VDOT’s Accelerated Pavement Testing Program

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A Little Background

• VDOT maintains the 3rd largest network in the US
  – 128,000+ lane miles of pavement
  – $5.3 billion FY 2017 budget
    • $500 million for pavement maintenance

• Virginia Transportation Research Council
  – Research division for VDOT, est. 1948
  – FY 2017, $21.5 million research spending
  – 50 full-time employees
Outline

- What is APT
- Resources
- Testing Plans
- Data Examples
Accelerated Pavement Testing

- A means to study pavement performance
  - Under controlled conditions, more rapidly
  - Less risk to the traveling public / agency
  - Simulate loading and temperature
  - And an opportunity to be more experimental
Accelerated Pavement Testing

• A means to study pavement performance
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Accelerated Pavement Testing

- Quantifying benefits
  - On a program basis, BCR’s reported from 1.6 to 11.4
  - On a project basis, could exceed 20-30
Resources
Dynatest HVS, Mark VI
HVS, Mark VI

- Test length (constant wheel speed)
  - 22 feet to 48 feet (with extension)
- Loads applied
  - Up to 22.5 kips
  - Usually we use 9, 12, and maybe 15 kips
- Passes per day
  - 6,000 unidirectional per day is typical (up to 7,000+)
- Investment
  - About $3 million for the machine
2 ends 50 ft each
3 test sections 50 ft each
2 gaps 25 ft each

Test Lane Overhead View
Asphalt layer 1
Asphalt layer 2
Aggregate Base
Subgrade

- Pressure Cell
- Horizontal Asphalt Strain Gauge
- Temperature Probe
- Multi-Depth Deflectometer
Testing

- **Field testing**
  - Accelerated trafficking using HVS
  - Instrumentation response
  - Falling weight deflectometer
  - Trenching

- **Laboratory testing**
  - Characterization from cores collected at test site
  - Modeling?
Recently Completed Tests

- Cold Central Plant Recycling Base
  - 1.5 inch and 3 inch asphalt overlay
  - Approx 550,000+ ESALs per cell
  - Next steps include M-E modeling
VDOT Heavy Vehicle Simulator
Ongoing Tests

- **Superpave Mix Design Study**
  - VDOT seeking ways to improve mixture durability
  - One way is to reduce the gyration level at design to create room for additional binder
  - Lane 3 = 50 gyration (treatment)
  - Lane 4 = 65 gyration (control)
Future Tests

• Reflective Cracking Study
  – Investigate methods to mitigate reflective cracking
  – Placed concrete pavement in lanes 5 and 6 in 2016
    • Saw cut joints at 10ft spacing
    • Testing in “long beam mode”
  – Overlay with 3 treatments + 1 control in 2017
    • SMA surface mixture (control)
    • High polymer content binder
    • Fibers
    • Arizona rubber process (wet blend)
Some Example Data
Strain Response

- Strain (10^-6)
- Speed, mph
- Load, kips

Time (seconds)

- Strain
- Speed
- Load
Things You Should Know

- Everything sounds easy until you start doing it
- Pre-mortem analysis
  - Instrumentation
  - Paving
- Identify clear and simple objectives at the beginning
- Help is available
Summary

• VDOT research using accelerated pavement testing
  – Researching questions about design and performance

• Future topic areas
  – High recycled content mixtures
  – Additives to improve performance
  – Novel structural designs