

## MP Committee Meeting – 10-31-19



### Agenda

1:00 PM at MCST

#### I. MPs for Review and Voting (Old Business)

1. Champion: Dan Brayack  
**100.00.02** - ACCEPTANCE OF NON-STANDARD OR NON-CONFORMING MATERIALS IN CONSTRUCTION. (Not Ready for Vote)
2. Champion: Ted Whitmore, George Hanna, Dave Lipscomb  
**707.02.13** - PROCEDURE TO APPROVE GALVANIZED STEEL U-CHANNEL SIGN POSTS AND U-CHANNEL BREAKAWAY SPLICE DEVICE PRODUCTS. (Not Ready to Vote yet)
3. Champion: Randy Shuman
  - a) **703.00.21** – STANDARD METHOD OF TEST FOR PERCENT CRUSHED PARTICLES. (Ready for Vote)
  - b) **703.01.20** - STANDARD METHOD OF TEST FOR FRIABLE PARTICLES IN AGGREGATES. (Ready for Vote)
  - c) **703.00.27** - STANDARD METHOD OF TEST FOR PERCENT BY WEIGHT OF SHALE IN CRUSHED AGGREGATE. (Ready for Vote)
  - d) **703.00.25** - METHOD OF DETERMINATION OF PERCENT OF THIN OR ELONGATED PIECES IN COARSE AGGREGATE. (Ready for Vote)

#### MPs for Review and Voting (New Business)

4. Champion: Dan Brayack  
**106.66.66** – MP on Material Certifications (MC-8).
5. Champion: Mike Mance  
**MP 601.04.21** – ACCEPTANCE USE OF THE MATURITY METHOD FOR THE ESTIMATION OF CONCRETE STRENGTH ON WVDOH PROJECTS
6. Champion: Kelly Chapman  
**MP 601.04.21** – BASIS FOR CHARGES FOR NON-SUBMITTAL...(Already Passed, Dan to Explain)

Next Meeting – 11/21/19

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

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ACCEPTANCE OF NON-STANDARD OR  
NON-CONFORMING MATERIALS IN CONSTRUCTION

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**1. PURPOSE**

- 1.1 To provide guidelines of sampling, testing and resolution of all materials that may be addressed in in plans, but are not otherwise addressed by the current edition of the Standard Specifications and Supplementals (Standard Specifications) and/or Materials Control, Soils and Testing Division (MCS&T) testing.
- 1.2 Provide a method for accepting material that does not meet the requirements of the above-mentioned documents and is not otherwise addressed in those documents.
- 1.3 Provide guidelines and/or course of action/inaction when a material test has not been performed or has been performed incorrectly.

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**2. SCOPE**

- 2.1 This procedure applies to all materials that do not have an already established acceptance, or non-conformance resolution already established in the Standard Specifications, or any other WVDOH documents.
- 2.2 This procedure applies to situations where the resolution of a non-conformance is not clearly defined or described by the Standard Specifications or other WVDOH documents, or a District wishes to diverge from these documents.

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**3. PROCEDURE**

- 3.1 **ST-1** - The [Special Testing](#) (ST-1) form shall be submitted to MCS&T with documentation and/or data sheets pertaining to the proposed material. Pre-sampled material cannot be used until authorization is received from the MCS&T Division or the non-conformance has been resolved.
  - 3.1.1 Payment for this material shall be withheld upon [the](#) non-concurrence of [the ST-1](#), pending a DMIR.
  - 3.2 DMIR – A District Materials Inspection Report (DMIR) shall be submitted to MCS&T for [consideration](#) for the following situations:
    - 3.2.1 The Material did not meet the Standard Specifications or other Division Testing Requirements.
    - 3.2.2 The Material is not addressed in the Standard Specifications or other Division Documents and has been placed before testing (ST-1 or acceptance methods were not utilized.)

Lipscomb, David L 10/15/19 7:39 AM

**Comment [1]:** The statement “This procedure applies to all materials that do not have an already established acceptance” sounds a bit misleading, I mean very often district forces submit ST-1 forms for items that have established acceptance methods, such as approved sources or direct coverage. They should not do this, but they often do.

Lipscomb, David L 10/15/19 7:43 AM

**Comment [2]:** It would make things run smoother if the district was required to contact us prior to issuing an ST-1, that way they would know what correct paperwork for us to evaluate, otherwise they may submit incomplete paperwork.

Dan 8/20/19 1:33 PM

**Deleted:** authorization / approval

- 3.2.3 Sampling and/or testing was not done correctly, samples or documentation was lost, or testing otherwise cannot be used to represent or accept the material.
- 3.2.4 The resolution of the material has not been addressed in a change order or other contractual resolutions.

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**4. ST-1 DOCUMENTATION AND SUBMISSION TO MCS&T**

- 4.1 The ST-1 Form is available as a pdf file on the Division Webpage<sup>1</sup>. This form shall be filled out with all the listed information pertaining to the material that the contractor proposes to use, or has used. All required fields must be completed before submitting the ST-1 to MCS&T.
  - 4.1.1 The District must electronically send the fillable PDF form. This cannot be hand-written and scanned (the Sample ID must be able to be selected for Copy and Paste).
- 4.2 The ST-1 shall be submitted by District Construction to the District Materials Supervisor. The District shall then generate the sample and associate all line items before submitting the ST-1 sample to MCS&T for review and concurrence/non-concurrence. A workflow guideline for this is available in the MCS&T ProjectWise folder (location provided by request.)
- 4.3 The ST-1 shall be sent to the ST-1/DMIR mailbox ([St1dmir@wv.gov](mailto:St1dmir@wv.gov)). The sample shall be logged and sent to the applicable MCS&T section to review. If the subject material(s) meets the project requirements, MCS&T will concur with the sample. The reviewer will then authorize the sample.
- 4.3.1 An email will be generated to the District Materials Supervisor notifying them that the ST-1 has been concurred and authorized. The District will place the ST-1 and MCS&T email into ProjectWise under the Contract ID and associated line item number.
- 4.4 If the material fails to meet the minimum requirements, the reviewer will mark the sample as non-concur, then authorize the ST-1. MCS&T will send the ST-1 to the District Materials Supervisor stating why the ST-1 was not concurred. The District will place the ST-1 and MCS&T email into ProjectWise under the Contract ID and associated line item number.

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**5. DMIR DOCUMENTATION AND SUBMISSION TO MCS&T**

- 5.1 The DMIR shall also include all the pertinent project information that is provided on the WVDOH DMIR form. A sample DMIR form is attached. The live DMIR form is available on the WVDOH MCS&T Webpage.
  - 5.1.1 The DMIR shall be sent to the ST-1/DMIR mailbox ([St1dmir@wv.gov](mailto:St1dmir@wv.gov)).

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<sup>1</sup> <https://transportation.wv.gov/highways/mcst/Pages/tbox.aspx>

Dan 10/15/19 7:27 AM

**Comment [3]:** Martin had a comment here, non-concur is SM language, it's the actual setting that we use.

Lipscomb, David L 8/20/19 1:45 PM

**Comment [4]:** Should this be "process" authorized sounds too much like approving or agreeing - DB – We authorize samples in SM, even if they fail.

Stanevich, Ron L 10/15/19 7:30 AM

**Comment [5]:** Martin had a comment here, I like to include a sample here so in case the link goes away (or the person who creates it), we have somewhere to start from.

No Sample Form is attached.

DB Answer – I will have this ready when we send it through

- 5.2 The DMIR shall include the following sections: General Information, Materials Requirement, Materials Inspection, Investigation, Recommendation, and Attachments.
- 5.3 The Materials Inspection Section shall clearly state the purpose and scope, giving the problem statement of the situation that initiated the DMIR.
  - 5.3.1 A description of the material, known quantities, technical issues, or any requirement from the applicable Specifications, Contract Proposal, Project Plans, Material Procedures (MPs), Standard Details, Special Provisions, AASHTO, ASTM, or any Non-Specification issues should be provided.
- 5.4 The Investigation Section shall clearly state all relevant details of the situations during the occurrence.
  - 5.4.1 A justification and any supporting and/or relevant detail shall be provided.
- 5.5 The Recommendation Section shall clearly state and justify the final price assessment resolution (which may be \$0.00), including all applicable fees and penalties.
  - 5.5.1 The assessment fees should be listed individually and with a final total price assessment. A justification of the price assessment shall be provided.
  - 5.5.2 A resolution and a justification of the recommendation shall be provided.
- 5.6 The Attachment Section shall provide the necessary documentation and evidence for the materials inspection.
  - 5.6.1 All attachments shall provide the Laboratory.
  - 5.6.2 Project Data, Source Data, Sample Data, Lab Data, Daily Reports, Invoices, and/or any other document necessary to provide evidence should be provided.
- 5.7 A DMIR will originate in the District and be sent to the District Construction Engineer, then to MCS&T who will either concur or non-concur. It is then sent to Contract Administration, then to Regional Construction Engineer, then back to the District Construction Engineer.

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

RLS:PBc

Dan 8/22/19 9:59 AM

**Comment [6]:** RLS Comment - Either on the memo or DMIR form we need to establish a signature block and note that the District CE needs to be aware. DB answer – we will include this on the form.

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

MATERIALS PROCEDURE

**PROCEDURE TO APPROVE COATED STEEL U-CHANNEL SIGN SUPPORTS AND  
U-CHANNEL BREAKAWAY SPLICE DEVICE PRODUCTS**

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**1. PURPOSE**

- 1.1 To establish a procedure to approve coated steel u-channel sign supports (henceforth referred to as “supports”) and associated breakaway splice device products (henceforth referred to as “breakaway devices unit”) for use on West Virginia Division of Highways (WVDOH) projects.
  - 1.2 To insure the ongoing manufactured quality of the above-mentioned products.
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**2. SCOPE**

- 2.1 This procedure shall apply to all supports and breakaway devices described herein, used for WVDOH projects.
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**3. REFERENCED DOCUMENTS**

- 3.1 ASTM A1075 Standard Specification for Flanged Steel U-Channel supports.
  - 3.2 WVDOH Standard Specifications for Roads and Bridges, Sections 657.2.11 and 709.56.
  - 3.3 ASTM A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 3.4 Manual for Assessing Safety Hardware (MASH), Second Edition.
  - 3.5 
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**4. APPROVAL PROCEDURE**

Whitmore, Ted J 9/10/19 10:57 AM

**Comment [1] :** My opinion, I'd like to be specific about what coatings are acceptable. In 3.3, my intent is not to specifically call out ZAM. There is an AASHTO coating spec that ZAM falls under. That is what will be specified there. I'm waiting for the new spec subscription service to be up and running so we can make sure we insert the right thing.

ZAM was brought up in the meeting and I also discussed with Joe Hall about adding the AASHTO spec so the manufacturers could use that type product if they desire. The coating has already been well vetted because it has been approved as a coating on guardrail.

4.1 For a supports and breakaway devices sign to be considered for inclusion on the Approved Products List (APL), the manufacturer must first submit the product information as outlined in this MP and Standard Specification 709.56.1. Required certification statements described herein are in addition to the product information and documentation described in 709.56.1.

4.2 The manufacturer shall submit a certification statement that identifies the following information:

1. Brand name of the manufacturer's supports
2. Brand name of the manufacturer's breakaway devices...

The statement shall clearly specify if one or both the manufacturer's 2 lb/ft and 3 lb/ft supports units are being submitted for evaluation. A manufacturer recommended breakaway device is required to be submitted and evaluated for each u-channel support size.

The statement shall clearly certify that each size u-channel support and breakaway device submitted for evaluation fully complies with all requirements specified in Standard Specification Section 709.56.1. The certified statement shall be signed by a representative of the manufacturer who has authority to bind the company.

4.3 The manufacturer shall submit a certification statement stating that all supplied steel components are domestic. The certified statement shall be signed by a representative of the manufacturer who has authority to bind the company.

4.4 An evaluation and sampling of material at the manufacturer's facility or facilities will be conducted by WVDOH personnel, or by its designee, for conformance to the appropriate ASTM specification. Five sample of support-supports support of each size shall be obtained at each facility. Each sample can be of any length greater than two feet. Supports U-channel support-supports must be drilled or punched and representative of the finished product.

4.5 The u-channel supports will be tested to the mechanical and chemical requirements of ASTM A1075 Grade 60, and the applicable coating requirements contained in Sections 3.3 and 3.4. Laboratory testing of breakaway splice devices is not required.

4.6 The material will be inspected for proper hole alignment, spacing, and clearance. All supports shall have a hole spacing that is consistent at 1-in center to center without misalignment relative to one another and relative to the centerline of the u-channel support web. All hole clearances after coating shall allow for the insertion of a 5/16-in galvanized bolt by hand, without interference from excessive coating buildup.

4.7 Subsequent inspection of the manufacturing facilities shall be conducted on a two (2) year frequency which may be adjusted at the discretion the Director of the WVDOH Materials Control, Soils and Testing Division (MCST)WVDOH or their designee.

4.8 Once the above requirements are met, laboratory approval numbers will be assigned to indicate WVDOH Specification conformance and approval of the product(s).

Individual lab approval numbers will be issued for the manufacturer's 2 lb/ft u-channel support, 3 lb/ft u-channel support, and breakaway devices for each size u-channel support. Note, as specified in Standard Specification 709.53, verification and approval of conformance to crash testing performance requirements contained in MASH is required prior to final approval and the issuance of laboratory approval numbers. In addition, Traffic Engineering Division monitored field evaluation testing of the recommended breakaway splice devices for use with the u-channel supports is also required at the discretion of the Director of Traffic Engineering Division or of their designee.

- 4.9 Affirmation of the assigned laboratory approval numbers after the initial two (2) years, and every two (2) years thereafter shall typically be based on historical satisfactory performance and conformance to the Standard Specifications, additional sampling similar to that described in Sections 4.4 through 4.6, and/or follow up inspection of the manufacturer's facilities as described in section 4.7.
- 4.10 Revocation of approved source status may result from furnishing material that does not comply with Specifications.
- 4.11 "Approved Source" status may be reinstated at the discretion of the MCST Director or their designee based on the findings of an investigation. The reinstatement process will commence upon the receipt of a letter of request from the manufacturer. The letter of request should indicate reasons for reinstatement and documentation to substantiate such reasons.

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**5. SHIPPING DOCUMENTATION**

- 5.1 The manufacturing mill shall furnish to the project or MCST (when purchase order material is shipped) a shipping document. This document will include the following information:
  - 1. Date of shipment
  - 2. Project or purchase order number
  - 3. Description and quantity of materials shipped
  - 4. Current laboratory approval numbers for all materials shipped

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**6. PROCEDURE AT DELIVERY SITE**

- 6.1 District personnel will visually inspect each shipment and review information on the shipping document in accordance with Section 5.1.
- 6.2 All shipments that are damaged, incomplete, or otherwise considered to be in noncompliance with the specifications shall be rejected. A list of approved products as described herein is available to all contractors, fabricators, and suppliers by accessing the [WVDOH Approved Product List website](#).<sup>1</sup>

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<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)

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

RLS:Hlb



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

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**2. SCOPE**

- 2.1 This procedure shall apply to all supports and breakaway devices described herein, used for WVDOH projects.

**3. REFERENCED DOCUMENTS**

- 3.1 ASTM A1075 Standard Specification for Flanged Steel U-Channel supports.
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- 3.3 ASTM A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- 3.4 [INSERT APPLICABLE SPEC FOR ZINC-ALLOY-MAGNESIUM (ZAM) COATING]
- 3.5 Manual for Assessing Safety Hardware (MASH), Second Edition.
- 3.6 [REDACTED]

**4. APPROVAL PROCEDURE**

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Whitmore, Ted J 9/10/19 1:57 PM  
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Whitmore, Ted J 8/28/19 1:38 PM  
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Dan 8/29/19 6:10 AM  
Comment [1]: It just sounded “right” to have this pluralized. An English major or someone smarter than me may disagree, please do if you think so.

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Dan 8/29/19 6:20 AM  
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Whitmore, Ted J 9/10/19 10:57 AM  
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Whitmore, Ted J 9/10/19 11:00 AM  
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- The statement shall clearly certify that each size support and breakaway device submitted for evaluation fully complies with all requirements specified in Standard Specification Section 709.56.1. The certified statement shall be signed by a representative of the manufacturer who has authority to bind the company.
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- 4.8 Once the above requirements are met, laboratory approval numbers will be assigned to indicate WVDOH Specification conformance and approval of the product(s). Individual lab approval numbers will be issued for the manufacturer's 2 lb/ft support, 3 lb/ft support, and breakaway devices for each size support. Note, as specified in

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Standard Specification 709.53, verification and approval of conformance to crash testing performance requirements contained in MASH is required prior to final approval and the issuance of laboratory approval numbers. In addition, [Traffic Engineering Division monitored](#) field evaluation testing of the recommended breakaway splice devices for use with the supports is also required [at the discretion of the Director of Traffic Engineering Division or their designee](#).

4.9 [Affirmation of the assigned](#) laboratory approval numbers after the initial two (2) years, and every two (2) years thereafter shall typically be based on historical satisfactory performance and conformance to the Standard Specifications, additional sampling similar to that described in [Sections 4.4 through 4.6](#), and/or follow up inspection of the manufacturer's facilities as described in section 4.7.

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<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)

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Whitmore, Ted J 9/10/19 1:20 PM  
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Dan 8/29/19 7:12 AM  
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PAGE 4 of 4

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

RLS:Hlb

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Dan 8/29/19 6:16 AM  
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Page 1: [1] Deleted Whitmore, Ted J 9/10/19 11:00 AM

Any other current, applicable coating standards, or manufacturer's standards, including proprietary coating products

1.1  
Page 1: [2] Comment [3] Dan 8/29/19 6:20 AM

I'm not sure if this works, for "ZAM" or other products that may pop up, since we aren't specifically referring it. But this cover us if other "ZAM" type products pop up.

Page 1: [3] Comment [4] Whitmore, Ted J 9/10/19 10:57 AM

My opinion, I'd like to be specific about what coatings are acceptable. In 3.3, my intent is not to specifically call out ZAM. There is an AASHTO coating spec that ZAM falls under. That is what will be specified there. I'm waiting for the new spec subscription service to be up and running so we can make sure we insert the right thing.

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Page 2: [4] Deleted Dan 8/29/19 6:43 AM

u-channel sign post supports and associated breakaway hardware

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The submission must also adhering to the guidelines outline in the , and in the manner specified, in Standard Specification section Section 709.56.1.

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for use with the manufacturer's u-channel supports

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sign support units

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sign support units

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Do we have a frequency on this or is it based on the Spec?

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My understanding is there would be initial testing as part of the initial approval process and then re-testing every 2 years thereafter.

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to reinforce confidence in the ability of the manufacturer to produce a quality product within WVDOH specifications.

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galvanized u-channel sign post

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galvanized u-channel sign post

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to reinforce confidence in the ability of the facilities to produce a quality product.

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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

MATERIALS PROCEDURE

---

STANDARD METHOD OF TEST FOR PERCENT CRUSHED PARTICLES

---

**1. PURPOSE**

- 1.1 To set forth a standard method of test for determining the percent of crushed particles in coarse aggregate.
- 

**2. SCOPE**

- 2.1 This method of test is applicable to that portion of crushed aggregate which is retained on the 4.75 mm (No. 4) sieve when that material is being used for applications where the standard specifications places a requirement on the percent of crushed particles.
- 

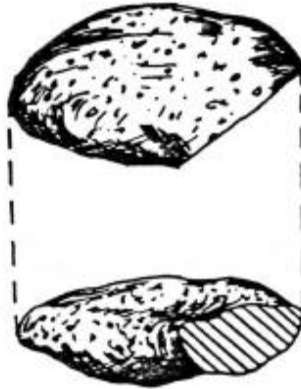
**3. EQUIPMENT**

- 3.1 *Balance*—The balance shall have sufficient capacity, be readable to 0.1 percent of the sample mass, or better, and conform to the requirements of M 231.
- 3.2 *Oven*—An oven capable of maintaining a temperature of  $230^{\circ}\text{F} \pm 9^{\circ}\text{F}$  ( $110^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ).
- 3.3 *Sieve*—4.75 mm (No. 4), conforming to AASHTO M 92
- 3.4 *Pans*—Large flat pans for spreading the aggregate in a single layer, and suitable for containing the pieces of aggregate as they are separated.
- 

**4. DEFINITIONS**

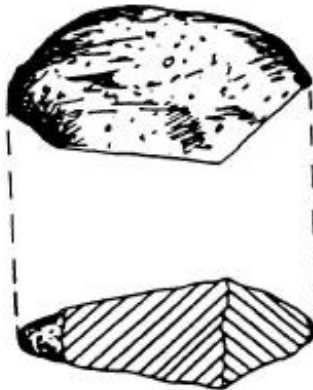
- 4.1 Crushed Particle - A particle of aggregate which has at least one face fracture as defined in Section 4.1.1.
- 4.1.1 Face Fracture - A face fracture is defined as a break that has resulted from the production process (crushing operation) which constitutes an area of at least 25 % of the largest two-dimensional area of the particle.
- 4.1.2 Single Face Fracture - A particle which has only one exposed break in a single plane meeting the requirements set forth in Section 4.1.1. An example of a single face fracture is shown in Figure 1.

FIGURE 1



- 4.1.3 Multi-Face or Two Face Fracture - A particle which has at least two exposed breaks in two or more planes meeting the requirements set forth in Section 4.1.1. An example of a multi-face fracture is shown in Figure 2.

FIGURE 2



---

**5. TEST PORTION PREPARATION**

- 5.1 Obtain enough aggregate from the field sample to yield a test portion of the appropriate size by use of a sample splitter. (*see NOTE*)
- 5.2 Sieve the aggregate over a 4.75 mm (No. 4) sieve and discard the minus 4.75 mm (No. 4) material.
- 5.3 Gently wash the aggregate retained on the 4.75 mm (No. 4) sieve to remove any dust or coatings.
- 5.4 Dry the clean, sieved aggregate to a constant mass in an oven maintained at 230°F ± 9°F (110°C ± 5°C).

*NOTE:* Approximate mass of the test portion of crushed aggregate after sieving.

NOMINAL MAXIMUM SIZE OF PARTICLES	MINIMUM MASS OF TEST PORTION
9.5 mm (3/8-in.)	500 g
19 mm (3/4-in.)	1500 g
37.5 mm (1-1/2-in.)	3000 g
Over 37.5 mm (1-1/2-in.+)	5000 g

---

## 6. TEST PROCEDURE

- 6.1 Weigh the test portion and record the mass on the WVDOH form T302 (see attached form). *See NOTE in Section 5. for the required test portion mass.*
- 6.2 Place the test portion in a large, flat pan or on another suitable workspace. Arrange and label three pans for separating the test portion into single-face, multi-face, and no-face fractures.
- 6.3 Pick up and inspect each particle to determine the number of face fractures and place them in the appropriate pan or container.
- 6.4 After the entire test portion has been separated, weigh each fraction and record the masses on the T302 form.
- 6.5 The entire test portion is to be re-combined and the test is to be conducted by a second technician. The second technician is to follow the steps described in Sections 6.1 through 6.4.
- 6.6 Use form T302 for comparison of the two Technician's results. When the results obtained by two technicians vary more than two percent, it is necessary for both technicians to review the test procedure and re-conduct the test, beginning at Section 6.1.

---

**7. CALCULATIONS**

7.1 Let  $M_2$  = the mass of all particles which have two or more face fractures.

$M_1$  = the mass of all particles which have only one fractured face.

$M_0$  = the mass of all particles which have no fractured faces.

$M_3 = M_1 + M_2$  = Total mass of crushed particles (Single-Face or more)

$M_4$  = Total test portion mass

7.2 Total Percent Crushed Particles (Single-Face or more) =

$$(M_3 / M_4) \times 100$$

7.3 Percent Multi-face Fractures =

$$(M_2 / M_4) \times 100$$

7.4 When the final two results have been obtained, they shall be averaged, and the average reported is to be to the nearest 1.0%.

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

MATERIALS PROCEDURE

STANDARD METHOD OF TEST FOR FRIABLE PARTICLES IN AGGREGATES

**1. PURPOSE**

- 1.1 To provide a standard method for obtaining the approximate percent by weight of clay lumps and friable particles in aggregates. Although this test method is performed on a dry, prewashed sample, it is not intended to alter the intent of ASTM C 142.

**2. SCOPE**

- 2.1 This method of test is applicable to all coarse and fine aggregates when a test for friable particles is required.

**3. EQUIPMENT**

- 3.1 *Balance*—The balance shall have sufficient capacity, be readable to 0.1 percent of the sample mass, or better, and conform to the requirements of M 231.
- 3.2 *Oven*—An oven capable of maintaining a temperature of 230°F ± 9°F (110°C ± 5°C).
- 3.3 *Pans*—Large flat pans for spreading the aggregate in a single layer.
- 3.4 *Sieves*—The following sieve sizes conforming to AASHTO M-92; 4.75 mm (No. 4), 2.36 mm (No. 8), 1.18 mm (No. 16), and 850 µm (No. 20).

**4. DEFINITIONS**

- 4.1 Friable Particle - Any piece of aggregate that can be broken into smaller particles with the thumb and forefinger, excluding the use of the fingernails.

**5. TEST PORTION PREPARATION**

- 5.1 In order to provide a clean, workable test portion, it is necessary that the aggregate sample be washed, oven dried and sieved over the proper sieve described below in sections 5.1.1 and 5.1.2.
- 5.1.1 *COARSE AGGREGATE* - Sieve a sufficient quantity of the coarse aggregate over a 4.75 mm (No. 4) sieve so as to yield a test portion of no less than 5000 g retained on the 4.75 mm (No. 4) sieve.
- 5.1.1.1 Record the mass of the test portion.

Shuman, Randy L 9/5/19 9:57 AM

**Comment [1]:** I removed the requirement for a second, more sensitive balance due to the smallest amount of friable material measurable on this aforementioned balance is well below the specification threshold of 1% for fine material, being 0.1% of 200g = 0.2g, and the balance used is capable of measuring 0.1g (.05% of the 200g sample), which makes a second, more sensitive balance unessential.

Shuman, Randy L 9/5/19 10:05 AM

**Comment [2]:** The requirement of splitting the coarse sample into multiple fractions has been removed. This procedure had previously been simplified from the AASHTO method, taking out the weighted average based upon the gradation. The most likely reason the weighted average was originally removed (when the MP was written) is that gradations are not required for quality testing, so the author had no gradations on which to base the weighted average. It has been decided that separating the coarse test portion and re-combining it was unnecessary.

5.1.2 *FINE AGGREGATE* - Sieve a sufficient quantity of the fine aggregate sample over a 1.18 mm (No. 16) sieve so as to yield a test portion of approximately 200 g retained on the 1.18 mm (No. 16) sieve.

5.1.2.1 Record the mass of the test portion.

---

**6. TEST PROCEDURE**

6.1 Spread the sieved sample in a thin layer on the bottom of a large flat pan.

6.2 Examine the sample for possible friable particles and squeeze or roll the pieces between the thumb and forefinger attempting to break them into smaller particles.

6.3 After all discernible friable particles have been broken, remove the smaller particles from the remainder of the sample by use of the sieves listed in the following table.

Standard size of sieve upon which test portion is retained	Standard size of sieve through which friable particles are permitted to pass
COARSE AGGREGATES: 4.75 mm (No. 4)	2.36 mm (No. 8)
FINE AGGREGATES: 1.18 mm (No. 16)	850 µm (No. 20)

---

**7. CALCULATIONS**

7.1 Percentages of friable particles are determined by the following formula:

$$Fp = \frac{Mf}{M} \times 100$$

where:

Fp = Percentage of friable particles

Mf = Mass of the friable particles removed after second sieving.

M = Mass of the test sample retained on the first sieving.

7.2 Report results to the nearest 0.01%.

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

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MATERIALS PROCEDURE

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STANDARD METHOD OF TEST  
FOR PERCENT BY WEIGHT OF  
SHALE IN CRUSHED AGGREGATE

---

**1. PURPOSE**

- 1.1 To provide a standard method for determining the percent by weight of shale and aggregate pieces exhibiting shale characteristics contained in crushed aggregate.
- 1.2 In cases where more detailed examination is considered necessary, other methods described in ASTM C 295 should be followed.
- 

**2. SCOPE**

- 2.1 This method is applicable to that portion of crushed aggregate which is retained on the 4.75 mm (No. 4) sieve when that material is being used for applications where the standard specifications places a requirement on the percent of shale in crushed aggregate.
- 

**3. EQUIPMENT**

- 3.1 *Balance*—The balance shall have sufficient capacity, be readable to 0.1 percent of the sample mass, or better, and conform to the requirements of M 231.
- 3.2 *Oven*—An oven capable of maintaining a temperature of 230°F ± 9°F (110°C ± 5°C).
- 3.3 *Sieve*—4.75 mm (No. 4), conforming to AASHTO M 92
- 3.4 *Aggregate Sample Splitter*—compliant with AASHTO T 248.
- 3.5 *Pans*—Large flat pans for spreading the aggregate in a single layer.
- 3.6 *Beakers*—600 ml capacity suggested.
- 

**4. DEFINITIONS**

- 4.1 Although shale is defined by many noted authors in numerous ways, Walter T. Huang, PhD (Petrology, 1962) defines shale in a manner best suited for Division of Highways quality determinations. Therefore, Huang's definition will act as a guideline and is defined as follows: "Shale is a laminated and thinly bedded fine grained clastic rock containing mainly silt and clay and including many particles

less than 1 or 2 microns in diameter." According to the same reference, most shale is made up of 1/3 quartz, 1/3 clay minerals, and 1/3 miscellaneous substances. "In addition, it may be said that shale usually has a relatively smooth or soapy texture, can be scratched with a copper penny and powder can be produced by scraping a piece of shale with a knife."

- 4.1.1 In addition to the above characteristics, shale, when in contact with a moist environment, softens considerably due primarily to the clay constituent and bedding properties and often exhibits the property of slaking. This is one of the primary characteristics which causes shale to be considered deleterious when contained in aggregate to be used in highway construction.

---

**5. TEST PORTION PREPARATION**

- 5.1 Obtain enough aggregate from the field sample to yield a test portion of the appropriate size by use of a sample splitter. (*see NOTE*)
- 5.2 Sieve the aggregate over a 4.75 mm (No. 4) sieve and discard the minus 4.75 mm (No. 4) material.
- 5.3 Gently wash the aggregate retained on the 4.75 mm (No. 4) sieve to remove any dust or coatings.
- 5.4 Dry the clean, sieved aggregate to a constant mass in an oven maintained at 230°F ± 9°F (110°C ± 5°C).

*NOTE:* Approximate mass of the test portion of crushed aggregate after sieving.

<u>NOMINAL MAXIMUM SIZE OF PARTICLES</u>	<u>MINIMUM MASS OF TEST PORTION</u>
19 mm (3/4 in.)	3000 grams
37.5 mm (1-1/2 in.)	5000 grams
75 mm (3 in.)	10000 grams

---

**6. TEST PROCEDURE**

- 6.1 Weigh the test portion and record the mass. *See NOTE in Section 5. for the required test portion mass.*
- 6.2 Spread the test portion in a thin layer on the bottom of a large flat pan.
- 6.3 Examine each particle for shale characteristics and separate the shale from the remainder of the crushed aggregate.

Shuman, Randy L 9/5/19 10:33 AM

**Comment [1]:** The process of separating the test portion over multiple sieves was removed. The procedure may have been based on another AASHTO procedure, where the percentages of shale were calculated using a weighted average based on the gradation of the original sample. Since gradations are not required for quality testing, a weighted average is not needed for this test.



- 6.3.1 In the case of pieces of aggregate resembling shale but not exhibiting all the properties of shale, weigh, and soak in water for 24 hours and re-examine.
- 6.3.1.1 If after 24 hours the suspect pieces of aggregate remain sound, they should be considered satisfactory and not be included with other deleterious material.
- 6.3.1.2 If after soaking in water for 24 hours the suspect pieces of aggregate show evidence of slaking or if slight hand pressure causes disintegration, these pieces should be recorded as being deleterious.
- 6.4 Weigh and record the mass of shale present in the test portion.

---

**7. CALCULATIONS**

- 7.1 Calculate the percentage of shale as follows:

$$S = \left( \frac{W_1}{W_2} \right) \times 100$$

Where:

S = Total percent of shale or shale like pieces in the test portion.

M<sub>1</sub> = Total mass of shale or shale like pieces contained in the test portion.

M<sub>2</sub> = Total mass of coarse aggregate test portion retained on the 4.75 mm (No. 4) sieve

MP 703.00.27  
ORIGINAL ISSUANCE: JUNE 1975  
REISSUED: JANUARY 1995  
REVISED: AUGUST 2019  
PAGE 4 OF 4

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

MATERIALS PROCEDURE

---

METHOD OF DETERMINATION OF PERCENT OF  
THIN OR ELONGATED PIECES IN COARSE AGGREGATE

---

**1. PURPOSE**

- 1.1 To provide a standard method for determining the percent of thin and elongated pieces in a coarse aggregate sample.
- 1.2 Excessive amounts of thin or elongated pieces of aggregate can create structural and workability problems in base course, portland cement concrete and bituminous concrete mixtures resulting in a loss in strength, skid resistance and wearing ability. Their presence may cause internal and/or external damages when utilized in the previously mentioned applications and consequently the quality of the finished product may be related to the presence of thin or elongated pieces.

---

**2. SCOPE**

- 2.1 This method of determination is applicable to all coarse aggregates (both natural and crushed) and is applied when a test for thin or elongated pieces is required.

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**3. EQUIPMENT**

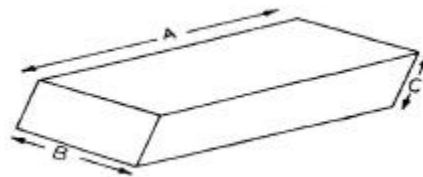
- 3.1 *Balance*—The balance shall have sufficient capacity, be readable to 0.1 percent of the sample mass, or better, and conform to the requirements of M 231.
- 3.2 *Pans*—Large flat pans for spreading the aggregate in a single layer.
- 3.3 *Calipers*—Precision built calipers that will maintain a constant 4:1 ratio.

---

**4. DEFINITIONS**

- 4.1 Thin Aggregate - One in which the ratio of the width to the thickness is greater than 4:1.
- 4.2 Elongated Aggregate - One in which the length to the width is greater than 4:1.
- 4.3 For consistency in evaluating aggregate for possible thin or elongated pieces, the following diagram is provided so as not to confuse one measured dimension with another.

Where:



A = length  
B = width  
C = thickness

---

**5. TEST PORTION PREPARATION**

- 5.1 Obtain enough aggregate from the field sample to yield a 5000 g minimum test portion by use of a sample splitter.
- 5.2 Sieve the aggregate over a 4.75 mm (No. 4) sieve and discard the minus 4.75 mm (No. 4) material.
- 5.3 Gently wash the aggregate retained on the 4.75 mm (No. 4) sieve to remove any dust or coatings.
- 5.4 Dry the clean, sieved aggregate to a constant mass in an oven maintained at 230°F ± 9°F (110°C ± 5°C).

---

**6. TEST PROCEDURE**

- 6.1 Weigh the test portion and record the mass.
- 6.2 Spread the test portion in a thin layer in the bottom of a large flat pan.
- 6.3 Make a preliminary separation of all material which is obviously neither thin nor elongated.
- 6.4 Determine the maximum thickness (C) of the possible THIN pieces of aggregate by using the small opening of the calipers.

- 6.4.1 Remove the aggregate particle from the caliper without disturbing the setting of the opening and place the greatest width (B) of the particle in the large opening.
- 6.4.2 If the greatest width of the aggregate particle is larger than the large opening of the calipers, it shall be considered a THIN piece of aggregate and shall be placed aside for weighing.
- 6.5 Determine the maximum width (B) of the possible ELONGATED pieces of aggregate by using the small opening of the calipers.
- 6.5.1 Remove the aggregate particle from the caliper without disturbing the setting of the opening and place the greatest length (A) of the particle in the large opening.
- 6.5.2 If the greatest length (A) of the aggregate particle is larger than the large opening of the calipers, it shall be considered an ELONGATED piece of aggregate and shall be placed aside for future reference.
- 6.6 Combine all pieces of aggregate classified as either THIN or ELONGATED and record the total mass to the nearest gram.

---

**7. CALCULATION**

- 7.1 The percent of thin and/or elongated pieces is determine in the following manner:

$$T\&E = \frac{M_1 + M_2}{M_3} \times 100$$

Where:

T&E = percent of thin and/or elongated pieces

M<sub>1</sub> = oven dry mass of THIN pieces

M<sub>2</sub> = oven dry mass of ELONGATED pieces

M<sub>3</sub> = oven dry mass of test portion

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

MATERIALS PROCEDURE

---

MATERIAL CERTIFICATIONS GUIDELINES

---

**1. PURPOSE**

- 1.1 To set forth procedures for the submittal and acceptance of Materials Certifications also know as MC-8s.
  - 1.2 To provide as an outline for training of employees new to the Materials Certification process.
- 

**2. SCOPE**

- 2.1 This will apply to all Materials Certifications done in the State of West Virginia, whether they are federally or non-federally funded, FEMA, or any other designation.
  - 2.2 Though this MP references the use of AASHTOWare SiteManager, ProjectWise, SiteManger Reports, and other agency specific programs, if these programs are supplanted by other programs or are otherwise rendered obsolete, this MP will apply to the equivalent, if applicable in the new programs, pending the update of this MP.
  - 2.3 This MP does not designate the organization structure or attempt to direct the actions of Construction or Contract Administration.
- 

**3. CERTIFICATION OF MATERIALS**

- 3.1 Different materials are accepted by different methods and these methods are often described in detail by various Materials Procedures, Specifications, or Plan Notes etc. All materials are accepted under the four general categories:
    - 1. Direction Test
    - 2. Approved Product List
    - 3. Direct Coverage
    - 4. Master Sample
    - 5. ST-1/DMIR
  - 3.2 The body of this MP will generically describe, using specific examples, the certification of materials based on the above-mentioned material acceptance.
- 

**4. APPLICABLE DOCUMENTATIONS FOR THE REVIEW OF MATERIALS ON PROJECTS**

- 4.1 This section provides a list of reports and their role in the certification of materials.
- 4.2 At the discretion of the reviewer, other reports may be utilized.
- 4.3 Sampling Checklist
- 4.3.1 The sampling checklist is the primary report for the certification of materials. This report lists all the samples on the project, by line item and lists the samples obtained. This report shows the type of test(s) and or acceptance done, the results, the frequency of sampling performed and the required frequency of sampling. An example of this is show below:

Contract ID: 0516541 MEIGHEN BRIDGE		<b>West Virginia</b> Department of Transportation		Current As Of: 7/17/2019 2:27:48 PM				
<b>Detailed Sampling Checklist</b>								
Project Number	Line Item Number	Item Description	Supplemental Description	Current Contract Quantity	Authorized Quantity	Unit		
Material Code - Desc			Sample Type - Acceptance Type					
0516541	601002-001	0200 CLASS B CONCRETE		164.000	156.400	CY		
<b>601.002.003 - Concrete Class B</b>								
<b>Quality Control - Test Results</b>								
Test Method		Completed	Current Req.	Total Expected	Frequency	Conv. Factor		
SM601.01a - Concrete		4	2	2	1 / 100	1		
Sample ID	Lab Number	Test Number	Sample Status	Sample Date	Completion Date	Authorized Date	Last Modified Date	Authorized By
B2187861836070741	C6V0121	1	COMP	03/02/2018	04/05/2018	04/05/2018	03/06/2018	B314039
B2187861842124731	C6V0122	1	COMP	03/26/2018	04/24/2018	04/24/2018	04/02/2018	B314039
B21878617C5092932	C6U2322	1	COMP	12/01/2017	01/02/2018	01/24/2019	12/05/2017	B314039
B21878617C5093538	C6U2323	1	COMP	12/04/2017	01/03/2018	04/05/2018	12/05/2017	B314039
Special Instructions:								
<b>601.002.003 - Concrete Class B</b>								
<b>Quality Assurance - Test Results</b>								
Test Method		Completed	Current Req.	Total Expected	Frequency	Conv. Factor		
SM601.01a - Concrete		1	1	1	1 / 1000	1		
Sample ID	Lab Number	Test Number	Sample Status	Sample Date	Completion Date	Authorized Date	Last Modified Date	Authorized By
B2187861842125644	M6V0123	1	COMP	03/26/2018	05/11/2018	03/15/2019	04/02/2018	B314039
Special Instructions:								

**5. GENERAL REJECTION REASONS**

- 5.1 The following (though not limited to these) issues will result in a rejection:
  - (1) Illegible or otherwise unreadable documentation.
  - (2) Any discrepancy on the sampling checklist.
  - (3) Any unresolved material failures.

- (4) Key Dates are not entered correctly (Showing 00/00/00).
- (5) Lab numbers do not match approved product list or item is not on the approved product list.
- (6) DMIR's have not been approved
- (7) Money has not been taken off the contract for price reductions or DMIR's
- (8) Quantities tested must be equivalent to or greater than material paid.
- (9) Documents are not filed in the District Org folders to show abar's for concrete and asphalt mix tests have been ran for materials shipped.


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**6. DIRECT TEST**

- 6.1 A direct test is the acceptance of a material based on a test that is performed on the material. For example Section 601 of the Standard Specifications discusses the acceptance of Portland Cement Concrete. Air content, slump and compressive strength are all examples of direct tests performed in the field.
- 6.2 There are many other direct tests. For details on a specific test, refer to the Standard Specifications and in some cases, the applicable MP.
  - 6.2.1 Reviewing the Sampling Check List, check that each material was sampled to meet or exceed the required frequency. Confirm that each sample was completed, authorized and any failure(s) were resolved.
  - 6.2.2 The testing documentation should be in ProjectWise under the applicable line item number.




6.3 An example of a Direct Test is shown below:

Contract ID: 0516541 MEIGHEN BRIDGE		 <b>West Virginia</b> Department of Transportation <i>Detailed Sampling Checklist</i>			Current As Of: 7/17/2019 2:27:48 PM			
Project Number	Line Item Code	Line Item Number	Item Description	Supplemental Description	Current Contract Quantity	Authorized Quantity	Unit	
0516541	601002-001	0200	CLASS B CONCRETE		164.000	156.400	CY	
601.002.003 - Concrete Class B								
<b>Quality Control - Test Results</b>								
Test Method		Completed	Current Req.	Total Expected	Frequency	Conv. Factor		
SM601.01a - Concrete		4	2	2	1 / 100	1		
Sample ID	Lab Number	Test Number	Sample Status	Sample Date	Completion Date	Authorized Date	Last Modified Date	Authorized By
B2187861836070741	C6V0121	1	COMP	03/02/2018	04/05/2018	04/05/2018	03/06/2018	B314039
B2187861842124731	C6V0122	1	COMP	03/26/2018	04/24/2018	04/24/2018	04/02/2018	B314039
B21878617C5092932	C6U2322	1	COMP	12/01/2017	01/02/2018	01/24/2019	12/05/2017	B314039
B21878617C5093538	C6U2323	1	COMP	12/04/2017	01/03/2018	04/05/2018	12/05/2017	B314039
Special Instructions:								
601.002.003 - Concrete Class B								
<b>Quality Assurance - Test Results</b>								
Test Method		Completed	Current Req.	Total Expected	Frequency	Conv. Factor		
SM601.01a - Concrete		1	1	1	1 / 1000	1		
Sample ID	Lab Number	Test Number	Sample Status	Sample Date	Completion Date	Authorized Date	Last Modified Date	Authorized By
B2187861842125644	M6V0123	1	COMP	03/26/2018	05/11/2018	03/15/2019	04/02/2018	B314039
Special Instructions:								


**7. DIRECT COVERAGE**

- 7.1 This type of coverage is provided directly by MCS&T or their designee. A prestressed box beam is an example of this type of coverage. The Director of MCS&T's designee, whether it be state employee or consultant will approve the material as per applicable MPs and assign a lab number to this coverage.
- 7.2 The lab sample shall be authorized in site manager and additional information about this approval may, but not is required to be provided.
- 7.3 An example of a direct coverage sample on the sampling checklist is provided below:

Contract ID: 0114546		 West Virginia Department of Transportation Detailed Sampling Checklist		Current As Of: 5/8/2019 10:05:17 AM				
TARKILN RUN SLAB BRIDGE								
Project Number	Item Code	Line Item Number	Item Description	Supplemental Description	Current Contract Quantity	Authorized Quantity	Unit	
Material Code - Desc			Sample Type - Acceptance Type					
0114546	620001-001	0285	PRECAST REINFORCED CONCRETE ARCH-TOPPED BRIDGE/CULVERT,		120.000	120.000	LF	
620.002.002 - Culvrt Prcst Arch			Direct Coverage - Certificate/Invoice					
<u>Test Method</u>			<u>Completed</u>	<u>Current Req.</u>	<u>Total Expected</u>	<u>Frequency</u>	<u>Conv. Factor</u>	
SM106.05 - Plant Inspection, Concrete			1	1	1	1 / 999999	1	
<u>Sample ID</u>	<u>Lab Number</u>	<u>Test Number</u>	<u>Sample Status</u>	<u>Sample Date</u>	<u>Completion Date</u>	<u>Authorized Date</u>	<u>Last Modified Date</u>	<u>Authorized By</u>
E02405117BE133201	1461363	1	CNTR	10/27/2017	06/28/2018	07/03/2018	06/29/2018	E024051
Special Instructions:								
0114546	620004-001	0290	WINGWALL FOR CONCRETE CULVERT		4.000	4.000	EA	
603.002.028 - Con Wng Prcst Rnfd			Direct Coverage - Certificate/Invoice					
<u>Test Method</u>			<u>Completed</u>	<u>Current Req.</u>	<u>Total Expected</u>	<u>Frequency</u>	<u>Conv. Factor</u>	
SM600.01 - Precast Concrete Final Inspection			1	1	1	1 / 999999	1	
<u>Sample ID</u>	<u>Lab Number</u>	<u>Test Number</u>	<u>Sample Status</u>	<u>Sample Date</u>	<u>Completion Date</u>	<u>Authorized Date</u>	<u>Last Modified Date</u>	<u>Authorized By</u>
E024051185H094049	1461363	1	CNTR	10/27/2017	05/17/2018	06/29/2018	05/17/2018	E024051
Special Instructions:								
0114546	636023-001	9010	TEMPORARY TRAFFIC SIGNAL		1.000	1.000	LS	
715.009.002 - Traffic Signals Misc			Approved Source - Certificate/Invoice					
<u>Test Method</u>			<u>Completed</u>	<u>Current Req.</u>	<u>Total Expected</u>	<u>Frequency</u>	<u>Conv. Factor</u>	
SM106.25 - Approved Source Verification			1	1	1	1 / 999999	1	
<u>Sample ID</u>	<u>Lab Number</u>	<u>Test Number</u>	<u>Sample Status</u>	<u>Sample Date</u>	<u>Completion Date</u>	<u>Authorized Date</u>	<u>Last Modified Date</u>	<u>Authorized By</u>
B5146111931105909	1392834	1	CNTR	03/01/2019	03/01/2019	03/01/2019	03/01/2019	B931220
Special Instructions:								


**8. MASTER COVERAGE**

- 8.1 This type of coverage is provided directly by MCS&T or their designee and is similar to Direct Coverage. The Director of MCS&T's designee, whether it be state employee or consultant will approve a lot of material as per applicable MPs and assign a lab number to this lot of coverage.
- 8.1.1 Districts request MCS&T to use this material and coverage is provided from this lot by MCS&T. For example, 100 pieces of lagging may be approved. A District may request 30 of these pieces. This leaves another 70 pieces of material to be requested by another District or project etc.
- 8.2 The lab sample shall be authorized in site manager and additional information about this approval may, but not is required to be provided.
- 8.3 An example of a Master Sample on the sampling checklist is provided below:

<b>Contract ID:</b> 1701729		 <b>West Virginia Department of Transportation</b>		Current As Of: 10/24/2018 8:35:37 PM	
FLATWOODS-HEATERS ROAD SLIDE		<b>Detailed Sampling Checklist</b>			
<b>Project Number</b>	<b>Line Item Number</b>	<b>Item Description</b>	<b>Supplemental Description</b>	<b>Current Contract Quantity</b>	<b>Authorized Quantity</b>
<b>Material Code - Desc</b>		<b>Sample Type - Acceptance Type</b>			
1701729	614001-004	0035	HP10X57 STEEL PILE	801.970	801.970
711.012.001 - Epoxy Mastic		Approved Source - Certificate/Invoice			
<u>Test Method</u>		<u>Completed</u>	<u>Current Req.</u>	<u>Total Expected</u>	<u>Frequency</u>
SM106.25 - Approved Source Verification		1	1	1	1 / 999999
<u>Sample ID</u>	<u>Lab Number</u>	<u>Test Number</u>	<u>Sample Status</u>	<u>Sample Date</u>	<u>Completion Date</u>
E073653181101647	1425213A	1	CNTR	01/18/2018	01/18/2018
<u>Authorized Date</u>					
10/16/2018					
<u>Last Modified Date</u>					
01/18/2018					
<u>Authorized By</u>					
B396989					
Special Instructions:					
1701729	614003-001	0040	CONCRETE LAGGING, THICKNESS 8"	931.700	931.700
614.002.003 - Lagging, Concrete		Master Sample - Certificate/Invoice			
<u>Test Method</u>		<u>Completed</u>	<u>Current Req.</u>	<u>Total Expected</u>	<u>Frequency</u>
SM600.01 - Precast Concrete Final Inspection		1	1	1	1 / 999999
<u>Sample ID</u>	<u>Lab Number</u>	<u>Test Number</u>	<u>Sample Status</u>	<u>Sample Date</u>	<u>Completion Date</u>
B688656168H081934	1458040	1	CNTR	08/17/2016	08/17/2016
<u>Authorized Date</u>					
01/19/2018					
<u>Last Modified Date</u>					
01/19/2018					
<u>Authorized By</u>					
B517368					
Special Instructions:					
1701729	638008-002	0045	TEMPORARY PAVEMENT MARKING- SOLID LINE PAINT 6 IN	519.000	519.000
711.040.001 - Paint,Temp W/Y Traff		Quality Assurance - District - Test Results			
<u>Test Method</u>		<u>Completed</u>	<u>Current Req.</u>	<u>Total Expected</u>	<u>Frequency</u>
SM711.07 - Retroreflectivity		0	0	0	0 / 999999
<u>Conv. Factor</u>					
1					
Special Instructions: no record of paint testing					

**9. ST-1/DMIR DOCUMENTATION**

- 9.1 If there is no other method for testing a material, or in the rare case, the material does not meet the specifications, the District may choose to accept the material using an ST-1 or DMIR.
- 9.2 ST-1s should be reviewed, accepted and authorized the Director of MCS&T's designee.
- 9.3 A DMIR should be reviewed and accepted by the District Construction Engineer. **(IS THIS RIGHT?)**
- 9.4 An example of a ST-1 Sample on the sampling checklist is provided below:

Contract ID: 1605302		D4 REIMBURSABLE GUARDRAIL		 West Virginia Department of Transportation <i>Detailed Sampling Checklist</i>		Current As Of: 9/10/2019 10:37:29 AM		
Project Number	Item Code	Line Item Number	Item Description	Supplemental Description	Current Contract Quantity	Authorized Quantity	Unit	
Material Code - Desc			Sample Type - Acceptance Type					
1605302	607070-103	0205	3/4 INCH CABLE	(MANUFACTURER SPECIFIED)	1,000.000	20.000	LF	
709.011.001 - Steel, Misc.				Project Specific - Concurrence				
Test Method				Completed	Current Req.	Total Expected	Frequency	Conv. Factor
SM106.27 - Special Acceptance Material (ST-1)				0	0	0/0	1	
Special Instructions:								
1605302	607070-104	0210	CABLE SPLICE	(MANUFACTURER SPECIFIED)	10.000	8.000	EA	
709.011.001 - Steel, Misc.				Project Specific - Concurrence				
Test Method				Completed	Current Req.	Total Expected	Frequency	Conv. Factor
SM106.27 - Special Acceptance Material (ST-1)				0	0	0/0	1	
Special Instructions:								
1605302	607070-109	0215	CABLE TENSIONING	(MANUFACTURER SPECIFIED)	100.000	6.000	EA	
709.011.001 - Steel, Misc.				Project Specific - Concurrence				
Test Method				Completed	Current Req.	Total Expected	Frequency	Conv. Factor
SM106.27 - Special Acceptance Material (ST-1)				0	0	0/0	1	
Special Instructions:								
1605302	607070-112	0220	ANCHOR POST,	(NUCOR)	15.000		EA	
709.011.001 - Steel, Misc.				Approved Source - Certificate/Invoice				
Test Method				Completed	Current Req.	Total Expected	Frequency	Conv. Factor
SM106.25 - Approved Source Verification				0	0	0/0	1	
Special Instructions:								

Tuesday, September 10, 2019 Page 17 of 22

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**10. EXPECTATIONS FOR DOCUMENTATION**

10.1

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

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ATTACHMENT

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

MATERIALS PROCEDURE

ACCEPTANCE USE OF THE MATURITY METHOD FOR THE ESTIMATION OF  
CONCRETE STRENGTH ON WVDOH PROJECTS

**1. PURPOSE**

- 1.1 To establish a procedure to estimate the compressive strength of concrete, used on West Virginia Division of Highways (WVDOH) projects, with the Maturity Method.

**2. SCOPE**

- 2.1 This procedure shall apply to all Contractors, Sub-contractors, Consultants, and WVDOH Personnel who test concrete on WVDOH projects.
- 2.2 This procedure may be used in place of compressive strength cylinders, for the determination of the compressive strength of concrete, when allowed by the WVDOH Specifications. The Maturity Method shall not be permitted as a substitute for 28-day acceptance cylinders.

**3. REFERENCED DOCUMENTS •**

- 3.1 *ASTM C1074 - Standard Practice for Estimating Concrete Strength by the Maturity Method*

**4. PROCEDURE**

- 4.1 The procedure outlined in the following sections shall be applied to each WVDOH approved concrete mix design for which the Maturity Method is desired to be used in place of concrete cylinders for the estimation of the concrete strength in the field. A separate strength-maturity relationship must be developed for each approved concrete mix design.

**4.2 DEVELOPMENT OF STRENGTH-MATURITY RELATIONSHIP**

- 4.2.1 Fabricate a minimum of fifteen concrete cylinders, in accordance with ASTM C192, from each WVDOH approved concrete mix design for which it is desired to establish a strength-maturity relationship. The mixes used to cast these cylinders shall be batched as closely as possible to the anticipated target air content, slump value, and chemical admixture dosage rate which will be used in the field. The mixes shall also be batched at a temperature as close as possible to the temperature that is anticipated in the field during concrete placement.

- 4.2.2 Either 6-inch x 12-inch cylinders or 4-inch x 8-inch cylinders may be used to develop the strength-maturity relationship, but if 4-inch x 8-inch cylinders are going to be used, then 4-inch x 8-inch cylinders must be approved to be used, in

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accordance with MP 711.03.23, with the mix design for which the strength-maturity relationship is being developed

4.2.3 Follow the procedure outlined in Section 8 of ASTM C1074-19, and establish a strength-maturity relationship and corresponding Strength-Maturity Curve. The maturity of the subject cylinders shall be recorded to the nearest degree-hour. The axes used to plot this Strength-Maturity Curve shall be Strength, expressed in pounds per square inch on the Y-axis, and Temperature-Time Factor, expressed in °C-hours on the X-axis.

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4.2.4 When concrete mixes designed for rapid strength gain are used, the compression tests shall be conducted at ages approved by the Engineer based on the strength development characteristics of that mix. However, a minimum of five test ages shall be used.

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#### 4.3 APPLICATION OF STRENGTH-MATURITY RELATIONSHIP

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4.3.1 The Strength-Maturity Curve may be used in the field at the Project, in place of compressive strength cylinders, to estimate the compressive strength of the concrete in question.

4.3.2 The strength-maturity relationship and Strength-Maturity Curve shall not be permitted to be used in place of 28-day acceptance cylinders. The strength-maturity relationship and Strength-Maturity Curve shall only be used for the purposes of opening structures to traffic (i.e. Section 501.4.4, Section 506, etc.) and for form removal and construction of superimposed elements (i.e. Section 601.8.7).

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4.3.3 When using the Strength-Maturity Curve for these purposes, the procedure outlined in Section 9 of ASTM C1074-19 shall be used for installing temperature sensors within the concrete of which the Strength-Maturity Curve is being used to estimate the compressive strength.

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#### 4.4 VALIDATION OF STRENGTH-MATURITY RELATIONSHIP

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4.4.1 After five days of production, and every ten days of production after that, seven "Maturity Validation Cylinders" shall be fabricated. One of these cylinders shall have a maturity sensor installed in it within ± 5/8" (15 mm) of the center of the cylinder. Three of these cylinders shall be tested at an age of three days, and three of these cylinders shall be tested at an age of seven days. The average of each of these sets of three cylinders shall be the average compressive strength at that age.

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4.4.2 The Maturity Validation Cylinders shall be the same size as the cylinders which were used to develop the original Strength-Maturity Curve.

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4.4.3 If the average of either the three-day or seven-day compressive strength results, obtained in Section 4.4.1, fall at a point more than 5.0% less than the corresponding compressive strength, at the same Temperature-Time Factor point on the Strength-Maturity Curve, additional maturity validations at three and seven days, as outlined in Section 4.4.1, shall be conducted on the next three concrete placements.

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4.4.4 The Contractor shall continue to conduct these maturity validations until the average result of the three cylinders in each individual compressive strength test in three consecutive validations (consisting of both three-day and seven-day results) is not more than 10.0% less than the corresponding compressive strength at the same Temperature-Time Factor point on the Strength-Maturity Curve, and the average of all three-day and all seven-day results in those three consecutive validations is not more than 5.0% less than the corresponding compressive strength at the same Temperature-Time Factor point on the Strength-Maturity Curve.

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4.4.5 If, after five maturity validations, the Contractor has not obtained three consecutive validations for which the criteria in Section 4.4.4 has been met, then a new Strength-Maturity curve shall be established, as outlined in Section 4.5.

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4.5 ESTABLISHMENT OF NEW STRENGTH-MATURITY CURVE

4.5.1 The new average three-day strength shall be established by averaging the five three-day strength results from the five maturity validations conducted in Section 4.4.5. The new average seven-day strength shall be established by averaging the five seven-day strength results from the five maturity validations conducted in Section 4.4.5.

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4.5.2 The percentages by which the average three-day and average seven-day compressive strength results in Section 4.5.1 are, below the corresponding compressive strengths at the same Temperature-Time Factor point on the Strength-Maturity Curve shall be calculated. The greater of these two percentages shall be the percent by which the Strength-Maturity Curve is lowered. This new "lowered" Strength-Maturity Curve shall be used from that point forward for estimating the compressive strength of the concrete from that approved mix design in the field.

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

RLS:M



WEST VIRGINIA DEPARTMENT OF  
TRANSPORTATION DIVISION OF HIGHWAYS  
CONTRACT ADMINISTRATION DIVISION

MATERIALS PROCEDURE

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BASIS FOR CHARGES FOR NON-SUBMITTAL  
OF SAMPLING AND TESTING DOCUMENTATION IN A TIMELY  
MANNER

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**1. PURPOSE**

- 1.1 To provide a unit cost per test to be assessed to the Contractor when testing is not submitted by the contractor in a timely manner. Documentation not submitted, limited to those tests listed in Table 1 of this procedure.

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**2. SCOPE**

- 2.1 This procedure is applicable to those circumstances where a construction item by specifications and MP's is not properly tested or the documentation is not submitted in a timely manner of seven (7) days for compaction, fourteen days (14) for gradations and thirty five days (35) for concrete cylinder breaks.
- 2.2 This only applies to Quality Control testing, not Quality Assurance testing.

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**3. GENERAL**

- 3.1 As stated in Section 106.3.1.2 of the Standard Specifications, it is the intent of the specifications that lots and sublots of materials, products, items of construction or completed construction meet testing specification requirements at the time of submission. In this case submission refers to the time when the contractor has completed the work and offers the finished 'product' to the Division for final acceptance testing.
- 3.2 In the case where no test was ran or no documentation was submitted for material placed according to the required quality control per specifications the price will be assessed in accordance with Table 1 and will include the cost of the material placed that the documentation was to represent if the material was left in place.
- 3.3 Test results can be email to the District Material Supervisor as a PDF. That has been signed in blue in the time frame stated above in Section 2.1.
- 3.4 The project may also decide to not pay for the material placed if proper and or adequate testing is not performed on that material.

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

**TABLE 1**

**COST FOR FAILING TO TEST OR SUBMIT  
 DOCUMENTATION FOR MATERIAL  
 PLACED**

ITEM#	TEST		COST
207	IN-PLACE DENSITY (5 TESTS)	\$140.00 ea	\$700.00
	GRADATION (EACH TEST)		\$700.00
	PLASTIC INDEX, LIQUID LIMITS		\$700.00
212	IN-PLACE DENSITY (5 TESTS)	\$140.00 ea	\$700.00
	GRADATION (EACH TEST)		\$700.00
307 & 308	IN-PLACE DENSITY (5 TESTS)	\$140.00 ea	\$700.00
	GRADATION (EACH TEST)		\$700.00
	PLASTIC INDEX, LIQUID LIMITS		
311	CRUSHED PARTICLE ANALYSIS		\$700.00
	GRADATION (EACH TEST)		\$700.00
401 & 402	CORING (EACH CORE) PWL		\$700.00
	PAVEMENT SMOOTHNESS		\$700.00
	(PER LANE MILE)		\$700.00
	ASPHALT CONTENT FAILURES		\$700.00
	AIR VOIDS FAILURES		\$700.00
405	GRADATION (EACH TEST)		\$700.00
495	GRADATION (EACH TEST)		\$700.00
601	ABAR (EACH TEST)		\$700.00
	CYLINDER BREAK REPORT		\$700.00
	PERMABILITY		\$700.00
	AIR AND SLUMP TESTS		\$700.00
603	GROUT BREAK REPORT (EACH TEST)		\$700.00
604	IN-PLACE DENSITY (5 TESTS)	\$140.00 ea	\$700.00
	GRADATIONS >60"		\$700.00
606	GRADATION (EACH TEST)		\$700.00
614	CONCRETE TESTING		\$700.00
	CYLINDER BREAK REPORT		\$700.00
	GROUT CUBE TESTING		\$700.00
	GROUT STRENGTH REPORT		\$700.00
626	IN-PLACE DENSITY (5 TESTS)	\$140.00 ea	\$700.00
	GRADATION (EACH TEST)		\$700.00
	PLASTIC INDEX, LIQUID LIMITS		\$700.00
720	FAILURE TO RUN PROFILER		\$700.00