I-70

*Five Years Later...*

Illinois Asphalt Pavement Association
Annual Meeting
March 9, 2009

William J. Pine, P.E.
Emulsicoat, Inc. / Heritage Research
- Joint Venture:
  - Howell Asphalt/Paving
  - Champaign Asphalt
- Project – 10.8 miles
- Rubblized – 9.7 miles
- Cost – $44.8 Million
Existing Cross Section (Prior to Rehabilitation)

Pavement Distresses:

- CRCP D-cracked with Punchouts
- HMA overlay too thin to carry total loading
Proposed Rehabilitation

- HMA on Rubblized CRCP
- Traffic Factor = 78.6 million ESAL’s
  - 24,000 ADT
  - 49% Trucks
- Determining the Pavement Thickness?
IDOT Experience with HMA on Rubblized PCCP prior to 2003

- 1990 I-57 Dist 5 (Pesotum)
- 1994 IL-38 Dist 2 and I-55 Fr. Rd.
- 1996 I-57 Dist 7 (Edgewood)
- 1997 I-57 Dist 9 (Anna)
- 1997 I-70 Dist 5 (Greenup)
- 1999 I-74 Dist 4 (Woodhull)
Traffic Factor of 78.6 off the chart!
Project Specific Decisions...

- **Polymer** Mod AC in **ALL** mainline lifts
  - Reduce perceived risk
- **No** RAP in mainline lifts
  - Typical for back then
  - RAP **was** allowed in Poly Mod Shoulders
- 4% Void Superpave design for bottom lift
Basic Project Schedule

- Preliminary Work (Fall 2002)
  - Raise Overheads
  - Bse Cse Wid & Inlay existing WB Lanes
- Stage 1 (Spring/Summer 2003)
  - Traffic “head-to-head” in existing WB lanes
  - Rebuild EB lanes
- Stage 2 (Summer/Fall 2003)
  - Traffic “head-to-head” in new EB lanes
  - Rebuild WB lanes
5-Year Warranty

- **Warranty Items:**
  - Fatigue Cracking
  - Block Cracking
  - Transverse Cracking
  - Longitudinal Cracking
  - International Roughness Index (IRI)
  - Potholes and Shoving
  - Bleeding, Flushing and Raveling
  - Rutting

- **Surety Bond Required**
Primary Project Activities

- Replaced Under Drains
- Milled existing 3-1/4” mainline HMA
- Rubblized 8” CRCP
- 17-1/2” HMA pavement
- Replaced concrete decks over Mill Creek
- Raised four overhead structures to accommodate new pavement elevation

546,000 tons
Rehabilitating the Cross Section

3-1/4” HMA Overlay
8” of “Brand X” (CRCP)
4” BAM Sub Base
Rehabilitating the Cross Section

1st Lift – 6” – N90 Binder with SBS PG 70-22

Rubblized CRCP

4” BAM Sub Base
Rehabilitating the Cross Section

2nd Lift – 4” – N90 Binder with SBS PG 70-22

Rubbled CRCP

4” BAM Sub Base
Rehabilitating the Cross Section

3rd Lift – 3” – N105 Binder with SBS PG 76-28

Rubbled CRCP
4” BAM Sub Base
Rehabilitating the Cross Section

4th Lift – 2-1/2” – N105 Binder with SBS PG 76-28

Rubblized CRCP

4” BAM Sub Base
Rehabilitating the Cross Section

5th Lift – 2” – N80 Steel Slag SMA with SBS PG 76-28

Rubbblized CRCP

4” BAM Sub Base
Final Cross Section

Top 7-1/2” – SBS PG 76-28

Top 4-1/2” – SBS PG 70-28

14-1/4” New Shoulders

17-1/2” HMA

8” Rubblized CRCP

4” BAM Sub Base
Plus Existing Greenup Plant
Open House – July 24, 2003
Dr. Thompson
The Evangelist of Rubblizing!
Performance to Date

- Excellent!
- Throughout Warranty Period JV examined and cleaned under drains as needed
- Warranty completed in 2008
  - NO work required during the entire 5-year period
  - IRI = 51”/mile (Threshold 110”/mile)
  - Rutting = 0.07” (Threshold 0.30”)
- Reward for the Risk!
What Have We Learned Since?

- HMA Fatigue...
  - U of I has years of data to show our “old” way is very conservative
  - U of I and others have proved the fatigue endurance limit is real
  - Based on these two points, a new graph has been developed and proposed
Classical Fatigue Theory

High Strain = Short Life

Low Strain = Long Life

More loads, thicker pavement
Realistic HMA Fatigue

High Strain = Short Life

Low Strain = Unlimited Life
Improved Algorithm
Fatigue Endurance Limit = 70
What Have We Learned That Should Improve Durability?

- Field VMA
- Lots About RAP:
  - IDOT’s RAP “Gsb” value
  - Processing and Fractionating
- Longitudinal Joint Density
The Next Project...

- HMA Pavements *can* handle the traffic
- What will the next design look like?
  - Thickness?
  - AC Performance Grade?
  - RAP?
- How much *money* can we save?
  - Reduced Thickness
  - Improved Performance
- **There IS an alternative to “Brand X”!**
Thank You!

- IDOT and FHWA
  - Allowed the project
  - Partnered with us
- Howell and Champaign Asphalt
  - Put forth the extra effort
- Marshall Thompson, Sam Carpenter & the U of I
  - Constantly supporting IDOT & our Industry
- Marvin Traylor
Questions?