Using Pave-IR to detect **Thermal Segregation** in Asphalt Paving
Significant temperature differentials exist in many projects due to many possible root causes

Courtesy of Jeff Uhlmeyer, WSDOT
Sources of Temperature Differentials: End Dump Trucks

Courtesy of Jeff Uhlmeyer, WSDOT
Sources of Temperature Differentials: Extended Paver Stops

Courtesy of Jeff Uhlmeyer, WSDOT
Sources of Temperature Differentials: Streaks

Courtesy of Jeff Uhlmeyer, WSDOT
TEMPERATURE DIFFERENTIALS

Sources of Temperature Differentials: Windrow Material Management

Courtesy of Jeff Uhlmeyer, WSDOT
Thermal segregation is a major problem in asphalt paving quality
Cold spots tend to be low density
These locations hold water
These locations often begin with a coarser texture and ravel
Ultimately loss of fatigue life occurs
Type D HMA. More compaction effort is necessary as temperature decreases (Source TTI)
What We’ve Learned
The Invisible Reality
Results
Cause
Results
Cause
Making The Invisible Visible

WHAT IS NEEDED?

- Easy jobsite documentation tool
- Full thermal profile of mat
- Real-time visualization of process

TO ....

- Identify thermal segregation problems
- Analyze root cause
- Make corrective action in the process
- Document as built quality
The Start of Pave-IR

Courtesy of Texas Transportation Institute
Moba Pave-IR Generation 1
Ongoing Development

- Easy daily installation
- Robust
- Out of the crew’s way
- Single sensor for high accuracy differential measurements
Pave-IR Scan System

2nd generation Pave-IR Scanner system
Moba is on site for two – three days. Covering installation and daily set-up.
Starting a Project

Roadway-ID: Moritzburger Str
Start location: Dresden
Layer: 1
Creation date: 29.07.2014 - 13:18:09

Roadway-ID: Pieschener Allee
Start location: Dresden

Roadway-ID: Freiberger Str
Start location: Dresden
Enter Correct Offset and Scan Area

Adjust scan width

Max. paving width: 10,66 ft

4.1 ft

6.56 ft
How can we use the thermal image to determine the type of segregation and take steps to remedy or lessen the amount of variability.
### Real-Time Analysis Screen

#### Thermal Profile Results Summary

<table>
<thead>
<tr>
<th>Number of Profiles</th>
<th>Moderate [25°F; 50°F]</th>
<th>Severe &gt;50°F</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>54</td>
<td>6</td>
<td>11</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Recent Test Result

<table>
<thead>
<tr>
<th>Beginning Location</th>
<th>Ending Location</th>
<th>Temp Differential</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>150</td>
<td>20.3</td>
<td></td>
</tr>
</tbody>
</table>

*Image of a thermal profile analysis screen showing number of profiles and test results.*
Using the Tool

Information necessary to make informed decisions on necessary changes to the process. The ability to see if those changes result in the desired effect.
How Do I Know What Changes to Make?

Best Practices

Run through a mental checklist

- End Dumping
- Windrow
- MTV
- Paver Set Up

Post Processing Software

Pave Project Manager