Materials Procedures Committee Regular Meeting

Meeting Time/Date: December 17th, 10:00 AM

Meeting Location: MCS&T (Conference Room) – 190 Dry Branch Drive, Charleston WV, 25301

Online Meeting: Google Meet Video Conference

Online Link - (https://meet.google.com/qaq-awvh-wcv?authuser=0)

Files Available on ProjectWise for DOT users – See Invite or Follow P/W path:

WVDOH ORGS\MCS&T (0077) - FM\Materials Procedure Committee\MP Committee Meeting Files\2025\2025 12 17 MP Meeting

Files Available on Webpage:

https://transportation.wv.gov/highways/mcst/Pages/MP-Committee-Page.aspx

Materials Procedures – Approved at Last Meeting

1. 700.00.53 – Procedure for the Independent Assurance Program
2. 106.03.50 – General Information Guide for Technician and Inspector Certification Program (TICP)
3. 106.00.02 – Procedure for Evaluating Products for Use in Highway Construction
4. 106.10.50 – WVDOH Buy America Acceptance Guidelines
5. 606.03.50 – Procedure for Determining a Reduced Unit Price to be Paid for Underdrain Aggregate Which Does Not Conform to the Grading Requirements of the Governing Specifications

Materials Procedures - Old Business

Number	Champion	Title	Description
1* – 106.10.51	Brayack/ Chapman	WVDOH Buy America Exception and Waiver Guidelines	Adds reference to MP 106.10.52 – WVDOH Buy America De Minimis Exception.
2* – 106.10.52	Brayack/ Chapman	WVDOH Buy America De Minimis Exceptions	Set forth instructions for De Minimis Cost for Buy America Materials requirements. This procedure is only applicable if the Special Provision for De Minimis is applied to the contract.
3* – 109.00.22	Brayack	Procedure for the Submission and Documentation of Quality Control Test Results	Update to allow using attachments for AWP Samples
4* – 110.00.41	Allison	Preparing Materials Inspection Reports	Creating a Standard Format for MIRs

5* – 700.00.54	Brayack	Procedure for Evaluating Quality Control Sample Test Results with Verification Quality Assurance Sample Test Results	Adds Ref Documents, cleanup and more specific language for clarity.
6& - 700.04.22	Wagner	Method for Approving Devices Used for Testing Density and/or Moisture Content of In-Place Material	Process for creating approved list for Density/Moisture Devices On Hold
7* – 715.09.20	Boothroyd	Standard Method for Determining the Stability of Portable Sign Stands	Adds a sample calculation to show the wind force spec limit.

Materials Procedures – Editorial Edits

-None on this Agenda

Materials Procedures - New Business with Significant or Process Updates

1& - 106.00.02	Brayack	Procedure for Evaluating Products for Use in Highway Construction	Product cannot be on both the APL and the QPOM. Also removed reference/section on Buy America.
2& - 100.00.00	Brayack	Preparing Materials Procedures	The effective date of an MP is on the next contract letting date after the date of its FHWA affirmation.
3& - 401.09.40	Jack	Procedure for Asphalt Mixture Plant and Truck Inspection	New document, SJ to discuss
4& - 401.02.24	Jack	Guide to Designing Asphalt Mixtures with Reclaimed Asphalt Pavement	Updated guidelines for reclaimed asphalt pavement mix design and production.
5& - 401.02.28	Jack	Guide to Designing Asphalt Mixtures Using the Superpave Volumetric Design Method	SJ to discuss.

Note 1: * Denotes this MP is up for Vote

Note 2: & Denotes this MP is not up for Vote

Comments

Comments are due December 10th, so the Champion may review and address them. Submit comments to Adam Boothroyd (adam.o.boothroyd@wv.gov)

Next Meeting

New or Updated MPs due to the MP Chair 3-weeks before the next meeting: January 28th

Meeting Time/Date: 10:00 AM, February 18, 2026

Meeting Location: MCS&T Conference Room

Online Meeting: Google Meet Video Conference (Link TBD)

Additional MP Committee Meeting Information

For details of previous meetings, please visit the MCST MP Committee Webpage https://transportation.wv.gov/highways/mcst/Pages/MP-Committee-Page.aspx

Tentative MP Committee Dates for 2026:

February 18, April 15, June 17, August 19, October 21, December 16

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

WVDOH BUY AMERICA EXCEPTION AND WAIVER GUIDELINES

1. PURPOSE

1.1. To set forth instructions for Waivers and Exceptions for Buy America Materials requirements as defined in MP 106.10.50.

1.2. Unless an exception or waiver exists, materials must meet all requirements of MP 106.10.50.

2. REFERENCED DOCUMENTS

2.1. MP 106.10.50 – WVDOH Buy America Acceptance Guidelines.

2.2. MP 106.10.52 – WVDOH Buy America De Minimis Exception

2.3. West Virginia Code | §5A-3-56[1]

2.4. West Virginia Code | §5-19[2]

3. DEFINITIONS

3.1. Buy America Exception: A Buy America Exception is when, if certain conditions are met, the contractor may incorporate foreign materials without regard to the restrictions of the Buy American statute.

3.1.1. General Applicability Waiver (General Waiver): General Waivers are exclusions that apply generally across multiple projects. A general applicability waiver can be "product-specific" (e.g., applies only to a product or category of products) or "non-product specific" (e.g., applies to all "manufactured products").

3.1.2. Project Specific Waiver: The Project-Specific Waivers are exclusions on a project-by-project basis, and they are not transferable. Therefore, a waiver that is approved for one particular project cannot be used on another project. WVDOH may request a project-specific waiver based on non-availability or inconsistent with Public Interest.

[1] http://www.legis.state.wv.us/Bill_Status/bills_text.cfm?billdoc=hb2207%20intr.htm&yr=2001&sesstype=RS&i=2207
[2] https://code.wvlegislature.gov/5-19/

4. SCOPE

4.1. For each Buy America required material as described in MP 106.10.50, a separate waiver and/or exception process is described.

These Buy America required materials are as follows:

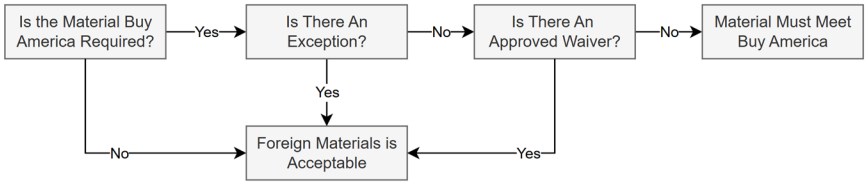
1. Steel and Iron
2. Manufactured Products
3. Construction Materials

4.2. If the material does not meet the requirements for an Exception as specified in Section 5, under certain circumstances a waiver may be granted. These waivers are specified in Sections 6-9.

4.3. If the material is Buy America required and neither an exception or nor waiver exists, the material must meet the requirements of MP 106.10.50.

4.4. A flowchart of the process is shown in Figure 1:

Figure 1: Overview of Buy America Exceptions and Waivers



5. OVERVIEW OF BUY AMERICA EXCEPTIONS

5.1. The Federal Minimal Use Exception may be granted for Steel and Iron Materials.

5.1.1. As provided for in 23 CFR 635.410(b)(4), an exception from Federal Buy America requirements exists for the minimal use of steel and iron materials "if the cost of such materials used does not exceed one-tenth of one percent (0.1 percent) of the total contract cost or $2,500, whichever is greater. For the purposes of this paragraph, the cost is that shown to be the value of the steel and iron products as they are delivered to the project".

5.2. Unless MP 106.10.52 is applicable (the De Minimis Special Provision is active for the project), ~~There~~ there are no Buy America exceptions for Manufactured Products or Construction Materials.

5.3. If these conditions are not met, foreign material shall not be used on a project unless a waiver is granted. The conditions for these waivers are described in the following sections for each of the Buy America required materials.

6. OVERVIEW OF BUY AMERICA WAIVERS

6.1. In certain circumstances, waivers (either General or Project-Specific) may be applied to materials exempting them from both Federal and State Buy America requirements.

6.2. These are described in the following sections for each of the Buy America required materials.

7. BUY AMERICA WAIVERS FOR STEEL AND IRON

7.1. If the contractor chooses to use foreign material for steel and iron and no exception applies, both Federal and State laws require Buy America waivers. These waivers are independent of each other. Compliance and acceptance of one waiver does not in any way shape or form demonstrate compliance with the other waiver.

7.2. General Waiver:

7.2.1. There are no General Waivers for Steel and Iron.

7.3. Project-Specific Waiver:

7.3.1. Federal Requirements

7.3.1.1. A Project-Specific Waiver from Federal Buy America requirements for steel and iron materials may be requested for the following instances:

(1) Public Interest: the application of Buy America requirements would be inconsistent with the public interest; or

(2) Non-Availability: steel and iron materials/products are not produced in the United States in sufficient and reasonably available quantities which are of a satisfactory quality.

7.3.1.2. If a contractor wishes to apply for a Project-Specific Waiver, they will contact the WVDOH with justification and relevant supporting information. If found acceptable, this will be sent to FHWA for approval.

7.3.2. State Requirements

7.3.2.1. As provided for in H.B. 2207, West Virginia Code | §5A-3-56, the Director of the West Virginia State Purchasing Division may authorize in writing the use of a Project-Specific Waver for a minimal amount of foreign steel products if either of the following is true:

(1) The cost for each contract item used does not exceed one tenth of one percent of the total contract cost, or two thousand five hundred dollars, whichever is greater. For the purposes of this section, the cost is the value of the steel product as delivered to the project.

(2) The director of the purchasing division determines that specified steel materials are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet contract requirements.

8. FEDERAL BUY AMERICA WAIVERS FOR MANUFACTURED PRODUCTS

8.1. There is a Federal General Waiver for Manufactured Products. Due to this waiver, manufactured products permanently incorporated into FHWA-funded projects do not need to be produced domestically, apart from predominantly iron or steel manufactured products and predominantly iron or steel components of manufactured products.

8.2. There are currently no additional waivers (including Project-Specific) for Federal Buy America Requirements for Manufactured Products.

9. FEDERAL BUY AMERICA WAIVERS FOR CONSTRUCTION MATERIALS

9.1. If the contractor chooses to use foreign material for construction materials and no exception applies, Federal law requires Buy America waivers.

9.2. General Waiver:

9.2.1. There is no General Waiver for Construction Materials.

9.3. Project-Specific Waiver:

9.3.1. WVDOH may request a waiver from Federal Buy America requirements for construction materials based on:

(1) Public Interest: the application of Buy America requirements would be inconsistent with the public interest; or

(2) Non-Availability: construction materials/products are not produced in the United States in sufficient and reasonably available quantities which are of a satisfactory quality.

9.3.2. If a contractor wishes to apply for a Project-Specific Waiver, they will contact the WVDOH with justification and relevant supporting information. If found acceptable, this will be sent to FHWA for approval.

Michael A. Mance, P.E.
Director
Materials Control, Soils & Testing Division

MP 106.10.51 Steward – Materials Control Section
MM:Bb

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

WVDOH BUY AMERICA DE MINIMIS EXCEPTIONS

1. PURPOSE

1.1. To set forth instructions for De Minimis Cost for Buy America Materials requirements.

1.2. This procedure is only applicable if the Special Provision for De Minimis is applied ot the contract.

2. REFERENCED DOCUMENTS

2.1. MP 106.10.50 – WVDOH Buy America Acceptance Guidelines.

2.2. MP 106.10.51 – WVDOH Buy America Exception and Waiver Guidelines.

2.3. West Virginia Code | §5A-3-56[1]

2.4. West Virginia Code | §5-19[2]

3. DEFINITIONS

3.1. Buy America Exception: A Buy America Exception is when, if certain conditions are met, the contractor may incorporate foreign materials without regard to the restrictions of the Buy American statute.

3.1.1. General Applicability Waiver (General Waiver): General Waivers are exclusions that apply generally across multiple projects. A general applicability waiver can be "product-specific" (e.g., applies only to a product or category of products) or "non-product specific" (e.g., applies to all "manufactured products").

3.1.2. Project Specific Waiver: The Project-Specific Waivers are exclusions on a project-by-project basis, and they are not transferable. Therefore, a waiver that is approved for one particular project cannot be used on another project. WVDOH may request a project-specific waiver based on non-availability or inconsistent with Public Interest.

4. OVERVIEW OF DE MINIMIS FOR BUY AMERICA

4.1. De Minimis Costs may be granted for Construction Materials.

4.1.1. De Minimis Costs:

[1] http://www.legis.state.wv.us/Bill_Status/bills_text.cfm?billdoc=hb2207%20intr.htm&yr=2001&sesstype=RS&i=2207
[2] https://code.wvlegislature.gov/5-19/

The De Minimis Costs portion waives the application of the requirements of the Build America, Buy America Act (BABA) for construction materials when the total value of the non-compliant products is no more than the lesser of $1,000,000 or 5% of total applicable costs for the project. This portion of the waiver does not waive FHWA's Buy America requirements for steel or iron, and FHWA continues to apply its Buy America requirements to projects that would otherwise be covered by the De Minimis portion of the waiver. It is important to note, however, that FHWA's De Minimis standard for iron and steel under 23 CFR 635.410(b)(4) continues to apply.

4.1.2. Section 5 of this document describes the application and acceptance for De Minimus.

4.2. There are no exceptions for Manufactured Materials.

4.3. If these conditions are not met, foreign material shall not be used on a project unless a waiver is granted. The conditions for these waivers are described in the following sections for each of the Buy America required materials.

5. APPLICATION FOR DE MINIMUS FOR CONSTRUCTION MATERIALS

5.1. The following procedures are used by the contractor to submit for Division consideration for approval of De Miniums.

5.1.1. The contractor shall fill out form BAM-DM-25 and submit it to the Project.

5.1.1.1. The documentation shall ensure the conditions described in Section 4 are met and shall contain the following information:

1. Total Cost of Buy America Required Materials
2. Total Cost of Non-Compliant Buy America Materials.
3. Documentation of the delivered cost of materials (Invoices)
4. A signature from the Contractor certifying the accuracy of the document
5. The text: "I certify that the cost totals and provided documentation accurately reflect the cost of the materials delivered to the Project as defined by FHWA and MP 106.10.50. In the event of a change order, change in placed quantities, this form shall be updated and resubmitted to ensure continued compliance."

5.1.2. Upon approval the exception shall be granted. This documentation shall be placed in ProjectWise.

Michael A. Mance, P.E.
Director
Materials Control, Soils & Testing Division

MP 106.10.52 Steward – Materials Control Section
MM:Bc
ATTACHMENT

WVDOH Mininmal Use & De Minimus Worksheet

Federal Project #:

Contract ID:

De Minimis Cost Summary

Total Buy America Material on Project	$	2,734,000.00	
Total Non-Compliant Material	$	534,000.00	
Allowable Non Compliant Material ($1,000,000 or 5%)	$	1,000,000.00	Allowable Non-Compliant Material

Line #	Material Name	Cost of Material Delivered to Project	Buy America Compliant	Invoice Attached (Initial by Contractor)
0050	Epoxy Resin Injection System	$ 400,000.00	yes	
0060	Blockout, Polymer	$ 4,500.00	no	
0070	Impervious Membrane	$ 8,500.00	no	
0100	Paint, Intermediate Coat	$ 206,000.00	no	
0100	Paint, Top Coat	$ 315,000.00	no	
0200	Steel Super Structure	$ 1,800,000.00	yes	
	Total Cost of Non-Compliant Material	$ 534,000.00		
	Total Cost of All Material	$ 2,734,000.00		

I certify that the cost totals and provided documentation accurately reflect the cost of the materials delivered to the Project as defined by FHWA and MP 106.10.50. In the event of a change order, change in placed quantities, this form shall be updated and resubmitted to ensure continued compliance.

Signature of Consultant

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

PROCEDURE FOR THE SUBMISSION AND DOCUMENTATION OF QUALITY CONTROL TEST RESULTS

1. PURPOSE

1.1 To provide guidance for the streamline submission of test results documentation from the Contractor to the District.

2. REFERENCED DOCUMENTS

2.1 MP 109.00.21 – Basis for Charges for Non-Submittal of Sampling & Testing Documentation by the Established Deadline

2.2 MP 109.00.23 - Auto Finalize Condition of Industry Sample Records

3. DEFINITIONS

3.1 AWP: AASHTOWare Projects – The Division Approved Sampling and Testing Documentation Software.

3.2 Authorize: In AWP, the action in which a sample record is "completed" or "finished", regardless of the final sample status.

4. SCOPE

4.1 As required by MP 109.00.21, contractors must submit their Quality Control test results by the deadline specified in that document.

4.2 The submission of results includes the following steps: (A) generating the sample in the Division Approved Sampling and Testing software (SiteManager, AASHTOWare Projects, etc.), (B) entering all data into this system, (C) presenting the data to the District for review and (D) providing all testing documentation.

4.2.1 This procedure expands on each of these points.

5. GENERATION OF A SAMPLE RECORD IN AASHTOWARE PROJECTS

5.1 Test results shall be documented in AWP (or the current Division Approved Sampling and Testing Documentation Software) using the live version of the training guides available on the WVDOH MCS&T Webpage[1]. A sample of these guides is provided in Attachment 1.

6. ENTERING OF TEST DATA.

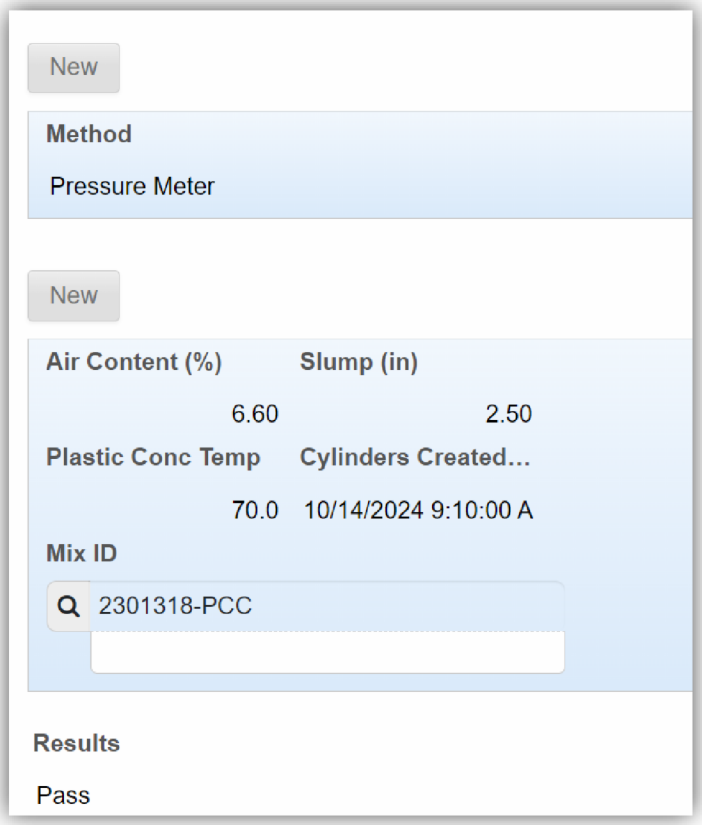
6.1 All applicable data shall be entered into AWP. This shall include all required fields as shown in the live version of the training guides available on the WVDOH MCS&T Webpage. A sample of these guides is provided in Attachment 1.

[1] https://transportation.wv.gov/highways/mcst/Pages/AWP.aspx

6.1.1 This data includes test results such as compacted density, or percentage of material passing a specific sieve.

6.1.2 Figure 1 shows an example of test data entered into AWP.

Figure 1 – An Example of Test Data Entered into AWP.



7. PRESENTING THE DATA TO THE DISTRICT FOR REVIEW AND SUBMITTING TESTING DOCUMENTATION

7.1 Once the test data has been entered, the data must be submitted to WVDOH.

7.2 An email shall be sent by the Contractor to the District Approved email submission inbox. An example of this email is shown in Attachment 2. A list of these inboxes is available on the WVDOH MCST Toolbox Webpage[2].

7.2.1 The title of the email shall contain the Contract ID and the Name of the Project, as well as "QC Test Results".

7.2.2 The email shall contain, but not be limited to the following information:

1. Contract ID
2. Name of the Project
3. Lab Reference Number
4. Sample ID
5. Material Name
6. Line Number(s)

[2] https://transportation.wv.gov/highways/mcst/Pages/tbox.aspx

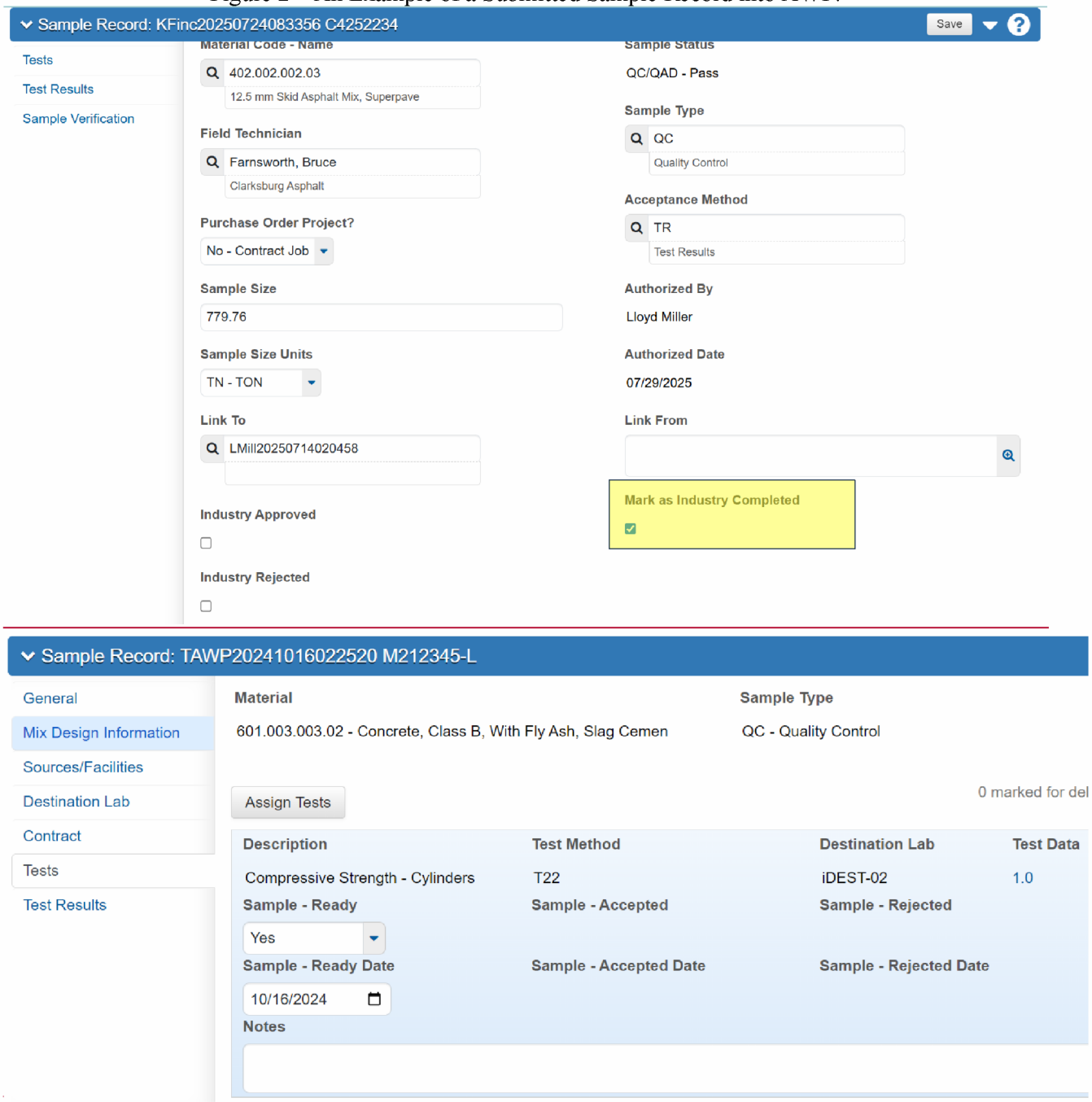
7. Final Status of the Material (Pass/Fail/Information Only)
8. A direct link to the AWP Sample Record

~~8. A PDF scan of all test data~~

7.3 The contractor may send multiple tests in a single email as long as each is on the same contract, for the same material and for the same testing day.

7.4 Once the sample record is ready to be submitted, the user will mark the test complete on the Sample Record. An example of this action is shown in Figure 2.

Figure 2 – An Example of a Submitted Sample Record into AWP.



8. ATTACHMENT OF TESTING DOCUMENTATION

8.1 Testing documentation shall be attached to the Sample Record. A training guide for this process is available on the WVDOH MCST Webpage[3].

8.1.1 This documentation shall be in PDF format and contains all data to document the entire test.

8.1.2 The file size limit for this documentation is 25mB per file.

8.2 Missing test documentation shall constitute a "rejection". No payment for a line item for the material represented by a sample record test shall be made without the required testing documentation.

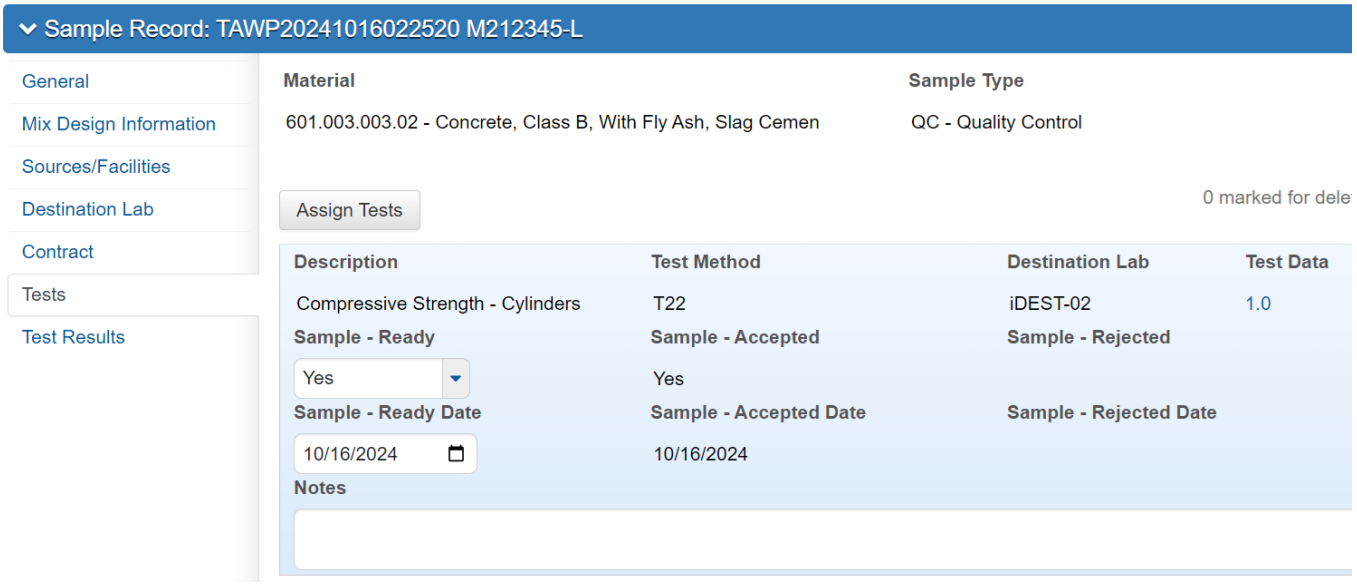
~~8.~~9. RECEIVING OF SAMPLES BY THE WVDOH

~~8.1~~9.1 Once the District has received and accepted the sample record, they will "authorize" the sample. Whether the test data passes or fails, the sample record is still authorized.

~~8.1.1~~9.1.1 If the sample record has been submitted to the District, and if the Contractor has an active "Auto-Finalize" status as described in MP 109.00.23, the sample record will be counted toward payment the next calendar day if it has not been reviewed by the District.

~~8.2~~9.2 The District will also mark the sample as "Sample-Accepted" on the sample record tests tab. An example of the completed screen is shown in Figure 3.

Figure 3 – An Example of an Accepted Sample Record into AWP.



~~8.3~~9.3 Once accepted, the District shall reply to the submission email stating that the sample record has been accepted.

~~8.4~~9.4 If rejected, the District will mark the Sample as "rejected" with the rejection date. The District will then reply to the original email, stating the reasons for the rejection.

~~8.5~~9.5 If a sample is rejected, the Contractor must correct the sample. Once corrected the Contractor will reply to the email stating that the sample has been corrected. The sample

[3] https://transportation.wv.gov/highways/mcst/Pages/AWP.aspx

will then be reviewed by the District. If found acceptable, the District will process the sample.

~~8.6~~9.6 If a sample record is once again rejected, the process shall repeat until the sample is correct.

~~8.6.1~~9.6.1 In the case where a sample record has been rejected, the total number of days (timeframe) specified in MP 109.00.21 will be the sum of the days until submitted and the number of days between rejection(s) and resubmission(s).

~~8.6.1.1~~9.6.1.1 For example, if the original submission takes 5 days and the sample is rejected, the correction(s) take an additional 5 days, the total number of days is 10. If the 10 days is greater than the allowable days in MP 109.00.21, the penalty will be applicable even if the original submission was within the allowable timeframe.

_____
Michael A. Mance, PE
Director
Materials Control, Soils & Testing Division

MP 109.00.22 Steward – Materials Control Section
MM:B
ATTACHMENT

ATTACHEMNT 1

I1-3 GENERAL TAB

Enter all the information (in Yellow) as it is Required.

NOTE: The Green Fields **MAY** be used based on the Sample Type and your District's workflow.

If you have the information, you can fill in the Green Fields.

(I1-5)

Go to the **Next Step**.

ATTACHMENT 2 – Sample Email Submission

Subject Line: 20240001243 – Contract Name – QC Test Results

Dear Robert,

I am submitting the following Sample Record(s):

20240001243
WV 19 to Allen's Run
C1N-1234
TAWP20241016022520
Class B Concrete with Fly Ash
LN 0020, LN 0030
Pass

20240001243
WV 19 to Allen's Run
C1N-1235
TAWP20241016022530
Class B Concrete with Fly Ash
LN 0020, LN 0030
Pass

https://wvXXX-pr-prod.infotechinc.com/#/SampleRecord/44209/Summary
https://wvXXX-pr-prod.infotechinc.com/#/SampleRecord/44209/Summary
(These links are examples; they are not a live.)

~~Attached is the Testing Documentation (PDF)~~The testing documentation is attached to the Sample Record.

Very Truly Yours,

Jimmy John, from Tom's Construction.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

PREPARING MATERIALS INSPECTION REPORTS

1. PURPOSE

1.1. To establish a standard format in the style, form, and substance of Materials Inspection Reports.

2. SCOPE

2.1. All formal reports from MCS&T should, whenever reasonable, be presented as a Materials Inspection Report (MIR).

2.2. All MIRs shall conform to the format used herein. See attachments for templates.

3. FONT

3.1. The font shall be Times New Roman, size 12, fully justified for all text except for the section title.

3.2. The section title shall be all capital letters, fully justified, Times New Roman, size 12 and bold.

3.3. Links shall be blue and clickable. The link path shall also be included as a footnote. An example of this is demonstrated by the “blue and clickable” text and link above and the footer at the bottom of this page.

3.4. Any instances of an email address shall also be clickable and adhere to the guidelines for a link.

4. FORMAT

4.1. The line numbering shall be as follows: “x.” for a section title and “x.x” for a section paragraph. From here, follow the format of “x.x.x…” for additional layers of sub paragraphs. This document provides an example of the formatting.

4.2. Every paragraph that is not a section header shall end with a period.

4.3. Paragraph spacing shall be single, and have a 6 pt spacing after each paragraph.

4.4. The left indent for each paragraph shall be at 0.75.

4.5. The margins for the page shall be set to 1.0 inches.

5. FIGURES

5.1. Figures such as images, charts, graphs, tables, etc shall be labeled numerically, e.g. “Table 1”. These figures should be referenced as such in the narrative of the report.

5.2. The figure caption should give the figure number followed by a brief description of the figure.

5.3. Tables captions should appear above the table. All other figure captions should appear below the figure. Captions shall be bold.

6. CONTENT

6.1. On the first page of the report, at the very top, center justified, shall be the words "**MATERIALS INSPECTION REPORT**" in capital letters and bold.

6.2. Below that shall be, in bold and all capital letters, the words "**REPORT NUMBER:**" followed by the report number. Report numbers can be obtained from the administrative coordinator.

6.3. Below that should follow "**SUBJECT:**" and the subject of the report.

6.4. Below that in a similar fashion should follow all relevant information. This information may include project number, significant dates, etc. depending on the purpose of the MIR.

6.5. On all pages except the first, a header shall be included to show the MIR number, date of the report, and the page number.

6.6. Sections in an MIR are generally Introduction, Investigation, Procedure, Summary, Conclusion, etc. Specific sections are dependent on the purpose of each specific MIR.

6.7. There shall be a signature block at the end of the report for the author of the report, as well as the supervisor of the section (if the author is not the supervisor). The author's block shall be on the right, with the supervisor's signature lower and to the left. The title of each is also to be shown.

6.8. A memorandum shall accompany all Materials Inspection Reports.

SIGNATURE BLOCK

MP 110.00.41 Steward – Lab Support Section

MAM:AB

ATTACHMENT

MATERIALS INSPECTION REPORT

REPORT NUMBER:	**1234567**
SUBJECT:	**Report Template**
PROJECT NAME:	**Project Name**
FEDERAL PROJECT NUMBER:	**If Applicable**
STATE PROJECT NUMBER:	**Project Number**
CONTRACT ID:	**24000560**
COUNTY:	**County**
DISTRICT:	**ELEVEN**
DATE OF REPORT:	**YYYY-MM-DD**

1. INTRODUCTION

1.1. This section typically includes the reason for the report. This may be for a specific reason, or routine reason such as specification requirements. This section should list applicable sections of the specifications and other important information.

2. INVESTIGATION

2.1. This section should be an explanation of the investigation/inspection.

3. PROCEDURE

3.1. This section explains the procedure for any testing, and references any test procedures followed, such as MPs, AASHTO, or ASTM procedures. If there are multiple variations or ways to perform a test, the chosen method should be clarified here.

4. SUMMARY

4.1. This section should be a summary of results. Include applicable test data, final results of tests, or averages of data. Pictures, graphs, and any other supplemental pages of information can be included as supplemental pages with the report. See Table 1 below for an example of a summary table that might be included in a report.

Table 1 - Test Result Summary

	Location 1	Location 2
Test 1	44	59
Test 2	46	61
Average	45	60

5. CONCLUSION

5.1. This section is for the conclusion of the report and any recommendations if they are needed.

_____

John E. Doe

Title, Section

_____

Jane C. Smith

Title, Section

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

PROCEDURE FOR EVALUATING QUALITY CONTROL SAMPLE TEST RESULTS WITH VERIFICATION QUALITY ASSURANCE SAMPLE TEST RESULTS

1. PURPOSE

1.1. To provide a procedure to statistically compare Quality Control (QC) and Quality Assurance (QA) tests to verify the validity of the QC samples.

~~1.1.~~1.2. To ensure adequate QA coverage of QC samples for required materials and tests.

2. REFERENCED DOCUMENTS

2.1. MP 700.00.53 - Procedure for Evaluating Independent Assurance Samples with Acceptance Samples

2.2. MP 307.00.50 - Guide for Quality Control and Acceptance Plans for Base Course

2.3. MP 401.03.50 - Guide for Contractor's Quality Control of Bituminous Concrete

~~2.1.~~2.4. MP 601.03.50 - Guide for Quality Control and Acceptance Requirements for Portland Cement Concrete

3. DEFINITIONS

3.1. System: The Division Approved Materials Tracking System.

3.2. Sample: The sample record test which has been documented in the System.

3.3. Quality Assurance (QA) Sample: Samples performed by the Division to evaluate for acceptance, a material on a Project.

3.4. Quality Control (QC) Sample: Samples performed by the Contractor for a material on a Project to demonstrate the material's compliance with the Specifications.

3.5. Verification: The process of statistically comparing a QA sample to a series of QC samples. This comparison serves to verify the validity of the QC testing. There are two approaches to this comparison:

3.5.1. Project Approach: A verification Data Set must contain all of the following data. Each of these fields must match. For example, samples from different Projects may not be combined for the Project Approach:

1. Material Source
2. Mix Design (If Applicable)
3. Aggregate Class (If Applicable)
4. Project

3.5.2. System Approach: A verification Data Set must contain all of the following data. Each of these fields must match. For example, samples from different Mix Designs may not be combined for the System Approach:

1. Material Source
2. Mix Design (If Applicable)

3.6. Data Set: ~~The series QC and linked QA test result data that is statistically compared for verification~~The test results in the linked QC and QA sample record tests. This ~~data set includes all linked~~ test data must ~~that follows the inclusion~~having matching categories as specified in Sections 3.5.1 and 3.5.2. Examples are provided in Attachment 3.

3.7. Linked Samples: This is a technical term for a process in the System which creates a data set among joined samples.

4. SCOPE

4.1. On all Projects, all QC samples for the following tests must be represented by a QA sample. These are to be evaluated in chronological order by a QA sample. No more than 10 QC samples shall be evaluated by 1 QA sample.

4.1.1. All QA samples and linked QC samples must contain matching data for all the fields in Sections 3.5.1and 3.5.2. Examples are provided in Attachment 3.

~~4.1.~~4.2. The following materials and their respective test(s) and test result(s) are evaluated by the specified approach.

~~4.1.1.~~4.2.1. Aggregate Gradations – Project Approach

1. Specification Sieves (each)
2. Pan (if applicable)

~~4.1.2.~~4.2.2. Marshall Asphalt Mixture – System Approach

1. Asphalt Content
2. Air Voids
3. VMA
4. Stability
5. Flow
6. Gradation (each Specification Sieve and Pan if applicable)

~~4.1.3.~~4.2.3. SuperPave Asphalt Mixture – System Approach

1. Asphalt Content
2. Air Voids
3. VMA
4. Gradation (each Specification Sieve and Pan if applicable)

~~4.1.4.~~4.2.4. Portland Cement Concrete – Project Approach

1. Air Content
2. Consistency
3. Strength

5. PROCEDURE

5.1. After completion of the QA sample, the test data shall be entered into the System. The QA sample shall be linked to the appropriate QC sample(s) as specified in Section 4.2. Note that all samples being linked must contain all respective test results for the material shown in Section ~~3~~ 4 and meet the criteria stated in Sections 3.5.1and 3.5.2.

5.1.1. If a system approach QA sample is performed and it covers multiple Districts, the QA sample shall be performed by the District in which the plant is located.

5.2. The samples shall be linked by the person creating the QA sample, based on the total number of QC samples. This will allow the System to create a data set and perform an evaluation (if applicable). For QA samples evaluating QC samples in the system approach, all QC samples taken after the last QA sample and up to the current QA sample shall be evaluated.

5.2.1. 1-4 QC Sample(s)

If there are less than five QC samples, they shall be linked, but no calculation shall be performed; The evaluation will be conducted as specified in Section ~~5~~6.1

5.2.2. 5-10 QC Samples

If there are five to ten QC samples, they shall be linked; the data set shall consist of all of the available tests. The evaluation shall be conducted as specified in Section ~~5~~6.2

5.2.3. 11 + Quality Control Samples

If there are eleven or more QC samples available, they shall be organized sequentially by date/time; only the first ten shall be linked. The data set shall consist of these ten samples. The evaluation shall be conducted as specified in Section ~~5~~6.2.

An additional QA sample shall be completed, and the process shall be restarted independent of the prior evaluation. This extra date set shall be linked and evaluated according to the remaining QC samples.

5.2.3.1. For example, if 16 QC samples are taken, there shall be a QA sample for QC samples 1-10 and then another QA sample for QC samples 11-16, which would be evaluated as “5-10” QC samples.

6. EVALUATION

6.1. If the data set contains less than 5 linked QC samples, no calculation shall be made. The test data shall be visually evaluated for significant variance. If a significant variance is noted, appropriate action shall be taken by the District as specified in Section 7.3.2.1. If there is no significant variance, the report shall indicate: “This sample, <sample number recorded here> has been reviewed in accordance with MP 700.00.54, and judged to be similar." If it is not similar, it’s handled in accordance with Section 7.3.2.1.

6.2. If the data set contains 5 or more linked QC samples, they shall be evaluated by the System. No more than 10 QC samples shall be linked; if there are more than 10 QC samples, the System shall return an error.

6.2.1. The calculation and evaluation criteria used in the System are documented in Attachment 1.

6.3. Based on the calculation and evaluation criteria, the System shall report as follows:

6.3.1. If all the test results are evaluated as "Similar", the entire data set shall be judged "Similar".

6.3.2. If any of the test results in the set are evaluated as "Non-Similar", the entire data set shall be judged as "Non-Similar".

6.3.2.1. If the data set is "Non-Similar", the District Materials Supervisor shall perform and document the following for QC:

1. Review the sampling procedure.
2. Review the testing procedures.
3. Check testing equipment.
4. Review documentation.
5. Perform any additional investigations that may clarify the discrepancy.

7. REPORTING AND SAMPLE SUBMISSION

7.1. Once the evaluation is completed, the result shall be noted by the District on the QA sample.

7.2. If applicable, the sample shall also be marked by the District as "Pass" or "Fail" along with whether the data is "Similar" or "Non-Similar" as defined in Section ~~6~~7.2.1 and ~~6~~7.2.2.

7.2.1. If the data set is found to be "Similar", the QA Sample shall be marked "Similar" in the System by the District.

7.2.2. If the data set is found to be "Non-Similar" the QA sample shall be marked "Non-Similar" in the System by the District.

7.2.2.1. If the Sample is marked "Non-Similar", the documentation from Section ~~5~~6.3.2.1 shall be submitted with the sample by the District, including the corrective action when applicable.

7.2.2.2. In the event that other documentation is needed to resolve the material, that information shall also be provided with the sample by the District.

7.3. The sample shall then be submitted by the District to the respective MCS&T Materials Regional Coordinator for final evaluation and approval.

7.4. A sample report is shown in Attachment 2.

Michael Mance, PE
Director
Materials Control, Soils & Testing Division

MP 700.00.54 Steward – Materials Control Section
MAM:B

Attachment 1: Sample Calculations

To determine the range (R) of the QC samples, subtract the smallest test value from the largest test value.

Compute the interval (I) by substituting the values into the proper equation below.

Number of Samples Used in Calculating the Average	Equation for Computing the Interval (I)
10	$I = \overline{X}_{10} \pm 0.91 \times R$
9	$I = \overline{X}_{9} \pm 0.97 \times R$
8	$I = \overline{X}_{8} \pm 1.05 \times R$
7	$I = \overline{X}_{7} \pm 1.17 \times R$
6	$I = \overline{X}_{6} \pm 1.33 \times R$
5	$I = \overline{X}_{5} \pm 1.61 \times R$

The interval (I) is determined by first adding the average ($\overline{X}_n$) to the product of the range (R) times the given constant. This determines the upper limit of the interval. If the result obtained is greater than 100%, it will be recorded as 100%. Next, subtract the product of the range (R) times the given constant from the average ($\overline{X}_n$). This determines the lower limit of the interval. If the result is less than zero, it will be recorded as zero.

For aggregate gradations, the average for each sieve must be calculated separately.

All data must fall within the range to be judged “Similar”. Otherwise, the data set is “Non-Similar”.

Attachment 2: Sample Evaluation Report

West Virginia
Department of Transportation

Marshall Verification Sample Evaluation Computation Sheet

Sample Record: TKraf20241205122921
Material Name: Base 2/Wearing 4 Asphalt Mix, Marshall
Material Code: 401.002.000.05
Facility: F-JFA4.02.704 - J.F. Allen Co. - Lorentz

Laboratory ID: D07-ASP
Sample Date: 10/17/2024
Contract ID:

Sample Record Name	% Asphalt	% Air Voids	%VMA	Stability	Flow	Lab Reference Number	Open Sample Record
TKraf20241018080012	5.0	4.5	14.1	11,648	15.0	C7B2440	Click Here
TKraf20241022120955	5.1	2.2	12.3	12,642	15.3	C7B2441	Click Here
TKraf20241022121156	4.8	3.2	12.5	11,529	14.3	C7B2442	Click Here
TKraf20241022121345	5.0	2.0	12.0	11,633	15.5	C7B2444	Click Here
TKraf20241022121524	4.9	2.9	12.5	12,417	14.8	C7B2445	Click Here
TKraf20241108123059	5.3	2.0	12.5	12,337	15.7	C7B2448	Click Here
Average:	5.02	2.8	12.65	12034.33	15.1		**Records:** 6
Range:	0.5	2.5	2.1	1113	1.4		
Upper Limit Interval:	5.69	6.13	15.44	13514.62	16.96		
Lower Limit Interval:	4.36	0	9.86	10554.04	13.24		

% Asphalt	% Air Voids	% VMA	Stability	Flow	Lab Reference Number
4.9	2.2	11.8	12,480	12.9	M7B2443
✓	✓	✓	✓	✖	

(ALL NEW) Attachment 3 – Examples of Samples Which Can and Cannot Be Linked:

Project Approach:
All the following must match:

1. Material Source (Enforced by Mix Design for Concrete).
2. Mix Design (If Applicable)
3. Aggregate Class (If Applicable)
4. Project

The following example shows an incorrect data set contains an errant Mix Design and Project.

Lab Number	Contract ID	Project Name	Material	QC/QA	Mix Design
M1N8745	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QA	2406546
C1N2312	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QC	2406546
C1N2313	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QC	2406546
~~C1N2314~~	~~2025087334~~	~~Knollwood Dr~~	~~Class B Concrete with Fly Ash~~	~~QC~~	~~2508546~~
C1N2315	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QC	2406546
~~C1N2316~~	~~2024060004~~	~~Sharp Dr.~~	~~Class B Concrete with Fly Ash~~	~~QC~~	~~2406546~~
C1N2317	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QC	2406546

The following example shows a correct data set. All the required fields match.

Lab Number	Contract ID	Project Name	Material	QC/QA	Mix Design
M1N8745	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QA	2406546
C1N2312	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QC	2406546
C1N2313	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QC	2406546
C1N2314	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QC	2408546
C1N2315	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QC	2406546
C1N2316	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QC	2406546
C1N2317	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QC	2406546
C1N2318	2025087334	Knollwood Dr	Class B Concrete with Fly Ash	QC	2406546

System Approach:
All the following must match:

1. Material Source (Enforced by Mix Design for Asphalt).
2. Mix Design (If Applicable)

The following example shows an incorrect data set containing an errant Material and Mix Design.

Lab Number	Contract ID	Project Name	Material	QC/QA	Mix Design
M1N8745	2025087334	Knollwood Dr	Base 2/Wearing 4 Asphalt Mix, Marshall	QA	2406546
C1N2312	2024034008	University Ave	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
C1N2313	2025087334	Knollwood Dr	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
~~C1N2314~~	~~2025080008~~	~~Dunlap Drive~~	~~Wearing 1 Skid Asphalt Mix, Marshall~~	~~QC~~	~~2508526~~
C1N2315	2025080008	Dunlap Drive	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
C1N2316	2024034008	University Ave	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
C1N2317	2024034008	University Ave	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
C1N2318	2025087334	Knollwood Dr	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
C1N2319	2025087334	Knollwood Dr	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546

The following example shows a correct data set. All the required fields match.

Lab Number	Contract ID	Project Name	Material	QC/QA	Mix Design
M1N8745	2025087334	Knollwood Dr	Base 2/Wearing 4 Asphalt Mix, Marshall	QA	2406546
C1N2312	2024034008	University Ave	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
C1N2313	2025087334	Knollwood Dr	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
C1N2315	2025080008	Dunlap Drive	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
C1N2316	2024034008	University Ave	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
C1N2317	2024034008	University Ave	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
C1N2318	2025087334	Knollwood Dr	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546
C1N2319	2025087334	Knollwood Dr	Base 2/Wearing 4 Asphalt Mix, Marshall	QC	2406546

.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

METHOD FOR APPROVING DEVICES USED FOR ~~ACCEPTANCE~~ TESTING DENSITY AND/OR MOISTURE CONTENT OF IN-PLACE MATERIAL

Commented [1]: JC - Asphalt - PWL - Contractor can do anything they want. Contractors use it for non-nuclear for check. Will this approve list roll that out?

Commented [2]: This is only for gauges used for acceptance

1. PURPOSE

1.1. The WVDOH has a long history of using nuclear moisture/density gauges and is familiar with the test procedures, reliability, maintenance, and calibration procedures of such devices. In recent years, more devices have come to the market that are low or non-nuclear. This MP is in place ~~T~~to establish procedures ~~used~~ to approve the use of any testing device~~s~~ for Density and/or Moisture ~~of~~ for in-place material on WVDOH projects.

2. SCOPE

2.1. This MP applies to moisture and density testing devices used for acceptance testing, as well as any time such devices might be used when quality control testing results are used for acceptance.~~To establish procedures used to approve the use of testing devices for Density and/or Moisture of in-place material on WVDOH projects.~~

3. REFERENCED DOCUMENTS

Commented [3]: Do we need the 401 section here

Commented [4]: Added the specs

3.1. West Virginia Department of Transportation Specifications

~~3.1.~~3.2. AASHTO T355 - Standard Method of Test for In-Place Density of Asphalt Mixtures by Nuclear Methods

~~3.2.~~3.3. ASTM D2216 - Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

~~3.3.~~3.4. ASTM D4959 – Standard Test Method for Determination of Water Content of Soil by Direct Heating

3.5. ASTM D8167/D8167M – Standard Test Method for Density of Asphalt Mixtures in Place by Nuclear Methods~~Add Name~~

Commented [5]: Is this the same as T-355

3.6. ASTM D7830/D7830M Standard Test Method for In-Place Density (Unit Weight) and Water Content of Soil Using an Electromagnetic Soil Density Gauge

3.7. AASHTO T 343-12 (2024) Density of In-Place Asphalt Pavement by Electronic Surface Contact Devices

~~3.4.~~3.8. ASTM D7113/D7113M Standard Test Method for Density of Asphalt Mixtures in Place by the Electromagnetic Surface Contact Methods

~~3.5.~~3.9. MP 207.07.20 – Nuclear Field Density – Moisture Test for Random Material Having less than 40% of +3/4 Inch Material

3.10. MP 700.00.24 – Nuclear Density Test by Roller Pass Methods

~~3.6.~~3.11. MP 717.04.21 – Guide for Quality Control of Compaction ~~Add MPs from BW email~~

4. APPROVAL REQUIREMENTS OF DEVICES FOR TESTING OF DENSITY AND/OR MOISTURE OF IN-PLACE MATERIAL ~~TESTING PROCEDURE~~

4.1. The testing device must meet ~~WV DOH Standard~~ Specification ~~717~~716.3.2, as well as conform to the needs of the above referenced MPs and ASTM procedures as applicable.

4.2. ~~The~~ The testing device must provide accurate and precise results according to the Gauge Comparison process described in section 401.6.4.1.1 of the Specifications.

4.3. The testing device must be entirely self-contained and ~~be~~ suitable for each application. The testing device must be capable of providing wet density, dry density, and moisture of asphalt, soil, and aggregates through the operations of a single test, without the need for supporting devices.

~~The testing device must be entirely self-contained and must be capable of providing results for Dry Density, Wet Density and Moisture content through the operations of ain one single test, without the need for othersupporting devices.~~

4.4. The testing device must be capable of completing a test and delivering ~~rapid~~ results within a ~~, suitable for the application. M~~maximum of one minute per test.

4.5. The testing device must, ~~not allow the introduction of bias into test results, i.e., the device~~under normal operations, collect a single reading and produce~~s~~ a single result~~s~~ for each operation~~s~~ of the device. This result must not be an average, minimum or maximum of values collected by the device through subsequent readings. ~~must test once and provide a reliable result, rather than test multiple times to find the best result.~~

~~The testing device must not interfere with, nor be susceptible to interference from, any other typical testing device that is expected to be on a project.~~

5. APPROVAL PROCESS

5.1. For consideration to be added to the list of approved devices, submit the ~~gauge~~device information and manufacturer's documentation to dohcompaction@wv.gov.

5.2. The WVDOH will evaluate each brand/model of moisture/density testing device as needed. Evaluations shall be based~~base~~ on ~~according to~~ the requirements listed in Se

Commented [6]: Are these MP names going to change?

Commented [7]: I would assume so based on trends, but as of now those are the current names of those MPs

Commented [8]: Doesn't exist, needs to be updated/deleted, BW to take a look at this

Commented [9]: Define Accurate, precise and comparable or reference AASHTO that does…
If you are not willing to specify hard requirements for what is allowed then just delete this whole section. This it is too vague and subjective to set a reliable and unbiased

Commented [10]: Added sentence to address this

Commented [11]: Stating precise and repeatable is redundant

Commented [12]: Combine with 4.4

Commented [13]: "The testing device must of suitable for testing the properties in 4.4 for

Commented [14]: What would you define as another device? Even the non nukes can

Commented [15]: This is not regarding correlation. This is to address test devices

Commented [16]: I suggest writing it out, don't imply what you want.

Commented [17]: Any piece of equipment will fail this requirement… all testing has some

Commented [18]: Yes there is inherent error. That is not what this is about. Our current

Commented [19]: What device are you referring too?

Commented [20]: Nuclear gauges are susceptible to being around steel…

Commented [21]: True, and that is why we teach not to test around steel. We have

Commented [22]: specify "testing" devices.

Commented [23]: What is the Evaluation Process?

Commented [24]: added "compared to the manufacturer's documentation". Will submit

ction 4 and ~~compared to~~ the manufacturer's documentation. WVDOH ~~and~~ reserves the right to reject or remove any ~~brand or model~~device from the approval list. ~~without further explanation~~.

4.1. Devices that meet all of the requirements of this MP will be evaluated first as a QC device. Upon satisfactory field performance as a QC device, it will be listed as a QA device. The brand and model can be found on the appropriate approved list on the MCS&T website.

Commented [25]: This seems excessive… if a bunch of consultant firms buy into a piece of equipment that you have on this approval list and you abruptly remove it what are the firms supposed to do? There should be fair warning and a justification for its removal.

~~**5. CURRENT APPROVED LIST OF DEVICES FOR TESTING OF DENSITY AND/OR MOISTURE OF IN-PLACE MATERIAL**~~

~~Humbolt HS-5001 series~~

~~Troxler 3430/3440 series~~

~~Instrotek 3500 series~~

~~Instrotek Xplorer 2~~

~~Instrotek/CPN MC-1~~

~~5.1. Instrotek/CPN MC-3Process TBD~~

Commented [26]: These should be an online list, attachment or addendum so the entire MP doesn't have to go through committee for a change.

Commented [27]: Agree. This is moving to an approved list.

~~**6. APPROVAL OF DEVICES FOR TESTING OF DENSITY AND/OR MOISTURE OF IN-PLACE MATERIAL**~~

~~6.1.~~5.3. ~~Process TBD~~

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

STANDARD METHOD FOR DETERMINING THE STABILITY OF PORTABLE SIGN STANDS

1. PURPOSE

1.1. To establish a procedure for determining the stability (acceptable wind resistance) for portable sign stands.

2. SCOPE

2.1. This procedure shall apply to all portable sign stands submitted for inclusion on the Division's Approved Products List (APL).

2.2. This testing shall be done in addition to the MASH testing as described in the Specifications.

3. REFERENCED DOCUMENTS

3.1. MP 106.00.02 - Procedure for Evaluating Products/Processes for Use in Highway Construction.

3.2. MP 106.00.21 - Acceptance Procedure for MASH Compliant Roadside Departure Hardware.

4. SUBMISSION OF PRODUCTS

4.1. Prospective Producers/Suppliers shall complete form HL-468[1] , as per MP 106.00.02 indicating intention to be included on the WVDOH APL.

5. TESTING PROCEDURE FOR 36-IN SIGN

5.1. The manufacturer's portable sign stand shall be assembled according to the manufacturer's instructions on a firm concrete or asphalt surface with legs contracted (for 36-inch (0.9 m) signs).

5.1.1. The testing technician shall inspect the device to ensure that it is functioning properly as per the manufacturer's standards.

[1] https://transportation.wv.gov/highways/mcst/Pages/tbox.aspx

5.2. Stands shall be secured such that there is no potential for sliding. This securing mechanism shall in no way alter the stability of the stand.

5.3. Attach the dynamometer force gauge to the top of the sign stand 60 inches (1.5 m) above the bottom of the sign. If the stand does not have a solid mast at that height, insert a testing rod into the stand for a solid anchor point. With an even motion, parallel to the ground surface at a 90-degree angle to the back of the sign, measure the force required to "tip-over" the sign.

5.3.1. A final pulling force shall be recorded as the maximum force exerted before the sign becomes unstable and falls.

5.4. Repeat the above step two more times and calculate the average of the 3 readings.

5.5. The acceptable minimum value shall be 7 lbf~~s~~. (~~3 kg~~29.42 N).

~~5.4.1.~~5.5.1. The associated wind speed with 7 lbf is approximately 17.4 mph. This calculation is shown in Attachment 1.

Commented [1]: Mass unit for a force measurement? Should probably be Newtons. Also maybe specify the lbs. as lbf?

6. TESTING PROCEDURE FOR 48-IN SIGN

6.1. The manufacturer's portable sign stand shall be assembled according to the manufacturer's instructions on a firm concrete or asphalt surface with legs fully extended (for 48-inch (1.2 m) signs).

6.1.1. The testing technician shall inspect the device to ensure that it is functioning properly as per the manufacturer's standards.

6.2. Stands shall be secured such that there is no potential for sliding. This securing mechanism shall in no way alter the stability of the stand.

6.3. Attach the dynamometer force gauge to the top of the sign stand 60 inches (1.5 m) above the bottom of the sign. If the stand does not have a solid mast at that height, insert a testing rod into the stand for a solid anchor point. With an even motion, parallel to the ground surface at a 90-degree angle to the back of the sign, measure the force required to "tip-over" the sign.

6.3.1. A final pulling force shall be recorded as the maximum force exerted before the sign becomes unstable and falls.

6.4. Repeat the above step two more times and calculate the average of the 3 readings.

6.5. The acceptable minimum value shall be 18 lbf~~s~~. (~~8.2 kg~~80.41 N).

6.5.1. The associated wind speed of 18 lbf is approximately 21.0 mph. This calculation is shown in Attachment 1.

7. APPROVAL OF PORTABLE SIGN STANDS

7.1. The results of the described test as well as the MASH testing results shall be presented to the Roadway Departure Task Force. The approval of these items shall be at the discretion of this Task Force as described in MP 106.00.21.

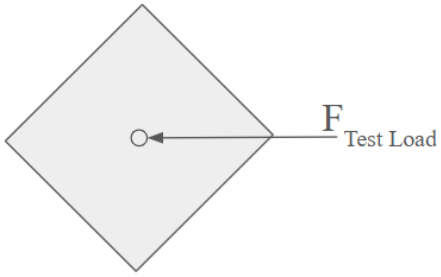
_____
Michael A. Mance, P.E.
Director
Materials Control, Soils & Testing Division

MP 715.09.20 Steward – Traffic Certification Section
MM:Bb
ATTACHMENT

This attachment is all new

Attachment 1: Conversion between Test Force and Associated Wind Speed

Assuming uniform density in the sign, symmetry, and the test force is applied at center of sign such that:



Then:

$$F_{Test\ Load} = p_{dynamic\ air\ pressure} \cdot A_{Sign}$$

$$F_{Test\ Load} = 0.5 \cdot \rho_{air\ density} \cdot v^2_{air\ speed} \cdot A_{Sign}$$

$$v_{air\ speed} = \sqrt{\frac{2 \cdot F_{Test\ Load} \cdot 32.174}{\rho_{air\ density} \cdot A_{Sign}}} = \left(\sqrt{\frac{2 \cdot F_{Test\ Load}}{\rho_{air\ density} \cdot A_{Sign}}}\right)$$

*Note that the 32.174 is an imperial units only conversion factor not used in the metric version in parenthesis

For a 36 in. x 36 in. sign's minimum allowable maximum test force/load:

Assuming air density = 0.0765 lbm/ft^3 (1.225 kg/m^3)

Force$_{\text{Test Load}}$ = 7 lbf (3 kg = 29.42 N)
Area$_{\text{Sign}}$ = 36 in. x 36 in. = 9 ft^2 (0.836 m^2)

$v_{\text{air speed}}$ = 25.6 ft/s = 17.4 mph (7.58 m/s = 27.29 kmph)

For a 48 in. x 48in. Sign's minimum allowable maximum test force/load:

Assuming air density = 0.0765 lbm/ft^3 (1.225 kg/m^3)

Force$_{\text{Test Load}}$ = 18 lbf (8.2 kg = 80.41 N)
Area$_{\text{Sign}}$ = 48 in. x 48 in. = 16 ft^2 (1.486 m^2)

$v_{\text{air speed}}$ = 30.8 ft/s = 21.0 mph (9.40 m/s = 33.84 kmph)

*Note that air density changes with temperature, pressure, and humidity; these calculations are general approximations.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

PROCEDURE FOR EVALUATING PRODUCTS FOR USE IN HIGHWAY CONSTRUCTION

1. SCOPE

1.1 New products are frequently presented to the Division by various manufacturers, suppliers and/or producers (MS&Ps) with a request that they be considered for use in our highway program. To facilitate handling of such requests in a uniform and expeditious manner, this Materials Procedure outlines the steps necessary for such product submittal and evaluation. This Procedure covers the addition of approved submitted products to the Division's Approved Product List (APL).

1.2 This Materials Procedure outlines the review of materials for use outside of standard bid contract work. This applies to District Purchase Order Projects and outlines a path for the addition of materials to the Division's Qualified Purchase Order Materials (QPOMs).

2. REFERENCE DOCUMENTS

2.1 MP 106.00.03: Guidelines for Establishing and Maintaining Approved Product Lists of Materials, Systems and Sources.

~~2.2 MP 106.10.50: WVDOH Buy America Acceptance Guidelines.~~

3. DEFINITIONS

3.1 MCS&T Reviewing Entity: The applicable Section Supervisor at MCS&T who is responsible for the review and acceptance of a new product.

3.2 Non-MCS&T Reviewing Entity: A subject matter expert at a WVDOH division separate from MCS&T.

3.3 Project: For this Materials Procedure, this term means a traditional bid contract.

3.4 APL: Approved Product List.

3.5 MS&Ps: Material Supplier and/or Producer.

3.6 QPOM: Qualified Purchase Order Material.

3.7 QPOS: Qualified Purchase Order Submittal.

3.8 PO Project: Purchase Order Project.

4. SUBMISSION OF PRODUCT

4.1 Consideration for product evaluation shall be requested through completion by the MS&Ps of WVDOH Form HL-468, "Preliminary Information for New Product

Evaluation". Once completed, DOH Form HL-468 shall be submitted to the MCS&T via email to the New Products Evaluation email address: DOHNewProducts@wv.gov .

4.1.1 The HL-468 Form can be found on the MCS&T Division's Materials Procedures Webpage[1]. A sample of this form is shown in Attachment 1. An online form may also be used to meet this requirement.

4.2 When submitting a product, the MS&P shall indicate whether the product is being submitted for either an APL or QPOM.

4.2.1 If a MS&P wishes the product to be submitted for both the APL and QPOM, they must complete two separate HL-468s. These may be sent together.

5. REVIEW OF SUBMITTED PRODUCT

5.1 Upon receipt of the completed Form HL-468, the MCS&T Division shall distribute to applicable MCS&T Reviewing Entity for preliminary evaluation.

5.1.1 Within 30 calendar days of receipt, the MCS&T Reviewing Entity shall review the submittal in accordance with the applicable material requirements and decide if the product is acceptable.

5.1.2 This MCS&T entity shall ultimately be responsible for the review of the new product, though they may reach out to Non-MCS&T Reviewing Entities for additional approving criteria.

5.1.3 A Non-MCS&T Reviewing Entity shall be given 7 calendar days to review the submission before making a final decision. If the entity does not respond within that time, their affirmation for the approval will be assumed by the MCS&T Entity.

5.2 If the preliminary review indicates that additional information is needed, the MS&P shall be notified to submit additional information. This may include but not be limited to: samples, product specifications, certified test data, or product demonstrations. Product testing shall be coordinated by the MCS&T Division with the results of any further testing/evaluation being submitted to all appropriate evaluating parties. In the case where additional information has been requested or additional testing is required, the 30-day timeframe shall be reset to the date when the additional information is provided, or the testing has been completed.

5.3 If the MS&P fails to submit the request information within 30-days, the reviewing entity may reject the request. Discretion may be given if the information request requires testing or evaluation that would exceed this time frame.

6. APPROVED PRODUCT LIST

6.1 If the review indicates that the product meets the specifications, it shall be considered accepted and added to the APL. The MS&P shall be notified via letter.

6.2 If the reviewing entity determines that the WVDOH does not currently have any specifications for the submitted product, the WVDOH shall notify the MS&P via

[1] https://transportation.wv.gov/highways/mcst/Pages/MP-100s.aspx

email that there is no specification; the MS&P may choose to submit the product for consideration as a QPOS (see Section 7.)

6.2.1 If the MS&P indicates that they do not wish to be considered a QPOS, a non-approval letter shall be sent.

6.3 If the evaluation indicates that the product is not acceptable, the MS&P shall be notified by MCS&T via letter. The MS&P shall not submit the same product for evaluation within a six-month period.

6.4 In the instance where a product has significant approved usage, the Director (or their Designee) of MCS&T may add a product to either a new or existing APL as per MP 106.00.03. If a product is a candidate for being added to the APL in this manner, the MCS&T Lab Coordinator shall contact the MS&P prior to the addition of the product to the APL to request completion of the required HL-468.

7. QUALIFIED PURCHASE ORDER MATERIALS

7.1 All products which appear on the Division's APL are approved for use on PO Projects. Under no circumstances shall an approved QPOM be used on a project without prior testing and approval.

7.2 The reviewing entity shall determine if the QPOS performs as specified by the manufacturer. If this product meets those criteria, a QPOM acceptance letter shall be issued.

7.3 If the evaluation indicates that the product is not acceptable, the MS&P shall be notified by MCS&T via letter. The MS&P shall not submit the same product for evaluation within a six-month period.

7.4 If a product is approved for the APL, it shall be removed from the QPOM. In no cases shall a product be on both the APL and the QPOM. If this is found to be the case, the QPOM shall be removed and a letter to the producer/supplier issued.

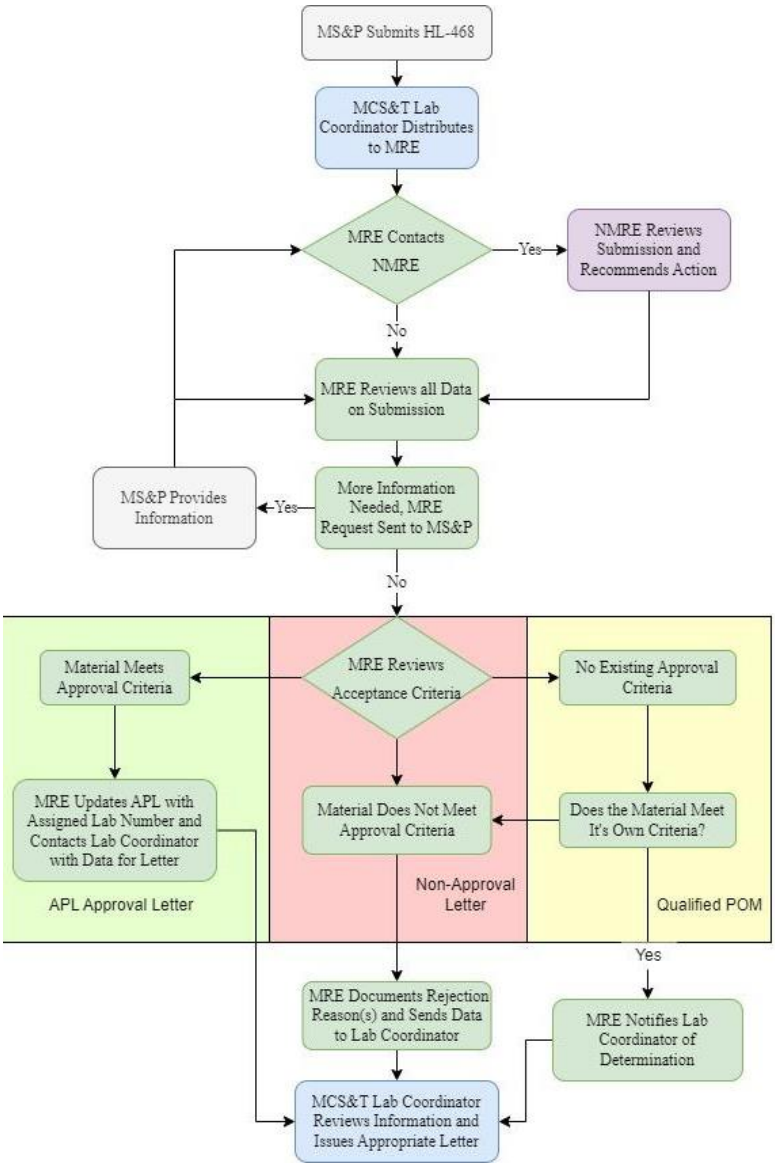
7.4.1 If a previously approved QPOM is approved for the APL, the approval letter shall note the removal from the QPOM.

~~7.3.1~~7.4.2 If a product is submitted and approved for the APL and QPOM concurrently, it shall only be approved for one or the other, with the APL approval taking priority if the product meets that criteria.

8. PROCESS FLOW CHART

8.1 A flow chart for the process is provided in Figure 1

Figure 1: Flow Chart for Approved Products List Process.



Key:
MRE: MCS&T Reviewing Entity
NMRE: Non-MCS&T, WVDOH Reviewing Entity
MS&P: Manufacturers, Suppliers and/or Producers

9. NOTIFICATION LETTERS

9.1 Sample language for submission responses is shown in Attachment 2.

10. DOCUMENTATION OF REVIEWED PRODUCTS

10.1 MCS&T shall maintain a directory on the Division's APL Webpage[2] listing all the current approved products.

[2] https://transportation.wv.gov/highways/mcst/Pages/APL_By_Number.aspx

10.1.1 Additionally, MCS&T may evaluate the product listing after one year to determine if the performance or functionality of the product/process meets the desired results, goals, or intentions of the DOH. Any such evaluation may result in the product being removed from the APL.

10.2 MCS&T shall maintain a directory on the Division's QPOM Webpage[3] listing all products in this category.

10.2.1 Additionally, MCS&T may evaluate the QPOM listing after one year to determine if the performance or functionality of the product/process meets the desired results, goals, or intentions of the DOH. Any such evaluation may result in the product being removed from the list.

11. REMOVAL OF PRODUCTS FROM APL OR QPOM

11.1 If, at any time the reviewing entity determines that a previously approved product no longer meets the specifications, the product shall be removed from the respective list.

11.2 In this instance, the reviewing entity shall notify the MS&P via letter.

~~**12. BUY AMERICA**~~

~~12.1 Each HL-468 submission must include whether the product meets the Federal and State Buy America requirements of Section 106.1 of the Specifications. If the MS&P indicates that their product meets Buy America requirements, the company shall produce a notarized Certificate of Compliance (CoC) signed by a company official with knowledge and authority to certify the product is compliant with applicable Buy America requirements.~~

~~12.1.1 In the event where the source of materials is changed and is no longer Buy America compliant, the MS&P must notify MCS&T in writing.~~

~~12.1.2 Under no circumstance shall the CoC described above be used for Buy America compliance on a project. Each project much submit a CoC as described in MP 106.10.50 "WVDOH Buy America Acceptance Guidelines."~~

~~12.2 A notarized CoC shall contain the following information:~~

~~12.2.1 Title: Certification of Buy America compliance for Source Approval.~~

~~12.2.2 The Name, Address and Contact Information for the Company.~~

~~12.2.3 The date of the application~~

~~12.2.4 A company statement that demonstrates compliance with Buy America.~~

~~12.2.5 The name of the material and/or material code reference in the CoC. This material name shall be a clear, common name of the material that is comparable to the AWP Material Name[4]. Part Numbers etc. may also be on the document if the company wishes.~~

~~12.2.6 Signature of the Company Official and date.~~

[3] https://transportation.wv.gov/highways/mcst/Pages/APL_By_Number.aspx

[4] ~~See "AWP Material Codes" at https://transportation.wv.gov/highways/mcst/Pages/tbox.aspx~~

~~12.3 The document must be notarized.~~

~~12.4 A sample of this CoC document is provided in Attachment 3.~~

_____
Michael A. Mance PE,
Director
Materials Control, Soils & Testing Division

MP 106.00.02 Steward – Lab Support Section
MAM:B
ATTACHMENTS

ATTACHMENT 1 - SAMPLE HL-468 FORM

Attachment 2: Sample APL Response Language

1. APL APPROVAL RESPONSE

West Virginia Division of Highways (WVDOH) Laboratory Approval Numbers 2XXXXXX has been issued to your company <Name of Company>, for the Approved Product List. The approval number, effective Date Month Day, 20XX, must appear on all shipping documentation for said product supplied to the WVDOH projects.

2. NO APL RESPONSE:

The West Virginia Division of Highways (WVDOH) has evaluated your submittal of <Product Name>, <Product Material> as per Materials Procedure MP 106.00.02. This Division is not approving your material at this time for the Approved Product List; the WVDOH does not currently have a Specification or Materials Procedure which applies to your product.

This material may be evaluated for the Division's Quality Purchase Order Material List as specified in MP 106.00.02.

Designers may propose the use of this product in project plans or Contractors may propose the use of the product in projects they are constructing for the WVDOH. In either case, the WVDOH would evaluate the product and its proposed application in the specific project to make a determination on approving the use of it at that time.

3. NON-APPROVAL RESPONSE (APL)

This material was submitted to the West Virginia Division of Highways for consideration in accordance with Materials Procedure 106.00.02.

This letter is to notify you that the Division is not approving this product at this time. As per Section <XXX> of the Standard Specifications Roads and Bridges, "<Description of Non-Approval Reason>."

4. QPOM ACCEPTANCE

The West Virginia Division of Highways (WVDOH) has evaluated your submittal of <Product Name>, <Product Material> as per Materials Procedure MP 106.00.02 for the Quality Purchase Order Material List.

West Virginia Division of Highways (WVDOH) Laboratory Approval Numbers Q2XXXXXX has been issued to your company <Name of Company>, for the above-mentioned product. This number, effective Date Month Day, 20XX, must appear on all shipping documentation for said product.

This product has been evaluated and meets the provided criteria. This material has been added to the Qualified Purchase Order Material List for use on Purchase Order projects only. The list is available on the Division's Webpage[5]. This material has not been added to the Division's Approved Product List and shall not be used on a contract project without prior approval.

5. NON-APPROVAL RESPONSE (QPOM)

This material was submitted to the West Virginia Division of Highways for consideration in accordance with Materials Procedure 106.00.02.

This letter is to notify you that the Division is not approving this product for the Qualified Purchase Order Master List currently. As per the provided criteria, this material <description of failure>."

[5] https://transportation.wv.gov/highways/mcst/Pages/Quality-Purchase-Order-Materials-List.aspx

ATTACHMENT 3: SAMPLE COMPLIANCE FORM

Certification of Buy America, Build America Compliance For Source Approval

Acme Manufacturing Company
123 Main Street
Charleston, WV
25302

HL 468 Submission Date: 10/31/2022

The below listed materials and products meets all the requirements of all Federal and State Laws for Buy America, including but not limited to: Chapter 5, Article 19 and Chapter 5A, Article 3 Section 56 of the West Virginia Code; 23 U.S.C. 313 Buy America, 23 CFR 635.410 Buy America Requirements, and Build America, Buy America Act, Section 70914.

This Certification of Compliance is for the material listed below:

526.003.004 - Widget, Part Qi
596.003.004 - Widget, Part Hr

OFFICIAL SEAL
NOTARY PUBLIC
STATE OF WEST VIRGINIA

Charleston, WV 25304
My Commission Expires October 16, 2027

Jonathan Doe, Quality Assurance Manager

WVDOH Use Only

Reviewed by: Reviewed Date: Status:

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

PREPARING MATERIALS PROCEDURES

1. PURPOSE

1.1 To set forth instructions for drafting Materials Procedures (MP) concerning sampling, testing, reporting, and inspection.

1.1.1 To establish a numbering system for MPs.

1.1.2 To establish a styles guideline for MPs.

1.2 To establish a workflow for the creation, acceptance, and approval for MPs.

1.2.1 To set up a reconfirmation schedule for existing MPs.

1.3 To provide further guidance and clarification from that set forth in DD-105.

2. REFERENCED DOCUMENTS

2.1 AASHTO Publications Style Manual and Process Guide[1], current edition.

2.2 Using SI Units in ASTM Standards: A Guide to Form and Style for ASTM Standards, Part H[2]

2.3 WVDOH Design Directives DD-105[3]

2.4 ASTM E29 - Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.

3. NUMBERING GUIDELINES

3.1 A MP consists of a sequence of numbers such as 120.20.01.

3.1.1 The first set (three digits) of an MP are taken from the WVDOH Specifications Roads and Bridges to denote the general area to which the procedure applies.

3.1.2 The second set (two digits) of an MP are taken from the WVDOH Specifications Roads and Bridges denotes the particular area to which the procedure applies.

3.1.3 The third set (two digits) is defined by this Division thus:

1. .00 - .09 Field Sampling
2. .10 - .19 Pre-sampling (Source or Intermediate Points)
3. .20 - .29 Testing
4. .30 - .39 (For future designation)
5. .40 - .49 Inspection
6. .50 - .59 Quality Assurance System

[1] https://materials.transportation.org/

[2] https://sn.astm.org/rules-and-regs/using-si-units-astm-standards-nd12.html

[3] https://transportation.wv.gov/highways/engineering/Pages/Design-Directives.aspx

7. .60 - .69 Reporting (laboratory)
8. .70 - .79 Reporting (issuance under master control)
9. .80 - .89 (For future designation)
10. .90 - .99 Miscellaneous

4. COMMON DEFINITIONS

4.1 To stay consistent, this section will define some commonly used terms and specify the term that is to be used in Materials Procedures.

4.2 Authors may choose to spell out these terms in titles, sections, or headers.

4.3 Specific Terms:

4.3.1 DWR: When referring to a Daily Work Report that is performed on a WVDOH project, the term to be used is "DWR".

4.3.2 Coverage: When referring to coverage for a material, traditionally referred to as "Direct Coverage" or "Master Coverage", the term to be used is "coverage".

4.3.3 Specifications: When referring to the WVDOH Standard Specifications, Roads and Bridges, current edition including Supplementals and Special Provisions, the term to be used is "Specification(s)" with a capital "S". There is no need to list the Specifications in the referenced document, this link is assumed. Specific references to aid in navigation are encouraged.

4.3.4 Should: When referring to a rule or provision, it indicates that said rule or provision is not mandatory, but is recommended as part of good practice.

4.3.5 Shall: When referring to a rule or provision, indicates that said rule or provision is mandatory.

4.3.6 WVDOH project: When referring to any construction project in the state that is governed by the Specifications, the term to be used is "WVDOH project(s)."

4.3.7 MS&P: When referring to Manufacture and/or a Supplier and/or a Producer, the term to be used is: "MS&P". This author may choose to define this in the first instance of use in the document as this is not a common, industry wide term.

4.3.8 Chief Engineer: When referring to the final approving entity, the term "Chief Engineer" shall be used based on the WVDOH org chart.

4.3.9 Division: When referring to the Department of Transportation, Division of Highways as an entire entity, the term: "Division" shall be used with a capital "D". There is no need to spell out the name in any materials procedure.

4.3.10 MCS&T Division: When referring to the Materials Control, Soils and Testing Division, the term: "MCS&T Division" shall be used. There is no need to spell out the name in any materials procedure, though the author may choose to do so.

4.3.11 TED Division: When referring to the Traffic Engineering Division, the term: "TED Division" shall be used. There is no need to spell out the name in any materials procedure.

4.3.12 All other Divisions shall be spelled out once and then given an appropriate abbreviation. For example, Engineering Division "Engr Division"

4.3.13 APL: When referring to MCS&T Approved Product List, the term to be used is "APL", with all letters capitalized.

4.3.13.1 When referring to an APL submission, the following text shall be used: "Prospective Producers/Suppliers shall complete form HL-468, as per MP 106.00.02 indicating their intention to be included on the WVDOH APL".

5. UNITS

5.1 For units each champion has the option of using solely SI, or both SI and Imperial (combined units) as the standard.

5.2 When writing a procedure, the following two statements govern:

5.2.1 For solely SI, the values stated in SI are to be regarded as standard. No other units of measurement are included.

5.2.2 For combined units, the values stated in either SI or Imperial are to be regarded separately. The value stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance.

5.2.3 When providing a sample calculation or an example of a filled form, the champion may choose to use any single unit system.

5.2.4 When converting units, rounding shall be performed as specified in ASTM E29-Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.

5.2.4.1 In the instance of length measurement, inches and feet shall be rounded to the nearest 5 mm. For example, 1 foot or 12 inches is 305 mm.

5.3 An example of the unit syntax is as follows:

5.3.1 The distance between the earth and moon is 238,900 mi (384,400 km).

5.3.2 The cylinder shall be 6 in (150 mm) x 12 in (305 mm).

6. FORMAT GUIDELINES

6.1 The style guides for MPs shall follow the general guidelines established in "Section 6.4.3" of AASHTO Publications Style Manual and Process Guide Typography in Design[4]. These guidelines are further refined in this document.

6.1.1 The font shall be Times New Roman, size 12, fully justified for all text except for the section title. The section title shall be all capital letters, fully justified, Times New Roman, size 12 and bold. There shall also be a horizontal line above this text.

6.1.2 The line numbering shall be as follows: "x." For a section title and "x.x" for a section paragraph. From here, follow the format of "x.x.x…" for additional layers of sub paragraphs. This document provides an example of the formatting.

6.1.3 Links shall be blue and clickable[5]. The link path shall also be included as a footnote. An example of this is demonstrated by the "blue and clickable" text and link above and the footer at the bottom of this page.

[4] https://downloads.transportation.org/Publications/aashto_style_manual.pdf

[5] https://transportation.wv.gov/highways/mcst/Pages/default.aspx

6.1.3.1 Any instances of an email address shall also be clickable and adhere the guidelines for a link.

6.1.4 Figure labels shall follow the guidelines of "Section 2.1.4" of AASHTO Publications Style Manual and Process Guide Typography in Design. This section states: "The title should be succinct noun or noun phrase that describes the figure, but does not provide unnecessary background information, nor repeat information found in the text." Do not abbreviate "Figure" and capitalize key words such; an example of this is as follows: "Conditions Determined to Be Pre-Existing."

6.1.4.1 Formatting for labels shall be the same as normal body text, except that "Figure X." shall be bold. All figure text shall be centered and located below the figure.

7. HEADER GUIDELINES

7.1 A standard numbering and indexing system shall appear in the upper right-hand corner shall of pages of all MPs. All header text shall be in "All Caps" format.

7.1.1 The letters MP shall appear first, denoting Materials Procedure. The number of the MP shall follow that text and be in the header of every page. The numbering of the MP shall follow the format as described in this document.

7.1.2 All MPs shall contain headers in the manner described in this section. There are two instances of a header. If an MP has been reconfirmed, the header will follow the example in Figure 1. This includes the date the latest date the MP was approved, and the date of confirmation.

MP 700.00.00
JULY 6, 2020
RECONFIRMED: JULY 6, 2022
PAGE 1 OF 2

Figure 1 – MP Header with Approval Date and Reconfirmation Date

7.1.3 In the instance of either a new MP or an approved update to a MP, only the ~~Director~~ effective ~~signature~~ date (located at the end of the body section of the document) is in the header. A sample is provided in Figure 2.

MP 700.00.00
JULY 6, 2022
PAGE 1 OF 2

Figure 2 – MP Header With Approval Date

7.1.4 In the instance of an attachment, the first line of the MP header shall be in the format: MP XXX.XX.XX – ATTACHMENT. All other lines shall follow the guidelines previously described. This is demonstrated in Figure 3.

MP 100.00.00 - ATTACHMENT
JULY 6, 2020
PAGE 4 OF 5

Figure 3 – MP Attachment Header

7.1.4.1 In all instances, on all pages (do not use different first page), the text "PAGE X1 to X2" shall be last, with X1 being the current page and X2 being the total pages in the section. The main body and each attachment shall be considered a separate section; numbering shall be restarted on any new attachment instance.

8. MP APPROVAL PROCESS

8.1 In the instance of any MP Committee work, the champion is a person defined as the person who is the primary author, editor and/or liaison for the document. The champion is responsible for introducing and presenting the document. The champion is also responsible for addressing comments on the document.

8.2 Attachment 1 provides an overview of the approval process of an MP. First the document is brought to the MP committee chair (chair) by the champion. The document is distributed by the chair and discussed at the next MP committee meeting. After the document has been at a minimum of two consecutive MP meetings, the committee may vote to recommend or reject the proposed document. The document is then reviewed, and if approved, signed by the Director of Materials Control, Soils and Testing Division (Director, MCS&T). The signed document is sent through DOH management for review and approval. Once the review is complete, the document is reviewed and affirmed by Federal Highways Administration (FHWA). Once the document is affirmed by FHWA, the document is posted and distributed. If any comment is received during the approval process, the document is cycled back to the MP Committee meeting for review and another approval vote.

8.2.1 In the instance where a document has no content changes (editorial changes only), the MP committee may choose to vote to approve the document after one meeting. In this case, any voting member of the MP committee or the FHWA representative may veto this decision.

8.2.2 The details of the MP committee, including the submission process, distribution practices, and current voting members is available for review in Design Directive 105 and available at the WVDOH Technical Support Webpage[6]

9. RECONFIRMATION PROCESS

9.1 Each MP shall be periodically reviewed for both relevancy and accuracy. At a minimum frequency, each MP shall be reviewed every 4 years by the applicable MCS&T Section Supervisor (Reconfirmation Champion). In the instances where

[6] https://transportation.wv.gov/highways/TechnicalSupport/Pages/Design-Directives.aspx

there is no obvious Section Supervisor, the delegation of the review shall be the responsibility of the chair in liaison with the Director of MCS&T.

9.2 After reviewing the document, if the Reconfirmation Champion determines that no changes are required, they will submit the document to chair for reconfirmation. The reconfirmation shall be done by the voting members.

9.3 If approved by the Committee, the MCS&T Director shall review the document and if accepted, sign the document. Because no changes were made to this document, once the document is signed, it shall be posted and distributed.

10. POSTING AND DISTRIBUTION OF MPS

10.1 Active MPs are available on the WVDOH MCST MP Webpage[7]. The webpage shows the MP number, the title of the MP and the latest approval or reconfirmation date.

10.1.1 For each document (if appliable), an archived link is available to provide a documented history of updates. Figure 4 provides an example.

106.00.02 Archive	Procedure for Evaluation of New Products for Use In Highway Construction	November 2016

Figure 4 – MP Committee Webpage Example

10.2 When a document is affirmed by FHWA, the documents will be distributed to applicable Division Directors, District Engineer/Managers and District Material Supervisors.

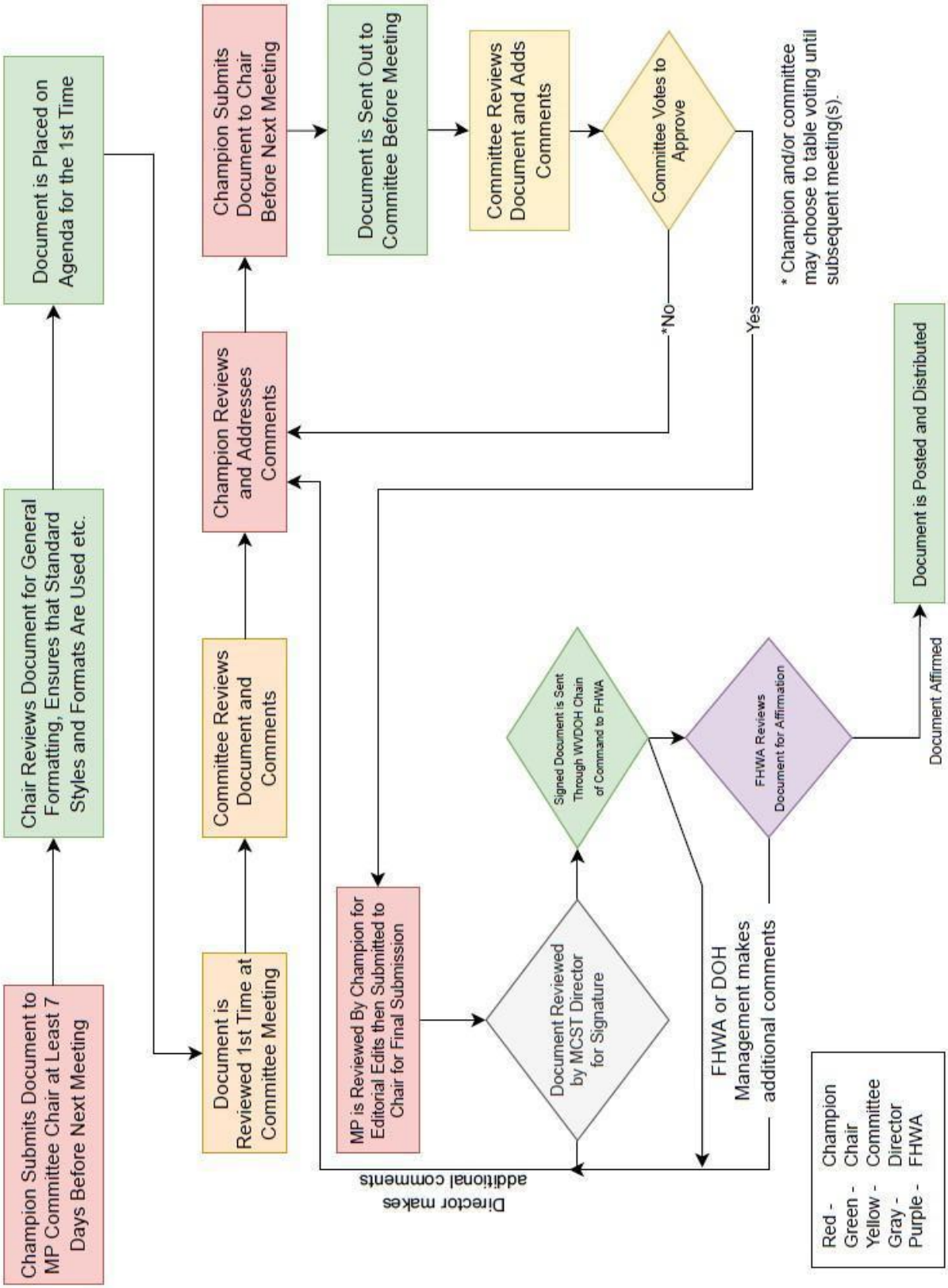
10.3 The effective date of an MP is the next contract letting date after the date of the FHWA affirmation. The Director may push this back one letting date at their discretion if the affirmation date is too close to the letting.

~~10.2~~10.3.1 This shall not be retroactively applied to already approved MPs except at the discretion of the Director.

Michael A Mance, PE
Director
Materials Control, Soils & Testing Division

MP 100.00.00 Steward – Materials Control Section
MM:Bb
ATTACHMENT

[7] https://transportation.wv.gov/highways/mcst/Pages/WVDOH-Materials-Procedures.aspx



ATTACHMENT 1 – MP Committee Meeting Flowchart

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURES

PROCEDURE FOR ASPHALT MIXTURE PLANT AND TRUCK INSPECTION

1. PLANT AND EQUIPMENT INSPECTION STICKERS

1.1 Physical plants and equipment which prepare materials for, or deliver materials to, State projects or Purchase Orders shall be regularly inspected and approved by the DOH District personnel in which the plant is located.

1.2 The inspections and approval shall be confirmed by an inspection sticker supplied by the Materials Control, Soils & Testing Division (MCS&T). The inspection sticker will indicate the following:

1. Name of inspector
2. Plant or portion thereof, or singular piece of equipment inspected.
3. Date of inspection
4. Date of expiration of approval
5. Lab Number

1.3 Inspections may be made at any time at the option of the Division. The status of the inspected facility shall be determined by the latest inspection. The date of expiration of approval, as noted on the latest inspection sticker, shall be the last day on which the facility is approved by the Division. The facility must have an approved status at time of production for or delivery to State projects or Purchase Orders.

1.4 The sole purpose of the inspection sticker is to inform all concerned that an entire plant, a portion thereof, or a singular piece of equipment has been inspected and found to substantially meet all requirements of the specifications and is, therefore, approved to supply materials to State projects. The inspection sticker shall be affixed to the equipment or displayed in other manners so that the purpose as stated above will be fulfilled.

1.5 The stickers shall be applied, insofar as practicable, and each District shall maintain records of these inspections in ProjectWise. The records shall include all the items listed in 1.2, a completed inspection checklist for Batch Plants or Drum Plants, and any supporting documentation.

1.6 A plant or portion thereof, or a singular piece of equipment, shall be approved for a period not to exceed twelve (12) months. The period of approval shall be determined, in general, by the age, physical condition, or durability of the plant or equipment, and the inspection interval shall be such that the Division will have reasonable assurance that the plant or equipment is maintained in an acceptable manner for that duration. If an Asphalt Mixture Plant, portion thereof, or singular piece of equipment is approved for a shorter period, the determining factor shall be noted on the Plant Inspection Checklist.

1.7 Each time a plant has been inspected, the District that performs the inspection shall notify the Asphalt Section at MCS&T, via email, at DOHAsphalt@wv.gov. MCS&T will generate a list of approved plants and post them on the Division Webpage[1].

1.8 Plant Inspection Checklists can be found in the Tool Box section of the Division's webpage. A flow chart and a sample of an inspection sticker can be found in Attachments 1 and 2.

2. QUALITY ASSURANCE IN ASPHALT MIXTURES

2.1 PURPOSE

The purpose of this procedure is to establish guidelines which will aid Division personnel in implementing in a prescribed and uniform manner the Division's Quality Assurance Program for Asphalt Mixtures. This program shall be directed primarily to maintain a predetermined and acceptable level of assurance that Asphalt Mixtures produced for the Division conform to their governing specifications.

2.2 DEFINITION OF TERMS

2.2.1 QUALITY ASSURANCE

Quality Assurance is an expression of confidence which the Division has in its program of acceptance testing and inspection which determines conformance of materials and construction to governing specification. A Quality Assurance Program is a planned program of acceptance testing and inspection which is conducted by the Division for the express purpose of maintaining a predetermined and acceptable level of assurance that construction materials conform to their governing specifications. Part of any Quality Assurance Program is an awareness and knowledge of the Producer's Quality Control Program and the level of Quality Control maintained by that Producer.

2.2.2 QUALITY CONTROL

[1] https://transportation.wv.gov/highways/mcst/pages/default.aspx

Quality Control is a planned program of testing, inspection and related activities conducted by an Asphalt Mixture Producer. The purpose of QC is to measure the various properties of Asphalt Mixtures and their component materials to control these properties within the limits of their governing specifications.

2.3 GENERAL DISCUSSION

The Division and the Producer/Supplier jointly participate in a program whose primary objective is to improve the quality of Asphalt Mixtures used in highway construction. One of the outcomes of this program is that the Division will run a smaller risk of having nonconforming materials incorporated into the work, and the Producer/Supplier will run a smaller risk of having suitable materials rejected.

The following major developments are outgrowths of the Quality Assurance Program:

2.3.1 WVDOH Asphalt Plant Technician certification is available to the Producer/Supplier to aid in the implementation of a Quality Control Program.

2.3.2 The requirement for a Contractor to maintain equipment and qualified personnel including at least one certified Asphalt Plant Technician at each plant is specified in Section 401.6.1 of the Standard Specifications.

2.3.3 The requirement for a Contractor to have a field laboratory which is equipped and maintained in a specified manner to facilitate a proper Quality Control Program is specified in Section 401.9.8 of the Standard Specifications.

2.3.4 Asphalt Mixture plants and hauling equipment are regularly inspected by the Division, and their approval as conforming to requirements of governing specification is attested to by an inspection sticker (See Section 1 of this MP for details).

2.3.5 The requirement for each producer to design a Job Mix Formula (JMF) using acceptable sources and types of materials that are to be used in the work, is specified in Section 401.4.2 of the Standard Specifications. The requirement for each producer to perform JMF Field Verification, yearly, for each JMF, is specified in Section 401.6.2 of the Standard Specifications. The requirement for each producer to conduct ongoing Quality Control Testing is specified in Section 401.6.3 of the Standard Specifications. These requirements compel producers to design and maintain JMF's for each of the various mixture types to be supplied, and it guards against the possibility of source materials changing appreciably and affecting the quality of the mixtures.

2.4. PHYSICAL PLANT EVALUATION

District personnel will inspect and evaluate asphalt mixture plants in conformance with Section 1 of this MP. Any nonconformities shall be documented on the inspection report.

A copy of the inspection data, which is specified in Subsection 1.5, shall be transmitted to MCS&T immediately after the inspection is completed.

3. PLANT APPROVAL STATUS

3.1 PLANT CERTIFICATION

3.1.1 When District Personnel determine that an Asphalt Plant, which is not already listed as an approved plant on the Division's Approved Source Page, has met the requirements of this Materials Procedure, the Specifications, and all other applicable Materials Procedures, they shall notify MCS&T and provide all applicable documentation and information to MCS&T Division.

3.1.2 District Materials personnel shall notify the subject Asphalt Plant that they are approved to begin production for WVDOH projects, using mix designs approved by MSCS&T Division. MCS&T Division shall add the Asphalt Plant to the Division's Approved Products Page.

3.2 PLANT DE-CERTIFICATION

3.2.1 When District Personnel determine that an Asphalt Plant, which is currently listed on the Division's Approved Source Page, is not complying with the requirements of this MP, the Specifications, or any other applicable Materials Procedure, they shall immediately notify MCS&T Division and provide all applicable documentation and information to MCS&T Division. This information shall include a summary of the reason(s) for the de-certification of the subject Asphalt Plant.

3.2.2 Upon review and concurrence, MCS&T Division shall immediately notify the subject Asphalt Plant and all applicable WVDOH District and Divisions that the subject Asphalt Plant is no longer approved to supply asphalt for WVDOH projects. MCS&T Division shall remove the Asphalt Plant from the Division's Approved Products Page.

3.2.3 If the subject Plant, which has been de-certified and removed from approved status, desires re-approval, they shall initiate the re-approval process by submitting a plan of corrective action, which addresses all of the reasons for which that Plant was de-certified. This plan of corrective action shall be submitted to the District in which the Concrete Plant is located and to MCS&T Division.

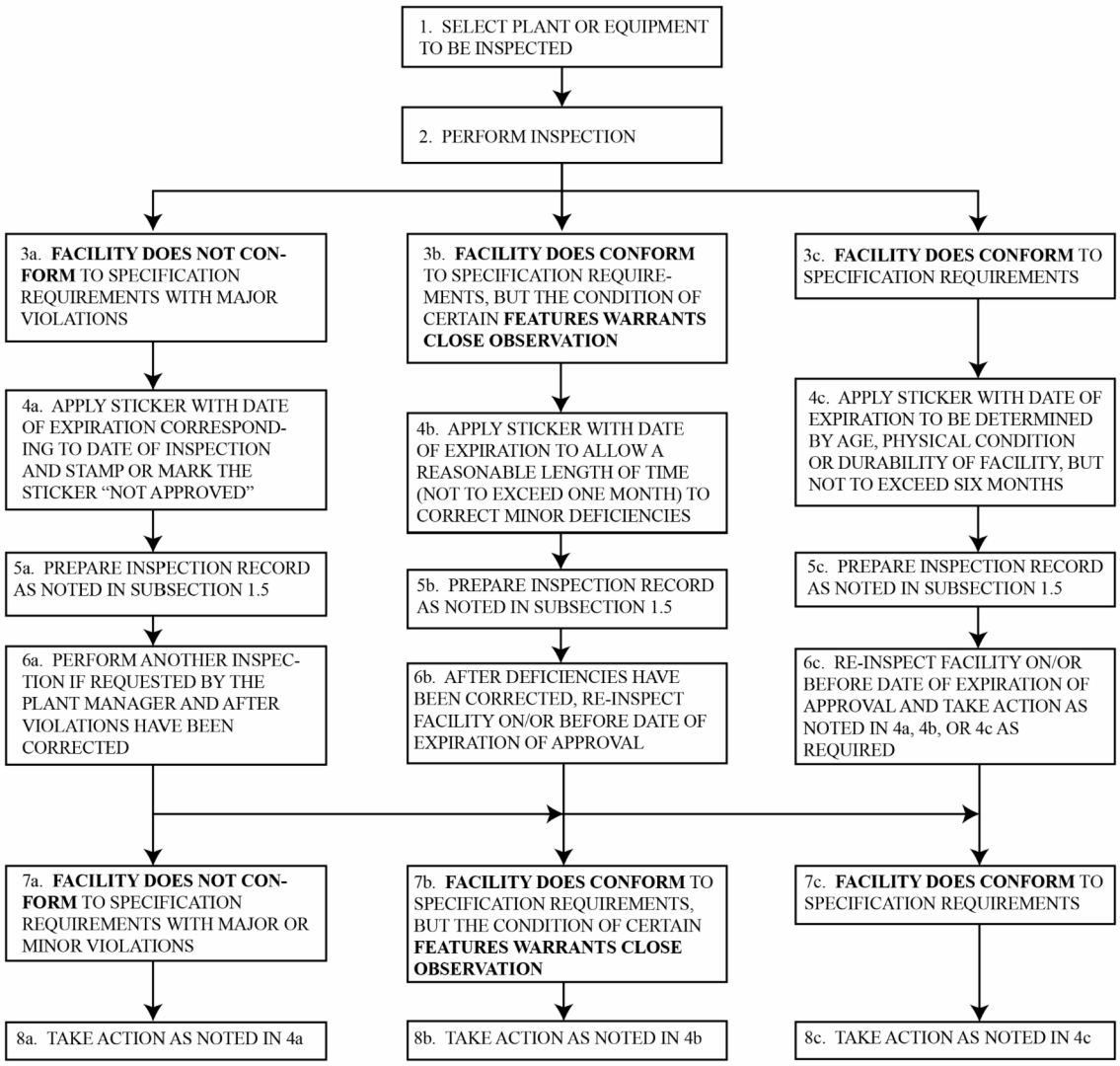
4. TICKETING REQUIREMENTS

4.1 In addition to all other plant inspection requirements listed in this MP, and in addition to the ticketing requirements listed in Section 5.2 of MP 401.03.50, each approved asphalt mixture plant shall have the capability of providing electronic ticket delivery (e-tickets), as required by Section 109.20.1 of the Standard Specifications. In the event an asphalt mixture plant does not have the capability of providing e-ticket delivery, the plant shall not be approved. The plant shall not be reconsidered for approval until the producer can demonstrate the ability to produce e-tickets.

Michael A. Mance, P.E.
Division Director
Materials Control, Soils & Testing Division

MP 401.09.40 Steward – Asphalt Section
MAM:J
Attachment

Plant Inspection Flow Chart



Sample Plant Inspection Sticker

West Virginia Division of Highways
CHECKED & ACCEPTED
INSPECTOR: _____ **DATE:** _____ **LAB NUMBER:** _____ **DISTRICT:** _____
DATE OF EXPIRATION **MONTH/DAY/YEAR** _____/_____/_____
PLANT / TRUCK

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION
MATERIALS PROCEDURE

GUIDE TO DESIGNING ASPHALT MIXTURES WITH RECLAIMED ASPHALT PAVEMENT

Commented [JC1]: Need to add information within QC/QA MPs for the regular testing and possible AC/Grad adjustments of RAP

1. PURPOSE

~~1.1.~~ To establish criteria for designing asphalt mixtures which contain reclaimed asphalt pavement (RAP) and Performance Graded (PG) Binders.

1.1.

2. SCOPE

~~2.1.~~ This procedure is applicable to all asphalt mixture designs which contain both RAP and PG Binders.

2.1.

3. GENERAL

~~3.1.~~ This MP does not alter the design specification requirements of the 401 Specification, ~~or~~ MP 401.02.22, or MP 401.02.27. It is to be used only as a supplement to the specifications when designing RAP mixtures. It does not affect RAP mixtures which were designed through previously approved methods prior to issuance of this MP.

3.1.

4. REFERENCED DOCUMENTS

~~4.1.~~ MP 401.02.22

4.1.

5. GUIDELINES

~~5.1. The following guidelines shall apply to all new mix designs which incorporate RAP with PG Binders.~~

5.1. For ~~design~~ purposes of RAP mixture design and production the following shall apply:

5.1.1. ~~,t~~The specific gravity of the binder in the ~~virgin~~ RAP~~PG Binder~~ shall be assumed equivalent to the ~~used as the~~ specific gravity of the virgin ~~asphalt~~ bbinder, as supplied by the ~~in the RAP.~~Binder supplier. ~~Also, t~~

~~5.2.~~5.1.2. The effective specific gravity of the aggregate (Gse) ~~in the RAP~~ shall be determined from the RAP material and shall be used as the bulk specific gravity of the RAP aggregate for calculation purposes. (For greater accuracy, the producer may calculate a binder absorption of their virgin aggregates, utilize that absorption with the Gse of the RAP to calculate an assumed Gsb for the RAP).

5.2. RAP content is defined as the percentage of RAP by weight vs total weight of material. Allowable RAP content shall vary based on Base Binder Grade, RAP Fractionation, and Nominal Max Aggregate Size(NMAS) of the mixture as described in Table 1.

5.3. Proper stockpile management in accordance with Best Practices for RAP Management as documented by NCHRP report 752, Appendix D, and as discussed in Publication No. FHWA-HRT-11-0-21. These documents can be accessed at the respective links below:

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_752.pdf

http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/11021/11021.pdf

Commented [JC2]: Should we add a general/common absorption so Gsb can be calculated. This would be a more accurate way to calculate VMA especially as RAP levels increase.

Commented [JC3]: Move this to QC Plan MP

TABLE 1 – Maximum RAP by Weight allowable per Mix Type and Fractionation Practices

	Project Specifies <PG64E-22 Binder				Project Specifies PG64E-22 Binder (Note 1)	
	Fractionated RAP		Non-Fractionated RAP		Fractionated RAP	Non-Fractionated RAP
Mix Type NMAS	Project Specified binder	Binder Dump Note 3	Project Specified binder	Binder Dump Note 3		
4.75mm Note 2	15	15	15	15	15	15
9.5mm	25	30	20	25	20	15
12.5mm	25	30	20	25	20	15
19mm	30	35	20	25	25	20
25mm	30	35	20	25	25 Note 4	20 Note 4

Note 1 – Binder dumping is not permitted on projects which specify PG64E-22.
Note 2 – RAP material utilized for a 4.75mm mixture for both design and production must be fractionated, scalped, and/or crushed to less than 4.75mm prior to incorporation into the mix.
Note 3 – Binder dump is defined in section 5.4.
Note 4 – 25mm should not normally be specified with PG64E-22

~~If the amount of RAP in the mix is equal to or less than 15 percent, then the selected PG Binder to be used as the virgin asphalt shall be the same as the specified PG Binder for the region where the mix will be used. For example, if the specified PG Binder for the region is a PG 64S-22 then the PG Binder used in the RAP design shall be a PG 64S-22.~~

~~5.3. If the amount of RAP in the mix is 16 to 25 percent, then the selected PG Binder to be used as the virgin asphalt shall be one grade below both the high and low temperature grade of the specified PG Binder for the region where the mix will be~~

~~used. For example, if the specified PG Binder for the region is a PG 64S-22 then the PG Binder used in the RAP design shall be a PG 58S-28.~~

5.4. A binder dump is defined as the reduction of the PG temperature grades by one 6-degree step for both the high and low temperature requirements of the specified PG Binder. For example, if the specified PG Binder for the projects is a PG 64S-22 then the PG Binder used in a RAP design requiring a dump shall be a PG 58S-28. PG64H-22 > PG58H-28

~~5.4.~~ For projects specifying PG64S-22 and PG64H-22 binders and mixtures with NMAS greater than or equal to 9.5mm,~~If the amount of RAP in the mix is more than 25 percent, then the~~ a contractor may utilize blending charts to exceed the limits of Table 1. Blending chart usage is described in Section 6.0 of this MP shall be used to select the high temperature grade of the virgin asphalt. The low temperature grade shall be at least one grade lower than the binder grade specified for the area where the mix will be used. The binder test data and the blending chart must be submitted along with the mix design package (JMF).

5.5.

6. EXAMPLE USE OF BLENDING CHART

6.1. The dynamic shear rheometer (DSR) can be used to look at permanent deformation (rutting factor) of the binder, which is governed by limiting G*/sin d at the test temperature. The maximum allowable value of the rutting factor shall be 2.0 kPa. A blending chart, similar to the viscosity blending charts used with viscosity graded asphalts, has been developed which plots G*/sin d on a log-log scale on the y-axis as a replacement test for viscosity. Both the recovered asphalt and the virgin asphalt are tested at the high temperature of the specified binder to be used in the design. The test value G*/sin d for each asphalt is plotted on the chart (the recovered asphalt result on the left and the virgin asphalt on the right) and connected with a straight line. The point on the chart where the plot of G*/sin d intersects the y-axis (G*/sin d, kPa, at test temperature) at 2.0 kPa is represented on the x-axis (% virgin binder) as the minimum percentage of virgin binder to be used in the RAP design.

~~6.2.~~ The attached example illustrates how the blending chart shall be used. The standard binder for the design in this example is a PG 64S-22. Test measurements for both the recovered asphalt and the virgin binder are taken at 64 °C. Point A on the chart represents the G*/sin d value for the recovered asphalt. Point B represents the G*/sin d test value for the PG 64S-22 binder which has a minimum requirement of

1.0 kPa. The line connecting points A and B intersects the 2.0 kPa rutting factor value at approximately 87% on the x-axis. This means that the minimum amount of virgin asphalt (PG 64S-22) used in the RAP design shall be 87%.

6.2.

6.3. Looking at point C on the example chart, this represents G*/sin d for a PG 58S-28 Binder which has been tested at 64 °C. A PG 58S-28 Binder would normally be tested at 58 °C and would have a minimum G*/sin d value of 1.0 kPa. However, because this material is being used where the required binder is a PG 64S-22, the virgin binder must be tested at 64 °C. The higher test temperature results in a test value of less than 1.0 kPa, as illustrated on the chart attachment. The line connecting points A and C intersects the 2.0 kPa rutting factor value at approximately 75% on the x-axis. This means that the minimum amount of virgin asphalt (PG 58S-28) used in the RAP design shall be 75%.

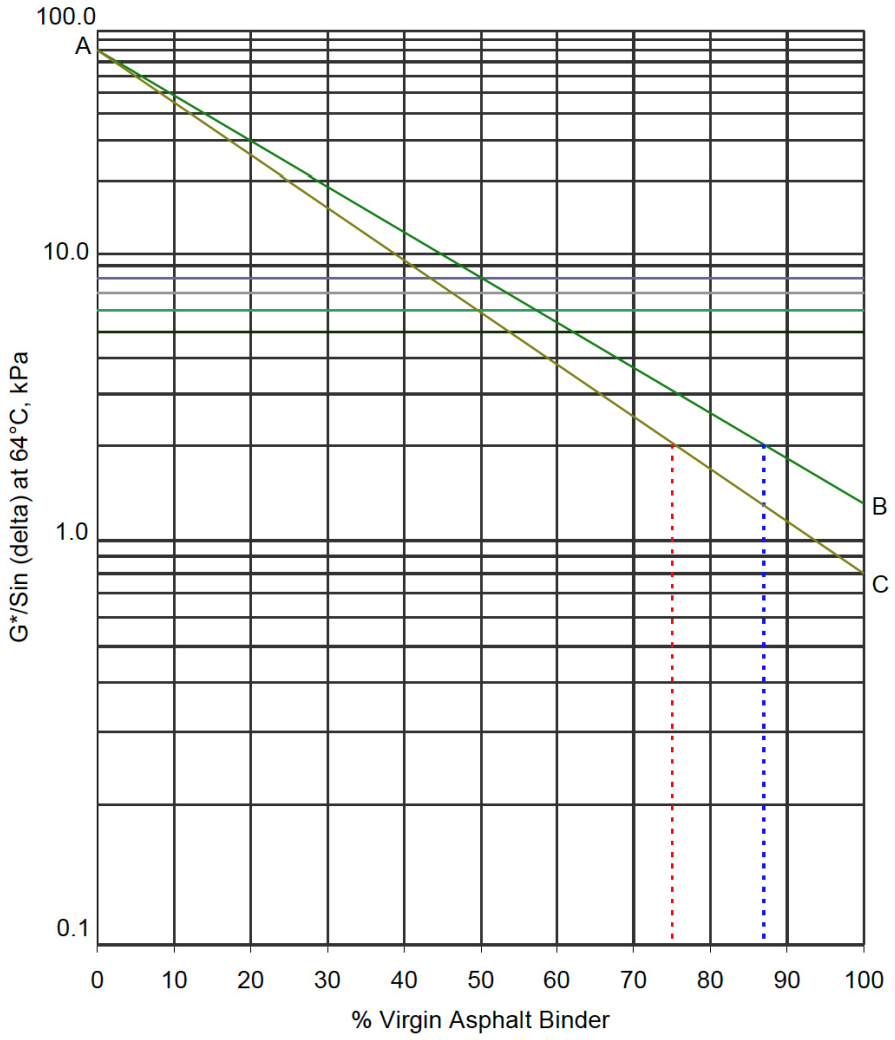
01/04/2023

Ronald L. Stanevich, P.E.
Director
Materials Control, Soils and Testing Division

MP 401.02.24 Steward – Asphalt Section RLS:J

ATTACHMENT

PG Binder/RAP Blending Chart



WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

GUIDE TO DESIGNING ASPHALT MIXTURES USING THE SUPERPAVE VOLUMETRIC DESIGN ~~M~~METHOD

1. PURPOSE

1.1 To establish an approved Aspahlt Mixture design or Job Mix Formula (JMF) using the Superpave volumetric design to be used for construction of an asphalt pavement. ~~method,~~ To outline test methods and procedures~~,~~ and to establish evaluation criteria for Superpave asphalt mixtures. ~~If reclaimed asphalt pavement (RAP) is used in the design, refer to Materials Procedure (MP) 401.02.24 for additional guidelines.~~

2. SCOPE

2.1 This procedure is applicable to design tests conducted for the purpose of establishing mixture proportions for asphalt mixtures using the Superpave mix design method. ~~Superpave~~JMFs ~~designs previously approved under the March 2000~~approved prior to June 2025 ~~version of this MP~~ may continue to be used only if they can meet the current ~~were designed and approved within the~~ volumetric, aggregate and gradation parameters of Table 1, Table 2, Table 3 and Table ~~4~~3, as well as ~~and~~ the quality control requirements of MP 401.02.29 can be maintained. Such JMFs should be sent to the Division for reapproval and issuance of a new JMF number.

2.2 If reclaimed asphalt pavement (RAP) is used in the design, refer to Materials Procedure ~~(~~MP~~)~~ 401.02.24 for additional guidelines.

2.3 The Division may, at any point, revoke the approval of a JMF~~Any approved mix design that~~ which exhibits poor field and/or laboratory performance. See MP401.02.29 for details on steps to revoke a JMF. ~~may be rejected from further use by the Division.~~

~~2.2~~2.4 Multiple factors of mixture design are based upon a project 20-year design traffic Equivalent Single Axel Loads (ESAL) counts. ESAL counts are to be provided by WVDOH within the project's contract documents. If values are not indicated contact District Construction to obtain this information.

Commented [JC1]: Instead of this sentence, Thoughts on issuing a memo with this MP stating existing mixtures can be used till the end of the construction season.

3. REFERENCED DOCUMENTS

3.1 AASHTO Standards:

- M 323, Superpave Volumetric Mix Design
- R 30, Mixture Conditioning of Asphalt Mixtures
- R 35, Standard Practice for Superpave Volumetric Design for Asphalt Mixtures
- T 11, Materials Finer Than 75 µm (No. 200) Sieve in Mineral Aggregates by Washing

- T 27, Sieve Analysis of Fine and Coarse Aggregates
- T 30, Mechanical Analysis of Extracted Aggregate
- T 84, Specific Gravity and Absorption of Fine Aggregate
- T 85, Specific Gravity and Absorption of Coarse Aggregate
- T 164, Standard Method of Test for Quantitative Extraction of Asphalt Binder from Asphalt Mixtures
- T 166, Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens
- T 176, Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
- T 209, Theoretical Maximum Specific Gravity and Density of Asphalt Mixtures
- T 269, Percent Air Voids in Compacted Dense and Open Asphalt Mixtures
- T 283, Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage
- T 304, Uncompacted Void Content of Fine Aggregate
- T 308, Determining the Asphalt Binder Content of Asphalt Mixtures by the Ignition Method (Test Method A)
- T 312, Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor

3.2 ASTM Standards

- D 4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
- D 5821, Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate

3.3 Material Procedures

- MP 401.02.24, Guide to Designing Asphalt Mixtures with Reclaimed Asphalt Pavement
- MP 401.02.29, Guide for Quality Control and Acceptance Requirements for Superpave Asphalt Mixtures

3.4 WVDOH Webpage Form

3.4.1 Current version of the WVDOH T-400 Form~~1~~, available at the WVDOH MCS&T Toolbox.

~~3.4.1~~3.4.2 https://transportation.wv.gov/highways/mcst/Pages/tbox.aspx

4. LABORATORY AND TECHNICIAN REQUIREMENTS

~~3.5~~4.1 The laboratory performing the design shall be a Division approved laboratory. In order to~~To~~ obtain Division approval, a laboratory must demonstrate ~~that~~ they are equipped, staffed, and managed for batching and testing asphalt mixtures in accordance with this MP. This shall be accomplished by submitting a copy of their latest report of inspection by AASHTO re:source to the District Materials Section. The laboratory must also submit a letter detailing ~~the~~all ~~-~~actions taken to correct ~~any~~ deficiencies noted during said inspection. The inspection shall include~~in~~ the test procedures listed below. The District will forward this information to Materials Control, Soils and Testing Division (MCS&T). To maintain Division approval

a ~~It is also required that the~~ design laboratory shall ~~request to be included on the~~be routinely ~~schedule of inspections~~inspected by AASHTO re:source. Subsequent inspections shall take place on a roughly 24-month cycle, depending on AASHTO re:source's availability. MCS&T will maintain a list of the approved design laboratories.~~, which are usually every 18 to 24 months to maintain their approval status.~~

4.1.1 A design laboratories AASHTO re:source inspection shall include a minimum of the following AASHTO Test Procedures.

- T 30, Mechanical Analysis of Extracted Aggregate
- T 84, Specific Gravity and Absorption of Fine Aggregate
- T 85, Specific Gravity and Absorption of Coarse Aggregate
- T 166, Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens
- T 176, Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
- T 209, Theoretical Maximum Specific Gravity and Density of Asphalt Mixtures
- T 283, Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage (specimens prepared using T 312)
- T 304, Test for Uncompacted Void Content of Fine Aggregate
- T 308, Determining the Asphalt Binder Content of Asphalt Mixtures by the Ignition Method (Test Method A)
- T 312, Preparing and Determining the Density of Asphalt Mixture (HMA) Specimens by Means of the Superpave Gyratory Compactor
- T 324, Hamburg Wheel-Track Testing (HWTT) of Compacted Asphalt Mixture (only applicable to laboratories utilizing this method for Section 5.6)

4.1.2 ~~The~~An asphalt mixture design laboratory shall~~is required to have~~be staffed with at least one a technician who has ~~attended and successfully~~been certified ~~completed~~through a WVDOH approved Asphalt Mixture Design course, henceforth known as the designer. ~~a Division approved Superpave mix design class. In addition to the class offered through the Division in conjunction with the Asphalt Pavement Association (APA) of West Virginia, hands-on Superpave mix design classes offered by the Asphalt Institute, National Center for Asphalt Technology (NCAT), and National Asphalt Pavement Association (NAPA)~~The designer shall also be certified as a WVDOH Asphalt Plant Technician and shall retain such certification at all times. Failure to maintain the Asphalt Plant Technician will result in revocation of mix design certification. MCS&T will maintain an official list of approved design technicians.

4.1.3 An Asphalt Mixture Design Course shall include but not be limited to material on the following topics: procedures and calculations for determining aggregate properties, gradations, and blending of properties and gradation; proper selection of design aggregate structure; proper sample mixing, aging and splitting procedures; volumetric testing and analysis; and hands on mixture creation.

4.1.4 A course developed in conjunction and offered through the Asphalt Pavement Association

Commented [JC2]: Should we add inspections for FAA, F&E, SE? What about R18

Commented [JC3]: NO R18.

Commented [JC4]: DO WE NEED A RECERTIFICATION PERIOD
Couple options
Test every X years
Participate in a Refresh course
Submit X number of mixtures/year
JMFs verified

Commented [JC5]: Must upkeep Asphalt Plant Tech Cert

Commented [JC6]: Do we want to require Agg Tech Cert?

of West Virginia was specifically developed to meet the requirement in section 4.2. Alternative courses such as those offered by the Asphalt Institute, National Center for Asphalt Technology (NCAT), or other state DOTs may be approved at the discretion of the Division. To seek approval for such cases, proof of successful completion of all course requirements (including a written examination and hands-on experience) must be provided. Additionally, course materials including agenda, course outline, and other course materials may be requested for approval. Submit such requests electronically to the MCS&T Asphalt Section (DOHAsphalt@wv.gov) ~~have been approved. Superpave design classes offered by other state DOTs may be approved at the discretion of the Division. Classes offered by other state DOTs will be evaluated for approval, as needed. Proof of successful completion of all class requirements (including a written examination) must be provided. Approval of an older design class that did not require a written examination will be on a case-by-case basis including a review of the designer's experience. MCS&T will maintain a list of the approved design laboratories and design technicians.~~

~~3.5.1~~

~~3.5.2 TESTING REQUIREMENTS~~

~~3.5.3 The laboratory performing the design shall be a Division approved laboratory. To obtain Division approval, a laboratory must demonstrate that they are equipped, staffed, and managed for batching and testing asphalt mixtures in accordance with this MP. This shall be accomplished by submitting a copy of their latest report of inspection by AASHTO re:source to the District Materials Section. The laboratory must also submit a letter detailing the actions taken to correct any deficiencies noted in the test procedures listed below. The District will forward this information to Materials Control, Soils and Testing Division (MCS&T). It is also required that the design laboratory request to be included on the routine schedule of inspections by AASHTO re:source, which are usually every 18 to 24 months to maintain their approval status.~~

~~3.5.4 AASHTO Test Procedures~~

~~3.5.5 T 30, Mechanical Analysis of Extracted Aggregate~~

~~3.5.6 T 84, Specific Gravity and Absorption of Fine Aggregate~~

~~3.5.7 T 85, Specific Gravity and Absorption of Coarse Aggregate~~

~~3.5.8 T 166, Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens~~

~~3.5.9 T 209, Theoretical Maximum Specific Gravity and Density of Asphalt Mixtures~~

~~3.5.10 T 283, Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage (specimens prepared using T 312)~~

~~3.5.11 T 308, Determining the Asphalt Binder Content of Asphalt Mixtures by the Ignition Method (Test Method A)~~

~~3.5.12 T 312, Preparing and Determining the Density of Asphalt Mixture (HMA) Specimens by Means of the Superpave Gyratory Compactor~~

~~The laboratory is required to have a technician who has attended and successfully completed a Division approved Superpave mix design class. In addition to the class offered through the Division in conjunction with the Asphalt Pavement Association (APA) of West Virginia, hands-on Superpave mix design classes offered by the Asphalt Institute, National Center for Asphalt Technology (NCAT), and National Asphalt Pavement Association (NAPA) have been approved. Superpave design classes offered by other state DOTs may be approved at the discretion of the Division. Classes offered by other state DOTs will be evaluated for approval, as needed. Proof of successful completion of all class requirements (including a written examination) must be provided. Approval of an older design class that did not require a written examination will be on a case-by-case basis including a review of the designer's experience. MCS&T will maintain a list of the approved design laboratories and design technicians.~~

VOLUMETRIC MIXTURE

~~4.~~5. TESTING REQUIREMENTS

5.1 The mix design shall be developed using the volumetric design guidelines provided in AASHTO M 323 and R 35 with the exception of any ~~variations~~modifications or additions ~~that are~~ noted in this Materials ~~M~~Procedure~~P~~. In addition, all laboratory prepared design specimens shall be conditioned in accordance with the *Mixture Conditioning for Volumetric Mixture Design* guidelines within AASHTO R 30.

5.2 Gyrations Level

5.2.1 For laboratory compaction of samples, the standard gyratory counts shall be equal to sixty-five (65) for all mixtures, regardless of ESAL counts.

5.2.2 A 4.75mm mixture is the only exception to section 5.3.1, with 4.75mm mixtures being compacted to fifty (50) gyrations.

5.3 Performance Graded (PG) Binder Selection

5.3.1 The PG Binder for the JMF shall be selected in accordance with Section 401.2 of the Standard Specifications based on ESAL levels of the project.

5.3.2 If Reclaimed Asphalt Pavement (RAP) is to be utilized in the JMF, refer to MP 401.02.24 regarding any modifications required to PG Binder Selection and/or RAP material processing.

5.3.3 The PG Binder for J

TABLE 1—SUPERPAVE METHOD VOLUMETRIC MIX DESIGN CRITERIA

Design air void content, percent (T269)						4.0
		Nominal Maximum Size, mm (in.)				
AASHTO R35 Tests		25 (1)	19 (¾)	12.5 (½)	9.5 (⅜)	4.75 (No.4)
Fines-to-effective asphalt (FA) ratio	Fine	0.6-1.2	0.6-1.2	0.6-1.2	0.6-1.2	0.9 – 2.0
	Coarse	0.8-1.6	0.8-1.6	0.8-1.6	0.8-1.6	
Percent Voids in Mineral Aggregate (VMA)(Note 3)		12.5	13.5	14.5	15.5	16.5
Percent Voids Filled with Asphalt (VFA)		68 – 76	70 – 78	72 – 79	74 – 80	75 – 81

Note 3: Mixtures designed with the VMA exceeding the minimum value by more than two percent may be susceptible to flushing and rutting, especially when used on pavements subjected to slow moving traffic conditions. They may also be difficult to compact as they often have a tendency to shove under the roller.

5.4 Volumetric Design

5.4.1 Utilizing best practices and historic knowledge the designer shall determine an estimated asphalt content for the mixture. Designers in need of guidance of selecting an estimated asphalt content should review Asphalt Institute's MS-2 publication, in particular the section on *Selecting a design aggregate Structure*. To establish a JMF, mixture samples shall be created at a minimum of four asphalt contents (P_b) as described below.

5.4.1.1 The designer shall create a minimum of two bulk specific gravity (G_{sb}) samples the estimated asphalt content as well as asphalt contents which are -0.5%, +0.5%, +1.0% from the estimated asphalt content.

Commented [JC7]: Is 65 the right number? Some states have moved lower (VA=50, PA=75. T =65, OH 65, KY=65

Commented [JC8]: Design ESALs
< 3 = 64S
3 - <15 = 64S
15 - <25 = 64H
≥ 25 = 64E

Commented [JC9]: ESALs
<20 = 64S
20 - < 30 = 64H
≥ 30 = 64E

Commented [JC10]: Using the later to stay with the current spec and DD

Commented [JC11]: Make a reference for new techs to get a starting point

5.4.1.2 The designer shall create two maximum theoretical specific gravity (G_{mm}/Rice) samples at 0.5% above the designers' estimated asphalt content. The average value of these two Rice samples shall be utilized to calculate the effective specific gravity of stone (G_{se}). Utilizing G_{se} calculate the Rice values at the remaining asphalt contents for use in volumetric analysis.

5.4.2 Samples prepared in Section 5.4.1 shall be analyzed for the volumetric properties including: Percent Air Voids (VTM), Percent Voids in the Mineral Aggregate (VMA), Percent Voids Filled with Asphalt (VFA) and Dust to Effective Asphalt (FA)~~The mix design~~.

5.4.3 The optimal design binder content shall be selected from the interpolation of the P_b vs VTM graph at 4% Air Voids. The remaining volumetric properties shall be determined via interpolation with the optimal design binder content and ~~properties~~ shall meet the design criteria ~~requirements~~listed in ~~of~~ Table 1~~, and shall consist of the following:~~

5.4.4 When a JMF is under development using the same aggregate proportions, and sources as a prior Division approved JMF, but with a different neat binder grade, full volumetric testing is not required. Utilizing the existing approved JMF's aggregate structure and the new PG binder grade, the designer may instead elect to create two bulk specific gravity (G_{sb}) samples and two maximum theoretical specific gravity (G_{mm}/Rice) samples at the approved JMF's optimal design binder content. Samples shall be made in accordance with this section. Mixing and compaction temperature will be adjusted based on the requirements of the new binder grade. The designer shall calculate the volumetric properties of the one-point check, which shall meet the criteria of Table 2 or Table 1 as noted. If the one-point check meets these requirements, then the designer shall submit the one-point data along with a new T-400 which denotes the reference T-400 number in the remarks. If the mix design fails to meet all of the requirements, then a new mix design shall be developed.

TABLE 2 – ONE-POINT VOLUMETRIC MIX DESIGN CRITERIA

Design air void content, percent (T269)	4.0 ± 0.3%
Percent Voids in Mineral Aggregate (VMA)	Reference JMF VMA ± 0.5%
Fines-to-effective asphalt (FA) ratio	Design Criteria (Table 1)
Percent Voids Filled with Asphalt (VFA)	Design Criteria (Table 1)

5.5 Moisture Susceptibility Analysis

5.5.1 Designers may utilize either the Tensile Strength Ratio or Hamburg Wheel Tracking Test to analyze JMFs for moisture susceptibility.

5.5.2 Tensile Strength Ratio

5.5.2.1 Test specimens shall be prepared and compacted using a gyratory compactor in accordance with AASHTO T-312 and AASHTO T283 at the JMF's optimal design asphalt content. An 80 ~~If the 80~~ percent minimum tensile strength ratio is required~~ is not met, a new design will be required. A Division approved antistripping additive, such as hydrated lime, conforming to the requirements of M 303 or a liquid antistripping additive, may be added to the mixture if needed. The additive must be identified on the T-400 Form.~~

5.5.2.2 If a ~~T 283 shall be waived when a new mix design~~JMF is under ~~develope~~development ~~d~~ using ~~the exact~~identical aggregate sizes, percentages, and sources of a previously approved ~~mix design~~JMF, and the previously approved JMF ~~that~~ has ~~met the required~~ a minimum

Commented [JC12]: Should we add a threshold of when this needs to be tested?

tensile strength ratio of ~~at least~~ 85 percent., TSR testing shall be waived. Follow section 5.5.5.~~This waiver information should be noted on the submitted design package along with the previously approved design T-400 number to inform MCS&T why T283 test data has not been included. If the approved design contained an antistripping additive, then the new design must also contain this additive.~~

5.5.2.3 Hamburg Wheel Tracking Test (HWTT) Stripping Inflection Point

5.5.2.4 Test specimens shall be prepared and compacted using a gyratory compactor in accordance with AASHTO T312 and AASHTO T324 at the JMF's optimal design asphalt content. A Stripping Inflection Point (SIP) shall not be found within XXXX number of passes, nor shall the rut depth exceed YY mm.

Commented [JC13]: Will have to come up with criteria

5.5.3 If a new JMF is under development using identical aggregate sizes, percentages, and sources of a previously approved JMF, and the previously approved JMF has met the requirements of Section 5.6.3.1, HWTT testing shall be waived. Follow section 5.6.5.

5.5.4 If the requirements within Section 5.5.2 or 5.5.2.3 are not met, the designer may consider a new aggregate structure, or the use of a Division approved antistripping additive. Such additives as hydrated lime, conforming to the requirements of AASHTO M303 or a liquid antistripping additive, may be added to the mixture. To validate an additives effectiveness, the JMF shall be retested for moisture susceptibility. The additive name, type and dosage rate shall be recorded on the JMF's T-400 Form.

5.5.5 If a previously approved JMF is to be reference for a moisture susceptibility waive, the designer shall: include the reference T400 number in the remarks of the JMF submittal; include all moisture susceptibility analysis from the reference JMF; if the reference JMF contained an antistripping additive, the new JMF must contain the same additive at the same dosage rate, the designer shall not such additives in the remarks of the JMF submittal.

5.5.6 MCS&T may request ~~the~~ moisture susceptibility of a JMF ~~tensile strength ratio~~ be verified ~~checked~~ at any time on any design ~~that is shown to exhibit signs of stripping~~.

~~1.1~~
~~1.1.1 Percent Air Voids: T 269~~
~~1.1.2 Percent Voids in Mineral Aggregate (VMA): R 35~~
~~1.1.3 Percent Voids Filled With Asphalt (VFA): R 35~~
~~1.1.4 Fines to effective asphalt (FA) ratio: R 35~~
~~1.1.5 Tensile Strength: T 283~~

~~**TABLE 1—SUPERPAVE METHOD VOLUMETRIC MIX DESIGN CRITERIA**~~

~~**Design air void content, percent**~~	~~**4.0**~~
~~Fines-to-effective asphalt (FA) ratio(Note 1)~~	~~0.6—1.2~~
~~Tensile strength ratio, percent (T283)(Note 2)~~	~~80 (minimum)~~

	~~Nominal Maximum Size, mm (in.)~~				
	~~25 (1)~~	~~19 (¾)~~	~~12.5 (½)~~	~~9.5 (⅜)~~	~~4.75 (No.4)~~

Percent Voids in Mineral Aggregate (VMA)(Note 3)	12.5	13.5	14.5	15.5	16.5
Percent Voids Filled with Asphalt (VFA)	68—76	70—78	72—79	74—80	75—81

Note 1: When the design aggregate gradation falls within the coarse graded requirement of Table 4, the FA ratio criteria shall be 0.8 – 1.6. For all 4.75 mm (No. 4) mixes, the FA ratio shall be 0.9 - 2.0.

Note 2: Test specimens shall be compacted using a gyratory compactor in accordance with T 312. If the 80 percent minimum tensile strength ratio is not met, a new design will be required. A Division approved antistripping additive, such as hydrated lime, conforming to the requirements of M 303 or a liquid antistripping additive, may be added to the mixture if needed. The additive must be identified on the T-400 Form. T 283 shall be waived when a new mix design is developed using the exact aggregate sizes, percentages, and sources of a previously approved mix design that has met the required tensile strength ratio of at least 85 percent. This waiver information should be noted on the submitted design package along with the previously approved design T-400 number to inform MCS&T why T283 test data has not been included. If the approved design contained an antistripping additive, then the new design must also contain this additive. MCS&T may request the tensile strength ratio be checked at any time on any design that is shown to exhibit signs of stripping.

Note 3: Mixtures designed with the VMA exceeding the minimum value by more than two percent may be susceptible to flushing and rutting, especially when used on pavements subjected to slow moving traffic conditions. They may also be difficult to compact as they often have a tendency to shove under the roller.

TABLE 2 - GYRATORY COMPACTION CRITERIA (NOTE 4)

	Compaction Parameters Gyration Level 1	GyrationLevel-2
20-Year Projected design ESALs (millions)	N_{design} for Binder < PG 64E-XX	N_{design} for Binders ≥ PG 64E-XX or Mixes Below Top Two Lifts(Note 5)
< 0.3	50	50
0.3 to < 3	65	65
3 to < 30	80	65
≥ 30	80	65

Note 4: Unless otherwise specified in the contract documents, a PG 64S-22 binder shall be used in mixtures located below the top two pavement lifts. The use of a different binder grade must be approved by the Engineer.

Note 5: The Gyration Level-2 criteria for mixes placed below the top two lifts applies only to mainline paving. Multi-lift base failure and other pavement repairs shall fall under the criteria of Gyration Level- 1 unless otherwise specified in the contract documents.

T

6. JMF AGGREGATE REQUIREMENTS

6.1 Aggregate Source Property Requirements

6.1.1 Individual aggregates used in a JMF shall meet the requirements of Standard Specification

Sections 702.3, 702.4, 703.1, 703.2, and 703.3.

6.1.2 Aggregate gradations for the individual aggregates utilized in a JMF shall be determined using an average of a minimum of three (3) gradation samples. Each sample shall be recorded in the JMF packet.

6.1.3 The JMF's combined aggregates ~~design~~ gradation ~~-~~shall meet the requirements of Table 3 for the specified mix type. Table 4 shall be used to distinguish between the gradation criteria for each mix type. The percent passing each sieve listed in Table 3, from one sieve larger than the nominal maximum size down to the 75 µm (No. 200), shall be included in all gradation calculations.

~~1.2~~

TABLE 3 – DESIGN AGGREGATE GRADATION REQUIREMENTS FOR ~~SUPERPAVE~~ ASPHALT MIXTURES (NOTE 7)

Type of Mix	25	19 (Patch ~~/&~~ Level)	12.5	9.5 (Scratch)	4.75 (Scratch)
Standard Sieve Size	Nominal Maximum Size				
	25 mm (1 inch)	19 mm (3/4 inch)	12.5 mm (1/2 inch)	9.5 mm (3/8 inch)	4.75 mm (No. 4)
~~50 mm (2")~~					
37.5 mm (1½")	100				
25 mm (1")	90 – 100	100 ~~100~~			
19 mm (3/4")	90 max	90 – 100 ~~90 – 100~~	100		
12.5 mm (1/2")		90 max ~~90 max~~	90 – 100	100 ~~100~~	100
9.5 mm (3/8")			90 max	90 – 100 ~~85 – 100~~	95 – 100 ~~100~~
4.75 mm (No.4)		(Note 6) ~~47 min~~		90 max ~~80 max~~	90 – 100 ~~90 – 100~~
2.36 mm (No.8)	19 – 45	23 – 49 ~~20-50~~	28 - 58	32 – 67 ~~30 – 55~~	---- ~~90 max~~
1.18 mm (No.16)					30 – 60 ~~40 – 65~~
600 µm (No.30)					
300 µm (No. 50)					
75 µm (No.200)	1.0 - 7.0	2.0 – 8.0 ~~2.0 – 8.0~~	2.0 - 10.0	2.0 - 10.0 ~~2.0 – 9. 0~~	6.0 – 12.0 ~~3.0 – 11.0~~

Commented [JC14]: Completely removed 37.5mm

Note-6: When a 19 mm mix is specified for use as a ~~heavy-duty~~ surface mix, it shall be designed as a fine-graded mix with the additional requirement of a minimum of 47% passing the 4.75 mm (No.4) sieve. For quality control of the mixture, ~~T~~the allowable tolerance limit shall be the JMF ± 5% on the 4.75 mm (No.4) sieve, but not below the minimum requirement.

Commented [JC15]: Remove this and just make the 19mm have a 47 minimum on all mixtures?
This change will:
Remove any confusion over different 19mm mixtures.
Due to the nature of finer mixtures it will promote better compaction of base mixtures

Note 7: For quality control of the mixture, the allowable tolerances for each JMF shall be the specified design control points shown in Table-3 with the exception that a 4.75 mm mix shall have a tolerance limit of the JMF ± 5% on the 1.18 mm (No. 16) sieve and all other mix types shall have a tolerance limit of the JMF ± 6% on the 2.36 mm (No.8) sieve. These tolerances shall also be applied to the mix design and shall be documented on the T-400 Form. The tolerances shall not fall outside of the specified control points of Table-3.

TABLE 4–COARSE AND FINE GRADED MIXTURE CRITERIA

Mixture Nominal	Coarse Graded	Fine Graded
Maximum Size	**% Passing / Sieve Size**	**% Passing / Sieve Size**
~~37.5 (1½)~~	~~< 47% / 9.5 mm~~	~~≥ 47% / 9.5 mm~~
25 (1)	< 40% / 4.75 mm	≥ 40% / 4.75 mm
19 (¾)	< 47% / 4.75 mm	≥ 47% / 4.75 mm
12.5 (½)	< 39% / 2.36 mm	≥ 39% / 2.36 mm
9.5 (3/8)	< 47% / 2.36 mm	≥ 47% / 2.36 mm
4.75 (No. 4)	No distinction between coarse and fine grading	

6.2 ~~The aggregate used in the mix design shall meet the requirements of Sections 702.3, 702.4, 703.1, 703.2, and 703.3 of the Standard Specifications with~~ Aggregate Consensus Property Requirements

6.2.1 Given a JMF which meets the requirements set forth within Table 1, and 3, aggregate consensus properties including coarse and fine aggregate angularity, fine aggregate sand equivalency and coarse aggregate flat and elongated particles ~~exceptions and additions as noted in Table 5~~shall be determined on the final aggregate blend of a JMF. Table 5 outlines the consensus property requirements for a JMF based on the 20-year Design ESAL level of the pavement. Consensus properties shall be determined and test results submitted with a JMF on their appropriate T400 attachments. Consensus testing may be performed by a WVDOH certified Asphalt Plant Technician or Aggregate Inspector. The name and location of the testing laboratory and the technician's name conducting the test shall be indicated on the worksheets. All consensus testing results shall be reported to the whole number.

6.2.2 Fine aggregate angularity testing shall be conducted in accordance with AASHTO T304 (Method A). Material for the fine aggregate angularity as well as the fine aggregate bulk specific gravity utilized in the determination of fine aggregate angularity shall be based on a sample blended in accordance with the methods described in Section 6.2.4.1 and 6.2.4.2.

~~4.1.1~~ If a ~~mix~~ JMF contains ~~reclaimed asphalt pavement (~~RAP~~)~~, the asphalt binder ~~must~~shall be removed from the RAP for ~~gradation~~ consensus analysis ~~via~~~~by the~~ ignition oven ~~method~~ (AASHTO T~~-~~308) or ~~a~~ solvent extraction ~~process (T~~(AASHTO T~~-~~164). ~~If the T 164 solvent extraction test method is used, a non-chlorinated solvent may be substituted for the standard specified solvent, and the test method may be modified as per the recommendations of the solvent supplier. The solvent must be a product that has been tested for use in extracting asphalt from asphalt mixtures.~~ The RAP aggregate shall be proportionally blended into the samples submitted to MCS&T as described in Section ~~4.8~~6.2.5. The RAP used for designing a mix must come from the plant stockpile from which it will be produced.

6.2.3

~~1.3 Test results for fine aggregate angularity, recorded on Design Attachment Number 13, shall be submitted along with the mix design package (JMF). Testing shall be conducted in accordance with T 304 (Method A) on a sample blended in accordance with the methods described in Section 4.8.1 and 4.8.2. This testing may be performed by a WVDOH certified Asphalt Plant Technician or Aggregate Inspector. The name of the testing laboratory and the technician conducting the test shall be indicated on the worksheets.~~

~~1.4 Other than the exception noted in Section 4.9, to obtain final approval of the mix design, coarse~~

Commented [JC16]: Is this still needed?

Commented [JC17]: no

Commented [JC18]: check

~~and fine aggregate samples shall be submitted to MCS&T through the District Materials Section. These samples shall be tested and used as part of the overall approval process for the mix design, therefore, they should be submitted well in advance of the earliest anticipated use of the mix. The aggregate property requirements of Table 5 shall be applied to the blend of coarse and fine aggregates within the mixture.~~

~~1.4.1 For each mix design, a minimum 30,000-gram sample (40,000-gram sample for a 37.5 mm mix) of the coarse and fine aggregates shall be blended to the mix design proportions. The blended sample shall then be separated into plus 4.75 mm (No. 4) and minus 4.75 mm (No. 4) portions. The fine aggregate sample shall then be further prepared in accordance with Section 4.8.2. Mixtures shall be designed in accordance with the criteria set forth in Table 1, 2 and 3 unless otherwise indicated in a special provision or as a note in the contract documents. All samples shall be submitted by the design laboratory in appropriate containers to prevent sample loss or contamination.~~

~~1.4.2 Fine Aggregate Sampling Procedure: The minus 4.75 mm (No. 4) portion of the blended aggregate sample shall be split into two separate samples. One of these split samples shall be bagged and labeled as the unwashed portion of the fine aggregate blended sample. The other split sample shall be washed, oven dried, and graded to remove all plus 2.36 mm (No. 8) and minus 150 µm (No. 100) material. This washed sample shall then be split and placed into two sample bags. One bag shall be labeled as *washed fine aggregate specific gravity* sample and the other shall be labeled as *washed fine aggregate angularity* sample.~~

6.2.4 Consensus Property Division Approval

6.2.4.1 Other than exception noted in Section 0 or otherwise indicated in a special provision, to obtain final approval of a JMF, the designer shall submit samples in accordance with 6.2.4.2 to the division. Samples shall be submitted by the design laboratory to MCS&T through the District Materials Section. Samples shall be in appropriate containers to prevent sample loss and/or contamination. Samples shall include adequate documentation to demonstrate what JMF the consensus properties are associated with. These samples will be tested by MCS&T and used as part of the overall approval process for the mix design. These samples should be submitted well in advance of the earliest anticipated use of the mix. For JMF approval, the submitted samples shall meet the consensus property requirements of Table 5.

6.2.4.2 If a JMF is under development and uses the same aggregate sources at the same proportions as a previously approved JMF, the consensus evaluation used to accept the previous JMF will apply to the new JMF. The designer shall note the T400 number from the previously approved JMF in the remarks section of the T400 worksheet being submitted along with the documentation of the new JMF.

Commented [JC19]: What is the appropriate timeframe to utilize old Consensus properties.

6.2.4.3 Consensus Property Sample Preparation

6.2.4.3.1 For each JMF, a minimum 30,000-gram sample of the combined aggregates shall be blended to the mix design proportions. The blended sample shall then be separated into plus 4.75 mm (No. 4) and minus 4.75 mm (No. 4) portions as per 6.2.4.2.

6.2.4.3.2 Fine Aggregate Sampling Procedure: The minus 4.75 mm (No. 4) portion of the blended aggregate sample shall be split into two separate samples. One samples shall be bagged and labeled as *unwashed blended fine aggregate* to be tested for Sand Equivalency. The other sample shall be washed, oven dried, and graded to remove all plus 2.36 mm (No. 8) and minus 150 µm (No. 100) material. This washed sample shall then be split and the two potions labeled *washed fine aggregate specific gravity sample* and *washed fine aggregate angularity sample*.

~~1.5 If a new mix design uses the exact aggregate design structure and sources as a previously~~

~~approved mix design, the aggregate evaluation used to accept the previous mix design will apply to the new mix design. A note of the testing waiver along with the T-400 lab number from the previous design shall be included in the remarks of the T- 400 worksheet submitted along with the documentation of the new mix design.~~

6.2.5 Consensus Property Contractor Annual Review

6.2.5.1 Annually, following Division approval, aggregate consensus properties for approved JMFs shall be tested against the requirements of Table 5. Tests shall be performed on the blended aggregate sample as prepared in accordance with Section 6.2.4.3. These tests may be conducted by a WVDOH certified Asphalt Plant Technician or Aggregate Inspector. These test results shall be submitted to the District Materials Section for the purpose of maintaining approval of the mix design. The name of the testing laboratory, date tested, associated T400 number(s) and signature of the technician conducting the tests shall be indicated on the worksheets. The annual review packet shall be signed and reviewed by the designer. These test results must be submitted before the mix is used on any Division project each year.

6.2.5.1.1 Strictly for the purposes of the annual consensus review, in-lieu of blended aggregate samples, the Contractor may instead test each material stockpile individually and utilize mathematical proportional blending equation for calculating a composite result for each consensus property. If the contractor chooses to do this, the designer must submit the individual tests along with the forms showing the calculations.

4.1.26.2.5.2 If the aggregate consensus property test results submitted to the District meets specification requirements, the District shall sign off on the report and forward ~~the results~~ to MCS&T for the purpose of maintaining approval of the ~~mix design~~JMF. If any of the required aggregate tests fail to meet specification requirements, retesting by the contractor will be permitted, and the District shall submit a sample of the blended aggregate to MCS&T to verify the consensus property test that failed.

4.1.2.16.2.5.3 During the time that the annual aggregate consensus testing is being performed, the Division may periodically request that a duplicate set of blended aggregate samples be prepared for submittal to MCS&T for testing. The Division will identify the ~~mix design~~JMF in advance so that sufficient material is obtained for ~~preparation~~the preparation of duplicate samples. Nonconforming test results on these samples will require further investigation by the Division. No corrective action will be required by the Contractor unless the investigation concludes that it is necessary. If corrective action is required, the contractor will be notified, and at a minimum further use of the subject ~~mix design~~JMF (and associated JMFs, ie. JMFs conforming to section 6.2.4.2) shall be discontinued until the Division has determined that the problem has been properly addressed.

6.2.6 If the mix is comprised of 100 percent crushed blended aggregates that contain no more than 20 percent RAP, and it met requirements for coarse and fine aggregate angularity, the flat-and-elongated, and sand equivalent during the initial design approval, and any annual follow-up testing, then retesting each year by MCS&T will not be required. However, fine aggregate samples of mixes containing rounded natural sand and/or greater than 20 percent RAP must be prepared by a certified Asphalt Plant Technician in accordance with sections 6.2.4, and a sample of sufficient size required for testing the fine aggregate angularity shall be submitted to MCS&T on an annual basis.

Commented [JC20]: Will this work for FAA? there is a chance that when separates aggregates interact they produce a different result than a weighted blend of individual tests

Commented [JC21]: Will need to add language about what equation, stockpile replicates, etc.

Commented [JC22]: Should this not also include material for Find Agg Gravity

Commented [JC23]: This section needs refined as it contridicts items in Sections 6.2.5 now

TABLE 5 – AGGREGATE CONSENSUS PROPERTY REQUIREMENTS

20 Year Projected	Coarse Agg. Angularity (% Minimum) ASTM D5821 (Note 8)		Fine Agg. Angularity (% Minimum) AASHTO T304, Method A (Note 10)		Fine Agg. Sand Equivalent AASHTO T176	Coarse Agg. Flat and Elongated ASTM D4791
Design ESALs (millions)	Top Two Pavement Lifts (Note 9)	Below Top Two Pavement Lifts	Top Two Pavement Lifts	Below Top Two Pavement Lifts	% Minimum	Maximum (Note 13)
< 3 (Note 11)	75 / -	50 / -	-	-	40	10
3 to < 20	85 / 80	75 / -	45	40	45	10
20 to < 30	95 / 85	85 / 80	45	40	45	10
≥ 30	100/100	100/100	45	40	45	10

Note 8: "xx~~85~~/~~80~~"yy denotes that a minimum of ~~85~~ xx percent of the coarse aggregate has one fractured face and a minimum of ~~80~~ yy percent has two or more fractured faces. This criterion does not apply to 4.75mm mixtures

Note 9: The referenced "top two pavement lifts" does not include a scratch course or patching-and-leveling course that may be placed between these lifts. When a scratch or patching-and-leveling course is placed between the top two lifts, the aggregate requirements for the mix shall fall under the "top two pavement lifts" criteria.

Note 10: For design traffic levels of 3 million ESALs or greater, any mix composed of a 100 percent crushed aggregate blend that will be used in the top two lifts of the pavement structure will be acceptable with an FAA value of 43 percent or greater. The 43 percent FAA criteria shall also apply to the 30 million or greater traffic level for mixtures below the top two lifts. It shall also apply to 100 percent crushed aggregate blends that contain no more than ~~15~~20 percent RAP.

Note 11: The minimum requirement for coarse aggregate angularity for any DOH Specification Section 402 skid resistant mix design with a projected ESAL value of ~~0.3 to~~ less than 3 million shall be 85/80. ~~For skid resistant mix designs with a projected ESAL value of less than 0.3 million it shall be 75/-.~~

Note 12 – PG64E-22 grade may still be used on roadways less than 30 million ESAL upon approval from the District Engineer, if a roadway is to utilize a PG64E-22 it shall meet the aggregate requirements of >30mil ESALs

~~**Note 12:** The 10 to less than 20 million design ESAL aggregate criteria only applies to Section 402 skid resistant mix designs.~~

Note 13: Flat and elongated particles in coarse aggregates shall be tested in accordance with D4791 with the exception that the material passing the 9.5 mm (⅜ in.) sieve and retained on the 4.75 mm (No. 4) sieve shall be included. The aggregate shall be measured using the ratio of 5:1, comparing the length (longest dimension) to the thickness (smallest dimension) of the aggregate particles.

Commented [JC24]: I think we should get a temperature map of our roads that show where 25+ M ESALS exists and the quantity of road ways this will affect.
I would prefer this to affect major municipal interstates but that's about it

Commented [JC25]: Likely can be removed

~~4.2 At the beginning of each paving season in subsequent years the aggregate consensus properties of Table 5 shall be tested on blended aggregate samples prepared in accordance with Section 4.8. These tests may be conducted by a WVDOH certified Asphalt Plant Technician or Aggregate Inspector. These test results shall be submitted to the District Materials Section for the purpose of maintaining approval of the mix design. The name of the testing laboratory, date tested, and signature of the technician conducting the tests shall be indicated on the worksheets. These test results must be submitted before the mix is used on any Division project each year.~~

~~1.5.1 During the time that the annual aggregate consensus testing is being performed, the Division may periodically request that a duplicate set of blended aggregate samples be prepared for submittal to MCS&T for testing. The Division will identify the mix design in advance so that sufficient material is obtained for preparation of duplicate samples. Nonconforming test results on these samples will require further investigation by the Division. No corrective action will be required by the Contractor unless the investigation concludes that it is necessary. If corrective action is required, the contractor will be notified, and further use of the mix design shall be discontinued until the Division has determined that the problem has been properly addressed.~~

~~1.6 If the aggregate consensus property test results submitted to the District meets specification requirements, the District shall forward the results to MCS&T for the purpose of maintaining approval of the mix design. If any of the required aggregate tests fail to meet specification requirements, retesting by the contractor will be permitted, and the District shall submit a sample of the blended aggregate to MCS&T to verify the consensus property test that failed.~~

~~1.7 If the mix is comprised of 100 percent crushed blended aggregates that contain no more than 15 percent RAP, and it met both the coarse and fine aggregate angularity requirements, the flat-and-elongated requirement, and the sand equivalent requirement during the initial design approval, and any annual follow-up testing, then retesting each year by MCS&T will not be required. However, fine aggregate samples of mixes containing rounded natural sand and/or greater than 15 percent RAP must be prepared by a certified Asphalt Plant Technician in accordance with sections 4.8 and 4.8.1, and a sample of sufficient size required for testing the fine aggregate angularity shall be submitted to MCS&T on an annual basis.~~

~~1.8 Full mix design testing will not be required when a mix design is developed using the exact aggregate structure, sources, and compaction level as a prior Division approved design, along with a different neat binder grade. The designer may instead elect to make a set of bulk specific gravity test specimens and a maximum specific gravity test specimen with the approved aggregate structure and the new binder grade at the optimum asphalt content of the approved design. Since these samples are laboratory produced design specimens, they must be oven aged for 2 hours ± 5 minutes before testing in accordance with R 30 (Mix Conditioning of Asphalt Mixtures) as specified in R 35 (Superpave Volumetric Design for Asphalt Mixtures). Mix and compaction temperature will be based on the requirements of the new binder grade. The percent air voids shall be 4.0 ± 0.3 percent. The voids-in- mineral aggregate shall be within ± 0.5 percent of the original approved job mix formula design target (but not outside of the limits of this MP). All other mix design criteria shall be within the limits specified in this MP. If the mix design meets all of these requirements, then this test data may be submitted along with a new T-400 form for approval as a new mix design. A copy of the approved T-400 on which this new design is based shall also be included. If the mix design fails to meet all of the requirements, then a new mix design shall be developed.~~

~~2.~~7. REPORTING

~~2.1~~ The T-400 JMF form shall include the design property information required in Section

7.1.1 401.4 of the Standard Specification. JMF submittals shall include all Superpave mix design software printouts from the specimen compaction and analysis covering the required mix properties. In addition, if not automatically generated through the mix design software, the following information shall be included.

~~2.1.1~~7.2 A summary sheet (Superpave Package Attachment #1) showing the optimum asphalt content determination plus the design properties compared to the design criteria of Table 1. This attachment shall be signed and dated by the mix design technician.

~~2.1.2~~7.3 Worksheet for calculating the effective gravity of the blended aggregates (Attachment #4 or #4A).

~~2.1.3~~7.4 Worksheets showing calculations for maximum specific gravities of the mix at the different

Commented [JC26]: Should this not also include material for Find Agg Gravity

Commented [JC27]: This section still needs refined based on the JMF packet

asphalt contents (Attachment #5). For any mix that contains any single coarse aggregate component with the water absorption of 1.5 percent or greater, follow the supplemental procedure of T 209 to determine if a dry-back is necessary. Because the dry-back procedure is addressing an aggregate coating issue, this same supplemental procedure shall be used on quality control and verification samples of mixes containing these high absorptive aggregates to determine if the dry-back procedure is necessary.

2.1.47.5 Worksheet for calculating the bulk and apparent specific gravities of the total aggregate, and the percent VMA in the compacted mixture (Attachment #6 or #6A).

2.1.57.6 Worksheet for determining the maximum specific gravity of the mixture, including the dry-back procedure when required (Attachment #7). Note that AASHTO R 35 specifies that the maximum specific gravity shall be based on the average of at least two tests.

2.1.67.7 Worksheets showing calculation for bulk and apparent specific gravities and absorption of the coarse and fine aggregates used in the mix design (Attachments #8 or #8A).

2.1.77.8 The 0.45 power gradation chart (Attachment #9) developed for each mix design. This chart shall include the maximum density line, aggregate control points, and a gradation plot showing each screen used in the design.

2.1.87.9 A worksheet showing the calculations for the combined aggregate of the mix design (Attachment #10).

2.1.97.10 Worksheets showing the washed sieve analysis results for each aggregate used in the mix design (Attachment #11).

2.1.107.11 A worksheet showing the calculations for the fine aggregate angularity test (Attachment #13).

2.1.117.12 A worksheet showing the calculations for absorbed asphalt and effective asphalt content (Attachment #14).

2.1.127.13 The temperature-viscosity chart for the asphalt used in the mix design. A supplier issued chart or document containing the mix and compaction temperature recommended for the specific grade of asphalt will be acceptable.

2.27.14 The entire T-400 JMF package shall be submitted, in Excel format, to the local District Materials Section in which the mixtures plant is located. After reviewing, the District shall attach a memo to the JMF package requesting approval of the design and submit it electronically to the MCS&T Asphalt Section (DOHAsphalt@wv.gov).

2.2.1 The MCS&T Asphalt Section will conduct a final review of the design package and assign a laboratory number to each approved mix design. MCS&T will contact the mix designer if there are any problems or concerns with the JMF package that will dll

7.14.1 ~~d~~delay final approval. An electronic copy of the approved T-400 form shall be e- mailed to the District and Producer for distribution.

~~2.3~~7.15 All applicable mix design worksheets can be found on the MCS&T's Webpage Toolbox[2]

~~02/16/2023~~

~~Ronald L. Stanevich, PE~~
Director
Materials Control, Soils & Testing Division

MP 401.02.28 Steward – Asphalt Section
RLS:J

[2] http://www.transportation.wv.gov/highways/mcst