Now that we have been using SMA for many years, does our pavement management data show that we made a good decision?
The network is monitored annually

A digital survey vehicle collects the data

Condition Rating Survey (CRS) by IDOT used in management system
- Surface distress
- Roughness (IRI)
- Rutting (asphalt surface)
- Faulting (concrete surface)

Pavement data updated annually

**Pavement Items**
- CRS
- Age
- Age- Original
- Cycle
- IRI
- Pvmnt-Type
- RSL
- Slab LTE
- Subgrade Support
- Thickness
- # Lanes

**Traffic**
- ADT
- ADT - Growth
- CV % - MU % - SU %
- ESAL
- ESAL – Growth
- Peak Traffic AM
- Peak Traffic PM

**Other**
- County
- Maintenance District
- Program

<table>
<thead>
<tr>
<th>Rating</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>9.0</td>
</tr>
<tr>
<td>Good</td>
<td>7.5</td>
</tr>
<tr>
<td>Transitional</td>
<td>6.5</td>
</tr>
<tr>
<td>Fair</td>
<td>6.0</td>
</tr>
<tr>
<td>Poor</td>
<td>4.5</td>
</tr>
<tr>
<td>Poor</td>
<td>1.0</td>
</tr>
</tbody>
</table>
The Tollway has a long history in pavement management

Pavement Management Implementation

- PMS used to study pavement features
- PMS used to develop CRP
- PMS used for Move Illinois
- PMS used for 50-year plan
- 50-year plan expanded to PAMP

Having data is great - use it to model performance

Different pavement types have different models

- Continuously reinforced concrete pavement (CRCP)
- Jointed plain concrete pavement, with 20-ft joint spacing (JPCP-20)
- Jointed plain concrete pavement, with 15-ft joint spacing (JPCP-15)
- Asphalt-overlaid JPCP with 20-ft joint spacing (HMA-JPCP-20)
- Asphalt-overlaid JPCP with no dowel (D-Crack)
- Full Depth Asphalt Pavement (HMAC)
- SMA-overlaid JPCP (SMA-JPCP)

\[ 	ext{CRS} = f(\text{pavement type, surface thickness, ESAL, age, initial CRS}) \]
Calibrating the CRS models allow us to understand performance

\[ CRS = 9 - 2 \cdot a \cdot (THICK \cdot TAF)^b \cdot (C_1 + \Delta YEAR)^c \cdot (C_2 + \Delta ESAL)^d \]

\[ C_1 = \left(\frac{9 - CRS_i}{2 \cdot a \cdot (THICK \cdot TAF)^b \cdot CESAL^d}\right)^{\frac{1}{c + d}} \]

\[ C_2 = C_1 \cdot CESAL \]

- **CRS** = Condition survey rating (1 to 9).
- **TAF** = Thickness adjustment factor. The thickness of HMAC and AC overlay are adjusted as described below.
- **THICK** = Slab thickness, HMAC thickness, or AC overlay thickness.
- **\( \Delta YEAR \)** = Change in the age of the pavement, years.
- **\( \Delta ESAL \)** = Accumulated ESALs in millions over the time period \( \Delta YEAR \).
- **CESAL** = Current annual ESALs.
- **C_1** and **C_2** = Calibration coefficients.
- **a, b, c, d** = Constants for each pavement type.

15+ yrs ago we used PMS to show polymers work

- Trigger extension - 3 Million ESAL
Pavement model over jointed plain shows decreasing life with additional overlay cycles

1\textsuperscript{st} generation overlay with HMA – 12 years

2\textsuperscript{nd} generation overlay with HMA – 10 years

3\textsuperscript{rd} generation overlay with HMA – 8 years

SMA mixes extend overlay life by 2 years

Thickness = 4”
ESAL\textsubscript{i} = 1.8 million
Growth Rate = 5%
CRS\textsubscript{i} = 8.9
SMA mixes extend full depth life by 3+ years

Thickness = 12"
ESAL$_i$ = 4.1 million
Growth Rate = 4%
CRS$_i$ = 8.9

Actual data is showing that we may be doing even better
In summary...

Pavement Management allows us to measure performance

Introducing polymers extended the life of dense graded

SMA further extended the life

The models show that we are doing well, may outperform the current mode.

Questions
Bill Vavrik, Ph.D., P.E.
V.P. – Transportation
Office: 217.356.4500
Cell: 217.778.0041
wvavrik@ara.com