Translation:

- EASL’s

- Average Daily Traffic
High Performance Intersections

Pavement Condition

Pavement Performance

Time or Traffic

Pavement Condition Index

100

0
High Performance Intersections

Pavement Condition

Time or Traffic

Pavement Condition

Preventive Maintenance

Reactive Maintenance
High Performance Intersections

Condition (PCI)

Time

Rehabilitation
>$10.00/SY

Reconstruction
>$$$$$$
The Challenge

Slow moving or standing loads subject pavements to higher than normal stress conditions

High-stress locations also include:
- Climbing lanes
- Truck weigh stations
- Rest areas
- Other slow-speed areas
High Performance Intersections

The Challenge

• Special attention to these areas can ensure that high-stress areas deliver the same outstanding performance as other asphalt pavements.
High Performance Intersections

The Challenge

Compounding factors:

• Increasing:
  – Traffic volumes
  – Percentage of trucks
  – Maximum loads
  – Tire pressures
  • Super single tires

• Decreasing
  – Revenues
    • It’s not just initial cost
    • Full Service Life
  – Loss of experienced personnel
    • Smaller staffs
    • Work together ensure success
High Performance Intersections

Have a Strategy

Recognize:
Intersections may need to be treated differently than posted-speed pavements.
High Performance Intersections

5-Point Strategy

• Form a team of local experts
  – Owner/Agency
  – Industry
  – Academics

• Assess the problem

• Ensure structural adequacy

• Confirm the materials, mix design, & quality control

• Practice proper construction techniques
High Performance Intersections

Condition Assessment

• Identify type / extent of pavement distress
  – Visual survey
  – Sampling and testing
  – Trenching

• Determine cause(s) of distress
  – unstable mixture
  – base failure
  – consolidation by traffic
Trenching

- Reveals the type and vertical extent of deformed layers
- Define limits distress
  - GPR
  - Cores

Replace all deformed layers
High Performance Intersections

Rutting in Subgrade or Base

original profile
Fatigue cracking
Weak Subgrade Or Underlying Layer

asphalt layer
subgrade deformation
High Performance Intersections

Plastic Flow

original profile

Weak Asphalt Layer

shear plane
High Performance Intersections

Rutting in Asphalt Layer

- Original profile
- Wheel path consolidation
- Inadequate Compaction
Ensuring Structural Integrity

- Structural Capacity to meet traffic needs
  - Existing pavements
    - Evaluate structural capacity of in-place material
    - Remove/replace any weak or failed areas
  - New Pavement Structure must be able to support present and future loads
- Mechanistic Design Software
  - Asphalt Institute
  - AASTHO’s MEPDG
Selecting Materials

High Performance Materials

• Evaluate local aggregates for economics
• Supplement with imported aggregates
  – Full replacement may be necessary
• Additional testing
  – Hamburg wheel
  – Field test strips
High Performance Intersections

Construction Best Practices

• Avoid segregation
  – Physical
  – Thermal
  – Use Material Transfer Vehicle

• Longitudinal Joints
  – Best Practices Synthesis; AI coop agreement w/FHWA
  – Soon to be published, plus a 4hr seminar

• Achieve target density
  – Density gauges to set rolling patterns and confirm
  – Intelligent Compaction
Effect of In-Place Voids on Life

Percent Pavement Voids vs. Percent Service Life

WA DOT Study
High Performance Intersections

Poor Construction Practices
High Performance Intersections
High Performance Intersections

5-Point Strategy

• Form a team of local experts
• Assess the problem
• Ensure structural adequacy
• Confirm the materials, mix design, & quality control
• Practice proper construction techniques
High Performance Intersections

Three Case Studies
City of Indianapolis

PAVED WITH REGULAR MIX,

AGE 2 YEAR
Replacement Project
2 years old
High Performance Intersections Replacement Project
12 years old
Case Study
Maryland  U.S. 40 & Rt. 213
Elkton, Maryland
1994
Rutting on a yearly basis
Determine depth of rutting!
2-Lifts 25 mm SMA
Removing pcc
July 2000
July  2000
Replacing pcc  w/ SMA
High Performance Intersections

18 years later
- Minor
- ¼ inch Ruts
- L/T Joint distress
- Reflective Cracking
High Performance Intersections

Background

- IDOT mill one year & fill the ruts the following year
- 1998 Rehab established an Evaluation Team
  - “Tough Mix Team”
Excavation (not Exploration)
High Performance Intersections

Evaluation

• Lower layers were plastic deformation
• Prior repairs left in place
• Last overlay was SMA
  – Consistent thickness
  – Deformed plastic mix.
High Performance Intersections

Material Selection

SMA vs Dense-Graded
High Performance Intersections
World’s Strongest Intersection

14 years later

Williams & Margaret in Thornton, IL
Largest Stone Matrix Asphalt project in USA spans 6 lanes for 8 miles

THE LEVY COMPANY of Portage, Indiana, supplied the steel slag for busy I-94, Bishop Ford Expressway, and its heavy loads.
High Performance Intersections

Asphalt Institute
www.asphaltinstitute.org

Asphalt Pavement Alliance
www.asphaltroads.org
Thanks!
Wayne Jones, PE
Senior Regional Engineer