An Overview of the Accelerated Pavement Testing Program: A Virginia Case Study

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Outline

• Accelerated Pavement Testing
• Objective
• Heavy Vehicle Simulator: Mark VI
• Data Acquisition System
• Test Sections
• Instrumentation
• Lessons Learned
What is Accelerated Pavement Testing?

• “A destructive test procedure that can apply as much as 20 years traffic loading in 3-4 months” (Dynatest)
Types of Distress Evaluation

- According to the NCHRP 433: Significant Findings from Full-Scale Accelerated Pavement Testing
Objectives

• Present and explain Phase I of the Virginia Department of Transportation/VTTI Accelerated Pavement Testing program:
  – Heavy Vehicle Simulator
  – Determination of the asphalt mixture and pavement structure
  – Construction layout
  – Instrumentation
Heavy Vehicle Simulator: Model Mark VI
Heavy Vehicle Simulator: Model Mark VI (cont)

- Dynatest Consulting Inc.
- $12.4 \pm 2 \text{ mph} \ (20 \pm 3.2 \text{ km/h})$
- $6.744 \text{ lb} \ (30 \text{ kN}) \text{ to } 22,500 \text{ lb} \ (100 \text{ kN})$
- Bi-directional / 24,000 passes in a 24 hrs.
- Uni-directional with 12,000 passes in 24 hrs.
Dynatest Software

- Total number of passes: 10,320
- Average Load: 9 kips
- Average Speed: 4 mph
National Instrument’s
Data Acquisition System Components

• LabVIEW Software:
  – Gather, analyze, display, and manage the measured data
LabVIEW: Strain Measurements
LabVIEW: Temperature Measurements
LabVIEW: Load Measurements
LabVIEW: LVDT
Monitor Station

Video Insight - Monitor Station

Advancing Transportation Through Innovation
Pavement Test Sections

- HVS-L1CC
- Bay 1: HVS Control Room
- Power Source
Pavement Test Sections Dimensions

- Test Section: 60 ft. x 300 ft. (18 m x 92 m)
- # Lanes: 6 lanes
- Width: 10 ft. (3 m)
Pavement Structure Construction

- Soil tested with FWD
- Replaced with 3 layers of 6 inches of aggregate base 21-B with geogrids between each layer.
- New soil with CBR of 7.5 above the 18 inches of 21-B
## Cold Central Plant Recycled Mix
### Lane 1 and 2

### Purpose
- Test the performance of a recycle mixture that contains a 5 inches CCPR base with different surface thicknesses.

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<th>Lane 1</th>
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<tr>
<td>1</td>
<td>1.5” SM</td>
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<td>2</td>
<td>5” CCPR</td>
<td>6” 21B</td>
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<td>CBR 7.5</td>
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High Asphalt Binder Content Mixture
Lane 3 and 4

- **Purpose:**
  - Evaluate the performances of mixtures designed with highly-modified asphalt content binder compacted at a low number of gyrations (50) vs a control section (65)
Reflective Cracking
Lane 5 and 6

Purpose:
- Evaluate the initiation and propagation of cracks reflected in 4 types of mixtures:
  1. SMA (control)
  2. Arizona asphalt rubber-wet blended
  3. Binder modified with high content of polymer
  4. Fibers

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Pavement Structure Layout

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6” 21B

6” 21B

6” 21B

Soil
Instruments Location

- Pressure Cell
- Thermocouple
- Strain Gauge

AC 1
AC 2
Base
Subgrade
Experiment Schedule

• Lane 4 Cell A—under study and expected to finish by the end of July 2017.
• Construction of 4 surface mixes in lane 5 and 6 will start late August 2017
Summary

• HVS must be monitored and maintained 24/7
  – Daily lubrication and inspection of data acquisition system.
• Daily climatic conditions should be recorded
• Processing and analysis of the data collected should be recorded both numerical and by visual inspection of the pavement deterioration.
Summary (cont.)

• Laboratory testing should be done by characterization from core.
• Profile readings should be taken every 24 hours to measure the depth changes.
• During thunderstorm, retained water on the surface of the tested section should be removed due to the possible reading error.
• Number of cycles should be recorded daily to estimate the rut depth.
Thank you!