

# New HMA Specifications & PWL

INDOT's Revised HMA Specifications for 2017

Presentation for APAI Mix Design Workshop 12-2-16

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*HMA – The Pavement of Choice For The Future*

12/2/2016

# ACCEPTANCE LOTS (No Change)

- PWL Based on Average of 5 Sublots
- 5 Sublots = 1 Acceptance Lot
- Sublot Size
  - 1000 Tons – Intermediate & Base
  - 600 Tons – Surface

# PWL QUALITY LIMITS

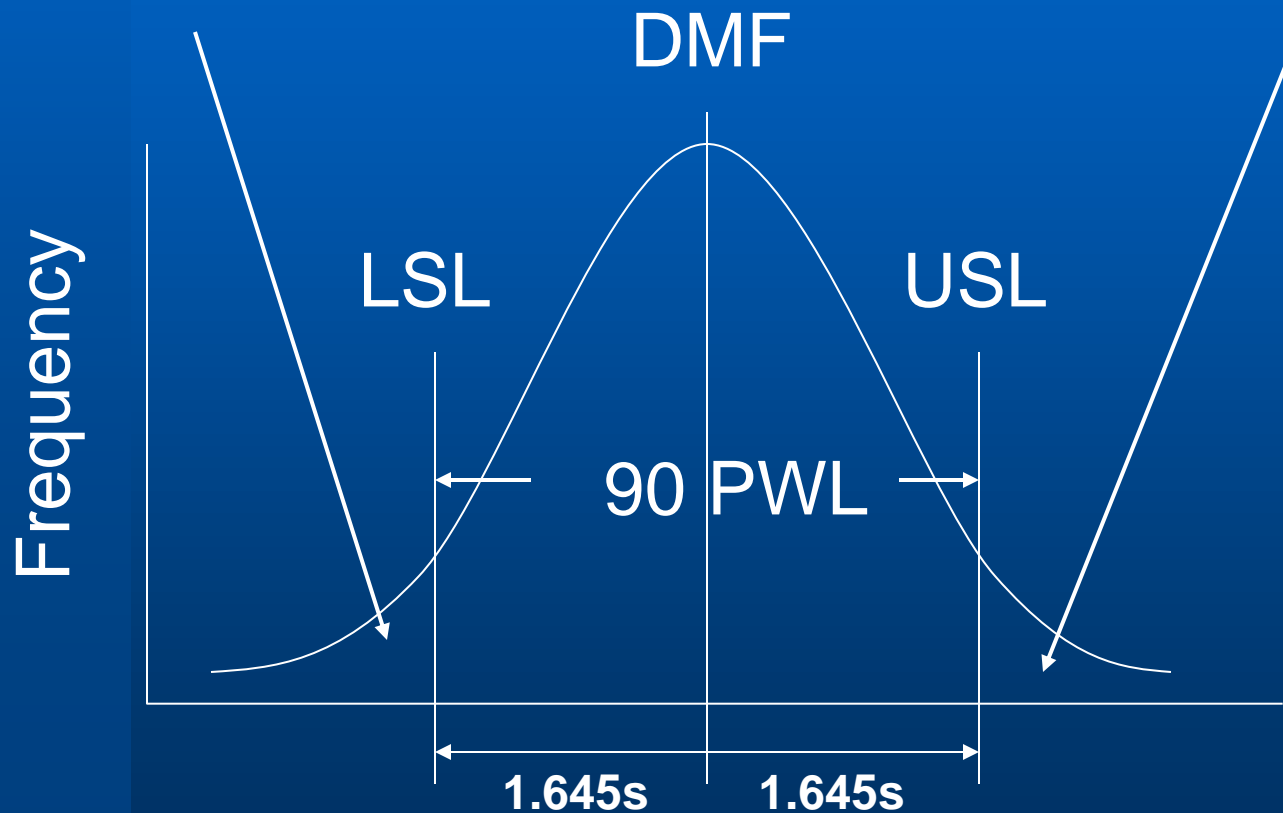
## (No Change)

- **Acceptable Quality Limit – AQL**
  - PWL = 90      100% Pay Factor
- **Rejectable Quality Limit – RQL**
  - PWL = 50      75% Pay Factor
  - PWL < 50      Lot Submitted to Failed Materials
- **Bonus Quality Range**
  - PWL 90 to 100      Up to 5% Max Bonus

# PWL Concept (No Change)

Area Below LSL = 5%

Area Above USL = 5%



12/5/2006

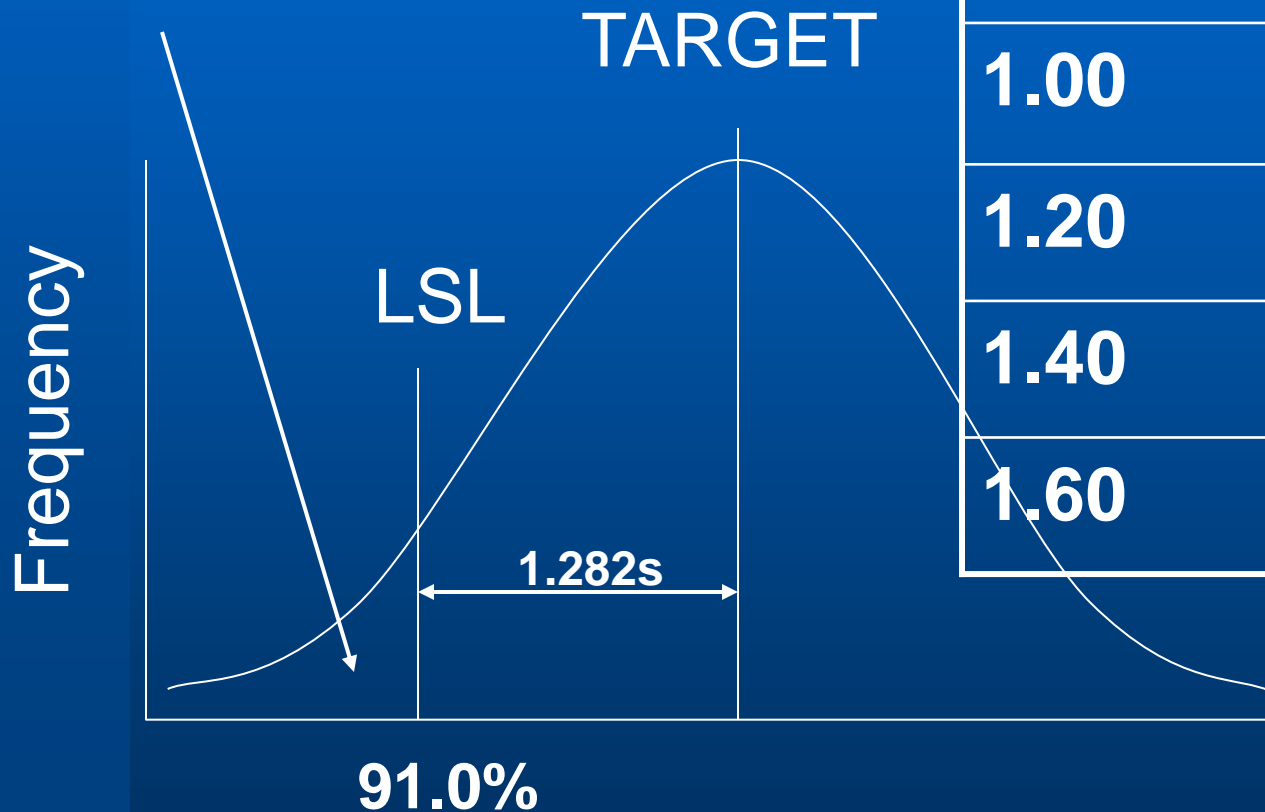
s = Standard Deviation

# New HMA PWL Specification

<u>Mix Property</u>	<u>Spec Limits</u>	<u>PF Weight</u>
● Density	$\geq 91.0\%$	35%
● Air Voids	$4\% \pm 1.4\%$	30%
● VMA	Spec Min to +2%	35%
● Binder Content	No Spec Limit	0%

# DENSITY (No Change)

Area Below LSL = 10%



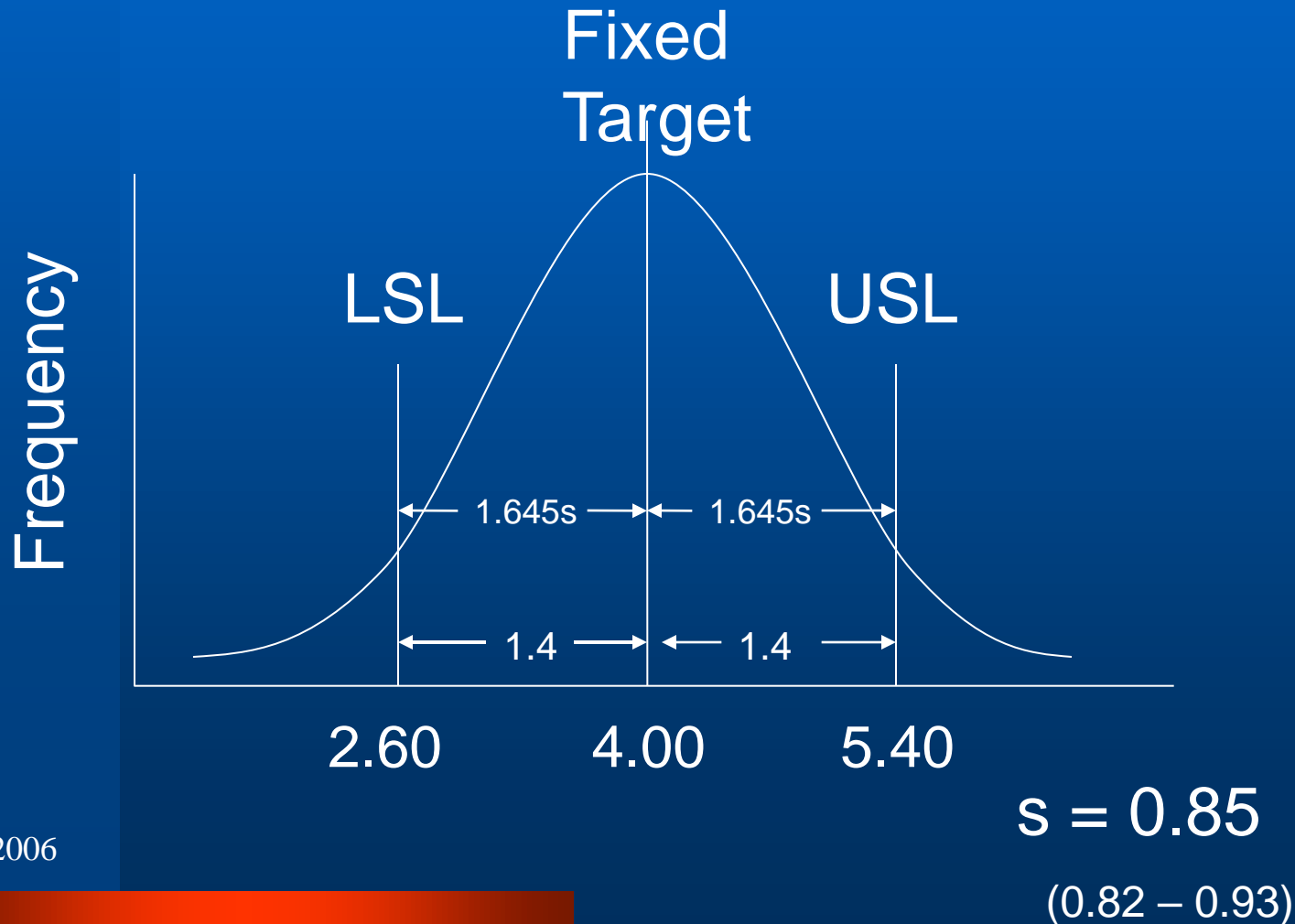
sdev	Targets
	100% / 105% Pay Pay
<b>0.80</b>	<b>92.0/93.4</b>
<b>1.00</b>	<b>92.3/94.0</b>
<b>1.20</b>	<b>92.5/94.6</b>
<b>1.40</b>	<b>92.8/95.2</b>
<b>1.60</b>	<b>93.1/95.8</b>

2 Core Av (1.10 – 1.19)

Single Cores (1.54 – 1.67)

# AIR VOIDS

(No Change)



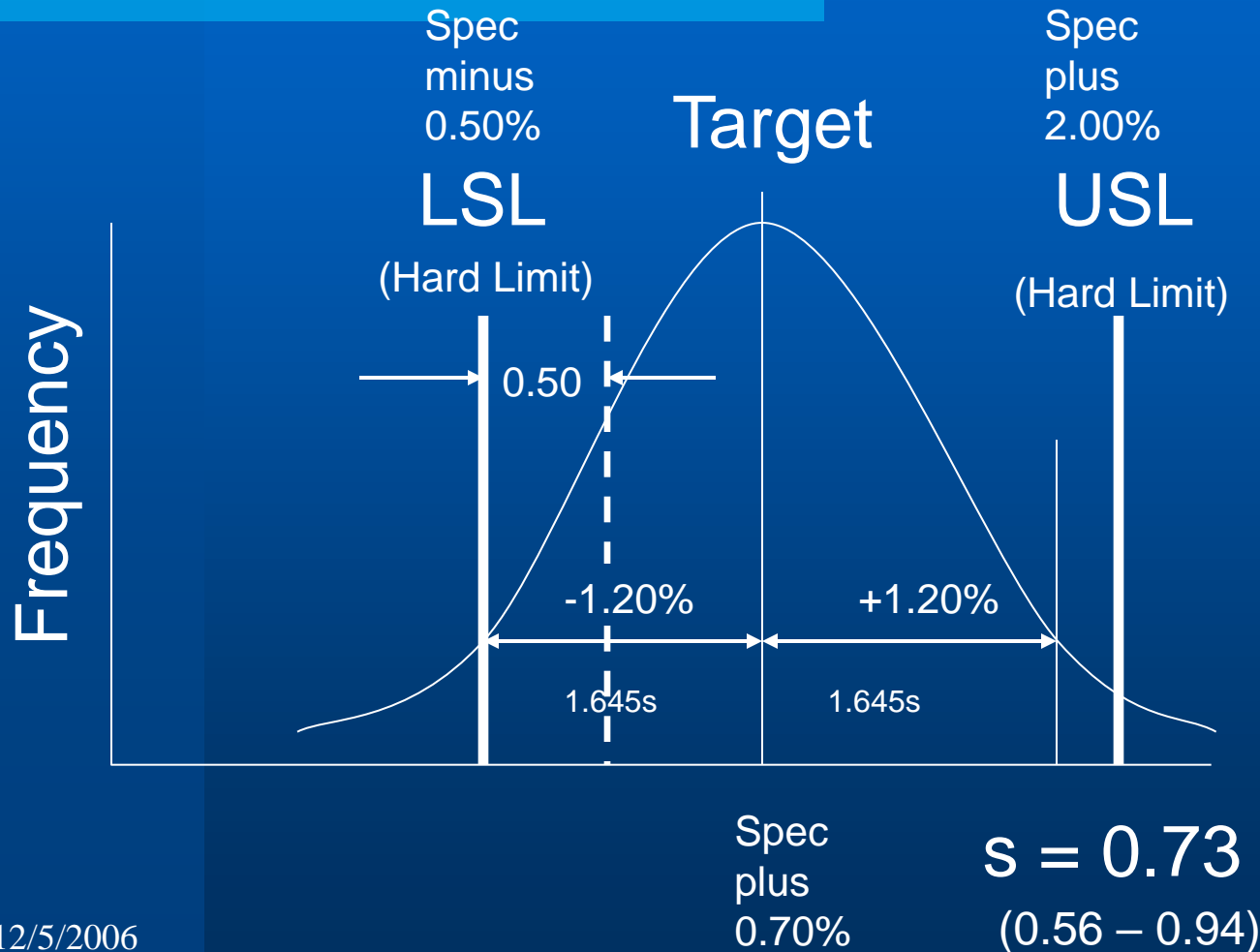
# VMA - New Specification Limits

**LSL = Specification Minimum**

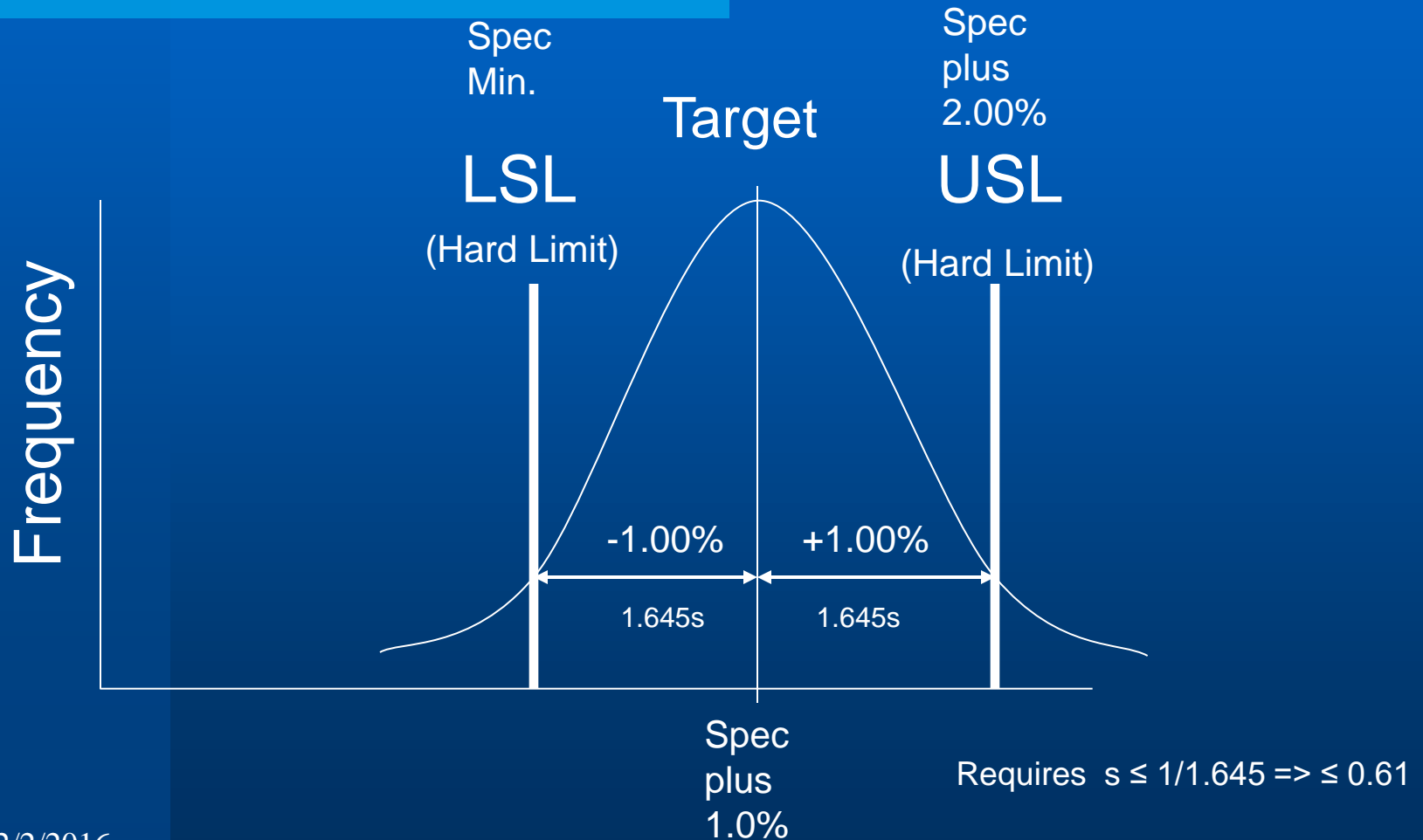
**USL = Specification Minimum Plus 2.0%**



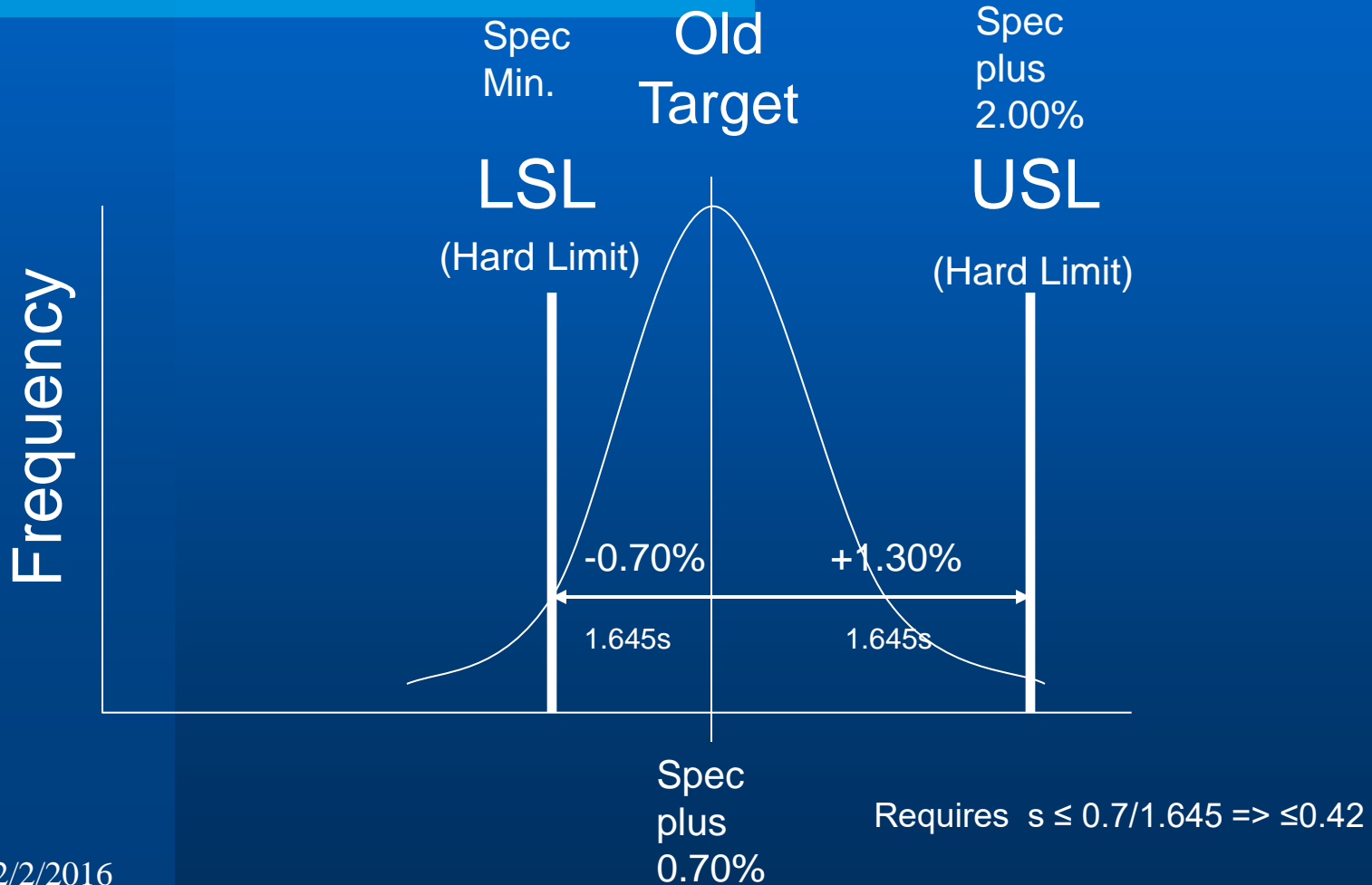
# VMA – Old Specification



# VMA – New Specification



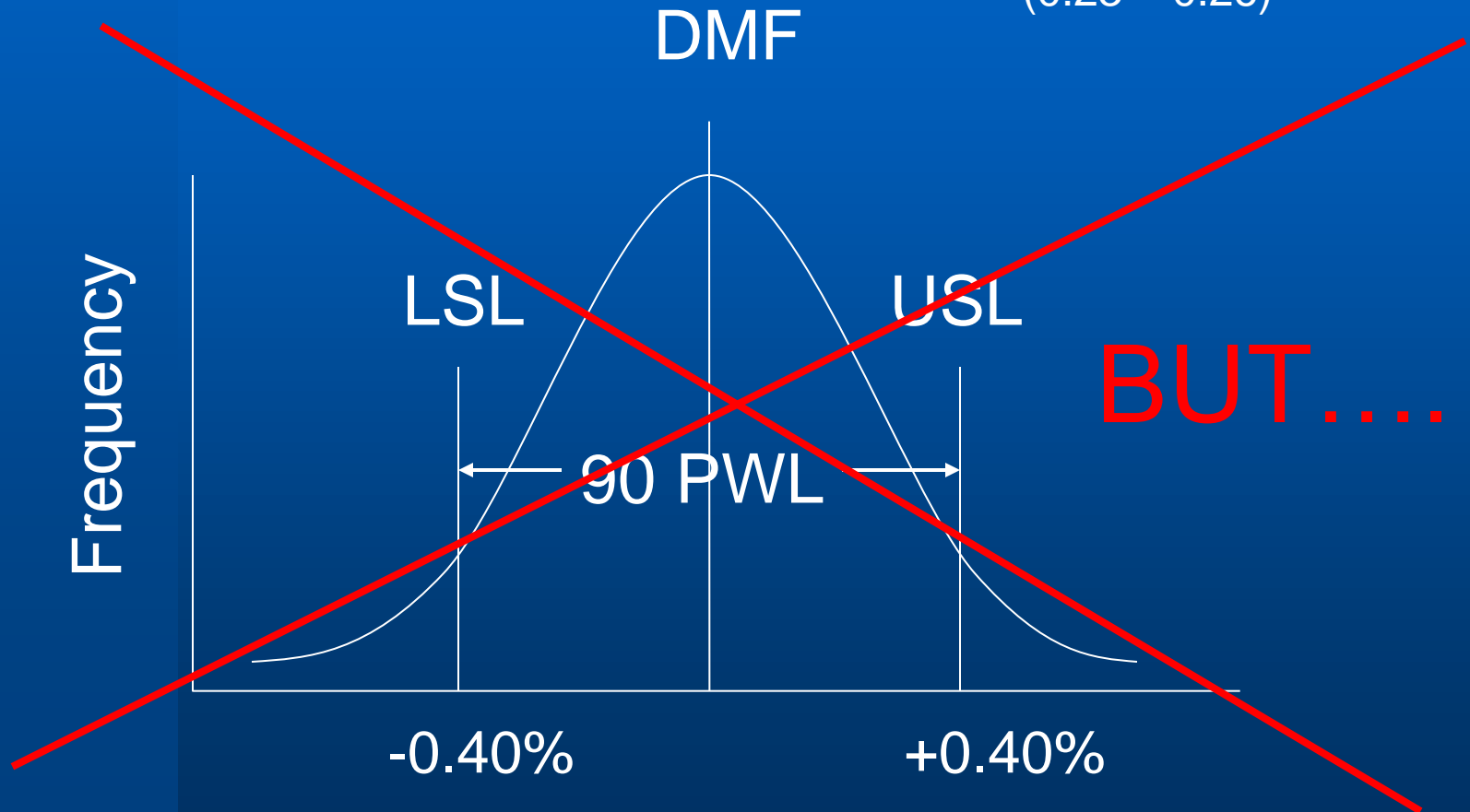
# VMA – New Specification



# BINDER CONTENT

No Longer Evaluated for PWL

$$s = 0.24$$
$$(0.23 - 0.26)$$



$$VMA = 100 - \left( \frac{Gmb \times P_s}{Gsb} \right), \text{ and}$$

$$P_s = 100 - P_b, \text{ and}$$

$P_b$  directly related to AV, so ....

$P_b$  still MATTERS!

# Old Pay Factor Equations

## Incentive/Full Pay Equation – Linear

$$PF = (105.00 - 0.50 \times (100.00 - PWL)) / 100$$

Use when PWL Greater than 90

## Disincentive Pay Equation – Curved

$$PF = (100 - 0.000020072(100 - PWL)^{3.5877}) / 100$$

Use when PWL Less than 90 and greater 50

# New Pay Factor Equations

Incentive/Full Pay Equation – Linear

Use when PWL > 90

$$PF = ((0.50 \times PWL) + 55.00)/100$$

(Different Equation – Same Line)

**Disincentive Pay Equation – Linear**

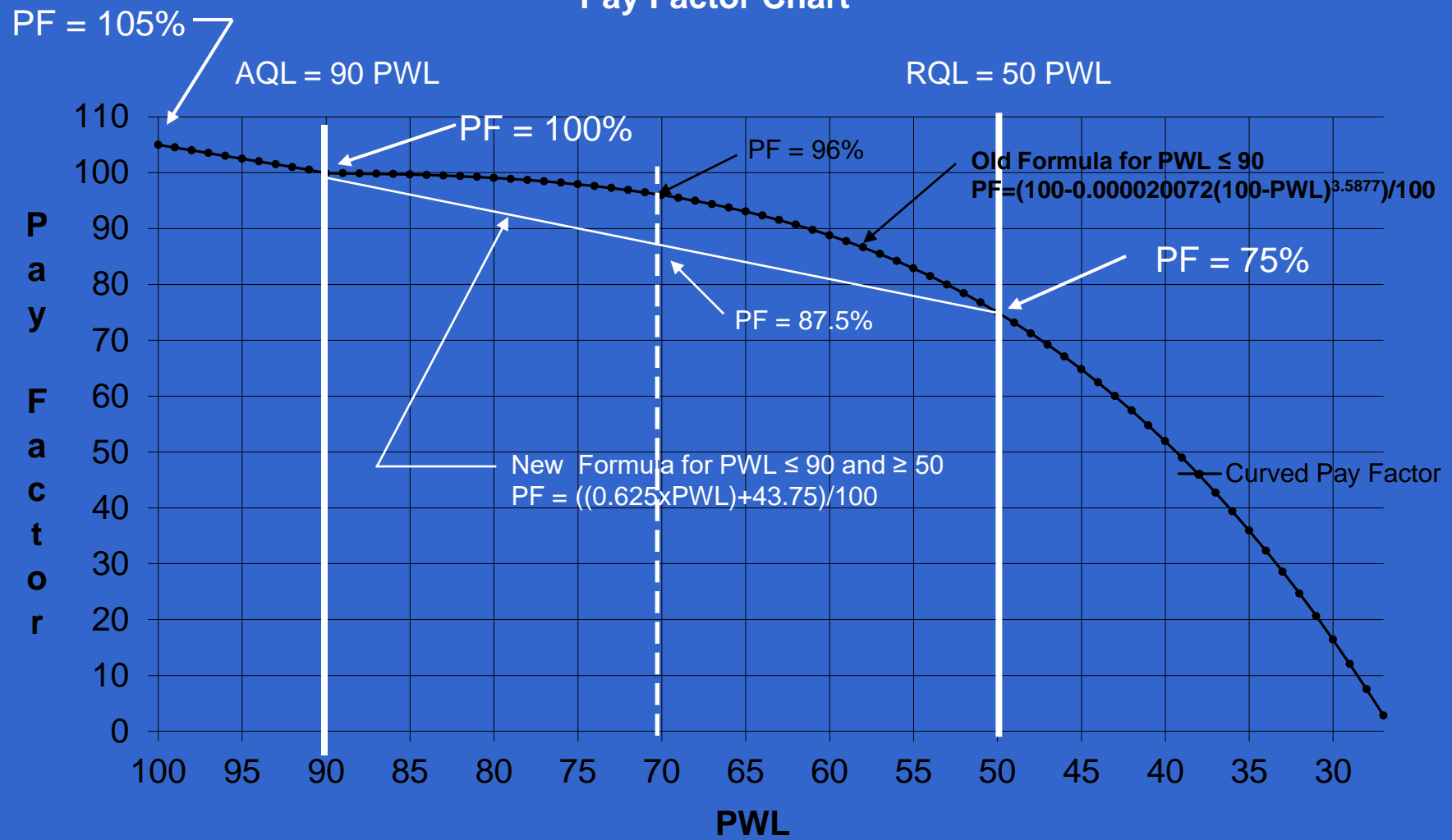
Use when  $PWL \geq 50$  and  $\leq 90$

$$PF = ((0.625 \times PWL) + 43.75)/100$$

**(Different Equation – Much Different Line)**

# Pay Factor Graph

Pay Factor Chart





# OTHER FEATURES

- Adjustment Period Eliminated – No targets to adjust
- 4hr aging for mix design and acceptance
- $\Delta P_b$  criteria added for mix design
- New Limits for D/A 0.6 to 1.4 for all mixes except 4.75
- Gradation analysis included in INDOT acceptance testing
- INDOT Calculation of D/A Ratio & Gse
- QC Requirement for D/A – corrective action required
- QC Requirement for  $V_{be} = VMA - AV$  – corrective action required if below design minimums.
- Coarse graded surface mixtures – All Categories
- 25% maximum binder replacement – all mixtures

# OTHER CHANGES (Continued)

- Shingles limited to  $\leq 3\%$  by mass and  $\leq 15\%$  binder replacement
- 401 Category 1 and Category 5 mixtures eliminated
- 402 Type A mixture eliminated
- Criteria added for Contractor appeal + \$500 fee if no improvement
- Contractor QC subplot tests submitted to Engineer
- INDOT QA results provided after receipt of Contractor QC results
- Fixed maximum temperatures at paver
  - 315F for PG 64 & 70 binders and 325F for PG 76 binder
- There is more, but these are the highlights

# EXPECTED IMPACTS

- HIGHER VMA => CUBICAL & CLEANER AGG & RAP
- HIGHER BINDER CONTENTS => LESS PVMT CRACKING
- FEWER BINDER GRADES / FEWER MIX DESIGNS
- REDUCED NUMBER OF APPEALS ACCEPTED
- INCREASED CONTRACTOR RISK – MORE PENALTIES

*AMA –*

*THE PAVEMENT OF CHOICE FOR THE FUTURE*

12/2/2016