Ultra Thin Bonded Wearing Course & Alternatives

Vince Galletti
Quality Control Manager
March 1, 2017
Thin Lift Pavements

• Overlays used for Pavement Preservation
  • Thin: < 1.5 inch
    • HPTO, OGFC, 9.5mm SMA, 9.5mm HMA
  • Ultra-Thin: < 1 inch
    • Micro-surfacing, UTBWC, 4.75mm, Chip Seal
SHA Goals & Objectives

- Preserve the value of the Maryland Highway & Interstate System
- Minimize the impact to the traveling public
- Thin Lifts Require Increased Bond Strength to Resist Shear Forces
- Delay the Reflective Cracking Hidden by the Gallons of Crack Sealant

\[
\begin{array}{ll}
\text{Interstate} & 2,786 \text{ LM} \\
\text{Highway} & 14,711 \text{ LM}
\end{array}
\]
Contractor’s Goals & Objectives

• Utilize Current Mixes
• Utilize Currently Available Aggregate sizes
• Utilize Currently Available Equipment
• Minimize the Intrusion to the Traffic Flow
Maryland SHA Pilot Project
Objective: Evaluate the Viability, Cost/Benefit Ratio, & Performance Thin Asphalt Lift Overlays

- 1” 9.5mm PG64E-22, HDFV, Level 1 placed with a high residual tack coat
- ¾” - 4.75 mm PG64E-22, HDFV, Level 1 placed with a high residual tack coat
- Open Graded Friction Course placed with a high residual tack coat.
- High Performance Thin Overlay (HPTO)
- Ultrathin Bonded Wearing Course
Scope

- MDSHA OMT to evaluate proposed pavement designs
- Field Trials
- Locations to be determined
- Materials must be current and approved
- Current specifications may need to be updated and/or revised
Plan of the Study

• Mix Design and Testing
• Construction Documentation
• Identify and Designate Test Sections
Mix Design & Testing

• Develop a mix design for approval at least 30 days before placement
• Test Section, minimum 200 ton for each
• Sampled from the truck at the plant
• OMT Mix and Binder Lab will test mix, binder and tack samples
• Producer will test mix samples
Testing for:

- VMA
- Asphalt Content
- Gradation/Percentage of RAP
- Air Voids
- TSR, via 9.5mm
- Core Density or Thin Lift Gauge for lift thickness > .75 inch
- PG Binder, any additive used
- Emulsion/Tack Coat
- Cracking Durability, Test to be outsourced
- Bond Strength
- Drain down test for Gap and OGFC, at mix design process and periodically throughout
Construction Documentation

• Following Items will be collected and reported:
  • Plant Type
  • Plant Temperatures
  • Stockpile moisture contents
  • Haul time
  • Weather conditions at time of paving
  • Job Mix Formula sheet for each mix placed
Identify & Designate

• Pavement and Geotechnical Division to identify the underlying pavement structure
• Note any existing problems
• Also provide original pavement design, Construction & Maintenance history, etc.
• Beginning and ending stations will be marked
• Determine if milling is required
• Photos/videos will be taken of work progress.
Benefit – Cost Analysis

• An analysis will be accumulated on each thin lift option
• Life extension and comparative costs
Study Period & Reporting

• Evaluated on:
  • Initial Construction experience
  • Test results
  • Bi-annual Comparison of pavement conditions
  • Post construction testing

• Office of Materials Technology:
  • Field condition surveys, bi-annual
  • Study and collect data for 5 years (maybe)
5 Years (maybe)

- Performance
- Maintenance
- Cost-benefit
- Durability

- All will guide MD SHA as to the extension or shortening of study
Final Report

• A final report, including recommendations for future use of the proposed pavement designs will be submitted 3 months after completion of the study
Mixes Revisited

• 1” 9.5mm PG64E-22, HDFV, Level 1 placed with a high residual tack coat
• ¾” - 4.75 mm PG64E-22, HDFV, Level 1 placed with a high residual tack coat.
• Open Graded Friction Course placed with a high residual tack coat.
• High Performance Thin Overlay (HPTO)
• Ultrathin Bonded Wearing Course
1” 9.5mm PG64E-22, HDFV, Level 1 placed with a high residual tack coat

- Most if not all producers have a 9.5mm
- Polymer modified asphalt
- High Residual Tack Coat
¾” - 4.75 mm PG64E-22, HDFV, Level 1 placed with a high residual tack coat

- Some producers may have
- Polymer modified asphalt
- High Residual tack coat
Open Graded Friction Course placed with a high residual tack coat

- Special Mix
- Polymer modified asphalt?
- High residual tack coat
High Performance Thin Overlay (HPTO)

- Special Mix
- Special aggregates
- Polymer Modified Asphalt
Ultrathin Bonded Wearing Course

- Special Mix
- Special aggregate
- Polymer Modified Asphalt
- Special Tack
- Specialized equipment
- Very few Lay Down Contractors
Something to Think About

• Would it be better to pay out more up front for a longer service life
  • Patching, Milling & Overlay
• Thin Lifts would only be a stop-gap measure, Pavement Preservation
A little Dollars & Cents (Sense)

• Material Costs and Contributions

<table>
<thead>
<tr>
<th></th>
<th>Structural Layer Cost</th>
<th>Structural Coefficient</th>
<th>Depth (in)</th>
<th>SLC</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> Ultra Thin Bonded Wearing Course (UTBWC)</td>
<td>$6.28</td>
<td>$144.00</td>
<td>@ 0.75</td>
<td>0.18</td>
<td>0.135</td>
</tr>
<tr>
<td><strong>B</strong> Ultra Thin Bonded Wearing Course (UTBWC)</td>
<td>$6.50</td>
<td>$149.00</td>
<td>@ 0.75</td>
<td>0.18</td>
<td>0.135</td>
</tr>
<tr>
<td><strong>C</strong> Ultra Thin Bonded Wearing Course (UTBWC)</td>
<td>$6.32</td>
<td>$145.00</td>
<td>@ 0.75</td>
<td>0.18</td>
<td>0.135</td>
</tr>
<tr>
<td>SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE PG 64E-22</td>
<td>$7.27</td>
<td>$83.41</td>
<td>@ 1.5</td>
<td>0.44</td>
<td>0.66</td>
</tr>
<tr>
<td>SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE PG 64S-22</td>
<td>$6.47</td>
<td>$74.20</td>
<td>@ 1.5</td>
<td>0.44</td>
<td>0.66</td>
</tr>
<tr>
<td>SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE PG 64E-22</td>
<td>$6.06</td>
<td>$83.41</td>
<td>@ 1.25</td>
<td>0.44</td>
<td>0.55</td>
</tr>
<tr>
<td>SUPERPAVE ASPHALT MIX 9.5MM FOR SURFACE PG 64S-22</td>
<td>$5.39</td>
<td>$74.20</td>
<td>@ 1.25</td>
<td>0.44</td>
<td>0.55</td>
</tr>
<tr>
<td><strong>SMA</strong></td>
<td>$7.90</td>
<td>$90.57</td>
<td>@ 1.5</td>
<td>0.44</td>
<td>0.66</td>
</tr>
<tr>
<td><strong>SMA</strong></td>
<td>$6.58</td>
<td>$90.57</td>
<td>@ 1.25</td>
<td>0.44</td>
<td>0.55</td>
</tr>
<tr>
<td><strong>SMA</strong></td>
<td>$5.26</td>
<td>$90.57</td>
<td>@ 1</td>
<td>0.44</td>
<td>0.44</td>
</tr>
</tbody>
</table>
KEEP CALM AND LISTEN TO FRANK SINATRA