# BMD IMPLEMENTATION STATUS UPDATE

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pennsylvania
DEPARTMENT OF TRANSPORTATION

# PENNDOT BY THE NUMBERS


*Total miles on all PA roadways

LB (1-24)

# SOL 481-24-01

- Published on February 23, 2024
  - Supersedes SOL 481-22-01 Dated January 21, 2022

- REVISED IMPLEMENTATION OF BMD FOR WEARING COURSE MIX DESIGNS

- FULL IMPLEMENTATION WILL BE PHASED OVER 3 YEARS

- BULLETIN 27 CHAPTER 2A REVISED TO INCLUDE THE SUBMISSION OF BMD DATA

# SOL 481-24-01

## JMF YEAR 2024

- ALL < 0.3 MILLION DESIGN ESAL WEARING COURSE JMFs ($N_{design}$ = 50)

- Dense-graded **wearing** courses
  - 6.3 mm, 9.5 mm, 12.5 mm, 19.0 mm
  - $N_{design}$ = 75 gyrations
  - Skid Resistance Levels of “E” or “H” are **required**
  - Skid Resistance Levels of “G”, “M”, or “L” are **not required** but <u>encouraged</u>

# SOL 481-24-01

## JMF YEAR 2024 Continued

- Dense-graded **binder** courses are **not required** but encouraged
  - 19.0 mm, 25.0 mm
- Dense-graded **base** courses are **not required** but encouraged
  - 25.0 mm, 37.5 mm
- Dense-graded **4.75 mm** is **not required**

# SOL 481-24-01

## JMF YEAR 2024 Continued

- SMA gap-graded **wearing** courses are **not required** but <u>encouraged</u>
  - 9.5 mm, 12.5 mm
  - $N_{design}$ = 100 gyrations
- Pervious Asphalt Pavement System with 9.5 mm, open-graded wearing and binder course, 9.5 mm or 19.0 mm, $N_{design}$ = 50 gyrations are **not required**
- Gap-graded Ultra-Thin Bonded Wearing courses (Types A, B, or C) are **not required**

# SOL 481-24-01

## JMF YEAR 2025

- All Dense-graded **wearing** courses
  - 6.3 mm, 9.5 mm, 12.5 mm, 19.0 mm
  - $N_{design}$ = 50 or 75 gyrations
  - Skid Resistance Levels of “E”,“H”,“G”,“M”, or “L” are **required**

# SOL 481-24-01

## JMF YEAR 2025 Continued

- Dense-graded **binder** courses are **not required** but encouraged
  - 19.0 mm, 25.0 mm

- Dense-graded **base** courses are **not required** but encouraged
  - 25.0 mm, 37.5 mm

- Dense-graded **4.75 mm** is **not required**

# SOL 481-24-01

## JMF YEAR 2025 Continued

- SMA gap-graded **wearing** courses are **required**
  - 9.5 mm, 12.5 mm
  - $N_{design}$ = 100 gyrations
- Pervious Asphalt Pavement System with 9.5 mm, open-graded wearing and binder course, 9.5 mm or 19.0 mm, $N_{design}$ = 50 gyrations are **not required**
- Gap-graded Ultra-Thin Bonded Wearing courses (Types A, B, or C) are **not required**

# SOL 481-24-01

## JMF YEAR 2026

- Requirements are the same as the JMF YEAR 2025

- It is intended that revised asphalt mixture design mechanical test **thresholds or limits** for Superpave Asphalt Mixture Design, dense-graded wearing course JMFs with a NMAS of 6.3 mm, 9.5 mm, 9.5 mm Fine-Graded, 12.5 mm, 19.0 mm, $N_{design}$ = 50 and 75 gyrations, All SRLs, **will be issued, but not enforced**.

# SOL 481-24-01

## JMF YEAR 2027

- A **revised policy** for implementation and enforcement of mechanical testing thresholds or limits into Pennsylvania's asphalt mixture design approval process will be issued prior to the JMF Year 2027 for Superpave Asphalt Mixture Design, dense-graded wearing course JMFs with a NMAS of 6.3 mm, 9.5 mm, 9.5 mm Fine-Graded, 12.5 mm, 19.0 mm, Ndesign = 50 and 75 gyrations, All SRLs.

- A **revised policy** for the identification and future implementation of mechanical testing thresholds or limits into Pennsylvania's asphalt mixture design approval process for Superpave Asphalt Mixture Design, dense-graded **binder and base courses.**
- All other asphalt mixture JMFs will be determined later and issued either by separate policy or updated with the revised policy for implementation of mechanical testing thresholds or limits into Pennsylvania's asphalt mixture design approval process for Superpave dense-graded wearing courses issued prior to the JMF Year 2027.

# SOL 481-24-01

| | 2024 | 2025 | 2026 |
|---|---|---|---|
| Nd = 50 Wearing | ✓ | ✓ | ✓ |
| Nd = 75 Wearing<br>SRL = E or H | ✓ | ✓ | ✓ |
| Nd = 75 Wearing<br>SRL = G, M, or L | ✗ | ✓ | ✓ |
| 6.3 mm | ✓ | ✓ | ✓ |
| Binder Course | ✗ | ✗ | ✗ |
| Base Course | ✗ | ✗ | ✗ |
| SMA | ✗ | ✓ | ✓ |
| 4.75mm, Pervious,<br>Ultra-Thin | ✗ | ✗ | ✗ |

# SOL 481-24-01

**General Requirements, Inclusions, and Exclusions:**

1) The asphalt producer will designate one or more laboratories to perform HWTT and CT(Index) testing. Designated laboratories may include the contractor's or producer's laboratory, a 3rd party commercial laboratory, or a university laboratory.

2) All 3rd party commercial laboratories shall be AASHTO re:source accredited for a Quality Management System [R 18 or D3666 (Asphalt Mixture)] or AASHTO re:source accredited for both the specific required asphalt mixture mechanical tests (AASHTO T 324 and ASTM D8225), or has completed a successful AASHTO re:source laboratory assessment, within the current or previous 3 calendar years, for both AASHTO T 324 and ASTM D8225 and resolved all non-conformities.

3) The asphalt producer shall notify the DME/DMM at least 48 hours before HWTT and CT(Index) test specimens are prepared. The DME/DMM or their Representative will witness HWTT and CT(Index) test specimen preparation or indicate if specific HWTT and CT(Index) test specimens can be prepared without a PennDOT Representative witness.

4) The costs for HWTT and CT(Index) testing will be considered incidental to the costs associated with the asphalt JMF mix design process.

5) When multiple products or supplier codes of the same JMF component material are listed on a JMF (e.g., asphalt binder, WMA Technology, anti-strip additive, etc.), the producer must indicate in the appropriate eCAMMS Asphalt JMF Reference Data Type field (e.g., **1 Virgin PG Binder Supp Code**, **1 WMA Technology Mtrl Class**, and **Anti-Strip Additive Product**) or, if the eCAMMS Asphalt JMF Reference Data Type fields do not capture the JMF component material with multiple products or supplier codes, indicate on the eCAMMS Asphalt JMF Maintenance: General page under Remarks which product and supplier code was used for the JMF component material for the preparation and mechanical testing of the asphalt mixture mechanical test results submitted with the JMF for review and approval [e.g., enter "**HWTT & CT(Index) results = Aramid Fibers: FORTA-FI**"].

# SOL 481-24-01

**General Requirements, Inclusions, and Exclusions:**

6) Producers currently do not need to perform HWTT and CT(Index) testing on each JMF for each JMF Year when both HWTT and CT(Index) test result data were previously submitted in eCAMMS in the Reference Data Type fields or, other designated eCAMMS mechanical testing data fields if implemented and available, when:

- the very same JMF component materials, products, and supplier codes used for the initial or last HWTT and CT(Index) test result data submitted for the JMF, will remain the primary JMF component materials, products, and supplier codes for production of the current JMF Year in its production/construction season, and
- the JMF component material proportions or gradation has not significantly changed or been adjusted (a significant change or adjustment exceeds the Pub. 408, Section 413, Table A, Multiple Samples ($n \geq 3$) tolerances for gradation or asphalt content, or a ≥5% change in the aggregate blend proportion of an aggregate product, or as otherwise determined by the DME/DMM).

7) When multiple products or supplier codes of the same JMF component material are listed on a JMF (e.g., asphalt binder, WMA Technology, anti-strip additive, etc.) and, if the producer anticipates the primary JMF component materials, products, and supplier codes will change for production of the current JMF Year for its production/construction season or the JMF component material proportions or gradation has significantly changed or been adjusted, the producer is required to submit new HWTT and CT(Index) test result data using the anticipated primary JMF component materials, products, and supplier codes and JMF proportions and gradation.

**TABLE A**
**Job-Mix Formula**
**Composition Tolerance Requirements of the Completed Mix**

| | Single Sample (n = 1) | Multiple Samples (n ≥ 3) |
|---|---|---|
| **Gradation** | | |
| Passing 12.5 mm (1/2 inch) and Larger Sieves | ±8% | ±6% |
| Passing 9.5 mm (3/8 inch) to 150 µm (No. 100) Sieves (Inclusive) | ±6% | ±4% |
| Passing 75 µm (No. 200) Sieve | ±3.0% | ±2.0% |
| **Asphalt Content** | | |
| 19.0 mm Asphalt mixtures and smaller | ±0.7% | ±0.4% |
| 25.0 mm Asphalt mixtures and larger | ±0.8% | ±0.5% |

# SOL 481-24-01

**General Requirements, Inclusions, and Exclusions:**

6) Producers currently do not need to perform HWTT and CT(Index) testing on each JMF for each JMF Year when both HWTT and CT(Index) test result data were previously submitted in eCAMMS in the Reference Data Type fields or, other designated eCAMMS mechanical testing data fields if implemented and available, when:

- the very same JMF component materials, products, and supplier codes used for the initial or last HWTT and CT(Index) test result data submitted for the JMF, will remain the primary JMF component materials, products, and supplier codes for production of the current JMF Year in its production/construction season, and
- the JMF component material proportions or gradation has not significantly changed or been adjusted (a significant change or adjustment exceeds the Pub. 408, Section 413, Table A, Multiple Samples ($n \geq 3$) tolerances for gradation or asphalt content, or a ≥5% change in the aggregate blend proportion of an aggregate product, or as otherwise determined by the DME/DMM).

7) When multiple products or supplier codes of the same JMF component material are listed on a JMF (e.g., asphalt binder, WMA Technology, anti-strip additive, etc.) and, if the producer anticipates the primary JMF component materials, products, and supplier codes will change for production of the current JMF Year for its production/construction season or the JMF component material proportions or gradation has significantly changed or been adjusted, the producer is required to submit new HWTT and CT(Index) test result data using the anticipated primary JMF component materials, products, and supplier codes and JMF proportions and gradation.

# SOL 481-24-01

**General Requirements, Inclusions, and Exclusions:**

8) When multiple products or supplier codes of the same JMF component material are listed on an approved JMF (e.g., asphalt binder, WMA Technology, anti-strip additive, etc.) and, during the JMF Year production season, the producer needs to switch from a primary JMF component material product or supplier code listed on the approved JMF (used for the submitted HWTT and CT(Index) test results) to one of the alternate JMF component materials, products, or supplier codes listed on the approved JMF (not used for the submitted HWTT and CT(Index) test results) due to supply chain, significant price difference, or other issues related to the JMF component material(s), the producer does not need to perform and submit additional HWTT or CT(Index) testing during the JMF Year production season using the alternate (secondary) JMF component material product(s) and supplier code(s) that they needed to switch to during construction season production.

# SOL 481-24-01

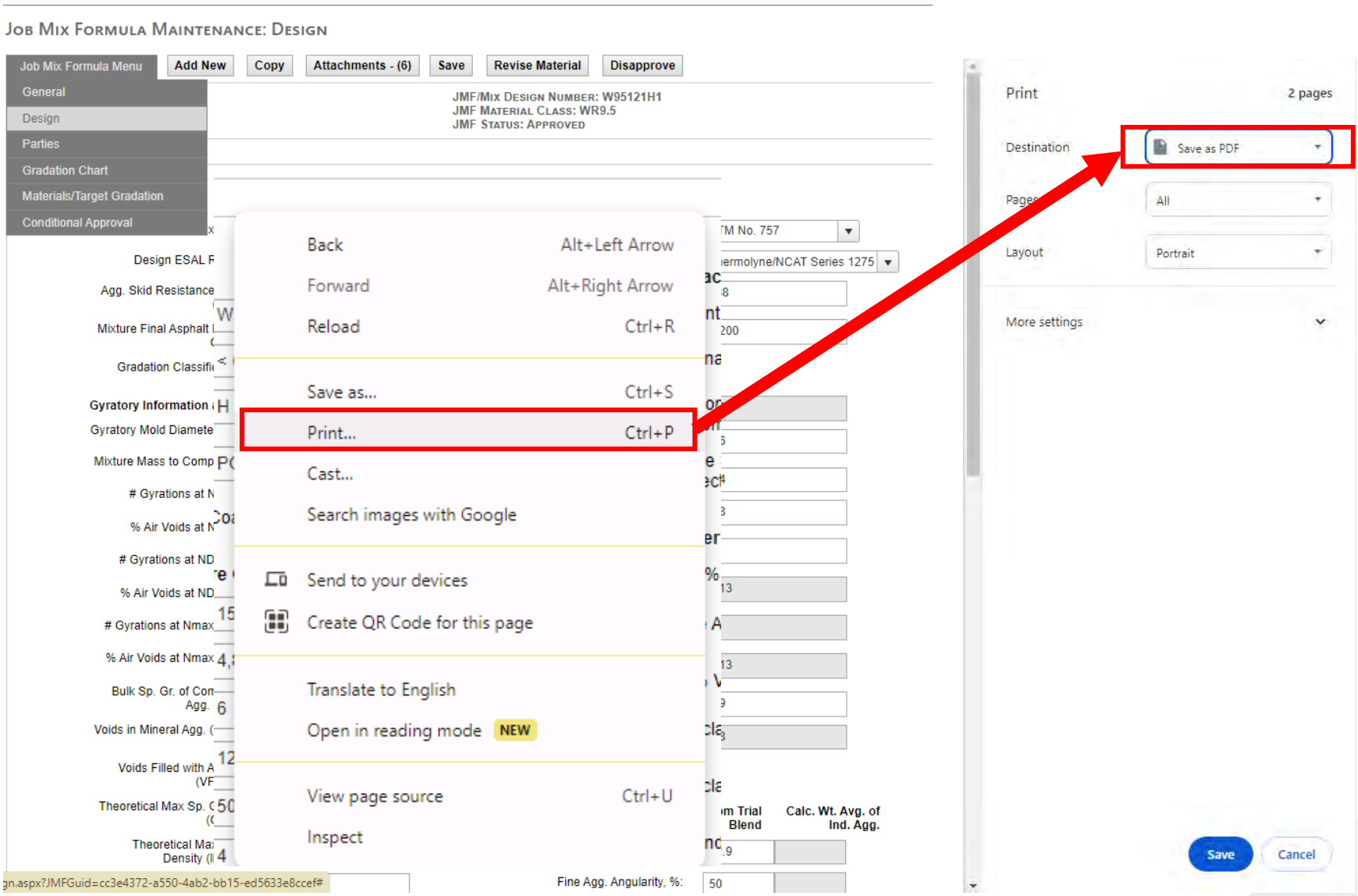
**General Requirements, Inclusions, and Exclusions:**

9) In eCAMMS when submitting the very same JMF with the same primary JMF component material products and supplier codes (e.g., asphalt binder, WMA Technology, anti-strip additive, etc.) that were used and previously submitted for both HWTT and CT(Index) test result data, producers shall indicate that the asphalt mixture mechanical test result data was previously submitted for the JMF by providing the **JMF Year – JMF/Mix Design Number** on the eCAMMS Asphalt JMF Maintenance: General page in the Remarks section (e.g., enter "**HWTT & CT(Index) results = JMF 2023-W95121H1**").

When copying a JMF from a previous JMF Year that had mechanical test result data entered in the Asphalt JMF Reference Data Type fields, it is also encouraged to Find the previous JMF in eCAMMS, navigate to the JMF Maintenance: Design page where all the previous mechanical test result data is available and viewable and then using the Internet browser print function, print this eCAMMS JMF Maintenance: Design page as an Adobe PDF document, save the PDF document, and then attach the PDF document to the new copied JMF so that the mechanical test data is available for the current JMF Year within the eCAMMS Asphalt JMF "Attachment(s)" button.

10) Follow the mechanical testing protocols specified in the revised Bulletin 27, Chapter 2A.

# SOL 481-24-01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Disapprove
General
Design
Parties
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Materials/Target Gradation
Conditional Approval
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JMF Material Class: WR9.5
JMF Status: Approved
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Forward Alt+Right Arrow
Reload Ctrl+R
Save as... Ctrl+S
Print... Ctrl+P
Cast...
Search images with Google
Send to your devices
Create QR Code for this page
Translate to English
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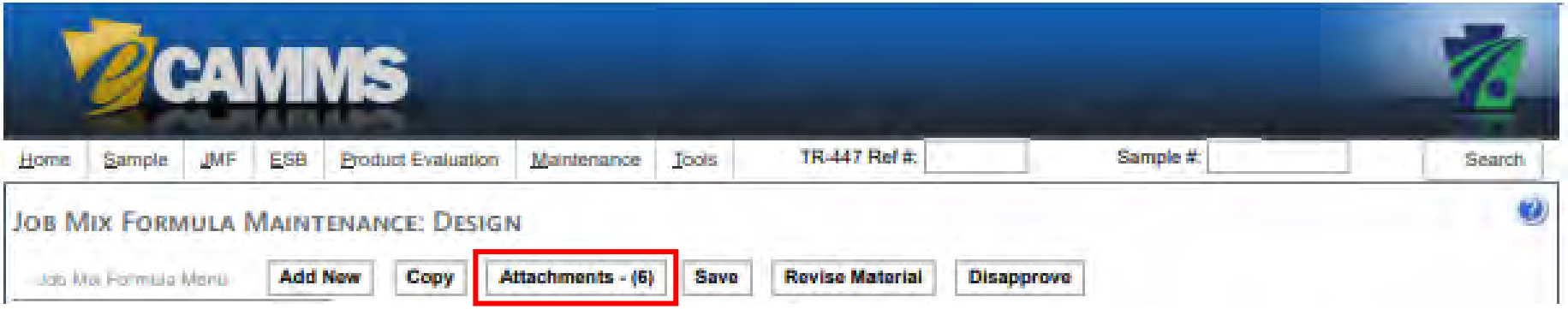
# SOL 481-24-01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Sample
JMF
ESB
Product Evaluation
Maintenance
Tools
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Sample #:
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Job Mix Formula Menu
Add New
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Revise Material
Disapprove

# SOL 481-24-01 – BULLETIN 27

**Table 4** - Aggregate Gradation Control Points

| | Nominal Maximum Aggregate Size - Control Points (% Passing) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 37.5 mm | | 25.0 mm | | 19.0 mm | | 12.5 mm | | 9.5 mm | | 4.75 mm | |
| Sieve Size | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| 50.0 mm | 100 | -- | -- | -- | -- | -- | -- | -- | -- | -- | | |
| 37.5 mm | 90 | 100 | 100 | -- | -- | -- | -- | -- | -- | -- | | |
| 25.0 mm | -- | 89* | 90 | 100 | 100 | -- | -- | -- | -- | -- | | |
| 19.0 mm | -- | -- | -- | 89* | 90 | 100 | 100 | -- | -- | -- | | |
| 12.5 mm | -- | -- | -- | -- | -- | 89* | 90 | 100 | 100 | -- | 100 | |
| 9.5 mm | -- | -- | -- | -- | -- | -- | -- | 89* | 90 | 100 | 95 | 100 |
| 4.75 mm | -- | -- | -- | -- | -- | -- | -- | -- | -- | 89* | 90 | 100 |
| 2.36 mm | 15 | 41 | 19 | 45 | 23 | 49 | 28 | 58 | 32 | 67 | | |
| 1.18 mm | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 55 |
| 0.075 mm | 0 | 6 | 1 | 7 | 2 | 8 | 2 | 10 | 2 | 10 | 6 | 13 |

# SOL 481-24-01 – BULLETIN 27

***Revise Table 7 completely as follows:***

**Table 7** – Asphalt Mixture Design Requirements

| Design ESALs, [a] million | Required Relative Density, Percent of Theoretical Maximum Specific Gravity | | | Voids in the Mineral Aggregate (VMA), % Minimum | | | | | | Dust-to-Binder Ratio Range [c] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Nominal Maximum Aggregate Size, mm | | | | | | |
| | $N_{initial}$ | $N_{design}$ [b,d] | $N_{max}$ | 37.5 | 25.0 | 19.0 | 12.5 | 9.5 | 4.75 | |
| <0.3 | ≤91.5 | 96.0 | ≤98.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 16.0 | 0.6-1.2 |
| 0.3 to <3 | ≤90.5 | 96.0 | ≤98.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 16.0 | 0.6-1.2 |
| 3 to <10 | ≤89.0 | 96.0 | ≤98.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 16.0 | 0.6-1.2 |
| 10 to <30 | ≤89.0 | 96.0 | ≤98.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 16.0 | 0.6-1.2 |
| ≥30 | ≤89.0 | 96.0 | ≤98.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 16.0 | 0.6-1.2 |

[a] Design ESALs are the anticipated project traffic level expected on the design lane over a 20-yr period. Regardless of the actual design life of the roadway, determine the design ESALs for 20 yr.

[b] For 4.75-mm nominal maximum size mixtures, the relative density (as a percent of the theoretical maximum specific gravity) shall be within the range of 94.0 to 96.0 percent.

[c] For 4.75-mm nominal maximum size mixtures, the dust-to-binder ratio shall be 1.0 to 2.0, for design traffic levels <3 million ESALs, and 1.5 to 2.0 for design traffic levels ≥3 million ESALs.

[d] The Required Relative Density at $N_{design}$ may vary if the requirements of Tables 7, 8, 9, and 10 are met and incorporated into the design.

***Revise Table 8 completely as follows:***

**Table 8**—Voids Filled with Asphalt

| Mixture NMAS (mm) | VFA (%) Minimum | Maximum |
|---|---|---|
| 37.5 | 66 | 72 |
| 25.0 | 68 | 74 |
| 19.0 | 71 | 76 |
| 12.5 | 73 | 79 |
| 9.5 | 75 | 81 |
| 4.75 | 62 | 79 |

# SOL 481-24-01 – BULLETIN 27

**Table 10** - Mechanical Testing Limits

| Property: | Rutting and Moisture Susceptibility | | | | Cracking | High RAP/RAS (≥ 0.35 RBR) |
|---|---|---|---|---|---|---|
| Standard: | AASHTO T 324, Hamburg Wheel Track | | | | ASTM D8225, $CT_{Index}$ (1) | AASHTO R 114, ΔTc (2) |
| Value: | Traffic Level (Millions of ESALs) | Maximum Rut Depth at 20,000 Passes (mm) | SIP (minimum passes) | Minimum Passes at 12.5 mm Rut Depth | $CT_{Index}$ | ΔTc |
| Limits: | <3 | ≤15<br>>15 to ≤20 | N/A<br>14,000 | N/A<br>10,000 | >70 | >-5.0°C |
| | 3 to <10 | ≤10<br>>10 to ≤15<br>>15 to ≤20 | N/A<br>14,000<br>16,000 | N/A<br>12,000<br>14,000 | >80 | >-5.0°C |
| | ≥10 | ≤10<br>>10 to ≤12 | N/A<br>16,000 | N/A<br>15,000 | >90 | >-5.0°C |

(1) ASTM D8225 $CT_{Index}$ tests with an average peak load result of less than 75 psi is a failing test.

(2) Only applies to JMFs with a total RBR greater than or equal to 0.35.

Reclaimed Binder Ratio (RBR) = $((Pb_{RAP} \times P_{RAP}) + (Pb_{RAS} \times P_{RAS})) / (100 \times Pb_{Total})$

Where:

$Pb_{RAP}$ = Percent asphalt in the RAP

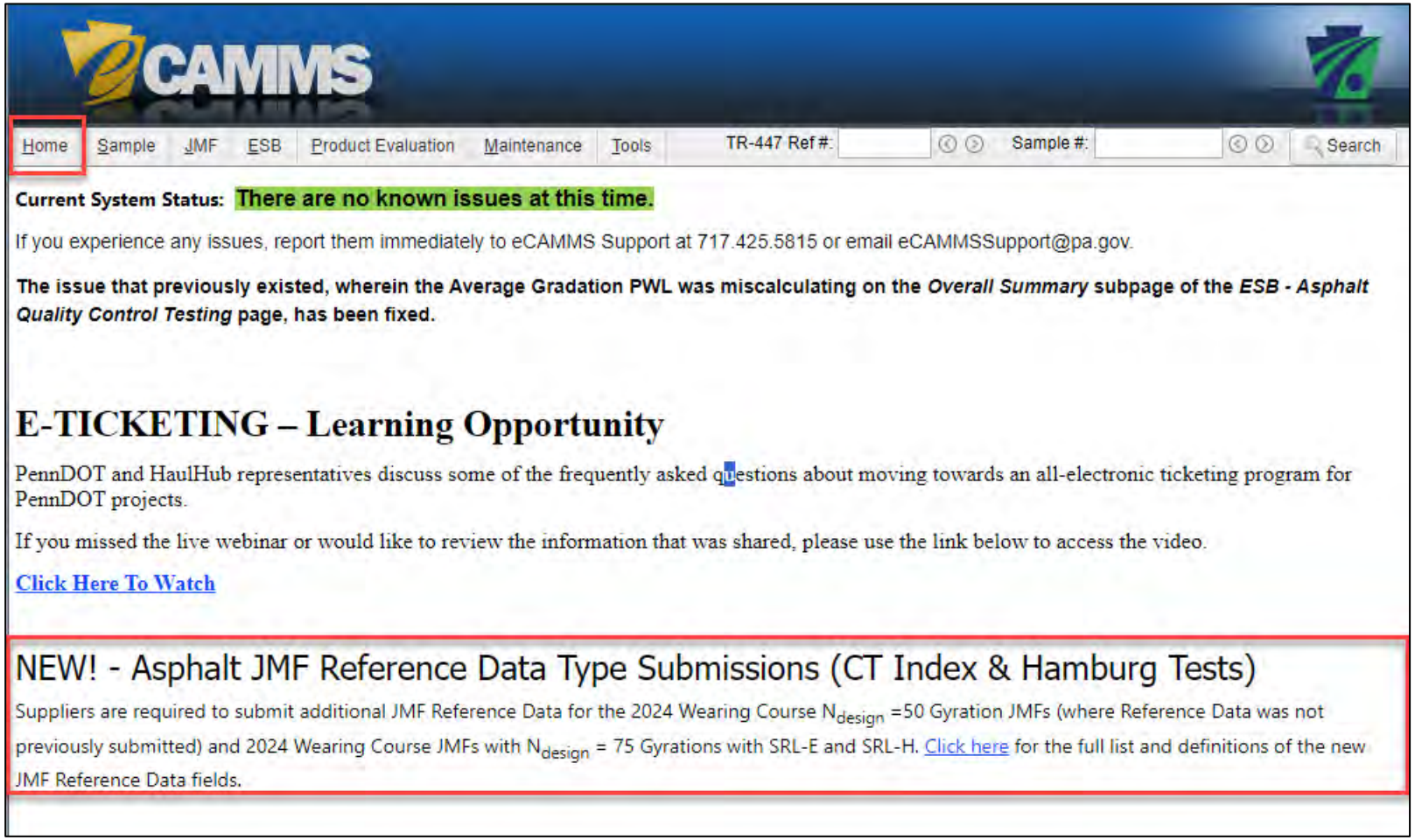
$P_{RAP}$ = Percent of RAP by weight in the JMF

$Pb_{RAS}$ = Percent asphalt in the RAS

$P_{RAS}$ = Percent RAS by weight in the JMF

$Pb_{Total}$ = Total percent of asphalt in the JMF

# JMF REFERENCE DATA



# JMF REFERENCE DATA

| | | eCAMMS Reference Data Type fields | Description |
|---|---|---|---|
| JMF DATA | New | 1 Virgin PG Binder Supp Code | Bulletin 15 Supplier Code of the Virgin PG Binder that was used in the mechanical test specimens |
| | New | 1 WMA Technology Mtrl Class | eCAMMS Material Class of the WMA Technology that was used in the mechanical test specimens |
| | New | Anti-Strip Additive Product | Product Name of the anti-strip additive that was used in the mechanical test specimens |
| CT INDEX ASTM D8225 | Existing | CT-Index: CTI Cracking Index | Average Cracking Tolerance Index of all specimens, (unitless) "ASTM D8225: Avg. $CT_{Index}$" |
| | Existing | CT-Index: $G_f$ (joules/m2) | Average Failure Energy of all specimens [Area under the load vs. the average Load-Line Displacement (LLD) curve], (Joules/m$^2$) "ASTM D8225: Avg. $G_f$" |
| | Existing | CT-Index: L75 (mm) | Average Post peak displacement at 75% of peak load of all specimens, (mm) "ASTM D8225: Avg. $l_{75}$" |
| | Existing | CT-Index: M75 Slope (N/m) | Average post-peak slope at 75% of peak load of all specimens, (N/m) "ASTM D8225: Avg. \|m75\|" |
| | Existing | CT-Index: $W_f$ (joules) | Average Work of failure of all specimens, (Joules) "ASTM D8225: Avg. $W_f$" |
| | Existing | CT-Indx: Average Air Voids | Average air voids of all specimens (Each individual specimen air void has to be within 7% ± 0.5%), (%) |
| | Existing | CT-Indx: Avg Disp.@Peak Ld | Average Displacement of all specimens at Peak Load, (mm) "ASTM D8225: Avg. $l_{i(Peak)}$" |
| | Existing | CT-Indx: Avg Peak Load (kN) | Average of the Peak Loads of all specimens, (kN) "ASTM D8225: Avg. $P_{i(Peak)}$" |
| | Existing | CT-Indx: CT-Index COV (%) | COV = Coefficient of variation for the CT Index, (%) |
| | Existing | CT-Indx: No. of Specimns (n) | Number of specimens, (n) |
| | New | CT-Indx: Pk Tens.Str. (kPa)* | Average Peak Tensile Strength of all specimens, (kPa) * = calculated per AASHTO T 283 |
| | Existing | CT-Indx: Test Equip.Man/Modl | Testing Equipment Manufacturer and Model, (Text) |
| | Existing | CT-Indx: Testing Lab | Name of the Testing Lab, (Text) |
| HAMBURG WHEEL-TRACK (HWT) AASHTO T 324 | Existing | HWT: 10K Impression | Average maximum rut depth of test specimens in Left and Right Wheel Tracks at 10,000 passes, (mm). Enter "99" if rutting reaches 20 mm before 10,000 passes occur. |
| | Existing | HWT: 10K Impression-Lt (mm) | Maximum rut depth of test specimens in Left Wheel Track at 10,000 cycles, (mm). Enter "99" if rutting reaches 20 mm before 10,000 passes occur. |
| | Existing | HWT: 10K Impression-Rt (mm) | Maximum rut depth of test specimens in Right Wheel Track at 10,000 cycles, (mm). Enter "99" if rutting reaches 20 mm before 10,000 passes occur. |
| | Existing | HWT: 12.5 mm Passes | Average Number of Passes on test specimens in Left and Right Wheel Tracks at 12.5 mm rut depth, (N passes). Enter "0" (zero) if the 12.5 mm rut depth is not reached. |
| | Existing | HWT: 12.5 mm Passes - Left | Number of passes to reach 12.5 mm rut depth on test specimens in Left Wheel Track, (N passes). Enter "0" (zero) if the 12.5 mm rut depth is not reached. |
| | Existing | HWT: 12.5 mm Passes - Right | Number of passes to reach 12.5 mm rut depth on test specimens in Right Wheel Track, (N passes). Enter "0" (zero) if the 12.5 mm rut depth is not reached. |
| | Existing | HWT: 20K Impression | Average maximum rut depth of test specimens in Left and Right Wheel Tracks at 20,000 passes, (mm). Enter "99" if rutting reaches 20 mm before 20,000 passes occur. |
| | Existing | HWT: 20K Impression-Lt (mm) | Maximum rut depth of test specimens in Left Wheel Track at 20,000 cycles, (mm). Enter "99" if rutting reaches 20 mm before 20,000 passes occur. |
| | Existing | HWT: 20K Impression-Rt (mm) | Maximum rut depth of test specimens in Right Wheel Track at 20,000 passes, (mm). Enter "99" if rutting reaches 20 mm before 20,000 passes occur. |
| | Existing | HWT: Creep Slope - Avg | Average Creep Slope of test specimens in Left and Right Wheel Tracks, (Calculated) |
| | Existing | HWT: Creep Slope - Left | Creep slope of test specimens in Left Wheel Track, (Calculated) |
| | Existing | HWT: Creep Slope - Right | Creep slope of test specimens in Right Wheel Track, (Calculated) |
| | Existing | HWT: No.of passes@max rut-Lt | Number of passes reached for test specimens in Left Wheel Track at maximum rut depth, (N passes) |
| | Existing | HWT: No.of passes@max rut-Rt | Number of passes reached for test specimens in Right Wheel Track at maximum rut depth, (N passes) |
| | Existing | HWT: SIP Passes | Average Number of Passes to Stripping Inflection Point (SIP) on test specimens in Left and Right Wheel Tracks, (N passes). Enter "0" (zero) if there is no SIP for the JMF. |
| | Existing | HWT: Specimen #1 Air Void-Lt | Air Voids of test specimen #1 in Left Wheel Track (has to be within 7.0 ± 0.5%), (%) |
| | Existing | HWT: Specimen #1 Air Void-Rt | Air Voids of test specimen #1 in Right Wheel Track (has to be within 7.0 ± 0.5%), (%) |
| | Existing | HWT: Specimen #2 Air Void-Lt | Air Voids of test specimen #2 in Left Wheel Track (has to be within 7.0 ± 0.5%), (%) |
| | Existing | HWT: Specimen #2 Air Void-Rt | Air Voids of test specimen #2 in Right Wheel Track (has to be within 7.0 ± 0.5%), (%) |
| | Existing | HWT: Stripping Slope - Avg | Average Stripping Slope of test specimens in Left and Right Wheel Tracks, (Calculated) |
| | Existing | HWT: Stripping Slope - Left | Stripping slope of test specimens in Left Wheel Track, (Calculated) |
| | Existing | HWT: Stripping Slope - Right | Stripping slope of test specimens in Right Wheel Track, (Calculated) |
| | Existing | HWT: Test Equip.Man./Model | Testing Equipment Manufacturer and Model, (Text) |
| | Existing | HWT: Testing Lab | Name of the Testing Lab, (Text) |

Updated on 3/17/2024

# JMF REFERENCE DATA

Peak Tensile Strength is calculated per AASHTO T 283

$$S_t = \frac{2000\ P}{\pi t D}$$

$S_t$ = Peak Tensile Strength, (kPa)

$P$ = Peak Load, (N)

$t$ = Thickness of the CT-Index Test specimen, (mm)

$D$ = Diameter of the CT-Index Test specimen, (mm)

**Example:**

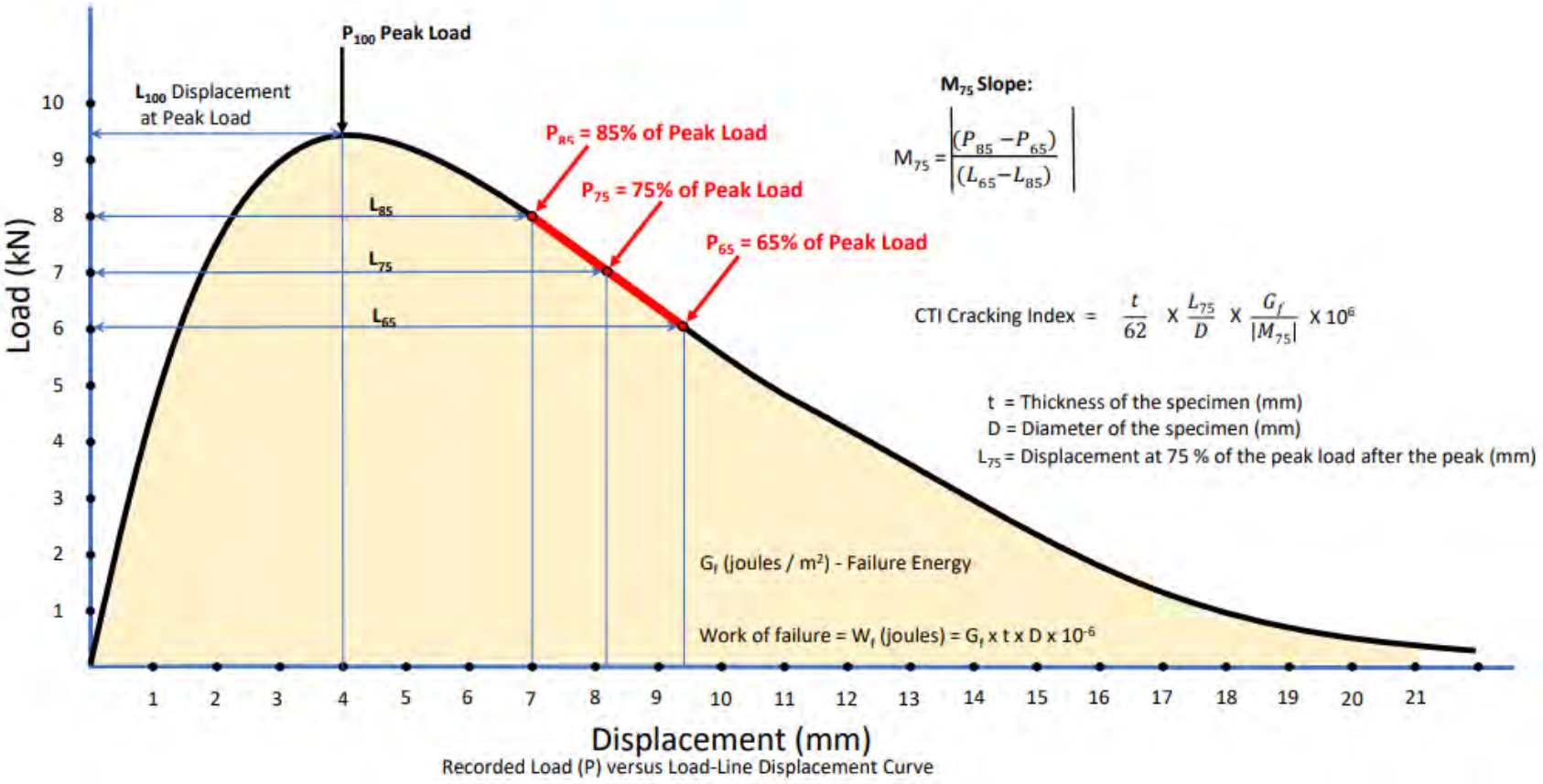
| Specimen ID | Thickness (mm) | Diameter (mm) | Peak Load (kN)* | Tensile Strength (kPa) |
|---|---|---|---|---|
| #1 | 61.9 | 150.6 | 10.6 | 723.9 |
| #2 | 61.9 | 150.4 | 10.5 | 718.0 |
| #3 | 62.0 | 150.2 | 11.2 | 765.7 |
| | | | **Average =** | **735.9** |

*Convert the Peak Load to Newton (N), where 1kN = 1000 N

# ECAMMS UPDATE

E-mail notification dated 12/7/2022

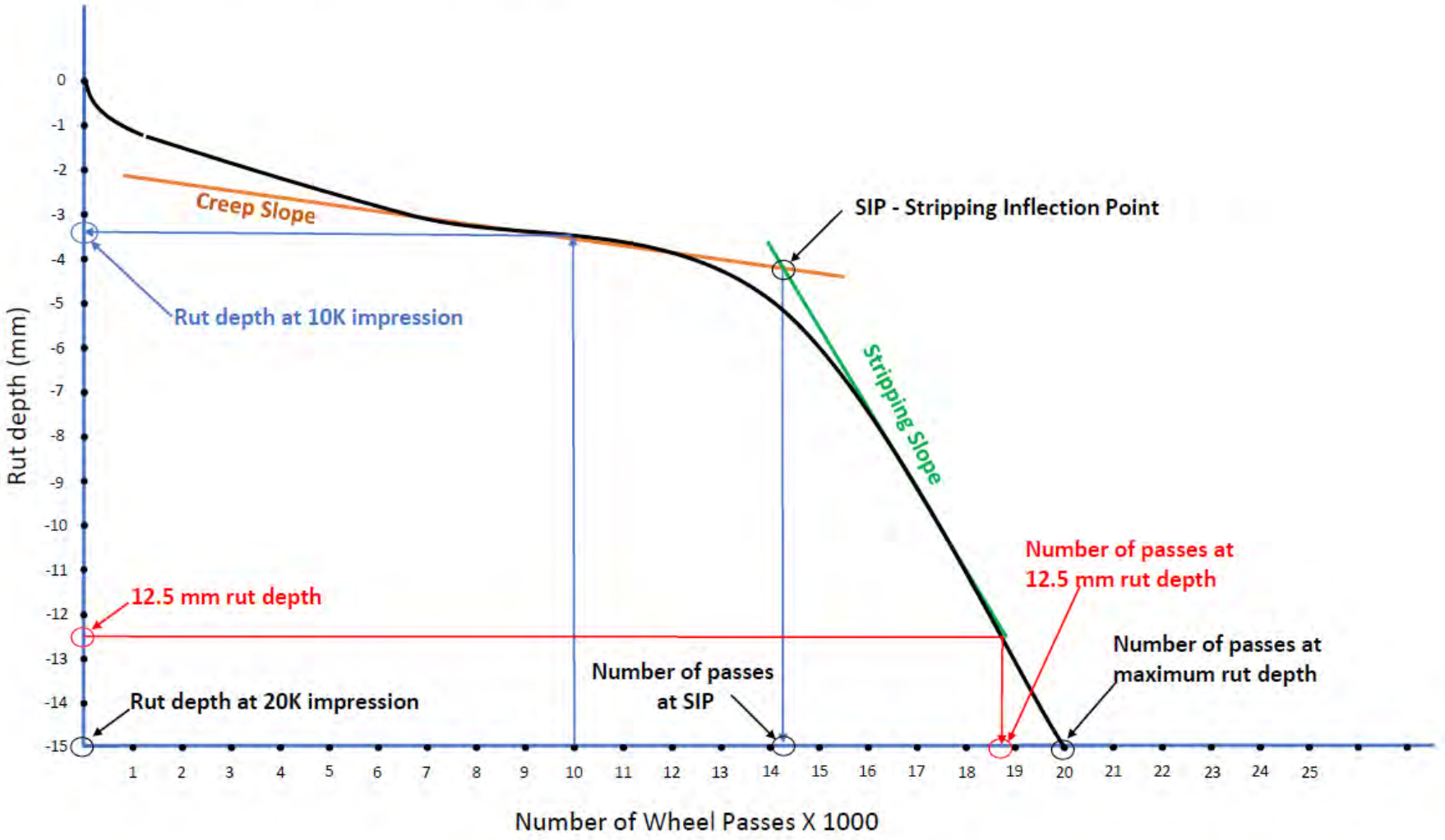
ASTM D8225 - Standard Test Method for Determination of Cracking Tolerance Index of Asphalt Mixture
Using the Indirect Tensile Cracking Test at Intermediate Temperature




Recorded Load (P) versus Load-Line Displacement Curve

# ECAMMS UPDATE

AASHTO T 324 Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures



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# QUESTIONS

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