6.3mm Thin Asphalt Overlay (Thin Hot Mix Asphalt Overlay or Thinlay)

Neal Fannin
Pavement Materials Engineer
CMD
Research Project on THMAO

• Four Year Project: June 2012 – June 2016

- District 8-0, Dauphin County, SR 0022
- District 8-0, Lancaster County, SR 0230
- District 3-0, Lycoming County, SR 0220
Specification features

- New section 412 in Pub. 408
  - SUPERPAVE MIXTURE DESIGN, CONSTRUCTION OF PLANT-MIXED HMA/WMA 6.3MM THIN ASPHALT OVERLAY COURSES

- Pub 242 changes
  - Usage guidance in chapter 5.
  - Changes to add this new material to chapters 9, 10, 11, & 12.
Specification features

- **Aggregates: Changes to Section 703**
  - **SRL**
    - **Coarse Aggregate** – SRL as listed in Bulletin 14.
      - AASHTO #89 and #9 aggregate gradations being added to Pub. 408, Section 703.
      - AASHTO #9 aggregate will need to be sampled and pass quality and SRL testing to be used in 6.3mm asphalt.
      - AASHTO #89 aggregate will be approved based on the AASHTO #8 aggregate quality test results.

- **Fine aggregate** –
  - **Manufactured fine aggregate** must be manufactured from the same parent rock as SRL rated coarse aggregate.
  - **Natural Fine Aggregate** – Must be sent for SRL determination.
Specification features

• Aggregates:
  – Consensus properties:
    • Same as superpave except:
      – Flat and Elongated Maximum 10 percent for 1:5 ratio, and
        Maximum 20 percent for 1:3 ratio.

• Can make WMA or HMA.

• RAP & RAS
  – No RAP or RAS allowed
Specification features

- Design Gyrations for all roadways = 75
- Design VMA = 16.5% minimum
- Drain down test (AASHTO 305) required for mixes with greater than 7.0% asphalt content.
- Binder grade is PG 76-22 only. Possible future inclusion of PG 64-22.
Specification features

• Mixture Acceptance:
  – Certification or Lot.
    • Lot acceptance includes
      – Asphalt content.
      – Percent passing 200 sieve.

• Density Acceptance:
  – Optimum rolling pattern
    • Information only density core taken from the first lot and sent to LTS.
Specification features

• Tack coat:
  – Proper application and adequate quantity's of tack are very important for thin asphalt layers.
  – New tack specification SOL 481-17-01.

• Weather limitations:
  – Air and Surface Temperatures 50° and rising.
  – For paving season extensions, compaction needs to be completed in less than 10 minutes.
THMAO Project - N. Cameron Street, WB, Passing Lane
Mat Temperature (Spot Measurement) - 7/23/12 - 7/24/12

Mat Temperature, °F

Elapsed Time from Placement, minutes

Data is courtesy of Mr. Garry Hoffman

Pavecool Prediction (Wind Speed = 5 mph)

Location 1

Location 2

Location 3
Thinlay Compaction

### PaveCool 3.0 Report

**Project:** 6.3mm Thinlay

<table>
<thead>
<tr>
<th>Date &amp; Time</th>
<th>Start Rolling*</th>
<th>Stop Rolling*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3/2017 9:25 AM</td>
<td>2 minutes (248 °F)</td>
<td>15 minutes (175 °F)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mix Type</th>
<th>Binder Grade</th>
<th>Thickness</th>
<th>Delivery Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine/Dense</td>
<td>PG 76-22</td>
<td>1.00 in.</td>
<td>300 °F</td>
</tr>
<tr>
<td><strong>Air Temp.</strong></td>
<td><strong>Wind Speed</strong></td>
<td><strong>Sky</strong></td>
<td><strong>Latitude</strong></td>
</tr>
<tr>
<td>70 °F</td>
<td>5 mph</td>
<td>Clear &amp; Dry</td>
<td>41 ° North</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Existing Surface</th>
<th>Moisture</th>
<th>State</th>
<th>Surface Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt</td>
<td></td>
<td></td>
<td>110 °F</td>
</tr>
</tbody>
</table>

![Graph](image-url)

**15 Minutes**
## Thinlay Compaction

### PaveCool 3.0 Report

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<td>1/3/2017 9:25 AM</td>
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<td>10 minutes (175 °F)</td>
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<td>Asphalt</td>
<td></td>
<td></td>
<td>70 °F</td>
</tr>
</tbody>
</table>

**Mix Temperature, °F**

- Cooling Curve
- Start Rolling
- Stop Rolling

**Graph:**

10 Minutes
# Thinlay Compaction

## PaveCool 3.0 Report

<table>
<thead>
<tr>
<th>Date &amp; Time</th>
<th>Start Rolling*</th>
<th>Stop Rolling*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/9/2017 10:20 AM</td>
<td>2 minutes (248 °F)</td>
<td>9 minutes (175 °F)</td>
</tr>
</tbody>
</table>

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<thead>
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<tbody>
<tr>
<td>Fine/Dense</td>
<td>PG 58-34</td>
<td>1.00 in.</td>
<td>300 °F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Air Temp.</th>
<th>Wind Speed</th>
<th>Sky</th>
<th>Latitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 °F</td>
<td>5 mph</td>
<td>Clear &amp; Dry</td>
<td>41 ° North</td>
</tr>
</tbody>
</table>

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</tr>
</thead>
<tbody>
<tr>
<td>Granular Base</td>
<td>Dry</td>
<td>Unfrozen</td>
<td>50 °F</td>
</tr>
</tbody>
</table>

![Graph showing cooling curve]

- **9 Minutes**
# PaveCool 3.0 Report

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<tr>
<td>1/3/2017 9:25 AM</td>
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<td>7 minutes (175 °F)</td>
</tr>
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<th>Surface Temp.</th>
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<tbody>
<tr>
<td>40 °F</td>
<td>5 mph</td>
<td>Clear &amp; Dry</td>
<td>41° North</td>
<td>40 °F</td>
</tr>
</tbody>
</table>

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<td>Asphalt</td>
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**Mix Temperature, °F**

- Cooling Curve
- Start Rolling
- Stop Rolling

Increasing the thickness to 1.5 inches increases time available to 14 minutes.
Where Is Use of Thin Asphalt Appropriate?

- **Roadway Conditions:**
  - Good base condition, well repaired base,
  - Patched pavement in good condition
  - Minor base depressions

- **6.3mm thin asphalt overlay can help with:**
  - Excessive roughness,
  - Poor surface friction and polishing,
  - Bleeding and weathering,
  - Shoving/ low severity surface related rutting,
  - Minor/Moderate Raveling,
  - Bumps, settlements, and heaves.
  - Scratch / interlayer.
Where Is Thin Asphalt Use NOT Appropriate?

- Base problems
- Alligator cracking,
- High severity rutting,
- High severity longitudinal cracking,
- Active cracking.
Summary

- Thin Asphalt A Good Tool for Surface Treatment.
- Improved Ride and Friction.
- Minimal Rutting Observed.
- Reflective cracking will occur.
Summary

- Proper Base Repair is a MUST.
- Pay special attention to tack coat application.
- Thin layers loose heat faster and need to be compacted sooner. (Within 10 minutes.)
Current Status

- First round Clearance Transmittal comments were due 12/28/2016.
- Second round Clearance Transmittal will be out in a month or so.
Questions?