A Low Volume Test Road for Ohio

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ODOT Mission Statement

To provide easy movement of people and goods from place to place, we will . . .

1. Take Care of What We have
   - ODOT is moving from reactive, or “worst first”, to preventive maintenance, “selecting the right treatment for the right pavement at the right time”

2. Make Our System Work Better
   - Training will ensure quality is maintained as ODOT transitions to preventive maintenance

3. Improve Safety
   - Concern about skid resistance of chip seal, microsurfacing and fine graded polymer asphalt concrete

4. Enhance Capacity
Test Roads in Ohio have been valuable

- The value of test roads was demonstrated on the Ohio/SHRP Test Road on US 23 in Delaware County and on US 30 in Wayne County.
Ohio SHRP Test Road – DEL-23

- Constructed 1994-1996
  - 19 AC and 21 PCC sections initially
    - Different mixes, layer thicknesses, base materials, drainage, etc.
  - Sections replaced with new experiments as recently as 2012
- Perpetual pavement
- Ohio led consortium of six universities
- $17 Million+ research effort
Other Test Roads in Ohio

• US Route 30: Wooster, Wayne County
  – Perpetual AC pavement
  – Long-lived PCC pavement
• I-77: Canton, Stark County
  – Perpetual AC pavement
• State Route 2: Erie County
  – PCC joint spacing
  – Free draining base evaluation
• State Route 541: Guernsey County
  – Warm Mix Asphalt
Other Test Roads in Ohio

• US Route 50: Athens
  – PCC joint seal experiment
  – Alternative dowel bar material

• US Route 33: Athens County
  – PCC joint seal/no seal

• US Route 33: Nelsonville
  – Use of large coarse aggregate in PCC

• US Route 33: Logan County
  – Free draining base evaluation
Workshop on Design and Rehabilitation of Local Roadways for Ohio’s Counties

Held April 28, 2015 at Cherry Valley Lodge in Newark, Ohio

List the top three issues you have with the pavement network in your jurisdiction

- 36%: alignment/ride quality
- 27%: material durability/performance
- 21%: poor drainage/no base
- 6%: rehab timing
- 3%: tree canopy
- 3%: High ADT

Attended by representatives from counties, cities, ODOT, industry, and consultants
Low Volume Roads in Ohio

• Most of the road inventory in state and local jurisdictions is classified as local roads, less than 6000 ADT*

* “Sustainable Roadway Widening Practices”, Douglas Davis, Muskingum County Engineer
Preventive Maintenance

• Providing protection against aging and oxidation of bituminous surfaces
• Restoring surface integrity
• Improving surface texture
• Preventing or slowing down infiltration of moisture and incompressibles

Preventive Maintenance Treatments

- Asphalt
  - Crack seal
  - Fog seal
  - Chip seal
  - Slurry seal
  - Cape seal
  - Thin overlay
  - Microsurfacing

- Concrete
  - Diamond grinding
  - Diamond grooving
  - Undersealing
  - Dowel retrofit

Site Chosen for Low Volume Test Road

- **VIN-50**
  - 5.40 miles
  - Composite
  - 2080 ADT
  - 20 year design ESAL
    - Rigid - 1.5 million
    - Flexible - 0.9 million
2 Lane Road on 4 Lane Right-of-Way

• Construction
  – Preventive maintenance on existing lane
  – Recycled and new material in newly constructed lanes adjacent to existing lanes
  – Include control sections in newly constructed lanes to provide future preventive maintenance test sections
VIN-50 Soil Borings

Predominately A-4 and A-6 soils
# Phase I - Low Volume Road Rehabilitation Techniques

<table>
<thead>
<tr>
<th>Construction sequence</th>
<th>Treatment</th>
<th>Layer</th>
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<tbody>
<tr>
<td>Phase 1: Rehabilitation, bi-directional</td>
<td>SAMI - VRAM</td>
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<tr>
<td></td>
<td>SAMI - chip seal</td>
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<td>SAMI - low void asphalt concrete</td>
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<td>Modified gradations</td>
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<td>Open Graded Friction Course</td>
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<td>RAP (30%) modified with rejuvenator</td>
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<tr>
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<td>RAP (40%) modified with rejuvenator</td>
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<td>RAP (50%) modified with rejuvenator</td>
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## VIN-50 Plans

### TREATMENT TABLE

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<tr>
<th>Build-up Station</th>
<th>Build-up End Station</th>
<th>Experiment</th>
<th>Description</th>
<th>Surface Type</th>
<th>Thickness</th>
<th>Intermediate Type</th>
<th>Thickness</th>
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### NORMAL TANGENT SECTION - OVERLAY

**EXISTING ASPHALT**

**SUGGESTED TREATMENT**

**SAFETY EDGE DETAIL**

1. Existing Pavement
2. Safety Edge
3. Surface Treatment
4. Safety Edge
5. Existing Pavement
6. Safety Edge
7. Surface Treatment
8. Safety Edge
9. Existing Pavement
10. Safety Edge
11. Surface Treatment
12. Safety Edge
13. Existing Pavement
14. Safety Edge
15. Surface Treatment
16. Safety Edge
17. Existing Pavement
18. Safety Edge
19. Surface Treatment
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21. Existing Pavement
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27. Surface Treatment
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33. Existing Pavement
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57. Existing Pavement
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59. Surface Treatment
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63. Surface Treatment
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83. Surface Treatment
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133. Existing Pavement
134. Safety Edge
135. Surface Treatment
136. Safety Edge
137. Existing Pavement
138. Safety Edge
139. Surface Treatment
140. Safety Edge

VIN-50 Plans

LEGEND

A. EXISTING ASPHALT CONCRETE
B. EXISTING PORTLAND CEMENT CONCRETE
C. ITEM 441 - ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64-22 (448) 10/7
D. ITEM 407 - TACK COAT FOR INTERMEDIATE COURSE (10.05 GAL./20.0 SQ.
E. ITEM 440 - ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG64-22 (448) 10/7
F. ITEM 407 - TACK COAT (10.07 GAL./20.0 SQ.
G. ITEM 441 - ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 3, PG64-22 (448) 10/4
H. ITEM 201 - PREPARING SUBGRADE FOR SHOULDER PAVING, A.P.P.
I. ITEM 601 - COMPACTED AGGREGATE
J. ITEM 408 - PRIME COAT
K. ITEM 605 - SPRAYED MEMBRANE (SAND/PRIM)
L. ITEM 402 - SINGLE CHIP SEAL
M. ITEM 803 - OPEN GRADED FRICTION COURSE, A.P.P.
N. ITEM 604 - ASPHALT CONCRETE THINLAY 10/7
O. ITEM 600 - LOW VOID ASPHALT CONCRETE 10/7
P. ITEM 442 - ASPHALT CONCRETE SURFACE COURSE, 9.5 MM, TYPE B, (448), A.P.P. 10/7
Q. ITEM 442 - ASPHALT CONCRETE INTERMEDIATE COURSE, 9.5 MM, TYPE B (448), A.P.P. 10/7
VIN-50 – Full depth concrete repair
VIN-50 – Chip seal
Testing

- QC/QA testing on site
- Field Data Collection
  - FWD
  - LWD
  - DCP
  - PSPA
  - Coring
- Laboratory Testing
  - Binder properties
  - Mechanical properties
<table>
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<tr>
<th>Test</th>
<th>Material</th>
<th>reason for test</th>
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<tbody>
<tr>
<td>QC tests per ODOT CMS 441.09</td>
<td>x  x  x  x  x  x</td>
<td>confirm contractor and ODOT measured values</td>
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<tr>
<td>Mat Density per ODOT Supplement 1055</td>
<td></td>
<td>confirm contractor and ODOT measured values</td>
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<tr>
<td>Semi-circular bending per AASHTO TP 105</td>
<td>x  x  x  x</td>
<td>measure cracking potential of mix</td>
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<tr>
<td>Indirect Tension per AASHTO T 283</td>
<td>x  x  x  x</td>
<td>measure flexural strength and moisture susceptibility of mix</td>
</tr>
<tr>
<td>Creep compliance</td>
<td>x  x  x  x</td>
<td>measure rutting potential of mix</td>
</tr>
<tr>
<td>Asphalt Pavement Analyzer (cores)</td>
<td>x  x  x  x</td>
<td>measure rutting potential of mix</td>
</tr>
<tr>
<td>Asphalt Pavement Analyzer (gyratory sample)</td>
<td>x  x  x  x  x  x</td>
<td>measure rutting potential of mix</td>
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<tr>
<td>Dynamic Modulus per AASHTO TP 62</td>
<td>x  x  x  x</td>
<td>measure stiffness of mix</td>
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<tr>
<td>PSPA</td>
<td>x  x  x  x</td>
<td>measure stiffness of mix</td>
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<tr>
<td>Boiling Test</td>
<td>x</td>
<td>measure aggregate/binder compatibility</td>
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<tr>
<td>Sand Test</td>
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<td>Determine macrotexture of layer</td>
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<tr>
<td>Infrared Thermography</td>
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<td>Evaluate uniformity of surface temperature during placement</td>
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<td>Ground Penetrating Radar (GPR)</td>
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<td>Determine Layer Thicknesses</td>
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<tr>
<td>Dynamic Cone Penetrometer (DCP)</td>
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<td>Determine layer stiffness with depth</td>
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<tr>
<td>Weather Station</td>
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<td>Provide climatic data for analysis</td>
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Long Term Performance Monitoring

• Manual Distress Survey
  – cracking

• Pathrunner multisubsystem van
  – Images
  – Rutting
  – Ride quality

• Skid
  – Skid number
Phase II and III - Low Volume Road Reconstruction and New Construction Techniques

• Reconstruction/new construction techniques being considered
  – Recycled asphalt
  – Recycled concrete
  – RCC
  – PCC with macrofiber
  – Chip seal
Low Volume Test Road Benefits

Short term benefits:

– Improved design procedures and construction specifications
– Training for ODOT and local personnel
– Effect of various PM treatments on texture and skid
– Test and evaluate drainage structures, e.g. pipes

Long term benefits:

– Increased use of recycled materials
– Improved pavement drainage systems
– Validation of completed research
Questions?
Create for Good.