Bituminous PWT
(Percent Within Tolerance)

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Quality

- PWT is a continuation of the Department’s goal of increased quality.
- Joint effort between the Department, FHWA and Industry
- 2016 was “A year to learn”
- Future of PWT
Typical 2,500 ton Lot

Sublot 1  |  Sublot 2  |  Sublot 3  |  Sublot 4  |  Sublot 5
Spec Limits and Goal Posts are Similar
“Percent within limits is the percentage of the lot falling between upper and lower specification limits. May refer to either the population value or the sample estimate of the population value.”
Quality Measure: Percent Within Tolerance (PWT)

- Efficiently captures mean and standard deviation in one quality measure

\( \bar{X} \) - mean

\( s \) - standard deviation (variability or dispersion)
Standard Deviation

- 68% of the data falls within 1 standard deviation of the mean (μ).
- 95% of the data falls within 2 standard deviations of the mean (μ).
- 99.7% of the data falls within 3 standard deviations of the mean (μ).
Standard Deviation

% Max. Theoretical Density

92 97

93.5 Target 94.5 95.5

3 1 2
Standard Deviation

% Max. Theoretical Density

92 97

Target 94.5
What Does PWT Drive?

- Tighter adherence to producing job mix formula
- Tighter adherence to field density spec. requirements
Advantages of PWT

• Well suited for low bids to achieve quality

• Contractors = **bonuses** for tighter adherence to targets

• Contractors = **reduced payments** for loose adherence to targets

• Moves focus to targets (NOT minimums/maximums)
What’s different with PWT spec?

• Adds **bonus** structure (maximum 4%)

• Adds **mix gradation** (PCS) as part of payment

• Modifies current “goal posts” approach for 100% payment (good or no good)

• Results in fewer 100% payments and spreads these out (bonus and penalty)
• **Current** specification (50% mix, 50% density)
  - 25% asphalt content
  - 25% #200 sieve
  - 50% field density

• **PWT** specification (50% mix, 50% density)
  - 30% asphalt content
  - 10% #200 sieve
  - **10% primary control sieve**
  - 50% field density
• **Defective lots** can be left in place at 70% pay by DE (previously 50% pay)

• **Allows contractor to terminate lot**
  - Allows contractor to limit risk when early QC results indicate an issue
  - Must stop paving
  - 90% maximum pay
  - Must R&R if defective by test results
Where can PWT be applied?

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

- NOT applicable to items such as Stone Matrix Asphalt (SMA), crumb rubber modified asphalt binder, gap-graded asphalt rubber mixtures, FJ-1 Wearing Courses, asphalt warranty pavements, etc.
• 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
   - Gmm Verification included on Federally Funded and NHS Projects.(Conducted at Local Lab)
• **Very similar** to **current process**

• Allows a **contractor option** to **expedite sample delivery** to Harrisburg
  - Inspection staff secures samples
  - Secure samples given to contractor
  - Contractor delivers to LTS at his cost
  - LTS verifies security prior to testing
  - 2-3 Standard Work Day Goal at LTS
• HMA/WMA Material samples collected as usual

• Acceptance testing performed at:
  • Proficient producers lab
  • or another mutually acceptable lab

• No LTS acceptance testing (except for dispute resolution situation)
Mixture Sample Collection

1. Contractor Pulls Sample
   - Representative Secures Sample
   - Representative Tests Sample Locally
   - Representative Splits Sample
   - LTS Tests IA Sample
2. Contractor Transports Sample
Contractor’s Lab Assessment

• Local acceptance lab will need on-site proficiency assessment by re:source (formerly AMRL)

• Every 2 years (from assessment date)

• Assessment on the equipment to be used for acceptance
Contract Adjustments

- Adjustments entered into ECMS
- “PWT-LTS” or “PWT-HOLA” Adjustment Types
- Attach eCAMMS Report
2016 PWT Summary

158 PWT Projects Let in 2016

<table>
<thead>
<tr>
<th>District</th>
<th>Total Active Project</th>
<th>SSP included in Advertisement</th>
<th>SSP Used on Project</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LTS</td>
<td>HOLA</td>
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<tr>
<td>1-0</td>
<td>9</td>
<td>9</td>
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<tr>
<td>2-0</td>
<td>3</td>
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<td>1</td>
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<td>8</td>
<td>7</td>
<td>1</td>
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<td>4-0</td>
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<tr>
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<td>8-0</td>
<td>25</td>
<td>23</td>
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<tr>
<td>12-0</td>
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<td>Total</td>
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<td><strong>73</strong></td>
<td><strong>12</strong></td>
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Industry Breakdown of Active Projects

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<thead>
<tr>
<th>Prime Contractors (ea.)</th>
<th>Suppliers (Plants) (ea.)</th>
<th>Paving Contractors (ea.)</th>
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<tbody>
<tr>
<td><strong>32</strong></td>
<td><strong>57</strong></td>
<td><strong>31</strong></td>
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### 2016 PWT Summary
(As of January 6, 2017)

<table>
<thead>
<tr>
<th></th>
<th>Overall Lot Payment Averages</th>
<th>Pay Factor Averages</th>
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<tbody>
<tr>
<td></td>
<td>Lots</td>
<td>Average Lot Payment</td>
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<tr>
<td>Total</td>
<td>452</td>
<td>1.01</td>
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<tr>
<td>PWT-HOLA</td>
<td>121</td>
<td>1.02</td>
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<tr>
<td>PWT-LTS</td>
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<td>1.01</td>
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### Average Density Pay Factor (Cores Only)

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>HOLA</th>
<th>LTS</th>
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<tbody>
<tr>
<td></td>
<td>Lots</td>
<td>Pay Factor</td>
<td>Lots</td>
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<td>BPN 3</td>
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<td>BPN 4</td>
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<td>102.60</td>
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## 2016 PWT Summary (As of January 6, 2017)

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<th></th>
<th>PWT</th>
<th>Sec. 409</th>
<th>PWT-HOLA</th>
<th>PWT-LTS</th>
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<tr>
<td>Bonus Pay Lots</td>
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<td>235</td>
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<td>100% Pay Lots</td>
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<td>420</td>
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<td>22</td>
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<td>Reduced Pay Lots</td>
<td>80</td>
<td>21</td>
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<td>68</td>
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<tr>
<td>Defective Lots</td>
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<td>11</td>
<td>0</td>
<td>6</td>
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<tr>
<td>Terminated Lots</td>
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<td>N/A</td>
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<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>452</td>
<td></td>
<td>121</td>
<td>331</td>
</tr>
</tbody>
</table>

### District Incentives Reductions

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<th>District</th>
<th>Incentives</th>
<th>Reductions</th>
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<tbody>
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<td>-$55,637.69</td>
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<td>2</td>
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<td>8</td>
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<td>12</td>
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<tr>
<td><strong>Total</strong></td>
<td>$1,168,105.23</td>
<td>-$454,604.65</td>
<td>$713,500.58</td>
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</table>
2016 PWT Summary
(As of January 6, 2017)

80 Reduced Pay Lots

- AC/Density/Gradation - 4 ea.
- Density/Gradation - 11 ea.
- AC/Density - 3 ea.
- Gradation - 11 ea.
- AC - 19 ea.
- AC/Gradation - 18 ea.

6 Defective Lots

- AC - 3 ea.
- Density - 3 ea.
2016 PWT Summary
(Data from January 1, 2015 – November 23, 2016)

(Sublot Acceptance Test Results for 9.5mm, 12.5mm, 19mm & 25mm Mixes, excludes SMA)
2016 PWT Summary
(Data from January 1, 2015 – November 23, 2016)

(Lot Acceptance Test Results for 9.5mm, 12.5mm, 19mm & 25mm Mixes, excludes SMA)

Average Density Standard Deviation

Average AC Standard Deviation

Average #200 Sieve Standard Deviation

Average PCS Standard Deviation

2015 2016 PWT

2015 2016 PWT

G O O D

G O O D

G O O D

G O O D

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What should we **sustain** that we are doing right?

- Standard Special Provisions
- Use Guidelines
- eCAMMS

What should we **improve** that we can do better?

- Standard Special Provisions
- Use Guidelines
- eCAMMS
2016 After Action Review
Lessons Learned: Sustain

• Standard Special Provisions
  – No Changes to Upper and Lower Spec. Limits
  – No Changes to Payment Formula
  – Retain DISTRICT Option to Witness Only on PWT-HOLA (100% State / Non-NHS)

• Use Guidelines
  – Retain Contractor Request to Re-evaluate Non-RPS Items in Accordance with Section 409 (PF_D < 100)

• eCAMMMS
  – Bonus and Reduced Pay Lots reported as “P”
2016 After Action Review Lessons Learned: Improve

- Standard Special Provisions
  - Updating AMRL to re:source
  - Clarifying Laboratory Assessment Period (24 months from Assessment Date)
  - PWT to PWL (not anticipated for 2017)

- Use Guidelines
  - Appropriate use of Density Acceptance by Cores (ref. Section 409)
  - Contract Item for Bonus/Reductions (PDA)

- eCAMMS
  - Multiple Ignition Oven Calibration Factors (PWT-HOLA)
2017 Construction Season

- 100% Use of PWT on Paving Projects
- Revised SSPs
- Revised Use Guidelines
- Field Users Guide
- Continued monitoring of all PWT Projects
- 2017 AAR
Questions?