The Asphalt Advantage

Special Presentation for:
The Asphalt Pavement Association of Michigan
56th Annual Asphalt Paving Conference
March 20-21, 2012

Mike Kvach

Executive Director

Asphalt Pavement Alliance

AMERICA RIDES ON US Asphalt.

Asphalt Mix

REVOLUTION!

AMERICA RIDES ON US

Asphalt.

Asphalt Mix Revolution

- Gyratory Mix Design
- Performance Grade Binders
- Quality Crushed Aggregates
- QC/QA Program

Superior Performing Pavements !

Gyratory Mix Design

Gyratory Mix Design

Marshall Hammer

Gyratory Compactor

Advanced Testing Equipment

Superpave Shear Tester

Thermal Stress Tester

Hamburg Wheel Tracking Device

Performance Grade Binders

PG 58 -28 or PG 64 -22

Designed for extreme HOT and extreme COLD situations
Latitude Specific!

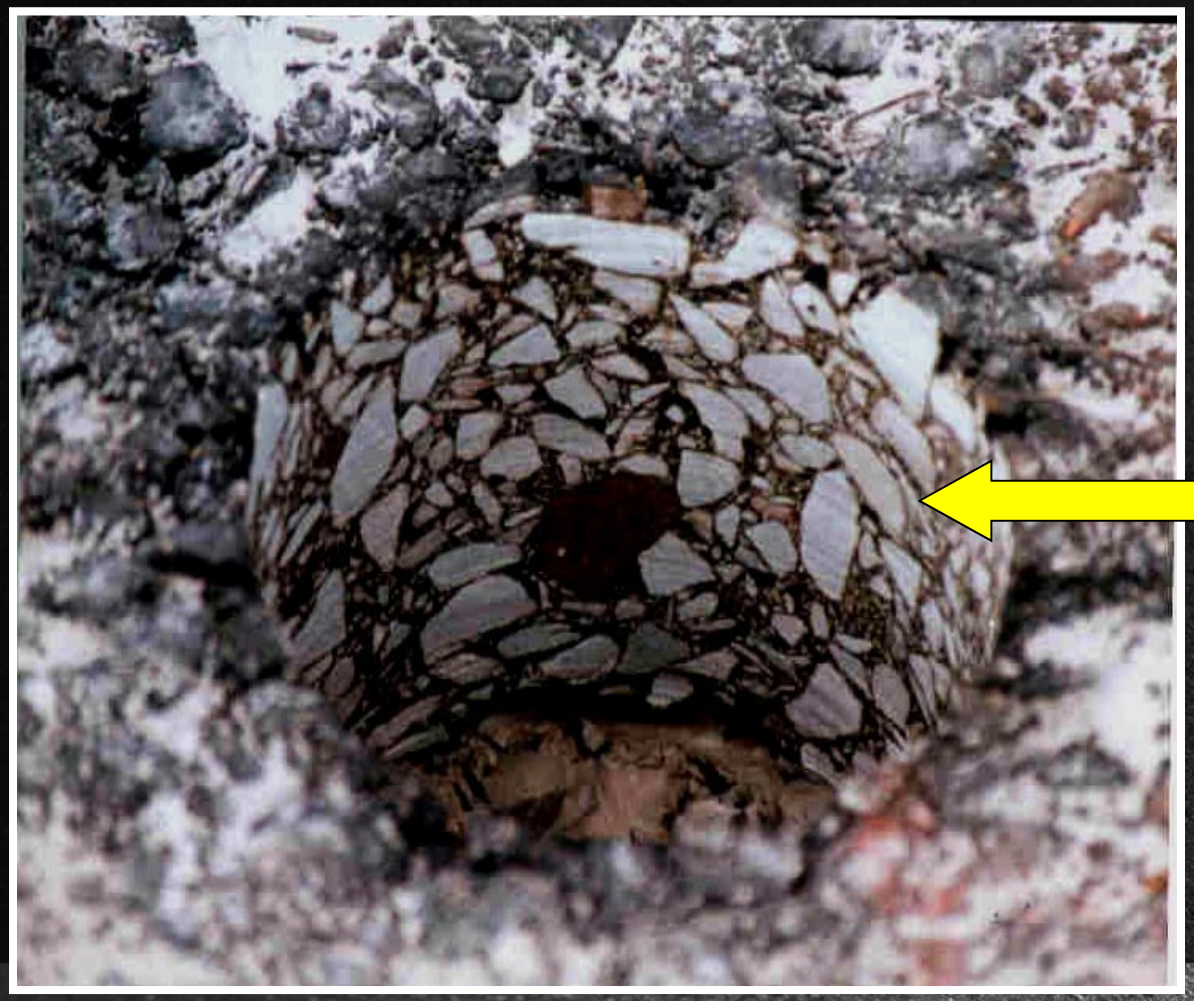
Quality Crushed Aggregate

AMERICA RIDES ON US

Asphalt.

Quality Crushed Aggregates

Quality Crushed Aggregates



Aggregate interlock

Quality Control / Quality Assurance

Environmental & Economic Sustainability

National Impact

- 2.6 Million Miles of Paved Roadway
  - 94% Paved with Asphalt
- 85% of the Nation's Airfields
- 85% of the Parking Lots
- Approx. 4,000 Asphalt Plants

How green are Asphalt Pavements?

EPA Delisting of HMA Plants

"…no HMA plant has potential to be a major source of hazardous air pollutants."

1970 – 1999:

- Total Emissions Reduced 97%

- Production Increased 250%

Warm-Mix Asphalt

- Reduced Mixing temperatures (50º-100º F)

Temp = 320º F

Temp = 245º F

Warm-Mix Asphalt

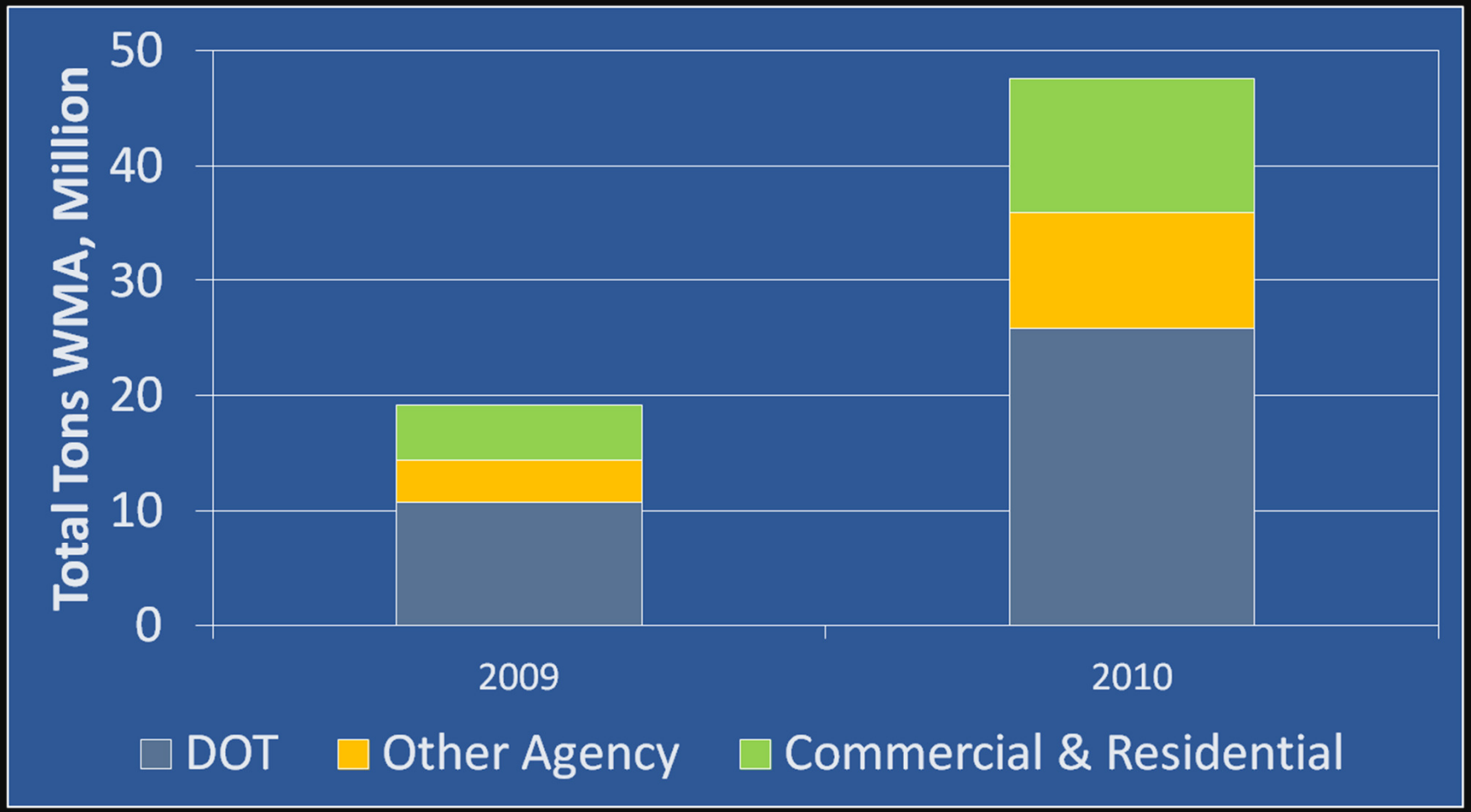
- Minimizing Absorption

2nd International Conference on Warm-Mix Asphalt

AMERICA RIDES ON US

Asphalt.

Estimated Total Tons WMA



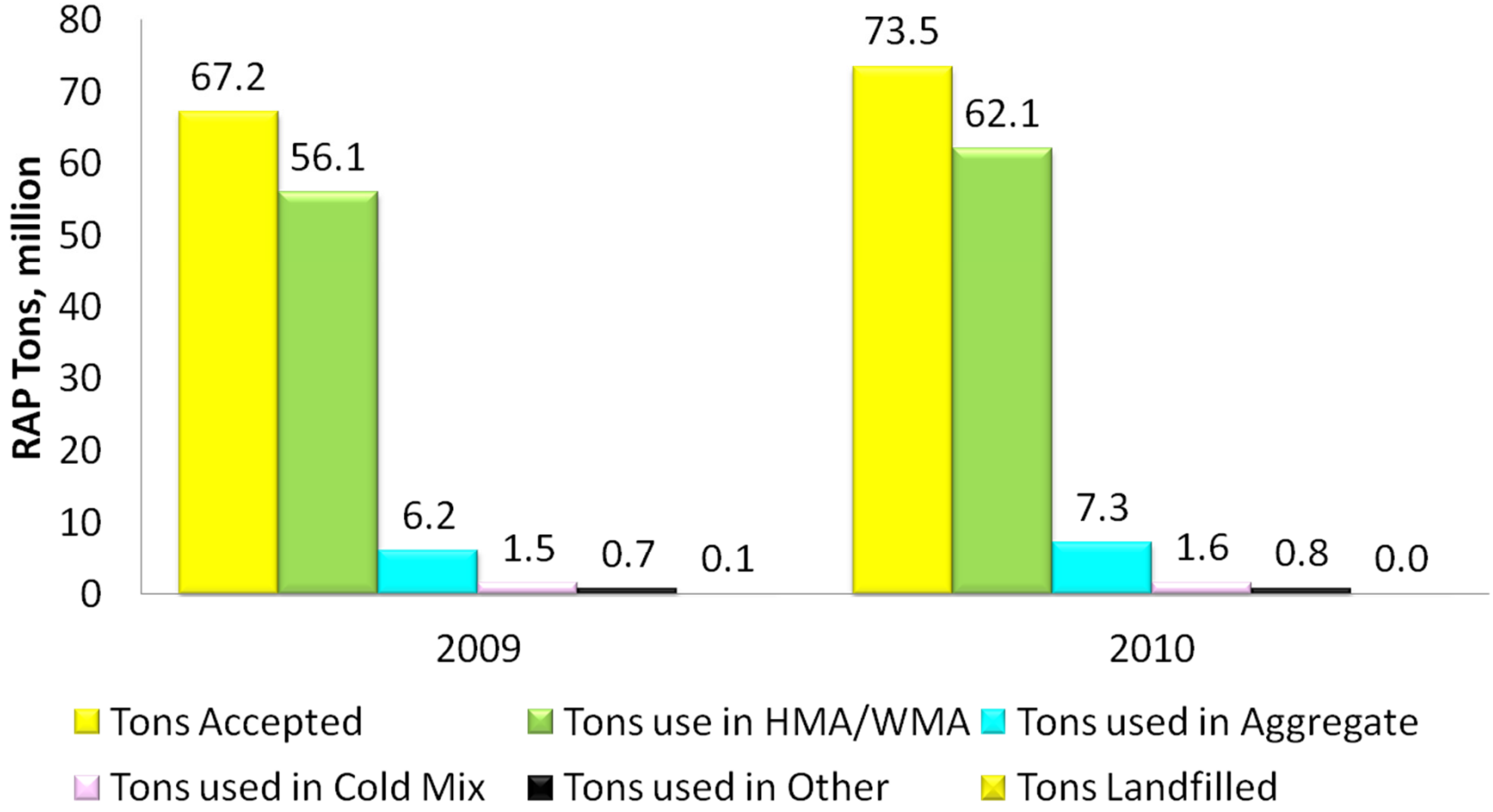
Use of Reclaimed Materials

- Reclaimed Asphalt Pavement (RAP)
- Asphalt Roofing Shingles (RAS)
- Crumb / Tire Rubber
- Glass
- Slag
- Foundry Sand

Reclaimed Asphalt Pavement

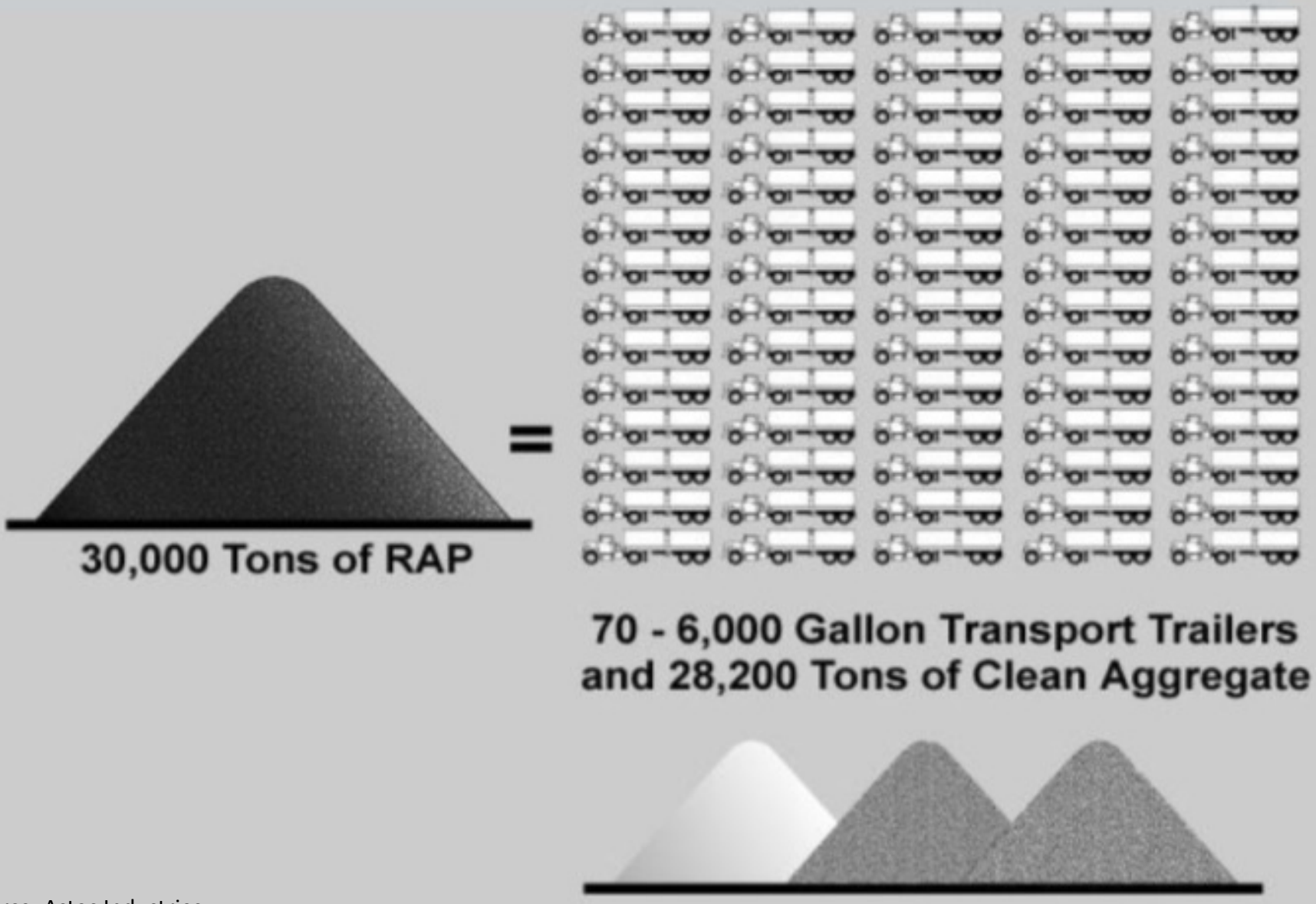
RAP

Estimated Total Reclaimed Asphalt Pavement



Recycling of Asphalt Pavement

Recycling 100% Asphalt Pavement



Source: Astec Industries

Recycling of Asphalt Pavement

- Significant Reduction in Greenhouse Gas Emissions
- Recently average ~18% nationwide.
- Increased to 25% = 10% reduction in GHG.
  (= 2,000,000 Tons Annually!)

Environmentally Sound

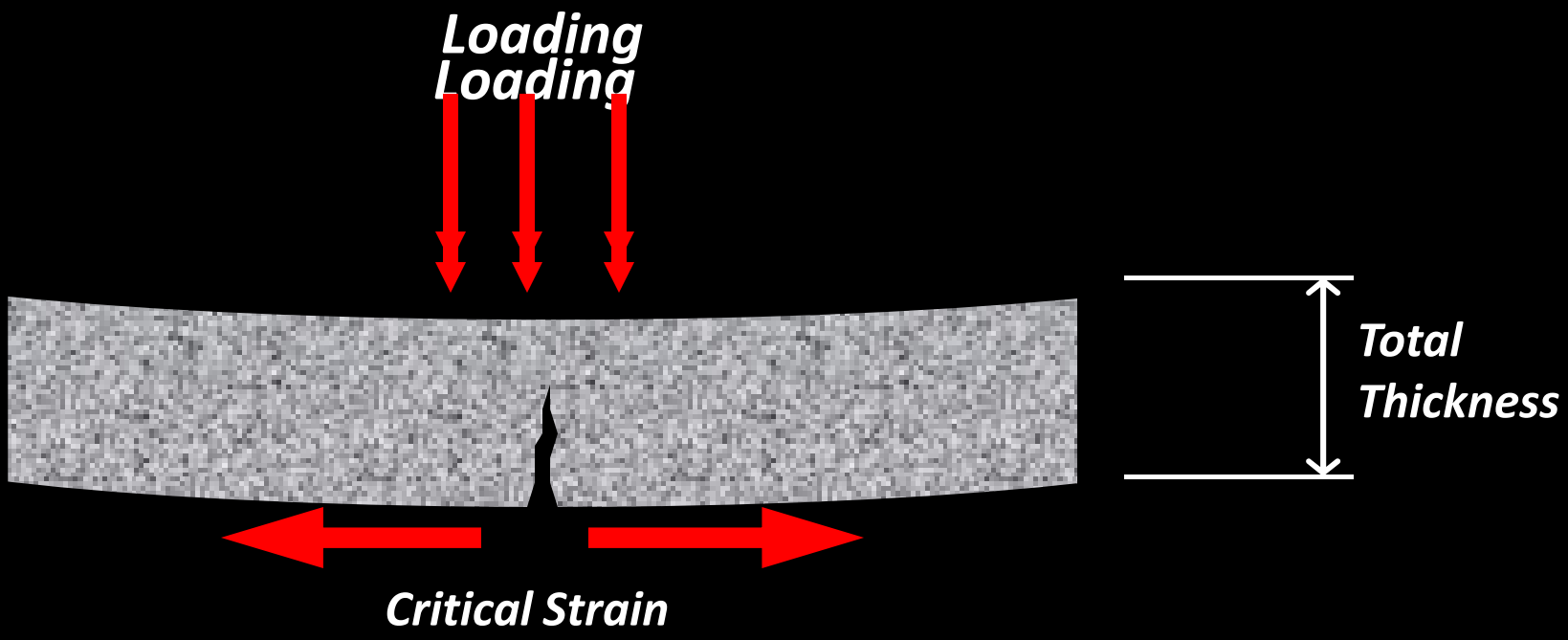
California has been specifying asphalt liners for water containment facilities since the 1950s

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”

Pavements That Last A Lifetime!

- I-80 in Iowa
- Built 1964
- Still in use today

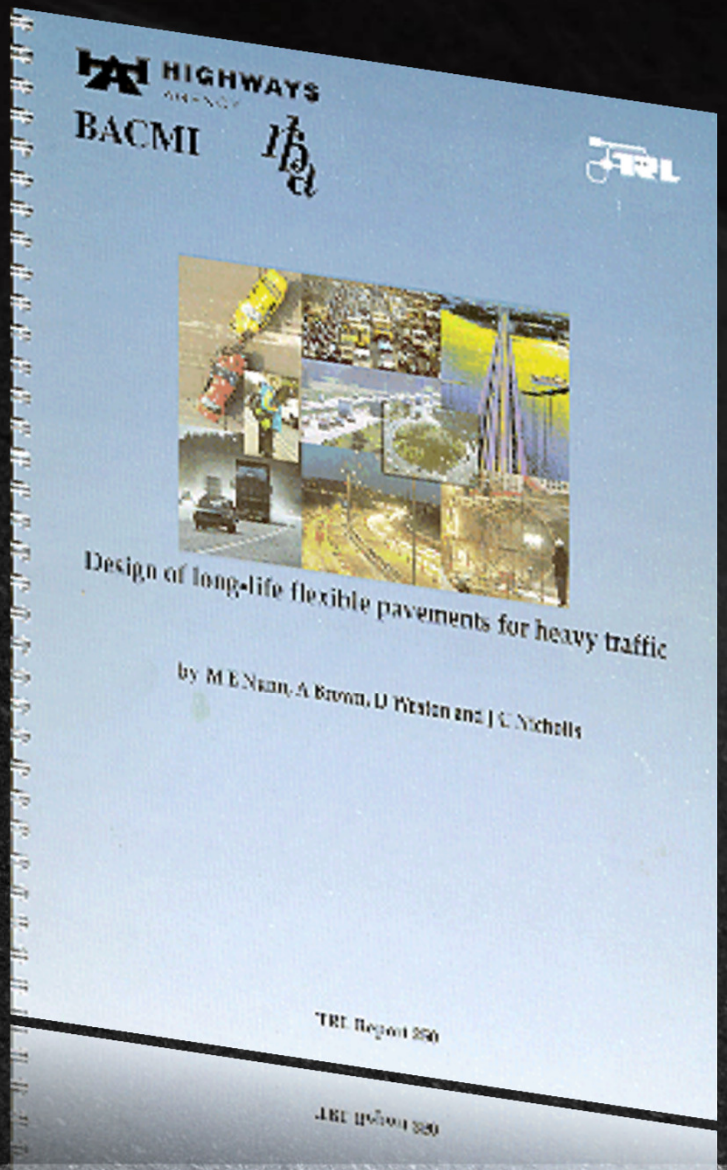
Pavements That Last A Lifetime!



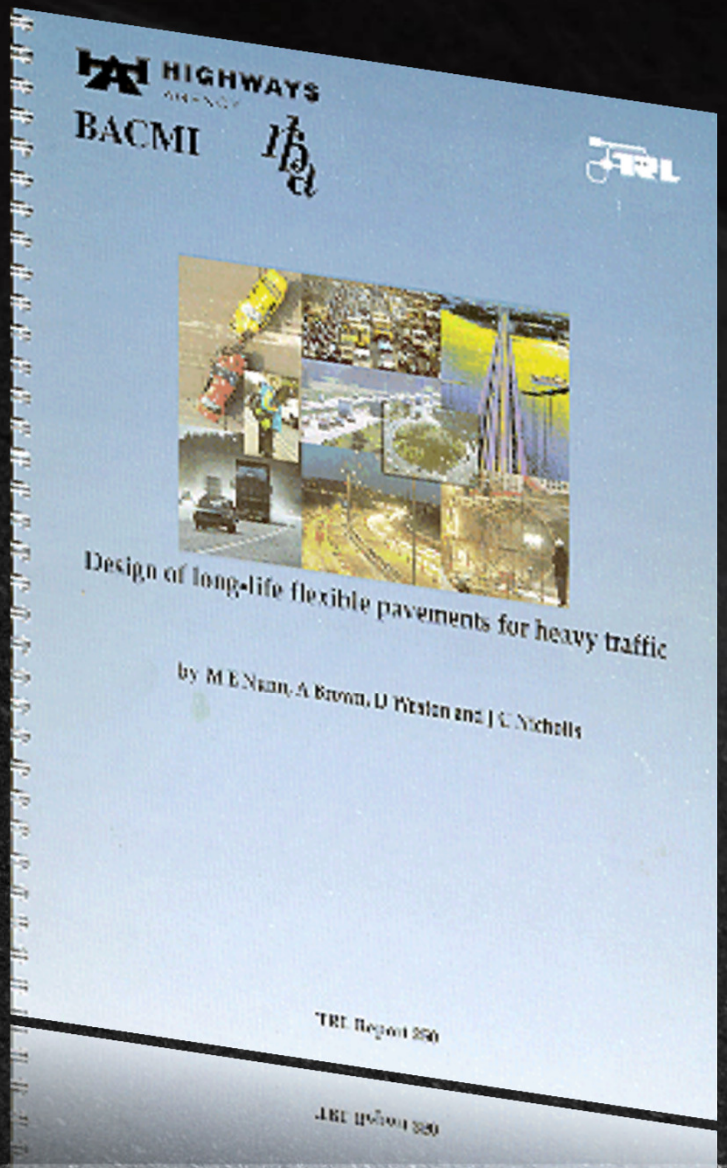
TRL Report 250
Nunn, Brown, Weston
& Nicholls

Design of Long-Life Flexible
Pavements for Heavy Traffic

www.trl.co.uk



"The deterioration of thick, well constructed, fully flexible pavements is not structural, but occurs at the surface as cracking and rutting."



Mechanistic Design

Mechanistic -

"Concerning the Relationships Between Applied Forces and Material Responses."

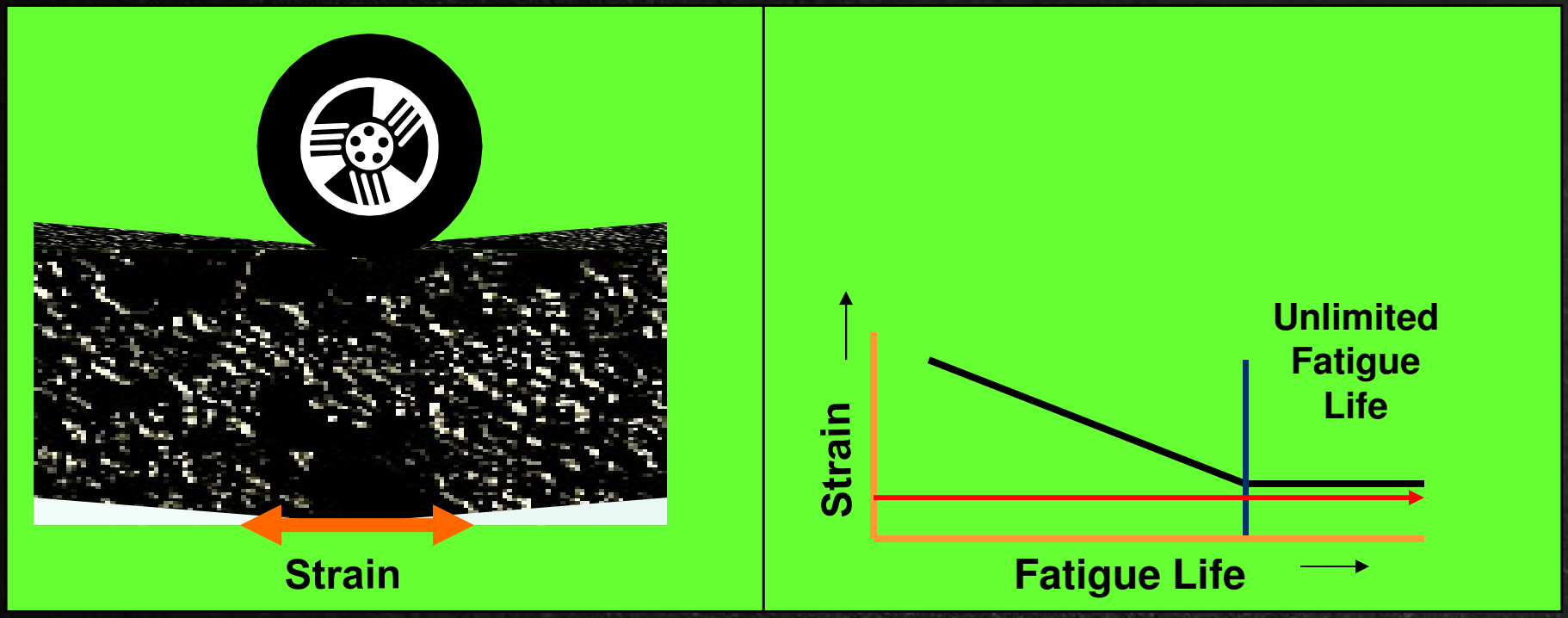
Basic Premise -

Low Deflections = Long Life

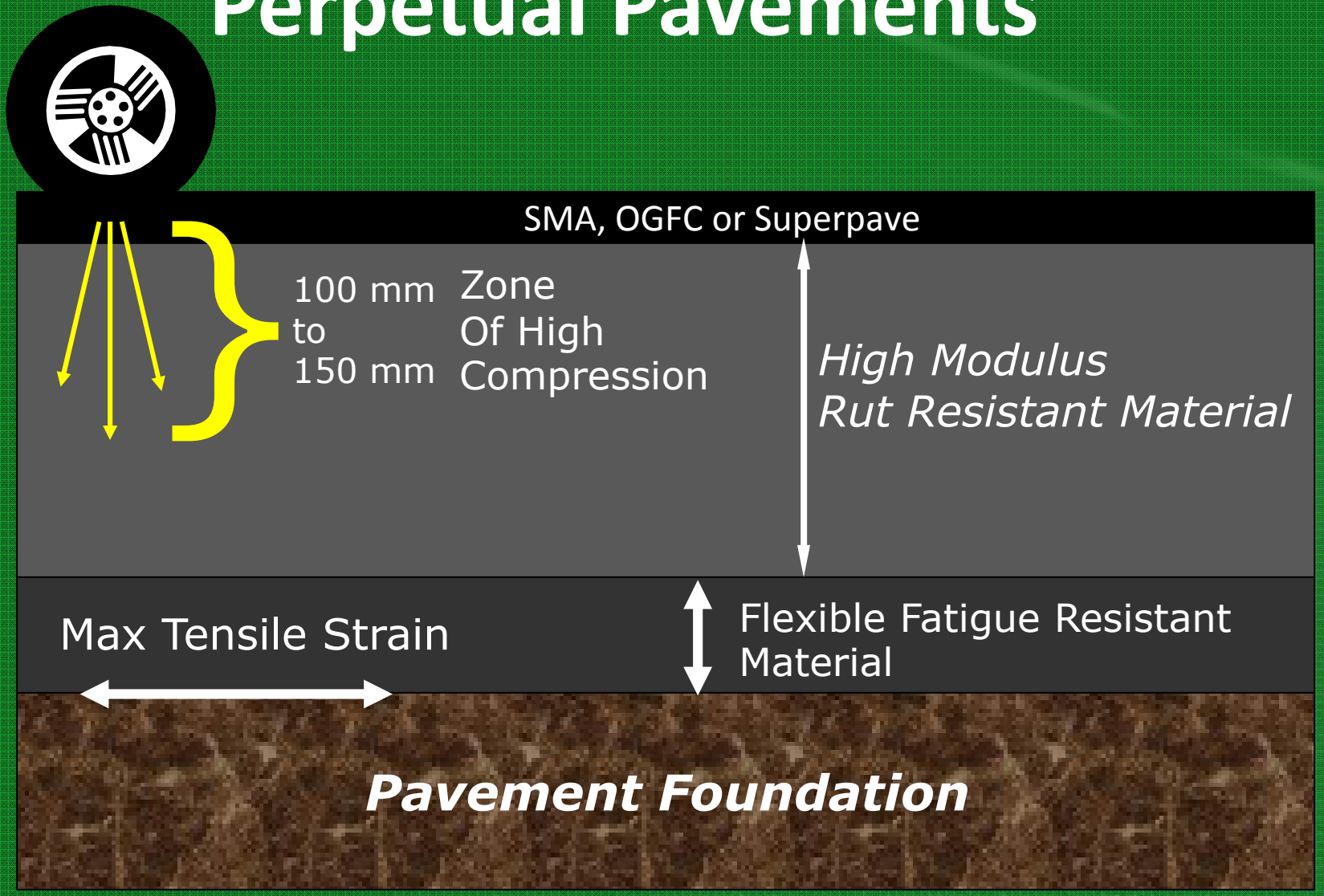
Fatigue Theory for Thick Pavements

High Strain = Short Life

Low Strain = Unlimited Life



Perpetual Pavements



Deep Strength Pavements

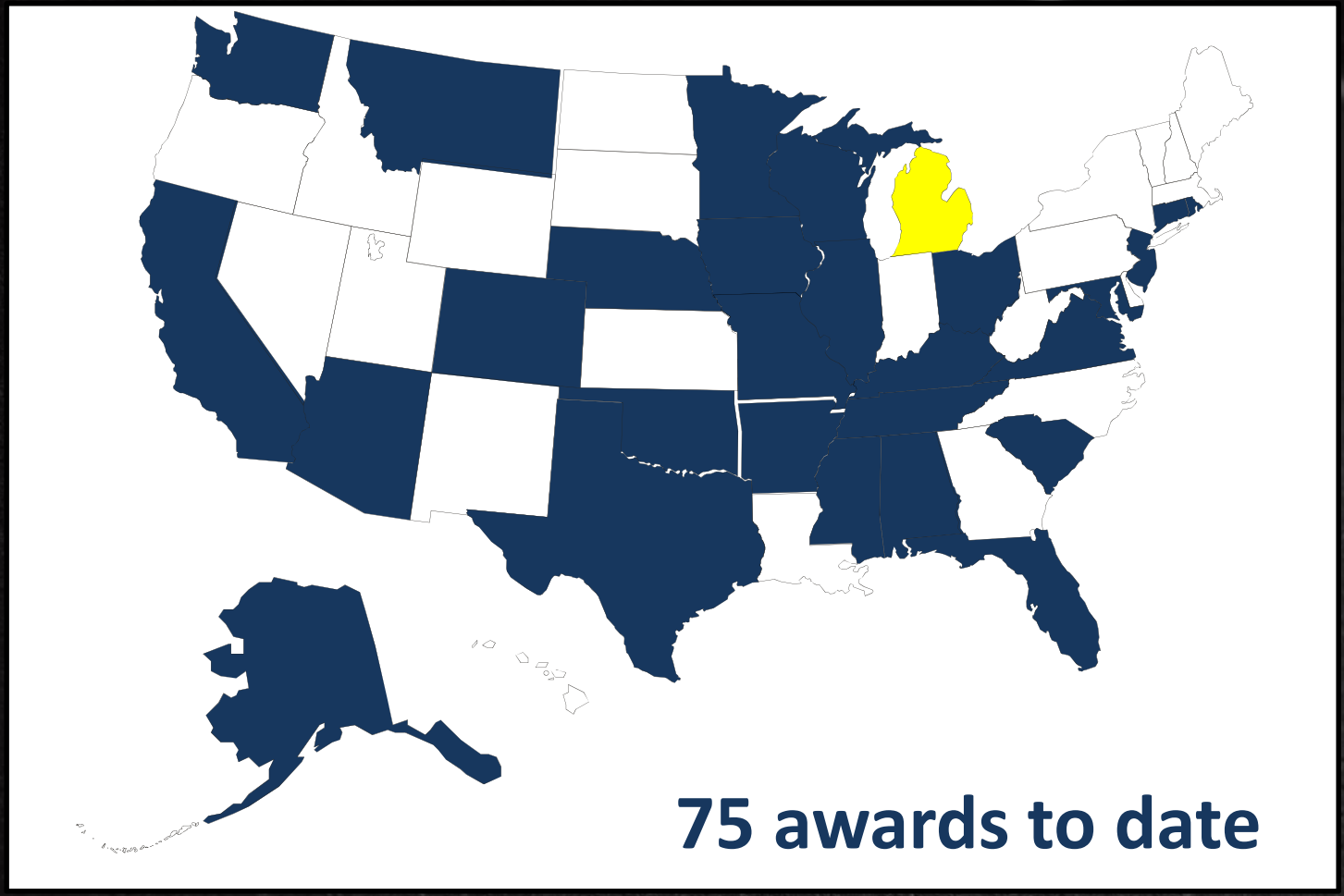
Structure Remains Intact

Perpetual Pavement Award

Asphalt.

States that have won Perpetual Pavement Awards from 2001 to 2010

Alabama - 3
Alaska - 1
Arizona – 1
Arkansas - 2
California - 2
Colorado - 1
Connecticut – 2
Florida - 1
Illinois - 1
Iowa - 1
Kentucky - 3
Maryland - 4
Michigan - 2
Minnesota - 9
Mississippi - 4
Missouri - 4
Montana - 3
Nebraska - 3
New Jersey - 2
Ohio - 3
Oklahoma – 3
Rhode Island - 1
South Carolina - 4
Tennessee - 8
Texas - 2
Virginia - 1
Washington - 2
Wisconsin - 1
Toronto, Canada - 1



75 awards to date

Asphalt.

5.2 mile section of MS-24, Tuscola County (Lapeer – Caro Road)

Asphalt.

6 mile section of US 31
(Ottawa and Muskegon Counties)

Asphalt.

Rehabilitation for Concrete Pavements

Rubblization

Asphalt.

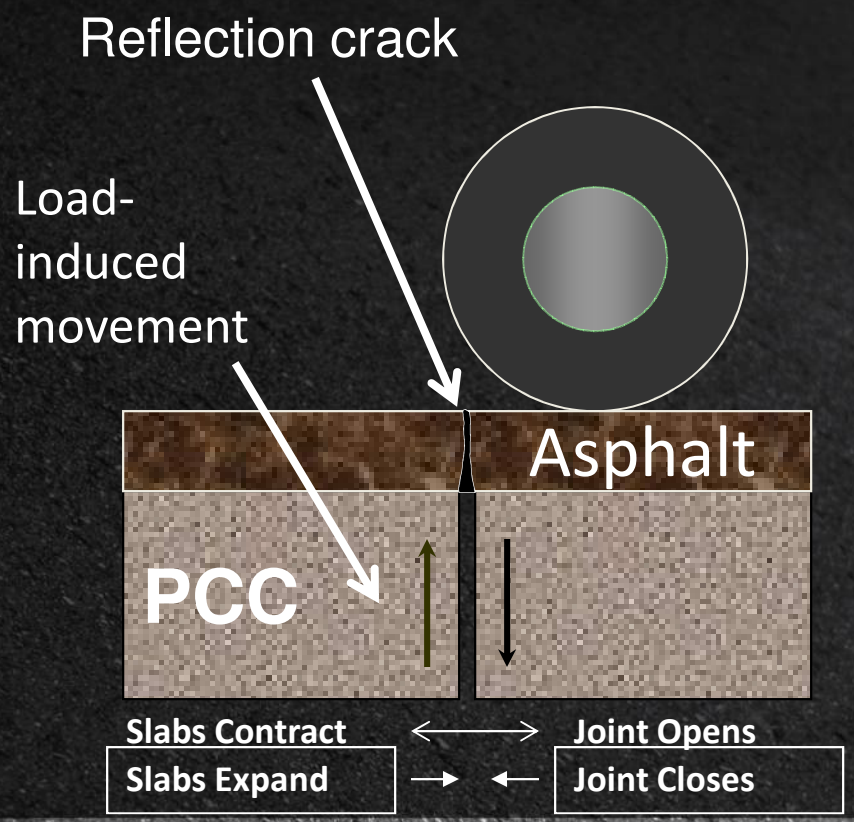
Rubblization

Quantities

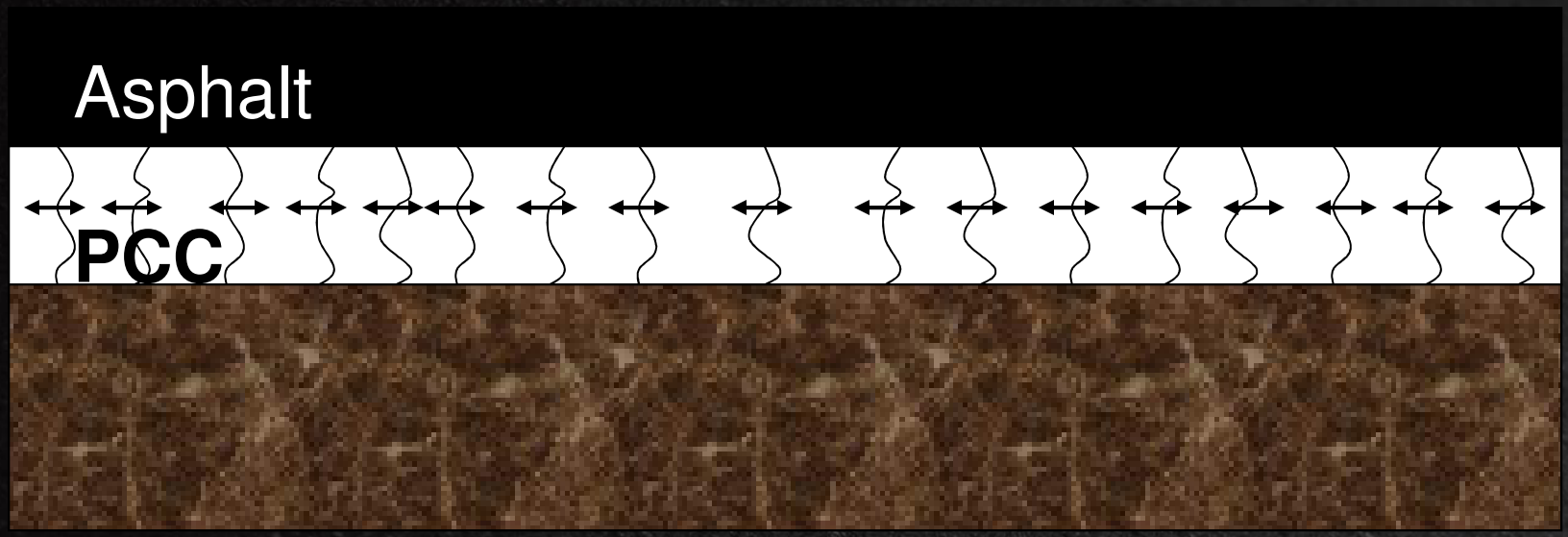
– Michigan:	3.5M/SY
– Wisconsin:	9.3M/SY
– Ohio:	1.3M/SY
– Indiana:	2.3M/SY
– Illinois:	2.3M/SY
Total:	18.7M/SY

Rubblization

- **Fracturing:**
  - **Eliminates slab action**
  - **Destroys bond between concrete and steel**
- **Rubblized base responds as a tightly keyed, interlocked high-density, unbound layer**
  - **Layer cannot crack; already fractured**



Smaller Pieces = Smaller Movement = No Cracking



Benefits

- Time savings
  - Choose work hours
  - High production rates
- Economic Savings
  - Reduce user delay costs
  - Reduce construction costs

Benefits

- Environmentally friendly
  - Reduce landfill
  - Reduce fuel consumption/air pollution
- Smoothness
  - Eliminate reflection cracking/faulting

Methods

Asphalt.

Performance

Asphalt.

WisDOT 2-Lane Hwy Rubblization Projects

Highway	Year	PCC Type	PCC Thick (in)	Base Over Rubblized	Added Base Thick (in)	HMA Type	HMA 1st Lift (in)	HMA Total Thick (in)	HMA Lifts	Edge drain	ADT-Future	%Trucks	Design ESALs
STH 16	1996	JRCP	8	CABC	2.5	STD	1.5	3	2	No	2016: 5,400	10	
STH 23	1996	JPCP	8			STD	2	5.25	3	No	2016: 8,650	9	
USH 12	1997	JPCP	9-6-9	RAP	6	STD	1.5	3	2	No	2016: 3,600	8	
USH 2	1998	JPCP	9	CABC	12	STD	2.5	8	4	No	2018: 7,900	15	
USH 14	1998	JPCP	8	RAP	2.5	STD	1.25	4.25	3	No	2016: 5,500	16	
STH 13	1999	JRCP	9	RAP	3	STD	2	5	3	No	2019: 6,900	10	
STH 64	1999	JRCP	9-6-9	RAP	6	STD	1.5	4.5	3	No	2018: 4,300	7	
STH 66	1999	JPCP	9-6-9	CABC	4	STD	2	5	3	No	2015: 15,500	10	
STH 13	2000	JPCP	9			SUP	3	4.75	2	Yes			
STH 20	2000	JRCP	8			SUP	2	5.25	3	Yes	2021: 9,800	7	
STH 33	2000	JRCP	9	CABC	6	SUP	1.75	5	3	No	2021: 13,400	4	
STH 13	2000	JRCP	8-9	RAP	3	STD	2.5	4.5	2	No			
USH 14	2000	JPCP	9-7-9	RAP	5	STD	1.5	3	2	No	2020: 6,850	10	
STH 42	2000	JRCP	9-6-9			STD	1.75	5	3	No	2019: 7,000	6	
STH 11	2000	JPCP	8-9			SUP	2.75	5.75	3	No	2022: 12,700	13	
STH 35	2000	JPCP	8			STD	2	5.5	3	No	2021: 6,400	9	
STH 59	2001	JPCP	8	CABC	4	SUP	2	5	3	Yes	2022: 9,500	6	
STH 33	2001	JPCP	8	CABC	8	SUP	2.5	6.5	3	No	2021: 22,100	8	
USH 8	2003	JPCP	9			SUP	2.5	4.5	2	No	2023: 5,600	11	1,314,000
USH 18	2003	JPCP	9			SUP	2	5.5	3	No	2023: 11,000	17	
USH 14	2003	JPCP	9-7-9	RAP	4	SUP	1.75	5.25	3	No	2023: 11,000	9	2,197,300
STH 73	2004	JPCP	9			SUP	3	5	2	No	2024: 11,400	7	2,343,300
USH 63	2004	JRCP	9-6-9	CABC	8.25	SUP	3	7	3	No	2024: 4,225	7	1,043,900
STH 113	2004	JRCP	9			SUP	2.5	4.5	2	No	2025: 25,700	6	4,132,276
USH 14	2004	JRCP	7	RAP	4	SUP	1.75	5.25	3	No	2023: 13,400	9	2,511,200
STH 13	2005	JPCP	8			SUP	2.25	6	3	Yes	2025: 15,230	10	4,679,300
STH 16	2005	JPCP	9	CABC	2	SUP	2	6	3	No	2023: 6,300	12	1,693,600
STH 16	2005	JRCP	9-6-9	RAP	4.5	SUP	2	3.5	2	No	2026: 5,300	5	474,500
STH 81	2006	JPCP	7			SUP	3	4.5	2	No	2026: 7,200	7	1,065,800
STH 96	2007	JRCP	8			SUP	3	4.75	2	Yes	2025: 5,600	10	2,007,500

WisDOT Biannual Distress Survey

WisDOT PDI Interpretive Categories

0 – 19	Very Good
20-39	Good
40-59	Fair
60-79	Poor
80-100	Very Poor

PDI is a mathematical expression for pavement condition rating keyed to observable surface distresses.

WisDOT Biannual Distress Survey

FHWA IRI Thresholds

<1.0 m/km	Very Good
1.0-1.5 m/km	Good
1.5-1.9 m/km	Fair
1.9-2.7 m/km	Mediocre
>2.7 m/km	Poor

WisDOT Biannual Distress Survey

Performance statistics for 2-lane highway rubblization projects

WisDOT PDI Categories:

28 of 30	Very Good
2 of 30	Good

FHWA IRI Thresholds:

16 of 30	Very Good
14 of 30	Good

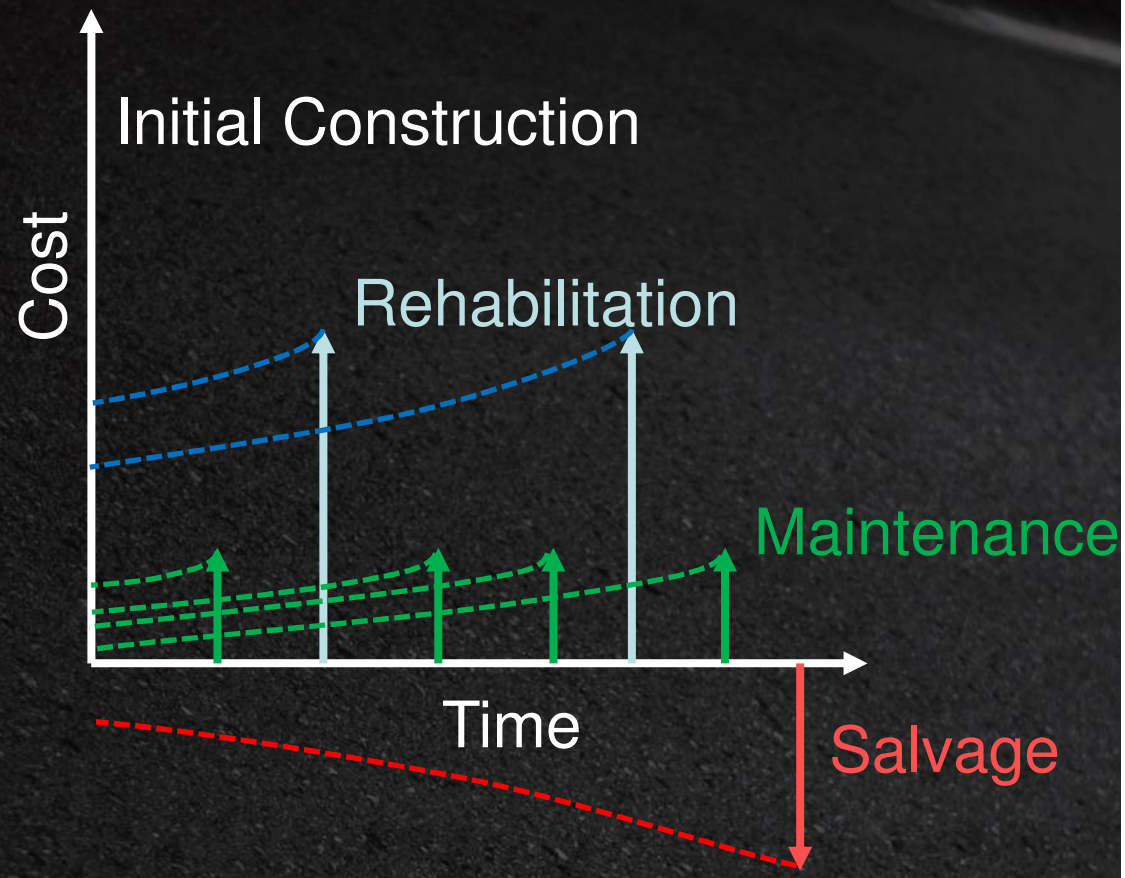
LCCA vs. LCA

- Life Cycle Cost Analysis (LCCA)
  - economic analysis tool

- Life Cycle Assessment (LCA)
  - Environmental impact tool

Life Cycle Cost Analysis (LCCA)

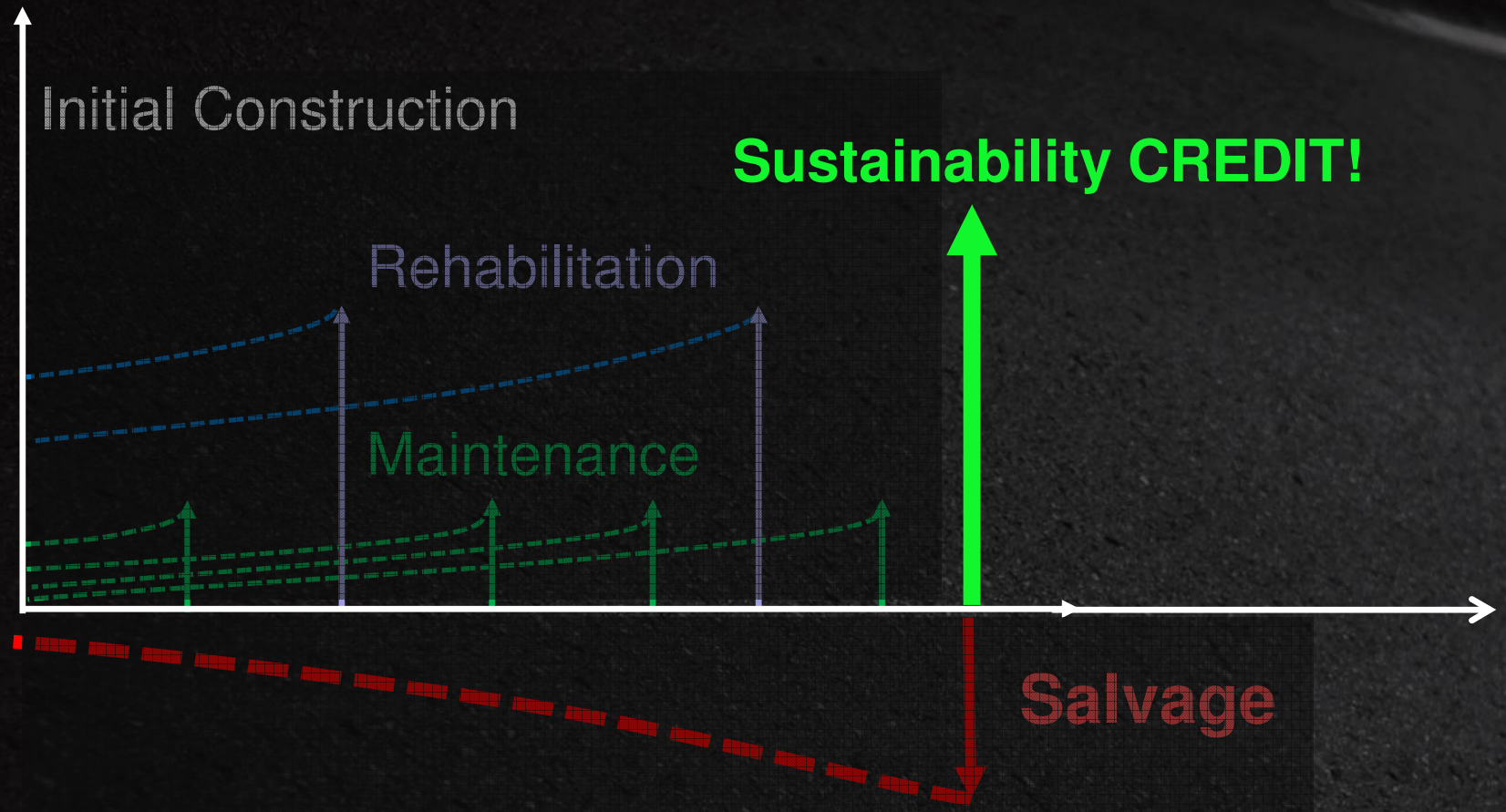
- Inputs
  - Initial cost
  - Performance
    - Maintenance
    - Rehabilitation
  - Analysis period
  - Discount rate
  - User costs?
  - Salvage value




EXIT 205B
University Blvd SOUTH
RIGHT ¼ MI
EXIT 205A
University Blvd NORTH
EXIT 205A
35

Perpetual Pavements

Life Cycle Cost Analysis (LCCA)



The Asphalt Advantage!

- Technologically Advanced Asphalt
- Proven to Last a Lifetime
- 100% R E U S A B L E
- Asphalt Pavements Are ***GREEN***.

The Asphalt Advantage

Special Presentation for:
The Asphalt Pavement Association of Michigan
56th Annual Asphalt Paving Conference
March 20-21, 2012

Mike Kvach

Executive Director

Asphalt Pavement Alliance

AMERICA RIDES ON US Asphalt.