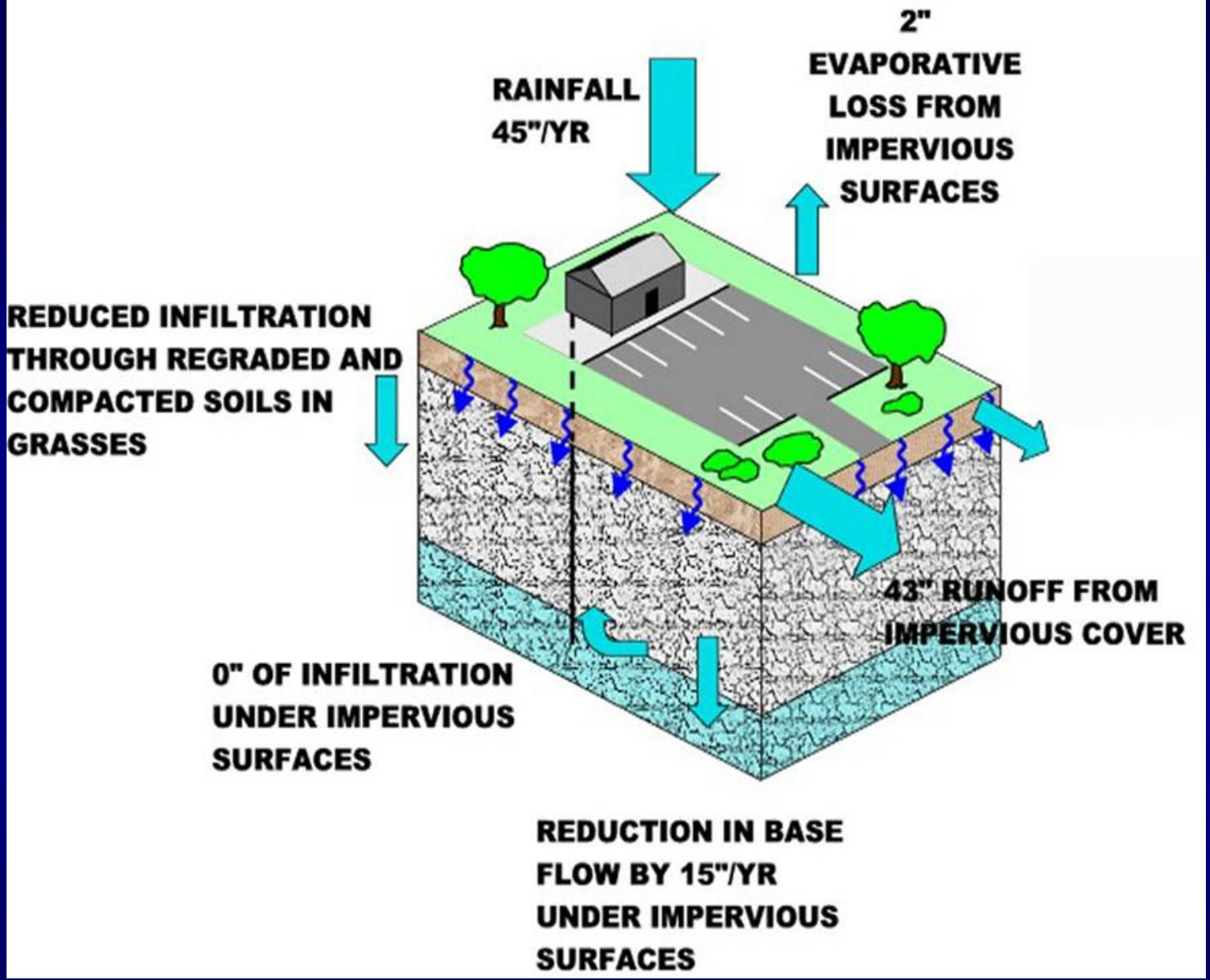

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Porous asphalt Pavements

HMA – Your Best Value

SMOOTH | DURABLE | SAFE | QUIET

Porous asphalt Pavements

Porous asphalt Pavements

Asphalt Pavements Are

100% Recyclable

100% Recyclable

Asphalt Pavements are 100% Recyclable AND the Surprise Leader in Recycled Materials

Recycling Rates

Asphalt pavement	80%
Aluminum cans	60%
Newsprint	56%
Plastic bottles	37%
Glass bottles	31%
Magazines	23%

100% Recyclable

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Recycling is unique to asphalt pavements.

- **Results in an economic savings**
- **Conserves natural resources:**
  - **energy**
  - **aggregate**
  - **asphalt cement**

Recycle (HMA) or Landfill (PCC)

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or

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Asphalt Pavements are State-of-the-Art

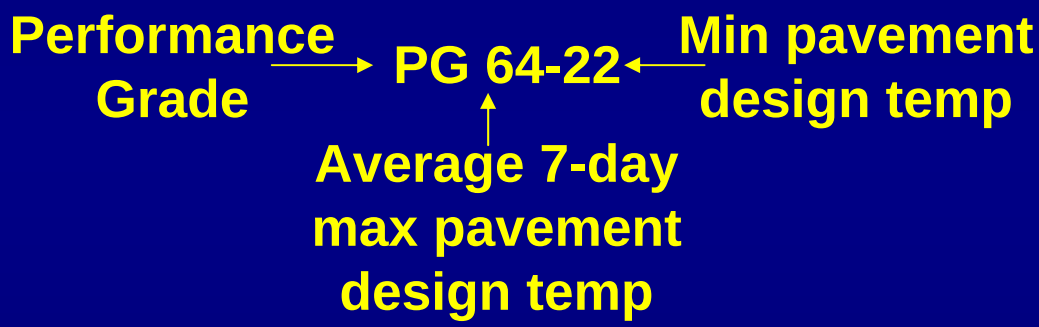
Strategic Highway Research Program

- 5 Years, $150 million
- asphalt ($50 million)
- cement and concrete
- long term pavement performance
- pavement effectiveness
- bridge protection
- snow and ice control

Superpave

SHRP Asphalt Binder Spec

- Grading System Based on Climate



Asphalt Pavements Are

State-of-the-Art

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HMA – Your Best Value

SMOOTH | DURABLE | SAFE | QUIET

Educational Opportunities

Left to Right: (Row 1) Roger W. Meier, Sang-Soo Kim, Youn-Hwa Choi, Jan Olek, Dorey Diab, Daniel J. Hazen, Joe Heflin (Row 2) Deren Yuan, Sanjaya Senadheera, Paresh Shettigar, Taher Abu-Lebdeh, Ronald M. Mauno, (Row 3) Horst Brandes, William B. Bruce, Thomas P. Van, David W. Washington, Emmanuel Owusu-Antwi, Lt. David P. Semnoski, JoAnne Nakamura, Athar Saeed, Gary Gowda, (Row 4) Robert Y. Liang, Walid Nassar, Hossam Farouk Hassan, Mary Stroup-Gardiner, Doug Hanson, John Zaniewski
NOT PICTURED: E.R. Brown, Ken Kandhal

University Professor Training

Technician Training

Funding for Research

NATC

NCAT Test Track

Asphalt Pavements Are

Versatile

HMA – Your Best Value

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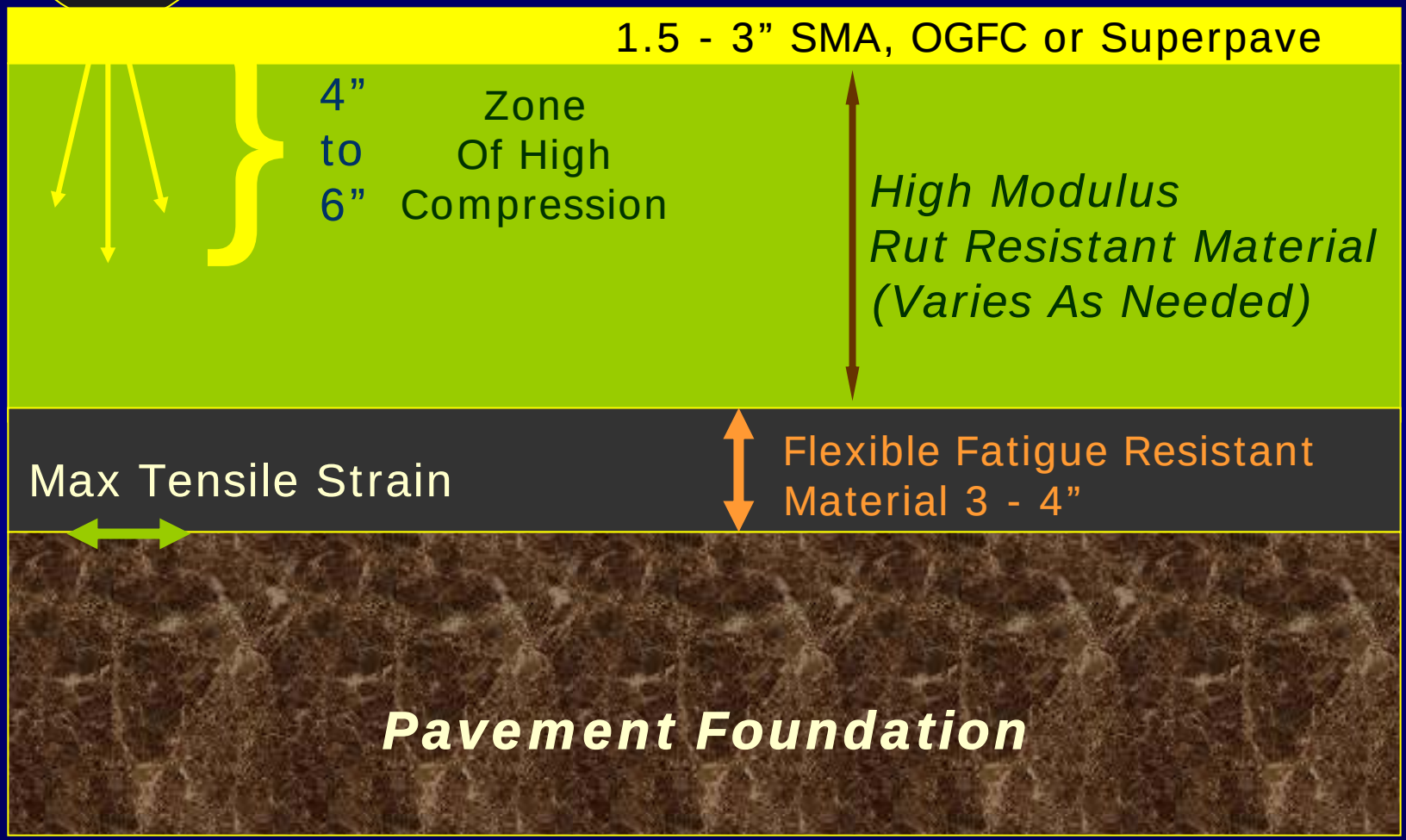
Perpetual Pavement

- Not a new concept
  - Full-Depth
  - Deep Strength
  - Mill & Fill

Perpetual Pavement



Perpetual Pavement

- Bottom-up Design and Construction
- Foundation
  - **Stable Paving Platform**
  - **Minimize Seasonal Variability and Volume Change in Service**
- Fatigue Resistant Lower Asphalt Layer
- Rut Resistant Upper Asphalt Layers

Perpetual Pavement

Possible Distresses

- *Top-Down Fatigue*
- *Thermal Cracking*
- *Raveling*

Solutions

- *Mill & Fill*
- *Thin Overlay*

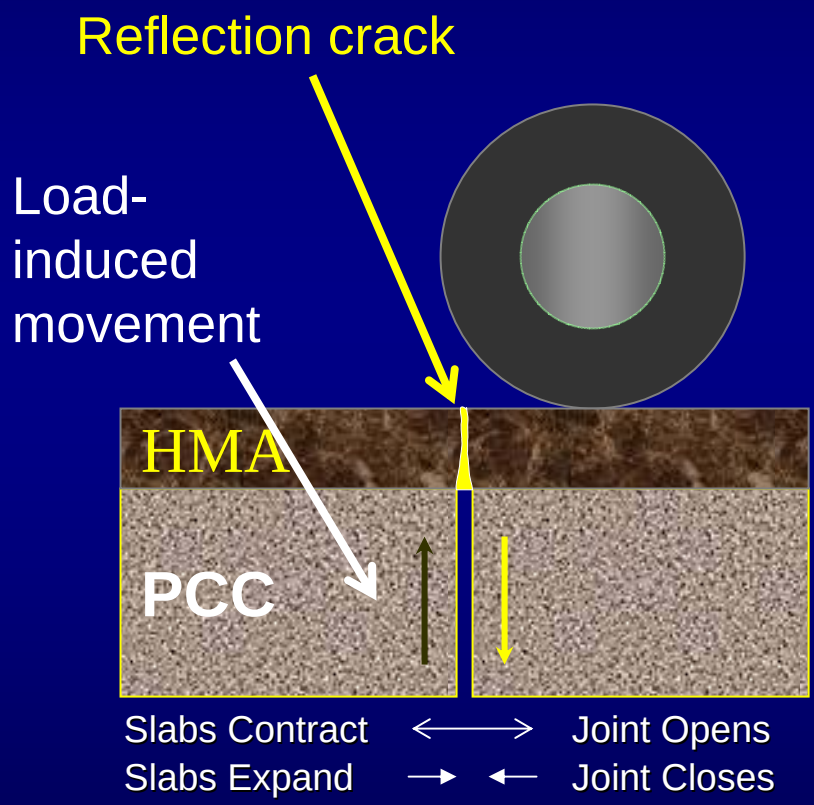
Rubblize PCC Pavement

Ability to Rubblize worn out pcc pavements and rehabilitate quickly and efficiently with hot mix asphalt.

Rubblize PCC Pavement

Reflection Cracking

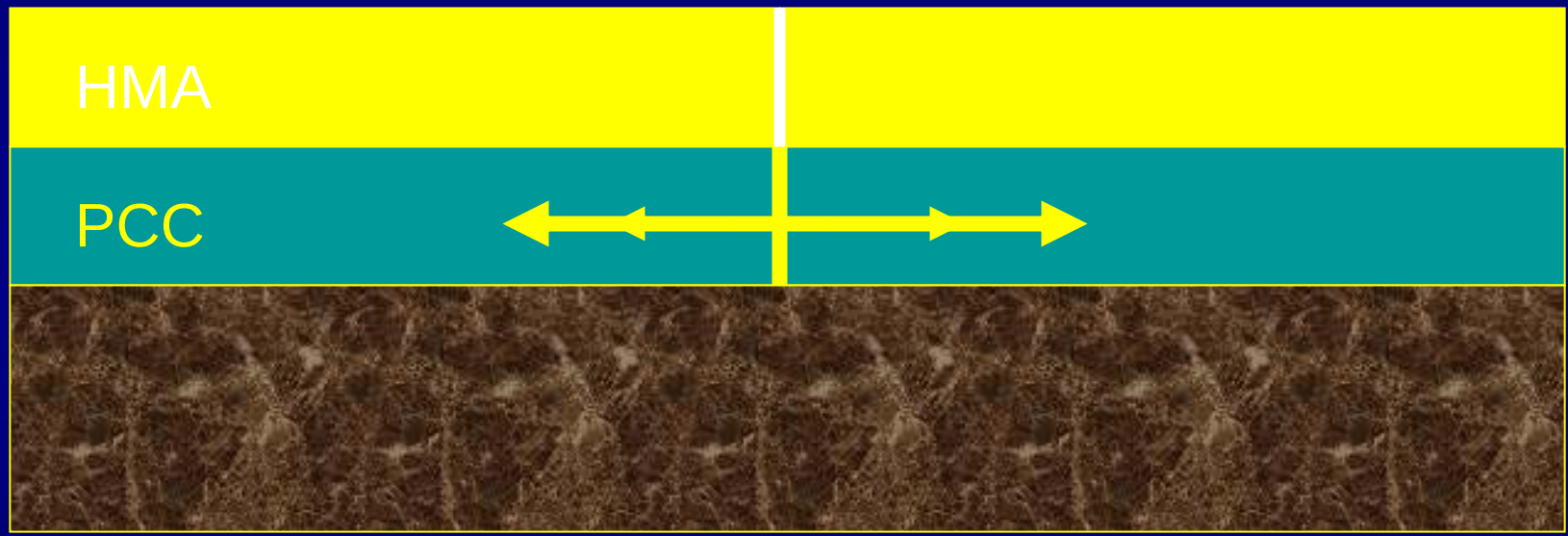
- By far, the biggest problem in HMA overlays of PCC pavement
- Caused by movement at PCC joints and cracks



Rubblize PCC Pavement

Asphalt Pavement Association of Michigan

Larger Pieces = Larger Movement = Cracking



Rubblize PCC Pavement

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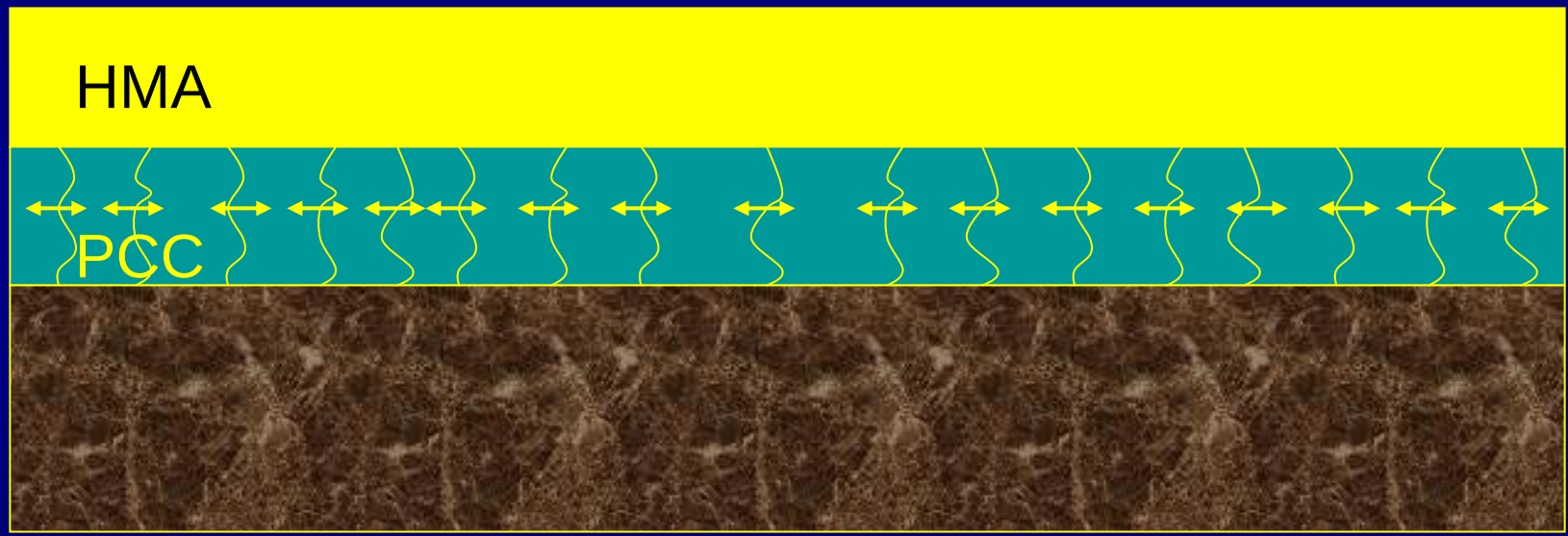
Smaller Pieces = Smaller Movement = No Cracking



HMA Ultra-Thin

High Value Pavement Enhancement

HMA – Your Best Value

SMOOTH | DURABLE | SAFE | QUIET

HMA Ultra-Thin

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HMA – Your Best Value

SMOOTH | DURABLE | SAFE | QUIET

HMA Ultra-Thin

HMA Ultra-Thin

HMA – Your Best Value

SMOOTH | DURABLE | SAFE | QUIET

HMA Ultra-Thin

Fancher Street, Mt. Pleasant – 6 years old

HMA Ultra-Thin

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Preventive Maintenance Treatment Cost Comparison

Treatment	$/syd	Cost/mile (24' wide)	MDOT Life extension range (years)	MDOT Life extension range average (years	Cost/mile* per year
Double chip seal	$2.35	$33,088	3-6	4.5	$7,353
Micro-surface	$2.35	$33,088	3-5	4	$8,272
Ultra-thin low	$2.27	$31,962	5-9	7	**$4,566**
Ultra-thin med	$2.39	$33,651	5-9	7	**$4,807**
Ultra-thin high	$2.82	$39,706	5-9	7	**$5,672**

Average Life Extension estimated by APAM
Unit Prices based on MDOT Information

HMA Ultra-Thin

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HMA – Your Best Value

SMOOTH | DURABLE | SAFE | QUIET

Asphalt Pavements

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Allow for
stage
construction

Asphalt Pavements Are

Easy to Maintain at a High Level of Serviceability

Asphalt Pavements Are

Asphalt Pavement Association of Michigan

Convenient when making utility cut repairs

Asphalt Pavements Are

Architect Friendly

Historical areas, cross-walks, driveways, etc. have the option to choose a variety of brick patterns in varying colors

Asphalt Pavements Are

BEAUTIFUL !


No wonder
94 times out of 100
"Your Best Value is
Hot Mix Asphalt"
Thank You!
Asphalt
Pavement
Association
of
Michigan