Seeking **BALANCE** On Our Journey Along an Asphalt Pavement

**Kevin D. Hall**, Ph.D., P.E.
Hicks Endowed Professor of Infrastructure Engineering
University of Arkansas
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Where are we going today?

- Our Context
- Some Examples – and Questions
- What Happens Now? Where Do We Go From Here?
Examining “Balance”: Context

- Mix Design
- Pavement Design
- System Design

- Research
- Development
- Implementation
Balance: Mix Design
Balance: Mix Design

1. Volumetric Design w/ Performance Verification
   - Conduct Volumetric Analysis
     - Select Design Binder Content & Volumetric Properties
     - Performance Tests
       - Rutting
       - Cracking
     - Performance Passed?
       - Yes
         - Conduct Moisture Damage Test
       - No
         - Redesign Mix
   - Moisture Damage Passed?
     - Yes
       - Conduct Moisture Damage Test
     - No
       - Decrease Moisture Susceptibility

2. Performance-Modified Volumetric Design
   - Conduct Performance Tests
     - Rutting
     - Cracking
   - Performance Passed?
     - Yes
       - Conduct Moisture Damage Test
     - No
       - Adjust Mix Proportions and/or Binder Content
   - Moisture Damage Passed?
     - Yes
       - Decrease Moisture Susceptibility
     - No
       - Conduct Volumetric Analysis
         - Design Binder Content
         - Determine & Report Volumetric Properties at Design Binder Content

3. Performance Design
   - Conduct Performance Tests
     - Rutting
     - Cracking
   - Performance Passed?
     - Yes
       - Conduct Moisture Damage Test
     - No
       - Decrease Moisture Susceptibility
   - Moisture Damage Passed?
     - Yes
       - Conduct Volumetric Analysis
         - Design Binder Content
         - Determine & Report Volumetric Properties at Design Binder Content

Select Trial Gradation; Ensure Aggregate Blend Properties

Validate JMF / Production
Balance: Pavement Design

Trial Design

Structural Model

Response

Transfer Functions

Damage Accumulation

Damage

Time

Distress

Calibration

Distress in Field
BUT...What if...

We DESIGNED the Life Cycle – intentionally?
Nice theory – but future maintenance, preservation, and rehab treatments depend on how the pavement actually performs!

BUT...What if...

We PREVENTED distresses rather than simply PREDICT distress?
Structural Design

Figure 3. Perpetual Pavement Design Concept
(Newcomb et al, 2000)

- Zone of High Compression 4" to 6"
- High Quality HMA or OGFC 1.5" to 3"
- High Modulus Rut Resistant Material 4" to 7"
- Durable, Fatigue Resistant Material 3" to 4"
- Pavement Foundation

No FATIGUE
No RUTTING
Mixture Design

- **Rutting**
- **Cracking**
- **Stripping**
Rehab Design

REFLECTION CRACKING
BUT...What if...

We DESIGNED the Life Cycle – intentionally?
What Does This Mean for Research??

We have issues needing solutions NOW

What does the "next generation" of asphalt pavements look like?
R & D – and I???

RESEARCH (R)
• Theoretical basis
• Parametric studies
• Proof-of-concept

DEVELOPMENT (D)
• Equipment/Procedures
• Ruggedness
• Precision & Bias

IMPLEMENTATION (I)
• Pilot projects
• Special Provisions
• Standard Specifications
Where are we going?

- BALANCE: not “either...or” – but “and”
- INTEGRATION of life stages
  - PREVENTION > PREDICTION (??)
  - materials...and...structure...and...construction...and...maintenance...and...preservation...and...rehabilitation
  - INTENTIONAL design of the life-cycle
- R – D – and I
The future belongs to those who prepare for it today.

Malcolm X
The best way to predict the future is to create it.

Peter Drucker
“There will be days... when you step out of the phone booth and try to fly, and the very people you want to save are the ones standing on your cape.”

Sarah Kay
TED 2011
Questions??

THANK You!!!