

## Materials Procedures Committee Regular Meeting

**Meeting Time/Date:** 10:00am, February 15, 2023

**Meeting Location:** CAWV (Conference Rm.) – 2114 Kanawha Blvd. E, Charleston, WV 25311

**Online Meeting:** Google Meet Video Conference

Online Link - ( <https://meet.google.com/apa-rvti-ndx?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\2023\2023 02 15 Meeting](#)

Files Available on Webpage –

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

### Materials Procedures approved at the last meeting (1/18/23)

1. 307.00.50 - Guide for Quality Control and Acceptance Plans for Subgrade, Base Course, And Aggregate Items
2. 601.03.50 - Guide for Quality Control and Acceptance Requirements for Portland Cement Concrete
3. 712.04.50 - Criteria to Approve Fabricators of Guardrail Beams, Steel Guardrail Posts and Hardware

### Materials Procedures - Old Business

| Number                                | Champion | Title  | Description   |
|---------------------------------------|----------|--|---|
| 1 - <del>644.XX.XX</del><br>106.00.21 | Mullins  | Acceptance Procedure for Mash Compliant Roadside Safety Hardware | Creates acceptance guidelines for MASH Safety Hardware. |
| 2 - 401.03.50*                        | Jack     | Guide for Quality Control Plans for Asphalt                      | Additional Comments made after last meeting.            |

### Materials Procedures - New Business

|                |                 |  |  |
|----------------|-----------------|--|--|
| 1 - 700.00.53& | Mullins/Brayack | Acceptance Procedure for Evaluating Independent Assurance Samples with Samples Used for Acceptance | Major update to the IA process   |
| 2 - 615.20.01& | Hanna/Mance     | Preparing, Recording and Transmitting Information on Approved List of Welded Stud Shear Connectors | Change from an IM to an MP, removal of language about removal of a material from the APL, discuss from George Hanna/Mike Mance |

|                |        |   |  |
|----------------|--------|---|--|
| 3 - 715.07.20& | Perrow | Standard Method of Test for Determining the Quality of Water Used with Hydraulic Cement | Revised MP 715.07.20 incorporating the test methods that were supposed to be referenced in MP 642.40.20. |
|----------------|--------|---|--|

**Note 1:** \* Denotes this MP is up for Vote

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

### Comments

Comments due February 8<sup>th</sup>, so the Champion may review and address them. Submit comments to Adam Nester ([Adam.W.Nester@wv.gov](mailto:Adam.W.Nester@wv.gov))

### Next Meeting

**New or Updated MPs due to the MP Chair 3-weeks before the next meeting:** March 1, 2023

**Meeting Time/Date:** 10:00 am, March 22, 2023

**Meeting Location:** MCST/TBD

**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 2023:

April 19, May 17, June 21

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

MATERIALS PROCEDURE

ACCEPTANCE PROCEDURE FOR MASH COMPLIANT

ROADSIDE SAFETY HARDWARE

1. PURPOSE

- 1.1 To set forth a procedure for acceptance of Roadside Safety Hardware to ensure compliance with Joint Implementation Agreement for the Manual for Assessing safety hardware (MASH) between FHWA and AASHTO by memorandum, dated January 7, 2016.

2. REFERENCED DOCUMENTS

- 2.1 ~~Manual for Assessing safety hardware (MASH) between FHWA and AASHTO by memorandum, dated January 7, 2016.~~ ~~That MASH Document~~
- 2.1
- 2.2 ~~Our MASH Specification~~ WVDOH DOH Specifications Roads and Bridges
- 2.2.3 MP 106.00.02 – “Procedure for Evaluation of New Products for Use in Highway Construction”

3. SCOPE

- 3.1 This procedure is applicable to any roadside highway safety hardware that is to be reviewed by the Roadway Departure Task Force that will be placed on the Division’s Approved Product List (APL).<sup>1</sup>

4. ~~PROCEDURE~~ EVALUATION OF SUBMITTED PRODUCTS

- 4.1 The product shall be submitted to the Director of Materials Control, Soils & Testing and will be assigned to the Roadway Departure Task Force for evaluation.
- 4.2 The Traffic Certification Supervisor will distribute the product information to the Task Force representatives. Those representatives shall ~~be~~ be from the following Division:
- a. Director of Traffic Engineering Division
  - b. Director of Contract Administration Division
  - c. Director of Materials Control, Soils & Testing Division
  - d. Traffic Mobility and Safety Engineer
  - e. Director of Maintenance Operations
  - f. Engineering Division
  - d.g. Technical Support Division

Commented [BDA1]: Ted and Donna will certainly have some input into this as well.

Commented [BDA2]: Same with RJ

Commented [BDA3]: Should we include operations or maintenance?

Commented [MGW4]: Done.

<sup>1</sup> [https://transportation.wv.gov/highways/mcst/Pages/APL\\_By\\_Number.aspx](https://transportation.wv.gov/highways/mcst/Pages/APL_By_Number.aspx)

- 4.3 A ~~Meeting-meeting~~ to discuss the submission shall be scheduled ~~within 460 calendar days~~ of the receipt of the submission.
- 4.4 The submission shall be evaluated ~~and accepted~~ based on ~~one of~~ the following criteria, in descending order of preference:
  - 4.4.1 Letter of Eligibility (LOE) from FHWA
  - 4.4.2 Full suite of passing MASH testing at an accredited facility, but no LOE
  - 4.4.3 Previous issue of NCHRP 350 Letter of Eligibility and an acceptable In-Service Performance Evaluation.
  - 4.4.4 A profession opinion letter of due diligence has been issued by an accredited testing facility determination of the hardware being MASH eligible.
  - 4.4.5 Minor modifications of hardware previously determined to be eligible by the DOH process that in the opinion of the Roadway departure Group determine are not significant modification to performance.
- 4.5 Products used by other DOT's will be considered after reviewing the data from the state standards coordinator as to the state's reasoning for usage after implementation dates.

**5. ACCEPTANCE OF MASH MATERIAL**

- 5.1 The voting members will determine if the product meets MASH criteria.
- 5.2 If approved, the submitted material will be added to the APL as per MP 106.00.02.

**Commented [BDA5]:** Crane - wants some sort of deadline in here.

**Commented [BDA6]:** David Price also feels that way.

**Commented [BDA7]:** DB to look into deadline on RL 468.

**Commented [BDA8]:** I believe these are sorted in order of preference, for example, if they have that LOE, they're pretty good to go. Maybe say something like "in descending order of preference"? Etc?

**Commented [MGW9]:** done

**Commented [BDA10]:** Maybe flesh this out? Or maybe not, since we already explain the process in the MP.

\_\_\_\_\_  
Ronald L. Stanevich, P.E.  
Director  
Materials Control, Soils & Testing Division

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

MATERIALS PROCEDURE

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GUIDE FOR QUALITY CONTROL PLANS  
FOR ASPHALT

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**1. PURPOSE**

- 1.1 This procedure presents uniform Quality Control (QC) guidelines for Contractor (and/or Producer(s)) to develop their QC Plan. All items listed are believed necessary to assure adequate product QC.
- 1.2 This procedure also creates a more uniform process for District Materials to review and approve Quality Control Plans for use on projects.

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**2. SCOPE**

- 2.1 This Material Procedure (MP) is applicable to, but not limited to the following Asphalt Items:
- a. Base
  - b. Wearing
  - c. Patching and Leveling Courses
  - d. All P.W.L. Items
  - e. Skid

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**3. GENERAL REQUIREMENTS**

- 3.1 As stated in 401.6.1 of the Specifications, a QC Plan must be developed by the Contractor and/or Producer and submitted to the Engineer prior to construction. Acceptance of the Quality Control Plan by the Engineer will be contingent upon its concurrence with these guidelines. For this reason, the plan should clearly describe the methods by which the Quality Control Program will be conducted. For example, the items to be controlled, tests to be performed, testing frequencies, sampling locations and techniques all should be included and each item should be listed separately. Also, a detailed plan of action regarding disposition of non-specification material should be included. Such a plan should provide for immediate notification of all parties involved in the event non-conforming situations are detected. Attachment #1 may be used as an example Quality Control Plan for plant operations using all items that are applicable to the specific type of plant items produced. Attachment #2 may be used as an example Quality Control Plan for field operations using all items that are applicable to field work.
- 3.2 Inspection and testing records shall be maintained, kept current, and made available for review by the Engineer throughout the life of the contract. All other documentation, such as date of inspections, tests performed, temperature measurements, and any

accuracy, calibration, or re-calibration checks performed on production or testing equipment should be recorded.

- 3.3 The Contractor shall maintain standard calibrated equipment and certified personnel in accordance with contract and Specification requirements for the item(s) being produced.
- 3.4 The Division reserves the right to review all pertinent documents concerning equipment calibration used for testing and proof of certified personnel performing tests.

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**4. MASTER QUALITY CONTROL PLAN**

- 4.1 The intent of a Master QC Plan is to facilitate the approval process in a more uniform manner. The Contractor may submit a Master QC when their workload in a given District is routinely repetitive for the year.
  - 4.1.1 The Contractor may submit a new Master Asphalt Items QC Plan each year to each District in which they have or expect to have work. If the Contractor does not have work or does not have a history of work in a given District for the year, then a Master QC Plan shall not be submitted to that District.
  - 4.1.2 The District will review the submitted Master QC Plans to see if they meet the requirements for the Asphalt Items in the QC Plan. If accepted, the District shall assign a laboratory reference number to the Master QC Plans for future referencing. The District will acknowledge approval of each Master QC Plan to the Contractor by letter (see Attachment #3 for an example), which will include the laboratory reference number and a copy of the approved Master QC Plan. This will then be scanned and placed in ProjectWise under the appropriate District's Org for that Contractor and/or Producer/Supplier.
  - 4.1.3 Once a project has been awarded, if a Contractor elects to use the approved Master Asphalt Items QC Plan on that project, the Contractor shall submit a letter requesting to use the Master QC Plan for that project. This letter must be on the Contractor's letterhead, be addressed to the District Engineer/Manager or their designee, and contain the following information: project number, CID#, project description, type of QC Plan, and the laboratory reference number for the Master QC Plan. (See Attachment #4a and 4b for Plant and Field operations respectively for examples.)
  - 4.1.4 The District shall review the referenced Master QC Plan to ensure it covers all items in the project. If the referenced Master QC Plan is found to be insufficient for some items on the project, the District shall request the Contractor to submit additional information for QC of those items as an addendum on a project specific basis. When the District is satisfied with the QC Plan for this project, a letter shall be sent to the Contractor acknowledging approval (see Attachment #5 for an example), with the following attached: the Contractor's project QC Plan request letter and the Master QCP approval letter. This shall then be placed in the project's incoming-mail mailbox in ProjectWise.
  - 4.1.5 A Master QC Plan that has been approved for project use shall be good for the duration of that project, even if that project continues into future calendar years.
  - 4.1.6 For the use of District Personnel, the District approval letter for this project must state the ProjectWise link to the referenced Master QC Plan for that Contractor. For example, WVDOT ORGS > District Organization #> Materials > Year>Master QC Plans, etc.

4.1.7 The Master Asphalt Items QC Plan shall be valid for the duration of one calendar year beginning on January 1st and ending on December 31st.

4.2 Delivery Tickets

4.2.1.1 Each truckload of asphalt delivered to the project shall be accompanied by one delivery ticket with the following items listed on the ticket:

1. Ticket Number
2. Producer/Supplier Code
3. Producer/Supplier Name
4. Producer/Supplier Location
5. Contract Identification Number (CID #)
6. Federal Project Number (If applicable)
7. State Project Number
8. Date
9. Time Batched
10. Item Number
11. Material Code
12. Material Name
13. License Number of Haul Unit or Truck Number
14. Approved Job Mix Formula (JMF) Number
15. Gross Weight (TN)
16. Tare Weight (TN)
17. Net Weight (TN)
18. Cumulative Weight (TN)
- ~~19.~~ Maximum Density (Note 1)
- ~~20.~~ Material Code
- ~~21.~~ 19. Material Name
- ~~22.~~ 20. Temperature (°F/°C)
- ~~23.~~ Lab Number for Testing.
- ~~24.~~ 21. In addition, once the design has been verified, the newly established Maximum Density shall be reported on each ticket thereafter.
- ~~22.~~ Weighperson's Name certifying that all information on the ticket is correct.
  
- ~~25.~~ Note 1: At the completion of Field Design Verification, the newly established Maximum Density shall immediately replace the Maximum Density from the JMF and shall be reported on each ticket thereafter.

4.2.1.2 Documentation shall be provided to the project as per the requirements of Section 109.20 of the Specification.

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**5. ASPHALT FOR MAINTENANCE**

- 5.1 The provisions of this MP will also apply to asphalt plant run purchase orders that are picked up at the plant by the Division's Maintenance forces. Yearly Master Plant and Field QCP's apply to Laydown Asphalt Purchase Orders awarded to vendors. Exceptions to this are as specified in the Purchase Order Maintenance Contract.

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**6. ACCEPTANCE PLAN**

- 6.1 The Asphalt Material shall be accepted in accordance with the material's specific MP and the Standard Specifications.
- 6.2 Key Dates
- 6.2.1 Once the Quality Control Plan is approved for the project the key date shall be entered into the current AASHTOWare software by the appropriate District Materials personnel. The first date entered shall be the date the Project Quality Control Plan letter is received. The second date shall be when the district approves the quality control plan for use on the project.

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**7. ABSENT TESTING OF MATERIAL**

- 7.1 If the Contractor fails to perform testing of the material in accordance with the Contractor's Division Approved Quality Control Plan, payment for the portion of the item represented by the absent test shall be withheld, pending the Engineer's decision whether or not to allow the material to remain in place.
- 7.1.1 If the Engineer allows the material to remain in place, the Division shall not pay for the material represented by the absent test. However, the Division shall pay for the cost of the placement of the material, including labor and equipment. The invoice or material supplier cost (if applicable), determined at the time of shipment, shall be used to calculate the cost of material when evaluating the total cost of labor and equipment.

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



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

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MATERIALS PROCEDURE

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ACCEPTANCE PROCEDURE FOR EVALUATING  
INDEPENDENT ASSURANCE SAMPLES WITH  
SAMPLES USED FOR ACCEPTANCE

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**1. PURPOSE**

- 1.1 To provide a procedure for the immediate evaluation of Independent Assurance (IA) Samples with samples used for acceptance.
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**2. SCOPE**

- 2.1 This procedure is intended to apply to the following:
- 2.2 Aggregate Gradations
- 2.3 Hot Mix Asphalt
- 2.3.1 Asphalt Content
- 2.3.2 Air Voids
- 2.4 Portland Cement Concrete
- 2.4.1 Air Content
- 2.4.2 Consistency (Slump)
- 2.4.3 Compressive Strength
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**3. REFERENCED DOCUMENTS**

- 3.1 Office of Pavement Technology Publication No. FHWA-HIF-12-001, October 2011
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**4. DEFINITIONS**

- 4.1 Verification Samples and Tests - All of the samples and tests performed by the Division of Highways (DOH) or its designated agent used to validate the quality and acceptability of the materials and workmanship which have been used or are being incorporated in the project.
- 4.2 Quality Control Samples and Tests - All the samples and tests performed by the contractor that are performed or conducted to fulfill the contract requirements.
- 4.3 Independent Assurance Samples and Tests - Independent and unbiased samples or other activities performed by the DOH or its designated agent who do not normally have direct responsibility for quality control or verification sampling and testing. IA

samples and tests are taken to evaluate the sampling and testing procedures used in the acceptance program.

- 4.4 Split Sample - One of two selected samples that have been halved, quartered, etc. from a single sample taken in the field. The field sample must be of adequate size to render each "split sample" sufficient material for test.
- 4.5 Adjacent Sample - One of two field samples taken in close proximity to each other in both time and space. Adjacent samples must represent the same material, production process, and other activity through the point of sampling.
- 4.6 Proficiency Sample - A single (homogeneous) sample that has been tested by two or more laboratories and used to assure that the quality control testing is performed correctly, and that the equipment is in calibration.
- 4.7 Active Tester – A person who has performed a material test for acceptance in a calendar year.

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**5. SYSTEM APPROACH TO IA SAMPLING AND TESTING**

- 5.1 The personnel and equipment will be verified on a “system” basis as recommended by the FHWA tech briefing. The purpose is to cover all testers and equipment over a period of a year. This approach is a more effective means of performing IA since it ensures that the WVDOT is evaluating a larger portion of testers instead of redundant testing of the same testers.

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**6. PORTLAND CEMENT CONCRETE**

- 6.1 The means and methods of meeting the yearly IA requirement for PCC is outline in Attachment 1: IA Work Plan.
- 6.2 The IA frequency goal for each tester and each piece of testing equipment is as follows:

| PCC IA Samples Frequency     |            |
|------------------------------|------------|
| Slump                        | 1/Year     |
| Air                          | 1/Year     |
| Compressive Strength Testing | 1 Set/Year |

Commented [BDA1]: List ASTM/AASHTO T22 etc

- 6.3 The evaluation of these tests shall be described in Section 10 of this document.

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**7. SUPERPAVE HOT MIX ASPHALT**

- 7.1 The means and methods of meeting the yearly IA requirement for Superpave HMA is outline in Attachment 1: IA Work Plan.
- 7.2 The IA frequency goal for each tester and each piece of testing equipment is as follows:

| SuperPave IA Samples |
|----------------------|
|----------------------|

|                                     |        |
|-------------------------------------|--------|
| % Asphalt                           | 1/year |
| Bulk Specific Gravity - Vacuum Seal | 1/year |
| Bulk Specific Gravity - Gyratory    | 1/year |
| Max Specific Gravity                | 1/year |
| Gradation on the #200 Sieve         | 1/year |

7.3 The evaluation of these tests shall be described in Section 10 of this document.

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**8. MARSHALL HOT MIX ASPHALT**

8.1 The means and methods of meeting the yearly IA requirement for Marshall HMA is outline in Attachment 1: IA Work Plan.

8.2 The IA frequency goal for each tester and each piece of testing equipment is as follows:

| Marshall IA Samples   |        |
|-----------------------|--------|
| % Asphalt             | 1/year |
| Max Specific Gravity  | 1/year |
| Bulk Specific Gravity | 1/year |
| Air Voids             | 1/year |
| Stability/Flow        | 1/year |

8.3 The evaluation of these tests shall be described in Section 10 of this document.

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**9. MARSHALL HOT MIX ASPHALT**

9.1 The means and methods of meeting the yearly IA requirement for Marshall HMA is outline in Attachment 1: IA Work Plan.

9.2 The IA frequency goal for each tester and each piece of testing equipment is as follows:

| Aggregate Gradation Samples |        |
|-----------------------------|--------|
| Class 1,3, or 10            | 1/year |

9.3 The following sieves will be evaluated:

9.3.1 3/8" sieve

9.3.2 #30 sieve

9.3.3 #200 sieve.

9.4 The evaluation of these tests shall be described in Section 10 of this document.

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**10. EVALUATION PROCEDURE**

- 10.1 In the case of less than 5 split samples, The criteria for evaluation shall be as denoted in Attachment 2: Evaluation of IA results.
- 10.1.1 If the results do not meet the criteria defined above, a corrective action report must be completed by the respective District and submitted to the IA sampler within 30-days of the District being notified of the dissimilar results.

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**11. PROFICIENCY SAMPLING**

- 11.1 In the case where a split sample cannot be obtained, AASHTO re:source samples may be used to meet the yearly IA requirement.
- 11.2 Evaluation of the active tester's proficiency sample shall be based on their rating. A rating of 3, 4, 5 shall be considered acceptable. Any score of 0, 1 or 2 shall require a corrective action report in addition to that required by AASHTO as described in Section 10.1 of this document.

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

### **Independent Assurance Plan for Processing IA Sample Testing**

1) **Introduction:** The following materials are to be sampled by the District and tested by both the District and MCS&T for IA sampling compliancy requirements.

- a) Asphalt – Superpave and Marshall
- b) Aggregate – Class Material
- c) Concrete – Cylinders, Slump and Air.

2) **Testers:** The District is required to identify testing quality assurance testing technicians who perform the tests in Section 3 and provide this information to IA Sampler at the start of the season. This needs to be updated on a regular basis, specifically when testing technicians are added. This includes the following personnel

- a) QAM / Consultant Testing Technicians
- b) District Testing Technicians

3) **Tests:** The following tests will be evaluated for the IA Program:

- a) Superpave Mixture Testing
- b) Marshall Mixture Testing
- c) Class Aggregate Gradation
  - i) Only Class 1,3,10
- d) PCC Cylinder Testing
  - i) Only 4x8 cylinders
  - ii) Only 28-day breaks
- e) PCC Field Testing (Slump and Air)

4) **Sampling:** The samples are to be prepared by the District as a split sample from project acceptance testing.

a) The District will collect one IA sample per test, per testing technician, per year. Example:  
In the occurrences where a District has two Aggregate Testers, they will need two Class samples per year.

b) The samples will be labeled, and all documentation shall be provided with the sample, including the District Lab Number, Project Information, etc.

i) The District will test the sample as per normal guidelines and provide the IA sampler with the Sample ID for the test results.

ii) The District will enter a note on the sample record in AWP that an IA sample was taken with this sample.

5) **Plastic Concrete Testing:** In the occurrences of tests done on plastic concrete, there will be no change in the current procedure.

**6) Sample Pickup:**

i) The District will notify the IA sampler that a sample has been created and is available for pickup. The IA sampler will be responsible for the transportation of the sample to MCS&T.

ii) No sample will be dropped off at MCST unless specifically instructed by the IA sampler.

iii) In the occurrences of a PCC cylinder, the District will notify the IA sampler of the creation date of the sample within 3 days of the sample creation. The District will also notify the IA sampler of the intended break date.

**7) Testing at MCS&T:**

a) The IA sampler will be responsible for coordinating testing of the IA sample with the respective MCST Section Supervisor.

b) The IA sampler will be responsible for entering the test results into AWP.

**8) Sample Evaluation:**

- a) The evaluation of the sample data will be the responsibility of the IA sampler and in accordance with MP 700.00.53.
- b) The IA sampler will notify the District Material Supervisors of the results of the corresponding MCS&T sample, when completed.

**Equipment Tracking**

Add a section about tracking equipment, especially air meters.

SAMPLE GRADATION COMPUTATION SHEET  
**SPLIT OR ADJACENT SAMPLE**

| A          | B                   | C                             | D                         | E                        | F                       | G                  | H                     |
|------------|---------------------|-------------------------------|---------------------------|--------------------------|-------------------------|--------------------|-----------------------|
| Sieve Size | IA Sample Gradation | Verification Sample Gradation | X(bar)<br>$\frac{B+C}{2}$ | "md"<br>MAXIMUM<br>Diff. | "ad"<br>ACTUAL<br>Diff. | Similar<br>ad ≤ md | Dissimilar<br>ad > md |
| 1.5"       | 100                 | 100                           | 100                       | 2.0                      | 0                       | YES                |                       |
| ¾"         | 86                  | 73                            | 79.5                      | 5.0                      | 6.5                     |                    | YES                   |
| #4         | 26                  | 25                            | 25.5                      | 4.5                      | 0.5                     | YES                |                       |
| #40        | 1                   | 1                             | 1                         | 2.0                      | 0                       | YES                |                       |
| #200       | 0.1                 | 0.1                           | 0.1                       | 2.0                      | 0                       | YES                |                       |

Sample Represents a split  adjacent \_\_\_\_\_  
 Samples similar \_\_\_\_\_ Dissimilar

**ASPHALT CONTENT**

| IA Result | Verification or Quality Control Result | Difference Allowed | Actual Difference | Similar | Dissimilar |
|-----------|--|--------------------|-------------------|---------|------------|
| 6.3       | 6.5                                    | 0.8                | 0.2               | YES     |            |

Sample Represents a split  adjacent \_\_\_\_\_

**AIR VOIDS**

| IA Result | Verification or Quality Control Result | Difference Allowed | Actual Difference | Similar | Dissimilar |
|-----------|--|--------------------|-------------------|---------|------------|
| 3.6       | 4.1                                    | 3.0                | 0.5               | YES     |            |

Sample Represents a split  adjacent \_\_\_\_\_



INDEPENDENT ASSURANCE SAMPLE  
 MAXIMUM DIFFERENCE VALUES  
 GRADATION ANALYSIS COMPARISON PER SIEVE

TABLE 1

| Split Samples                    |   | Adjacent Samples                 |   |
|----------------------------------|---|----------------------------------|---|
| Average %<br>Passing<br>Column 1 | (md)<br>Max. Difference<br>From Average<br>Column 2 | Average %<br>Passing<br>Column 3 | (md)<br>Max. Difference<br>From Average<br>Column 4 |
| 0 ---> 7.0                       | 2.0   | 0 ---> 4.5                       | 2.5   |
| 7.5 ---> 11.5                    | 2.5   | 5.0 ---> 7.5                     | 3.0   |
| 12.0 ---> 16.0                   | 3.0   | 8.0 ---> 10.5                    | 3.5   |
| 16.5 ---> 19.5                   | 3.5   | 11.0 ---> 13.5                   | 4.0   |
| 20.0 ---> 23.5                   | 4.0   | 14.0 ---> 16.0                   | 4.5   |
| 24.0 ---> 27.0                   | 4.5   | 16.5 ---> 18.5                   | 5.0   |
| 27.5 ---> 31.5                   | 5.0   | 19.0 ---> 21.0                   | 5.5   |
| 32.0 ---> 36.0                   | 5.5   | 21.5 ---> 23.5                   | 6.0   |
| 36.5 ---> 42.5                   | 6.0   | 24.0 ---> 26.0                   | 6.5   |
| 43.0 ---> 65.0                   | 6.5   | 26.5 ---> 28.5                   | 7.0   |
| 65.5 ---> 71.5                   | 6.0   | 29.0 ---> 31.0                   | 7.5   |
| 72.0 ---> 76.0                   | 5.5   | 31.5 ---> 34.0                   | 8.0   |
| 76.5 ---> 80.0                   | 5.0   | 34.5 ---> 37.0                   | 8.5   |
| 80.5 ---> 83.5                   | 4.5   | 37.5 ---> 40.5                   | 9.0   |
| 84.0 ---> 87.0                   | 4.0   | 41.0 ---> 44.5                   | 9.5   |
| 87.5 ---> 90.0                   | 3.5   | 45.0 ---> 50.0                   | 10.0  |
| 90.5 ---> 93.5                   | 3.0   | 50.5 ---> 66.5                   | 10.5  |
| 94.0 ---> 97.0                   | 2.5   | 67.0 ---> 71.5                   | 10.0  |
| 97.5 ---> 100                    | 2.0   | 72.0 ---> 79.5                   | 9.5   |
|                                  |   | 80.0 ---> 81.5                   | 8.0   |
|                                  |   | 82.0 ---> 83.5                   | 7.5   |
|                                  |   | 84.0 ---> 85.5                   | 7.0   |
|                                  |   | 86.0 ---> 87.0                   | 6.5   |
|                                  |   | 87.5 ---> 88.5                   | 6.0   |
|                                  |   | 89.0 ---> 90.0                   | 5.5   |
|                                  |   | 90.5 ---> 91.5                   | 5.0   |
|                                  |   | 92.0 ---> 93.0                   | 4.5   |
|                                  |   | 93.5 ---> 94.0                   | 4.0   |
|                                  |   | 94.5 ---> 95.5                   | 3.5   |
|                                  |   | 96.0 ---> 96.5                   | 3.0   |
|                                  |   | 97.0 ---> 97.5                   | 2.5   |
|                                  |   | 98.0 ---> 99.0                   | 2.0   |
|                                  |   | 99.5 ---> 100                    | 1.5   |

To Use Table

- 1) Calculate the average percent passing for each sieve size for the IA and Verification sample.
- 2) Individually locate each average to the appropriate interval in the Table in Column 1 or 3 depending on sample selection (split or adjacent).
- 3) For the maximum difference (md) between the sample result(s) and the average, read the values listed in column 2 or 4 depending upon the sample selection.
- 4) If the difference between the result(s) and the average is equal to or less than the listed value, the individual sieve size will be considered similar. If the difference is greater than the listed value, the individual sieve size will be considered dissimilar.

SAMPLE GRADATION COMPUTATION SHEET

PROFICIENCY SAMPLE

| A          | B                   | C                   | D              |
|------------|---------------------|---------------------|----------------|
| Sieve Size | IA Sample Gradation | QC Sample Gradation | Difference B-C |
| 1.5"       | 100                 | 100                 | 0              |
| ¾"         | 86                  | 84                  | 2              |
| #4         | 26                  | 23                  | 3              |
| #40        | 1                   | 2                   | 1              |
| #200       | 0.1                 | 0.4                 | 0.3            |

Sum of the differences = 6.3

Sum of the differences =  $\frac{6.3}{5} = 1.26$  (ATD)  
 No. of Sieves = 5

| ATD  | Difference Allowed | Similar | Dissimilar |
|------|--------------------|---------|------------|
| 1.26 | 1.8                | YES     |            |

IA FIELD TEST  
DOCUMENTATION  
FOR AIR AND SLUMP COMPARISONS

---

IA Sampler: \_\_\_\_\_

Project: \_\_\_\_\_

Date of Test: \_\_\_\_\_

Type of Test: \_\_\_\_\_

Batch ID: \_\_\_\_\_ [Check \_\_\_\_\_]

IA Sample ID: \_\_\_\_\_ [Check \_\_\_\_\_]

Verification sample ID: \_\_\_\_\_ [Check \_\_\_\_\_]

Quality Control Sample ID: \_\_\_\_\_ [Check \_\_\_\_\_]

IA Test Result: \_\_\_\_\_ [Check \_\_\_\_\_]

Comparison Test Result: \_\_\_\_\_ [Check \_\_\_\_\_]

Check Spaces - Use Only if  
Check Comparisons are Made

Calculations:

Largest: \_\_\_\_\_ - Smallest \_\_\_\_\_ = \_\_\_\_\_ Difference

Check: Largest: \_\_\_\_\_ - Smallest \_\_\_\_\_ = \_\_\_\_\_ Difference

Similar? For Slump The Difference Must Be 1.5 inches or Less

Yes \_\_\_\_\_ No \_\_\_\_\_ [Check: Yes \_\_\_\_\_ No \_\_\_\_\_]

For Air Content The Difference Must Be 1.5 % or Less

Yes \_\_\_\_\_ No \_\_\_\_\_ [Check: Yes \_\_\_\_\_ No \_\_\_\_\_]

If Dissimilar, Use This Space for IA Samplers Comments:

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

MATERIALS PROCEDURE

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PREPARING, RECORDING AND TRANSMITTING INFORMATION ON APPROVED  
LIST OF WELDED STUD SHEAR CONNECTORS

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**1. PURPOSE**

- 1.1 To establish a system whereby manufacturers may prequalify their welded stud shear connectors for use on Division of Highways projects.
  - 1.2 To establish a procedure for maintaining a record of such information.
  - 1.3 To establish a procedure for transmitting such information to the Districts and to the Contractor on Division of Highways projects.
- 

**2. SCOPE**

- 2.1 Certified test reports.
  - 2.2 Valid age of tests.
  - 2.3 Record keeping.
  - 2.4 Transmittal of information.
- 

**3. PROCEDURE**

- 3.1 Certified test reports.
  - 3.1.1 The manufacturer shall furnish to the Central Laboratory in Charleston, certified copies of test reports of all pertinent required tests of the Division of Highways of West Virginia, Standard Specifications for Roads and Bridges, section 615.3.3, Welded Stud Shear Connection
- 3.2 Valid Age of Tests
  - 3.2.1 The tests submitted shall be valid until such time as the manufacturer makes any change in the base stud, the flux, or the arc shield, which may effect the welding characteristics.
  - 3.2.2 The manufacturer may submit certified reports of tests at any time.
  - 3.2.3 The manufacturer may request removal of his name from the approved list at any time.

Commented [1]: original said 615.33. change to 615.3.3

3.3 Record Keeping

3.3.1 As certified reports of tests are received, they shall be reviewed and the approved manufacturer's name listed and filed together with the test data. A separate file shall be kept of those failing to qualify for the approved list, together with the reason for failure.

3.3.2 ~~Should any manufacturer request the removal of his name from the approved list, it shall immediately be deleted acknowledgement to the manufacturer. Such information shall be promptly transmitted to each Department of Highways District Materials Engineer and/or Supervisor, who in turn shall notify any contractor using welded stud shear connectors from that manufacturer.~~

Commented [2]: We can remove this section

3.4 Transmittal of Information

3.4.1 As soon as a manufacturer has been placed on the approved list this information shall be promptly sent to all District Materials Engineers and/or Supervisors.

3.4.2 Additional copies of the approved list shall be sent to all District Materials Engineers and/or Supervisors on request.

3.4.3 Additions to or deletions from the list shall immediately be sent to all District Materials Engineers and/or Supervisors who turn shall notify any Contractors using such materials

3.4.4 This approved list of manufacturers of welded stud shear connectors shall be available to all Contractors on Department of Highways projects by navigating to: <https://transportation.wv.gov/highways/mcst/Pages/default.aspx> ~~application to the District Materials Engineer and/or Supervisor.~~

3.5

Signature Block

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

MATERIALS PROCEDURE

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STANDARD METHOD OF TEST FOR DETERMINING THE QUALITY  
OF WATER USED WITH HYDRAULIC CEMENT

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**1. PURPOSE**

- 1.1 To establish a standard method of test and acceptance criteria to be used in determining the quality of water used with hydraulic cement.

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**2. PURPOSE**

- 2.1 This procedure is applicable to untreated water sources used in combination with mixtures containing hydraulic cement. An untreated water source may be defined as a source other than a treated public water system.
- 2.2 Treated water systems may be used without testing.

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**3. APPLICABLE DOCUMENTS**

- 3.1 ~~MP 642.40.20~~ ASTM C1602
- 3.2 AASHTO T 106
- 3.3 AASHTO T 162
- 3.4 ASTM C191

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**4. PROCEDURE**

- 4.1 Untreated water shall be tested at the source for pH. When the pH of the water is between 4.5 and 8.5 no further testing is necessary.
- 4.2 If the pH is less than 4.5 or more than 8.5, all tests listed in this procedure will be conducted. A water source whose pH is determined to be within the limits defined in section 4.1 but appears to be contaminated with foreign material which could have an adverse effect on the Portland cement concrete shall have a sample forwarded to the Materials Division and all tests listed in this procedure will be conducted. The sample shall be accompanied with the required documentation indicating the sampler's reasons for requesting testing. These tests shall be conducted before first use and thereafter once every 6 months, or more often when there is reason to believe that a change has occurred in the characteristics of the water source.

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**5. TEST METHODS**

- 5.1 Total Solids ~~Content~~ by Mass, Chloride as Cl<sup>-</sup>, Sulfate as SO<sub>4</sub>, and Alkalies as (Na<sub>2</sub>O + 0.658 K<sub>2</sub>O)
- 5.1.1.1 Tests shall be conducted in accordance with ~~MP 642.40.20~~ ASTM C1602.

5.2 Compressive Strength

5.2.1 The water under test shall be compared, in mortar, with distilled water. The proportions of dry materials in the mortar shall be 500 grams of Type III Cement, 1500 grams of graded OTTAWA sand and the amount of water sufficient to produce a flow of  $110 \pm 5$  in 25 drops in accordance with AASHTO T 106 using the sample under test and compared to three specimens made using distilled water.

5.3 Time of Setting by Vicat Needle

5.3.1 Time of set will be prepared with the test sample and Type III Cement in accordance with ASTM C191. A control specimen will be made with distilled water for basis comparison.

**6. ACCEPTANCE CRITERIA FOR UNTREATED WATER SOURCES**

| Performance Requirements for Untreated Water Source | Limit                    |
|---|--------------------------|
| Requirements for Mixing Water                       | Limit                    |
| Compressive Strength (Min% Control at 1 day)        | 90                       |
| Time of Set, (deviation from control)               | -60 to<br>+90<br>minutes |

| Chemical and Physical Limits for Untreated Water Source   |        |
|---|--------|
| Maximum Concentration in Combined Mixing Water, ppm   | Limit  |
| A Chloride as Cl <sup>-</sup> , ppm   |        |
| In prestressed concrete or bridge decks   | 500    |
| Other reinforced concrete in moist environments or containing aluminum embedments or dissimilar metals or with stay-in-place galvanized metal forms | 1,000  |
| B Sulfate as SO <sub>4</sub> , ppm  | 3,000  |
| C Alkalies as (Na <sub>2</sub> O + 0.658 K <sub>2</sub> O), ppm   | 600    |
| D Total solids by mass, ppm   | 50,000 |

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