Asphalt
The Sustainable Pavement

Special Presentation for:
The Oklahoma Asphalt Pavement Association
and
The OK Local / Tribe Technical Assistance Program
Sept. 13-14, 2012

Mike Kvach
Executive Director – Asphalt Pavement Alliance
Sustainable Pavements
Asphalt Pavements

Best Choice

for Overall Performance
Asphalt Mix

REVOLUTION!
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

AMERICA RIDES ON US
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 Aggregates
Quality Crushed Aggregates
Quality Control / Quality Assurance
Environmental & Economic Sustainability
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
2nd International Conference on Warm-Mix Asphalt
Estimated Total Tons WMA

![Bar chart showing total tons WMA in 2009 and 2010. The chart indicates a significant increase from 2009 to 2010. The chart is divided into categories for DOT, Other Agency, and Commercial & Residential.](chart.jpg)
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

- **2009**
  - Tons Accepted: 67.2
  - Tons used in HMA/WMA: 56.1
  - Tons used in Aggregate: 6.2
  - Tons used in Cold Mix: 1.5
  - Tons used in Other: 0.7
  - Tons Landfilled: 0.1

- **2010**
  - Tons Accepted: 73.5
  - Tons used in HMA/WMA: 62.1
  - Tons used in Aggregate: 7.3
  - Tons used in Cold Mix: 1.6
  - Tons used in Other: 0.8
  - Tons Landfilled: 0.0
Recycling of Asphalt Pavement
Recycling of Asphalt Pavement

30,000 Tons of RAP =

70 - 6,000 Gallon Transport Trailers and 28,200 Tons of Clean Aggregate

Source: Astec Industries
Recycling of Asphalt Pavement

• Significant Reduction in Greenhouse Gas Emissions

• Recently average ~12% 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!

Loading

Critical Strain

Total Thickness
Perpetual Pavements

High Quality Asphalt Surface Course

Structure Remains Intact!
Perpetual Pavements take pavement performance to the next level!

- Save asphalt and aggregate over the long-term. (It’s Sustainable)
- Further Lowering Life Cycle Cost (3:1)!
- Lower User Cost

![Graph comparing HMA thickness vs. traffic for Perpetual Pavement vs. Conventional Design](image-url)

*Perpetual Pavement vs. Conventional Design*
A recent survey of 50 state Departments of Transportation found that the costs of mid-life reconstruction of major roads are increasing. With initial and life-cycle costs for repaving your dollars and cents, it's time to think harder about how we build and maintain our streets.

The asphalt industry calls it Perpetual Pavement, but Perpetual Pavement might not be closer to the truth. That's because traditional life-cycle cost analysis (LCCA) methods can underestimate the costs. Researchers at the Massachusetts Institute of Technology have developed a new methodology, called Life-Cycle Comparison Analysis (LCCA), to project the actual cost of maintaining a road over its life span. This new approach reveals that by using Perpetual Pavement, we can save millions of dollars in maintenance costs.
States that have won Perpetual Pavement Awards from 2001 to 2011

80 awards to date

- Alabama - 4
- Alaska - 1
- Arizona - 1
- Arkansas - 2
- California - 2
- Colorado - 1
- Connecticut - 2
- Florida - 2
- Illinois - 1
- Iowa - 1
- Kentucky - 4
- Maryland - 4
- Michigan - 2
- Minnesota - 10
- Mississippi - 4
- Missouri - 4
- Montana - 3
- Nebraska - 3
- New Jersey - 2
- Ohio - 3
- Oklahoma - 3
- Pennsylvania - 1
- Rhode Island - 1
- South Carolina - 4
- Tennessee - 8
- Texas - 2
- Virginia - 1
- Washington - 2
- Wisconsin - 1
- Toronto, Canada - 1
Best Choice for Overall Performance

Studies prove that asphalt pavements cost substantially less over the life of the pavement.
Best Choice for Overall Performance

- A Synthesis: Pavement Life-Cycle Cost Studies Using Actual Cost Data (Ohio, Kansas, Iowa & Minnesota)

“Long-life asphalt pavements have been shown to have lower life cycle costs than concrete pavements or conventionally designed pavements”

Ref: APA document: IM-40; www.asphaltroads.org
• The rate of increase in cost for maintaining the Asphalt pavements is less than the rate of increase in cost for maintaining the adjoining Concrete and/or composite pavements.

By: Clifford Ursich, P.E., Executive Vice President Flexible Pavements, Inc.
www.flexiblepavements.org
Best Choice for Overall Performance

Kansas Interstate Study:

<table>
<thead>
<tr>
<th></th>
<th>Concrete</th>
<th>Asphalt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Construction</td>
<td>$824K</td>
<td>$613K</td>
</tr>
<tr>
<td>0 – 20 Years</td>
<td>$20K</td>
<td>$23K</td>
</tr>
<tr>
<td>&gt; 20 Years</td>
<td>$95K</td>
<td>$34K</td>
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</tbody>
</table>

Average Cost of Maintenance Per Year

Executive Summary – Evaluation of Expenditures on Rural Interstate Pavements in Kansas
By: Stephen A. Cross, P.E., Associate Professor (Now @ Oklahoma Univ.) & Robert L. Parsons, P.E., Assistant Professor University of Kansas
Study may be downloaded in .pdf format from [www.asphaltroads.org](http://www.asphaltroads.org)
Best Choice for Overall Performance

Iowa Research Study on Performance and Costs:

Iowa County

Concrete

Asphalt

42% Less!

Jasper County

Concrete

Asphalt

62% Less!

A Study Conducted by the Asphalt Paving Association of Iowa with the assistance of the Center for Transportation Research and education; By: Ray Hogrefee; www.apai.net
Best Choice for Overall Performance

Minnesotta Pavement Analysis:

By: Erland Lukanen of ERS Consultants.

www.asphaltroads.org
Best Choice for Overall Performance

Minnesota Pavement Analysis:

50% Overlaid

24 – 25 Years

By: Erland Lukanen of ERS Consultants.
www.asphaltroads.org
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Minnesota Pavement Analysis:

88% Overlaid

35 Years

By: Erland Lukanen of ERS Consultants.
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Florida – 3 year Pavement Analysis:

An article published in “Civil Infrastructure” Titled: “Real Road Value”
By: Bob Bushmeyer

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