Percent Within Tolerance
Acceptance of Asphalt Pavements

Steven L. Koser, P.E.
Bureau of Maintenance and Operations

Adam M. Ostinowsky, E.I.T.
Urban Engineers, Inc.
Continuation of the Goal of Increased Quality

- Target: Drive product consistency focused on job mix formula (JMF) (50% lot pay factor)
- Tighter adherence to field density spec. requirements (50% lot pay factor)
Two (2) Methods in Use

1. **PWT-LTS (Laboratory Testing Section)**
   - Acceptance at LTS
   - Gmm Verification included on Federally Funded and NHS Projects

2. **PWT-HOLA (Hands On Local Acceptance)**
   - Department Acceptance, Contractor Lab
   - Department Option to Witness Only on 100% State Funded and Non-NHS Projects
   - Gmm Verification included on Federally Funded and NHS Projects. (Conducted at Local Lab)
Where can PWL be applied?

- Applicable to all bituminous paving items of Sections 309, 311, 316, 409, 410, and 411

- NOT applicable to:
  - Shoulders falling under Section 650 Items
  - Stone Matrix Asphalt (SMA)
  - Crumb Rubber Modified Asphalt Binder
  - Gap-Graded Asphalt Rubber Mixtures,
  - 6.3mm Thin Asphalt Overlay Courses
  - 4.75mm Asphalt Mixtures
  - Asphalt Warranty Pavements
A Group Effort
Implementation and Monitoring

2016
Contractors – 32 ea.
Plants – 57 ea.

2016 Lot Pay Factor (% of Asphalt Plants)
- Incentive: 72%
- 100%: 16%
- Disincentive: 12%

2017
Contractors – 54 ea.
Plants – 92 ea.

2017 Lot Pay Factor (% of Asphalt Plants)
- Incentive: 75%
- 100%: 9%
- Disincentive: 16%

2018
Contractors – 56 ea.
Producers – 99 ea.

2018 Lot Pay Factor (% of Asphalt Plants)
- Incentive: 71%
- 100%: 7%
- Disincentive: 22%
### Percent Within Limits (PWL)
#### 3 – Year Summary

<table>
<thead>
<tr>
<th></th>
<th>PWT SUMMARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>2016</td>
</tr>
<tr>
<td>Number of PWT Projects Let</td>
<td>157</td>
</tr>
<tr>
<td>Number HOLA</td>
<td>24</td>
</tr>
<tr>
<td>Number LTS</td>
<td>133</td>
</tr>
<tr>
<td><strong>Average Pay Factors (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Asphalt Content</td>
<td>101.27</td>
</tr>
<tr>
<td>Primary Control Sieve</td>
<td>100.25</td>
</tr>
<tr>
<td>#200 Sieve</td>
<td>101.12</td>
</tr>
<tr>
<td>Density (Cores)</td>
<td>102.03</td>
</tr>
<tr>
<td>Average Density</td>
<td>94.2</td>
</tr>
<tr>
<td>Average Overall Lot Pay Factor (%)</td>
<td>1.01</td>
</tr>
<tr>
<td>Incentive ($)</td>
<td>$1,312,864.97</td>
</tr>
<tr>
<td>Disincentive ($)</td>
<td>-$467,422.49</td>
</tr>
</tbody>
</table>
Comparison of Lot Payments
3 – Year Summary

Breakdown of ALL PWT Lots
3 Seasons of PWT

Breakdown of PWT-LTS PWT Lots
3 Seasons of PWT

Breakdown of PWT-HOLA PWT Lots
3 Seasons of PWT
Percent Within Limits (PWL)  
3 – Year Summary

Asphalt Content (AC)  
(30% of Overall Lot Pay Factor)
Percent Within Limits (PWL)
3 – Year Summary

#200 Sieve
(10% of Overall Lot Pay Factor)

#200 Sieve Avg. from JMF (Absolute Value)

Avg. #200 Standard Deviation
Percent Within Limits (PWL)
3 – Year Summary

Primary Control Sieve (PCS) (10% of Overall Lot Pay Factor)
Percent Within Limits (PWL)
3 - Year Summary

Density
(50% of Overall Lot Pay Factor)

Avg. Density

Avg. Density SD

2016  2017  2018
Good

2016  2017  2018
Non-PWT
PWT

Non-PWT
PWT

1.610  1.590  1.570  1.550  1.530  1.510  1.490  1.470  1.450  1.430

0.947  0.946  0.945  0.944  0.943  0.942  0.941  0.940  0.939  0.938

Pennsylvania Department of Transportation
www.dot.state.pa.us
Average Density Pay Factor by BPN
3 – Year Summary of Density Cores

(50% of Overall Lot Pay Factor)
# 9.5mm 3-Year Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average PWT Pay Factors (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphalt Content Pay Factor</td>
<td>101.30</td>
<td>101.38</td>
<td>101.10</td>
</tr>
<tr>
<td>Primary Control Sieve</td>
<td>100.19</td>
<td>98.90</td>
<td>99.36</td>
</tr>
<tr>
<td>#200 Sieve</td>
<td>101.76</td>
<td>100.42</td>
<td>100.29</td>
</tr>
<tr>
<td>Density (Cores)</td>
<td>102.44</td>
<td>102.66</td>
<td>102.68</td>
</tr>
<tr>
<td>Average Density</td>
<td>94.3</td>
<td>94.5</td>
<td>94.5</td>
</tr>
<tr>
<td>Average Overall Lot Pay Factor (%)</td>
<td>1.02</td>
<td>1.02</td>
<td>1.02</td>
</tr>
</tbody>
</table>

![9.5mm AC Pay Factor by OCF (2017 and 2018 PWT Data)](chart.png)

---

**Pennsylvania Department of Transportation**

www.dot.state.pa.us
9.5mm
3 - Year Summary

Avg Asphalt Content SD

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWT</td>
<td>0.13</td>
<td>0.14</td>
<td>0.12</td>
</tr>
<tr>
<td>Non-PWT</td>
<td>0.15</td>
<td>0.16</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Avg #200 Sieve SD

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWT</td>
<td>0.36</td>
<td>0.37</td>
<td>0.35</td>
</tr>
<tr>
<td>Non-PWT</td>
<td>0.40</td>
<td>0.41</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Avg Primary Control Sieve SD

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWT</td>
<td>1.60</td>
<td>2.40</td>
<td>1.80</td>
</tr>
<tr>
<td>Non-PWT</td>
<td>1.50</td>
<td>1.70</td>
<td>1.60</td>
</tr>
</tbody>
</table>

Avg. Density SD

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWT</td>
<td>1.40</td>
<td>1.55</td>
<td>1.60</td>
</tr>
<tr>
<td>Non-PWT</td>
<td>1.70</td>
<td>1.75</td>
<td>1.70</td>
</tr>
</tbody>
</table>

Good
### 12.5mm 3 - Year Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average PWT Pay Factors (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Asphalt Content Pay Factor</td>
<td>100.16</td>
<td>98.49</td>
</tr>
<tr>
<td></td>
<td>Primary Control Sieve</td>
<td>99.06</td>
<td>101.56</td>
</tr>
<tr>
<td></td>
<td>#200 Sieve</td>
<td>98.00</td>
<td>100.38</td>
</tr>
<tr>
<td></td>
<td>Density (Cores)</td>
<td>97.84</td>
<td>101.10</td>
</tr>
<tr>
<td></td>
<td>Average Density</td>
<td>94.0</td>
<td>94.3</td>
</tr>
<tr>
<td></td>
<td>Average Overall Lot Pay Factor (%)</td>
<td>0.99</td>
<td>1.00</td>
</tr>
</tbody>
</table>

![Graph showing 12.5mm AC Pay Factor by Oven Correction Factor (OCF) (2017 and 2018 PWT Data)](chart.png)
12.5mm
3 – Year Summary

Avg Asphalt Content SD

Avg #200 Sieve SD

Avg Primary Control Sieve SD

Avg. Density SD

www.dot.state.pa.us

pennsylvania
DEPARTMENT OF TRANSPORTATION
www.dot.state.pa.us
### 19mm 3 - Year Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average PWT Pay Factors (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphalt Content Pay Factor</td>
<td>102.33</td>
<td>101.60</td>
<td>101.33</td>
</tr>
<tr>
<td>Primary Control Sieve</td>
<td>100.60</td>
<td>99.63</td>
<td>101.30</td>
</tr>
<tr>
<td>#200 Sieve</td>
<td>101.75</td>
<td>102.46</td>
<td>101.38</td>
</tr>
<tr>
<td>Density (Cores)</td>
<td>102.58</td>
<td>103.66</td>
<td>103.70</td>
</tr>
<tr>
<td><strong>Average Density</strong></td>
<td>94.3</td>
<td>94.4</td>
<td>94.7</td>
</tr>
<tr>
<td><strong>Average Overall Lot Pay Factor (%)</strong></td>
<td>1.02</td>
<td>1.02</td>
<td>1.02</td>
</tr>
</tbody>
</table>

#### Graph:

**19mm AC Pay Factor by OCF**

- (2017 and 2018 PWT Data)

- **Legend:**
  - PWT-LTS
  - PWT-HOLA
  - PWT (Combined)
  - PWT-LTS (%)
  - PWT-HOLA (%)
19mm
3 – Year Summary

- Avg Asphalt Content SD
- Avg #200 Sieve SD
- Avg Primary Control Sieve SD
- Avg. Density SD
## 25mm 3 – Year Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average PWT Pay Factors (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphalt Content Pay Factor</td>
<td>100.84</td>
<td>99.97</td>
<td>100.85</td>
</tr>
<tr>
<td>Primary Control Sieve</td>
<td>100.88</td>
<td>101.00</td>
<td>101.46</td>
</tr>
<tr>
<td>#200 Sieve</td>
<td>100.41</td>
<td>101.89</td>
<td>100.73</td>
</tr>
<tr>
<td>Density (Cores)</td>
<td>103.51</td>
<td>103.67</td>
<td>103.90</td>
</tr>
<tr>
<td>Average Density</td>
<td>93.8</td>
<td>94.0</td>
<td>94.9</td>
</tr>
<tr>
<td>Average Overall Lot Pay Factor (%)</td>
<td>1.01</td>
<td>1.01</td>
<td>1.02</td>
</tr>
</tbody>
</table>

### 25mm AC Pay Factor by OCF (2017 and 2018 PWT Data)

- **PWT-LTS**
- **PWT-HOLA**
- **PWT (Combined)**
- **PWT-LTS (%)**
- **PWT-HOLA (%)**
25mm 3-Year Summary

Avg Asphalt Content SD

Avg #200 Sieve SD

Avg Primary Control Sieve SD

Avg. Density SD

Good
2018 After Action Review
Proposed Changes to PWT

- CT 1
- Standard Special Provisions
  - Changing PWT to PWL
  - Proposed change to Dispute Resolution
  - Contractor Elected Terminated Lots Maximum Pay Factor
  - Proposed revision of Density Limits for Partial Lots
  - Proposed revision of Density Limits for Calculating PWL
    - Standard 9.5 mm & 12.5 mm – Lower Limit from 91.5 to 92.0
    - RPS and Standard 9.5 mm & 12.5 mm – Upper Limit from 98.0 to 98.5
- Use Guidelines/Field Users Guide
  - Changing PWT to PWL
- eCAMMS
  - Multiple Ignition Oven Calibration Factors (PWT-HOLA)
2019 Construction Season

• PWL on **ALL Applicable** Paving Projects
• PWT becomes PWL
• Revised SSPs
• Revised Use Guidelines
• Revised Field Users Guide
Thank You!

• Please feel free to email your comments, questions and experiences.

Steve Koser  
skoser@pa.gov

Adam Ostinowsky  
c-aostinow@pa.gov
Questions?