Full-Depth HMA Design in Illinois

North Central Hot Mix Asphalt\
Illinois Bituminous Paving Conference

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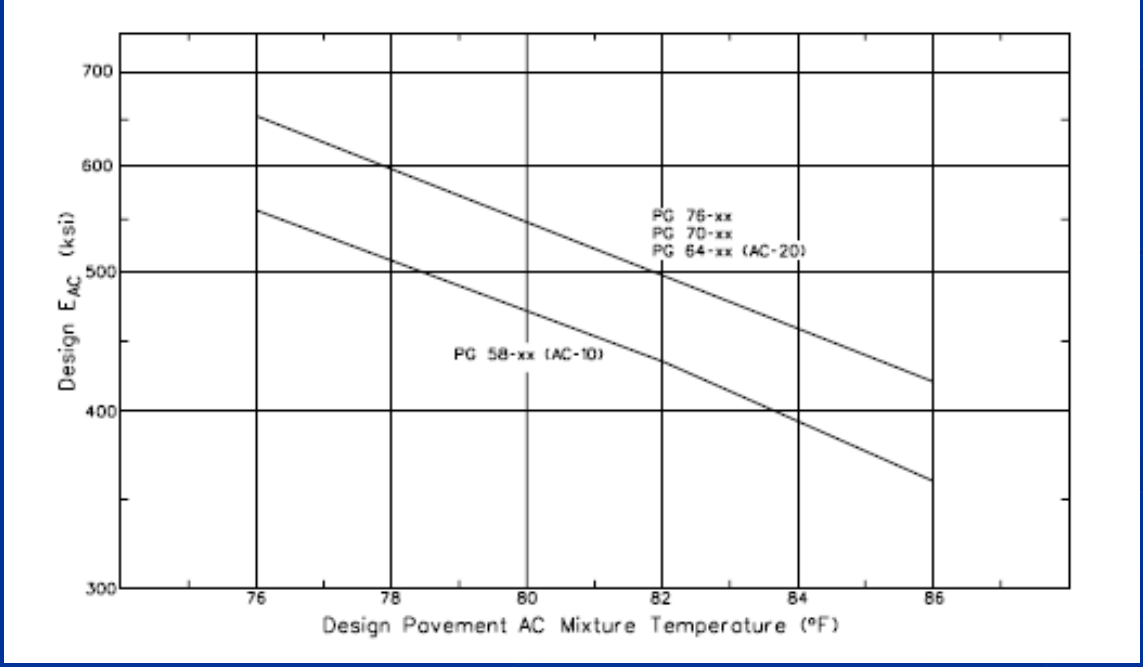
Dynamic Modulus Prediction Model Inputs

- Mix temperature
- Mix design parameters
- Binder properties



Modulus Inputs - Temperature

- Effect of temperature on design is apparent
- Current Design
  - Data from *Climatography of the US – No. 81*
  - 10 degree spread north to south
- Proposed Design
  - Data from Illinois State Water Survey database
  - 5 degree spread north to south

Modulus Inputs – Mix Parameters

- Current – generic mix: 5% AC, 5% - #200, and 2% voids
- Proposed (typical values) –
  - 9.5-mm surface: 5.3% AC, 5.0 % -#200, 4% voids
  - 12.5-mm surface: 5.2% AC, 5.0 % -#200, 4% voids
  - 19-mm binder: 4.6% AC, 4.5% -#200, 4% voids

Modulus Inputs – Binder Properties

- IDOT binder grades
  - PG 64-22, 64-28, 70-22, 70-28, 76-22, and 76-28
- PG 64-22 = base grade for design purposes
- Pen data from 2005 – 2007 averaged
- Modulus values for alternate binder grades compared to PG 64-22
- Net effect of input changes – Tac ⇩

Fatigue Algorithm

- IDOT algorithm form
  - **$N = K1 \times (1 / \text{HMA STRAIN})^{K2}$**
- Current algorithm
  - **$N = 5 \times 10^{-6} (1 / \text{HMA STRAIN})^{3.0}$**
- Proposed algorithm
  - **$N = 2.65 \times 10^{-9} (1 / \text{HMA STRAIN})^{4.0}$**
  - 150 microstrain, 3.0 algorithm – 1.5×10^6 ESALs
  - 150 microstrain, 4.0 algorithm – 5.2×10^6 ESALs
- Net effect – Tac ⇩⇩

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Past, Present, and …. Future

- IDOT will not adopt MEPDG
- Update existing design procedure and share w/industry
- Develop extended life design (max. thickness)
- Develop Hirsch modulus prediction model