Materials Procedures Committee Regular Meeting

Meeting Time/Date: 10:00 AM, July 19, 2023

Meeting Location: MCS&T (Conference Rm.) - 190 Dry Branch Drive, Charleston, WV 25306

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 07 19 - MP Meeting

Files Available on Webpage:

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

Materials Procedures approved at the last meeting (6/21/23)

1. 711.00.20 - Paint Testing Methods
2. 100.00.02 - Method of Evaluating of Non-Standard or Non-Conforming Materials in Construction Via St-1
3. 100.00.03 - Method of Evaluation of Non-Standard or Non-Conforming Materials in Construction Via DMIR
4. 106.00.02 - Procedure for Evaluating Products for Use in Highway Construction
5. 601.05.50 - Quality Assurance Procedures for Portland Cement Concrete
6. 702.01.25 - Method of Test for Determining Mortar Strength
7. 714.03.30 - Quality Assurance of Reinforced Concrete Culvert, Storm Drain, And Sewer Pipe
8. 700.00.50 - Method for Acceptance of Compaction Testing
9. 702.01.20 - Standard Method of Test for Determining the Percentage of Coal and Lightweight Particles in Aggregate
10. 212.01.21 - Test Method for Unconfined Compressive Strength of Rock Core Specimens
11. 712.05.57 - Criteria to Approve Fence Producer/Suppliers and Their Materials

Materials Procedures - Old Business

Number	Champion	Title	Description
1 - 658.05.06&	Whitmore	Ancillary Structure Anchor Bolt Tightening	Ted making significant changes to update bolt tightening.
2 - 700.00.56*	Ross	Commercial And Potential Skid Resistant Aggregate Source Approval Procedures	Major Updates
3 - 700.03.50*	Jobes	Standard Method of Microscopic Determination of Air-Void Content	Added verbiage to accommodate the newer machines that run the modified point count automatically.

4 - 712.21.26*	Jobes	Procedure For Determining the Random Location of Compaction Tests	Corrected numbering (was out of order before) and removed metric examples, and updated the graphics in the examples, also a few small grammar edits.
5 - 700.00.22*	Jobes	Procedure For Determining an Adjusted Pay Quantity Resulting from Excess Moisture in Aggregates	Removal of Metric Units, no other content change.
6 - 700.00.51*	Ross	Guide For Quality Control and Acceptance Plans for Purchase Order Contracts for Stone and Aggregate	Minor grammatical changes, reconfirmation.
7 - 212.02.20*	Ross	Procedure For Determining a Reduced Unit Price to Be Paid for Select Material for Backfilling Which Does Not Conform to Grading Requirements of Governing Specifications	Edits corresponding to special investigation and spec updates. Removal of information duplicated in the specifications
8 - 642.03.50*	Preston	Contractor's Quality Control for Surface Water and Sampling Procedures for Quality Determination	Reconfirmation with no content edits.
9 – 700.01.01*	Preston	Field Sampling and Testing of Surface Water for Quality Determination	Minor Edits
10 - 661.00.00*	Jones	Chemical Analysis of Aluminum Alloys	Changes to Procedure. Formatting issues need to be addressed before voting.
11 - 615.20.01*	Hanna	Preparing, Recording and Transmitting Information on Approved List of Welded Stud Shear Connectors	Minor process edits.
12 - 701.01.10*	Dickson	Portland Cement and Blended Hydraulic Cement Mill Certification	Update to frequency of testing.

Materials Procedures – Reconfirmations and Minor Edits

13 - 700.04.10*	Pennington	Determining Application Rate of Ground Agriculture Limestone Based on pH Tests	Reconfirmation with no content edits.
14 - 700.05.10*	Pennington	Quality Assurance of Fertilizer at Source	Reconfirmation with no content edits.

		Fertilizer Acceptance Criteria	
15 - 711.00.21*	Preston	Procedure For Approving Paint Formulations and Production Batches	Reconfirmation with no content edits.
16 - 711.20.59*	Preston	Inorganic Zinc Primer Quality Assurance Procedure	Reconfirmation with no content edit.
17 - 711.20.60*	Preston	Intermediate Field Coat for Zinc Rich Systems	Reconfirmation with no content edits.
18 - 711.22.22*	Preston	Zinc Rich Low VOC Systems	Reconfirmation with no content edits.
19 - 715.27.20*	Ratchford	Test Methods for Wood Cellulose Fiber Mulches	Reconfirmation with no content edits.
20 - 715.28.50*	Ratchford	Seed Acceptance Criteria	Reconfirmation with no content edits.

Materials Procedures - New Business with Significant or Process Updates

21 - 709.46.50&	Danberry	Quality Control of Steel Fence Post Studded Tee	Renumbered MP with only formatting edits.
22 - 601.03.52&	Thapa	Procedural Guidelines for Maintaining Control Charts for Portland Cement Concrete	The purpose of the MP change is to include guidelines for the preparation of control charts when using computers or as deemed appropriate by the Division. The last time this MP updated was in 1995 when only paper charts were in practice.
23 - 106.00.03&	Brayack	Guidelines For Establishing and Maintaining Approved Product Lists of Materials, Systems and Sources	Adding NTPEP change to AASHTO Project Evaluation and Audit Solutions, minor process updates, including a change in company name.
24 - 207.06.20*	Preston	Chemical Analysis for pH of Soil	Added "to the nearest 0.01g." to items B and C to 4.1, otherwise, no content edits

Note 1: * Denotes this MP is up for Vote

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

Comments

Comments due July 12th, so the Champion may review and address them. Submit comments to Adam Nester (Adam.W.Nester@wv.gov)

Next Meeting

New or Updated MPs due to the MP Chair 3-weeks before the next meeting: July 26th

Meeting Time/Date: 10:00 AM, August 16, 2023

Meeting Location: MCST

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:

September 20, October 26, November 15

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

MATERIALS CONTROL, SOILS & TESTING DIVISION

MATERIALS PROCEDURE

ANCILLARY STRUCTURE ANCHOR BOLT TIGHTENING

1. PURPOSE

1.1 To establish equipment, procedure, documentation, and documentation transmittal requirements for the tightening of anchor bolt nuts associated with signing, signal, lighting, and intelligent transportation systems (ITS) related roadway ancillary structures.

1.1.1 This Materials Procedure is specifically focused on the procedure to be followed when tightening anchor bolt nuts and does not address all requirements and procedures pertaining to the installation of ancillary structures. Individual component pre-inspection and repair, structure pre-assembly, structure installation preparation, pre-application of protective coatings, overall installation procedure, and proper tightening of structural connection bolts are included as part of the Standard Specifications.

2. MATERIALS AND EQUIPMENT

2.1 The mandatory materials and equipment required to properly tighten the anchor bolts include lubricant, snug tightening wrenches, and a hydraulic fastener tightening wrench.

2.1.1 Wrenches used for a snug tightening are to have an appropriate handle length in order to achieve a level of initial snug tightening as predictable and uniform as possible. The handle length used for fasteners 3/4-inch to 1-1/4-inches in diameter is to be 23-inches. The handle length used for fasteners 1-1/2-inches to 2-1/4-inches in diameter is to be 36-inches.

2.1.2 Beeswax or toilet ring wax may be used as lubricant.

2.1.3 Hydraulic wrenches and accompanying documentation are to meet the requirements herein.

2.1.3.1 The wrenches are to be capable of generating the necessary torque in order to tighten the anchor bolt nuts as described herein.

2.1.3.2 The hydraulic wrench consists of a wrench and a hydraulic power pack to power and operate the wrench.

2.1.3.3 Hydraulic wrenches are to have the wrench and the pressure or torque readout gauge associated with the power pack calibrated regularly. Prior to the tightening of any

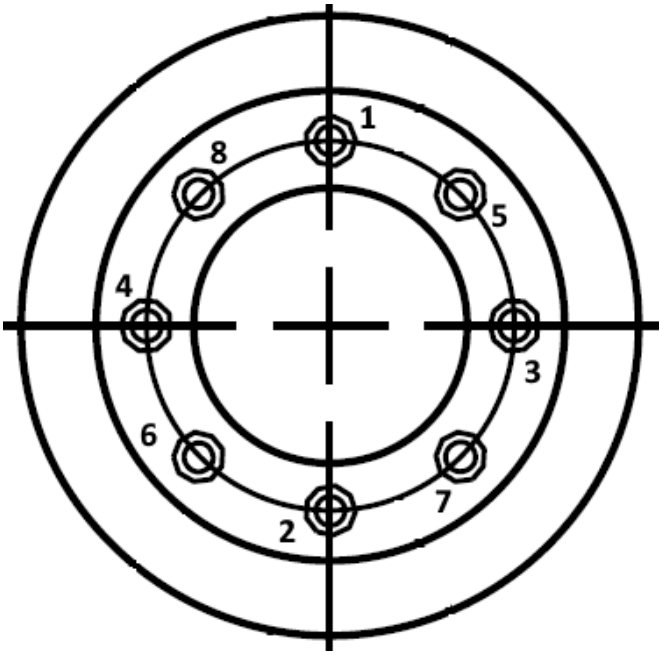
anchor bolt nuts, the project Engineer is to be provided with separate calibration certificates for the wrench and the gauge. The dates of the calibrations are to be one year or less prior to the date that the bolt tightening is performed. The certificates are to be from a calibration lab that is International Organization for Standardization (ISO) 17025 accredited, with the certificate indicating as such. The certificate for each is to display a serial number matching that shown on the wrench or gauge. If the gauge does not provide readings directly in torque values, the calibration certificate is to be accompanied by calibration charts which equate gauge pressure readings to torque values. Example calibration certificates and charts are included as part of attached ATTACHMENT 2.

3. DOCUMENTATION

3.1 The tightening of all anchor bolt nuts is to be documented using the form "WVDOH ANCILLARY STRUCTURE ANCHOR BOLT TIGHTENING RECORD" (documentation form) attached as ATTACHMENT 1, and available at the MCS&T DOH Webpage.[1]

4. PROCEDURES

4.1 Install the top nuts and washers and snug tighten the top nuts using the appropriate handle length wrench. Snug tightening is to proceed from nut to nut in a star pattern and the specific sequence chosen is to be indicated on the base plate by numbering the sequence using a permanent marker (see Figures 1 and 2 below). Snug tightness is considered to be the tightness which exists due to the full effort of a person using a spud wrench with the appropriate length handle for the bolt being tightened.



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

FIGURE 1 - EXAMPLE NUT TIGHTENING SEQUENCE FOR 8 BOLT BASE PLATE

FIGURE 2 -SNUG TIGHTENING SEQUENCE NUMBERING ON BASE PLATE

4.1.1 Snug tighten the leveling nuts following a star pattern.

4.2 After verifying that all nuts and washers have been brought into firm contact and the necessity or unnecessity for repeating the snug tightening procedure with beveled washers has been determined and performed if required, snug tight condition reference marks are to be placed on the nut and base plate using a permanent marker to prepare for the full tightening procedure(see Figure 3 below). One reference mark is to be placed on the top of the nut at one of the corners. One reference mark is to be placed on the base plate such that this reference mark and the reference mark on top of the nut will be aligned when the nut is rotated one half of the amount specified in Section 4.3.1. An additional reference mark is to be placed on the base plate such that this reference mark and the reference mark on top of the nut will be aligned when the nut is rotated the complete amount specified in Section 4.3.1. All reference marks are to be placed such that they will remain visible when the tightening wrench is placed on the nut.

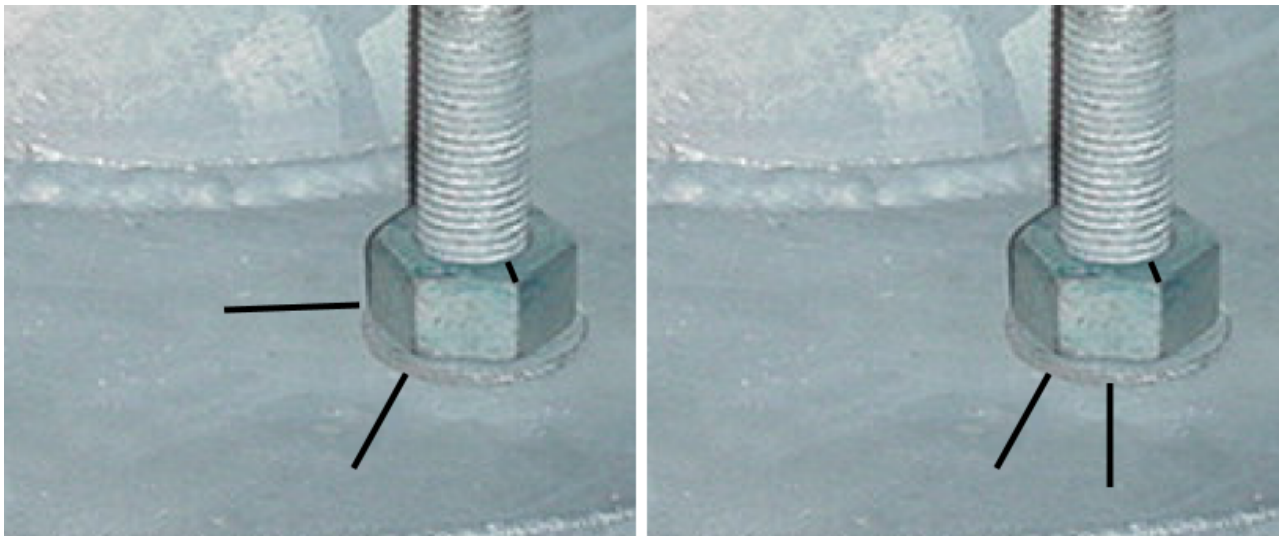


FIGURE 3 - SNUG TIGHT CONDITION REFERENCE MARKS FOR BOLTS 1-1/2" DIAMETER OR LESS (LEFT) AND BOLTS GREATER THAN 1-1/2" DIAMETER (RIGHT)

4.3 Fully tighten the top nuts using the hydraulic wrench.

4.3.1 Full tightness of each nut is achieved by rotating the nut a prescribed number of flats beyond the reference position. Rotation is to be 1/3 (2 flats) beyond the reference position for bolts 1-1/2-inches in diameter or less. Rotation is to be 1/6 (1 flat) beyond the reference position for bolts greater than-1-1/2 inches in diameter.

4.3.2 Tightening is to proceed from nut to nut in the same star pattern that was used for the snug tightening procedure and is to be achieved over two cycles. Using a structure with 2-inch anchor bolts as an example, each nut is to be tightened ½ flat. Each nut is to then be tightened an additional ½ flat. The amount of torque, as indicated on the power pack gauge, at the point when the full rotation of each nut is achieved is to be recorded on the documentation form. If the gauge associated with the power pack does not provide a torque readout, the pressure readout is to be recorded and the associated torque is to be determined from the power pack calibration charts and recorded on the documentation form.

4.4 Upon completion of the tightening of all nuts, a verification torque (Tv) is to be applied to each nut using the same hydraulic wrench and power pack that was used to tighten the nuts. This step is necessary to verify threads have not been stripped and is not intended to tighten the nuts further. The verification torque should be insufficient to

further turn and tighten the nuts. The required verification torque is to be calculated using the following formula and documented on the documentation form:

$$Tv = 0.12\ (Db)\ Fi$$

Where:

Tv = verification torque (inch-kips)
Db = nominal body diameter of the anchor bolt (inches)
Fi = 60% of the anchor bolt minimum tensile strength (kips.) For the commonly specified ASTM F1554 Grade 55 bolts, this calculated value is equal to 45
Multiply Tv by 83.3 to calculate Tv in ft-lbs

If the gauge associated with the power pack does not provide a torque readout, the pressure readout required to achieve the verification torque is to be determined from the power pack calibration charts.

4.4.1 The documentation form is to be marked where indicated to indicate that application of the verification torque did not result in further turning of each nut. If the application of the verification torque results in further turning of any nuts, the Traffic Engineering Division should be notified of this issue.

4.5 At least 48-hours after the tightening and verification torque procedures are completed, a torque equal to 110% of the Tv torque (1.10Tv) is to be applied to each nut using the same hydraulic wrench and power pack that was used to tighten the nuts. This step is necessary to verify threads have not been stripped and is not intended to tighten the nuts further. The 1.10Tv torque should be insufficient to further turn and tighten the nuts. If the gauge associated with the power pack does not provide a torque readout, the pressure readout required to achieve a torque of 1.10Tv is to be determined from the power pack calibration charts.

4.5.1 The documentation form is to be marked where indicated to indicate that application of the 1.10Tv torque did not result in further turning of each nut. If the application of the 1.10Tv torque results in further turning of any nuts, the Traffic Engineering Division should be notified of this issue.

5. DOCUMENTATION TRANSMITTAL

5.1 Upon completion of all procedures described herein and the documentation form being completed in its entirety, the Engineer is to transmit an electronic copy of the documentation form to the email address DOH.OS.AnchorNutTightening@wv.gov, which is established by the Traffic Engineering Division for this purpose. Prior to transmittal, the calibration certificates for the wrench and power pack pressure or torque readout gauge, as well as the calibration charts for the gauge, should be attached to the documentation form and included with the submittal. The subject line of the email should be named using the following format: D(*District Number*)-(*Contract ID Number*)-(*Sign, Signal, Lighting, or ITS*) Structure (*Structure Number as indicated on the project Plans*). Examples of this would be D4-2016000994-Sign Structure 6 and D7

-2006001093-Lighting Structure HML1. An example of all documents that should be included as part of a complete transmittal is attached as ATTACHMENT 2.

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

MP 658.05.06 Steward – Traffic Certification Section
RLS:W
ATTACHMENTS

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

COMMERCIAL AND POTENTIAL SKID RESISTANT AGGREGATE SOURCE APPROVAL PROCEDURES

Commented [MMA1]: See comment below

Commented [DB2]: Thomas to update to include definition of "full quality" and also review this document to make sure we say "full quality" and not just "quality"

Commented [BDA3]: DB, MM, where is the quarterly sampling requirement?

1. PURPOSE

1.1 To provide a uniform procedure for the following:

1.1.1 Approval of producers/suppliers of aggregates for the West Virginia's Department of Transportation's Division of Highways (WVDOH) Approved Material Source/Product List.

Commented [MMA4]: Is this just for the Commercial Source APL? Aren't A-1 Sources (Maintenance Contracts) covered by MP 700.00.52? We should clarify this.

1.1.2 Monitoring of producers/supplier's ongoing compliance with the governing specifications for use of their products in WVDOH projects.

2. SCOPE

2.1 This procedure shall apply to any aggregate producers/suppliers intending on ~~supplingsupplying~~ aggregates to any WVDOH projects ~~conducted by the WVDOH~~.

3. APPLICABLE DOCUMENTS

3.1 West Virginia Division of Highways ~~Standard~~ Specifications, Roads and Bridges~~, both Current Edition & Supplementary~~.

3.2 West Virginia Division of Highways Construction Manual~~, Current Edition~~.

3.3 West Virginia Division of Highways Materials Procedures.

3.4 MP 106.00.02 PROCEDURE FOR EVALUATING PRODUCTS FOR USE IN HIGHWAY CONSTRUCTION ~~Add ref to 106.00.02 as per Hao Chen~~

~~3.3~~3.5 MP 700.00.01 SAMPLING AND TESTING OF MATERIALS AT THE SOURCE

4. CONSIDERATION FOR THE LIST OF COMMERCIAL AGGREGATE SOURCES

4.1 If an entity wants to be placed on the commercial source list and has had no previous dealings with WVDOH, they shall submit a ~~Letter of Intent (LOI)~~HL-468 New Products Evaluation form to Materials Control, Soils and Testing Division (MCS&T) describing what they intend on selling, what production process is used, what type of projects they intend on supplying, and when they intend on starting production. The

~~LOI~~submission, upon review by MCS&T, will be forwarded to the nearest adjacent WVDOH District Materials Supervisor for notification purposes.

4.2 Test d~~D~~ata from a minimum~~total~~ of 20 samples shall be evaluated~~considered~~ for addition of the new Producer/Supplier to the WVDOH List of Approved Aggregate Sources. Historic data concerning aggregate quality test results signifying compliance with WVDOH specifications shall be available for review. Any data accepted by MCS&T concerning the quality of the material shall be obtained from an AASHTO re:source accredited laboratory. Quality testing consist of one or more of the fallowing tests. (Los Angeles abrasion, Sodium Sulfate Soundness, Liquid Limit, Plasticity index, and deleterious Material) See applicable test in section 702 and 703 in the WV DOH Standard Specifications.

4.2.1 At their discretion, MCS&T may sample stockpiles currently in production for ~~full~~ quality testing. If the material sampled meets the quality specifications, the stockpile can be approved for use in WVDOH projects. This data will be included with the required 20 sets of data for source approval in the future, if necessary. Any material submitted for use in WVDOH projects shall meet the criteria described in Sections 702, 703 and 704 of the WVDOH specifications for that ~~particular~~ material.

4.2.2 Independent quality testing data shall be evaluated~~verified~~ by MCS&T to ensure compliance with the ~~governing s~~Specifications. All data submitted will be reviewed in the verification process and may be included in the quality testing data compiled by MCS&T.

4.2.3 Records of both the geologic features of the source and historical quality testing data of the products compiled by the producer/supplier, if available, may be submitted to MCS&T for review.

4.2.4 Manufacturing and quality control processes and pertinent historical data shall be made available for review by MCS&T, if requested.

~~4.2.4~~4.2.5 The new Producer/Supplier shall demonstrate that they are capable of producing an E-Ticket as defined in Section 109.20.1 of the Specifications. A sample ticket shall be provided to MCS&T and shall be included on the HL-468 New Products Evaluation form at the time of initial submittal.

4.3 ~~Subsequent to~~After the review of historical and geologic data concerning the material in question, a sampling regimen shall be implemented to continually evaluate the quality of the material over the course of production.

4.4 Acceptance of any material submitted for approval from any potential producer/supplier is left to the discretion of MCS&T.

Commented [MMA5]: Should this be the District Materials Supervisor in the District in which the source is located?

Commented [MMA6]: Commercial and Potential Skid Resistant ?

Commented [MMA7]: Possibly re-word as: "may be used in this evaluation if it is available"

Commented [MMA8]: Do we need to define "quality testing"? (i.e. Soundness, LA Abrasion, Deleterious, etc.)

Commented [MMA9]: I think that we should discuss this. Is "all" data included or just data from an AASHTO re:source accredited lab?
Also, is this an "evaluation" process or an "approval" process?

5. MAINTENANCE OF THE LIST OF COMMERCIAL AGGREGATE SOURCES

5.1 To remain on the WVDOH List of Commercial Aggregate Sources, the following criteria shall apply:

5.1.1 The Pproducer/Ssupplier shall maintain a consistent and satisfactory ~~compliance of the~~ quality of the aggregates according to Sections 702, 703, and 704 of the WVDOH Specifications ~~of Roads and Bridges, Sections 702, 703 and 704 by~~ and shall permit~~ting~~ random, intermittent quality sampling of the aggregate source by MCS&T or a representative of MCS&T. This testing will determine~~s~~ if the approved products continually exhibit the same characteristics and quality as the originally approved material~~.~~ (see MP MP 106.00.03~~700.00.55~~; Guidelines For Establishing And Maintaining Approved Lists Of Materials And Sources, ~~section~~ Section 6)

5.2 If the Pproducer/Ssupplier has not provided any material~~products~~ to any WVDOH projects over a period of 5 consecutive years from the same source, that source will be removed from the WVDOH List of Commercial and Potential Skid Resistant Aggregate Sources. ~~In the event of~~ If an inactive Producer/Supplier~~source~~ re-establishes~~ing~~ production and desires to~~the producer/supplier wishes to~~ regain Division approval~~acceptance~~, ~~they shall refer to~~ sSection 4 of this MP shall apply~~for reconsideration~~.

6. REMOVAL FROM LIST OF COMMERCIAL and poptential AGGREGATE SOURCES

6.1 In the event the Pproducer/Ssupplier does not provide materials in compliance with the ~~governing sS~~pecifications, the following actions shall be taken by the Pproducer/Ssupplier~~,~~ and ~~subsequently by~~ MCS&T, up to and including removal from the List of Commercial and Potential Skid Resistant Aggregate Sources:

6.1.1 Upon testing~~sampling~~ of an aggregate sample ~~source~~ by MCS&T, if the quality test results from that sample do not meet the minimum specifications requirements, then a second test portion shall be split from the original~~same~~ field sample, and it shall be ~~re~~tested. The test results and methods of testing shall then be reviewed for accuracy and precision.

6.1.2 ~~When~~ If the "split" sample in Section 6.1.1 ~~a material, upon reexamination,~~ fails to meet quality requirements ~~WVDOH Specifications, MCS&T shall notify the Pproducer/Ssupplier shall be notified of the failing results and a~~. A second field sample shall be obtained by MCS&T and tested for quality. At this time MCS&T shall notify the Producer/Supplier of the failing results from the previous sample. The results from this sample will determine if further action is needed.

6.1.3 ~~For the second Field sample, f~~Follow the same procedure~~tocol~~ in~~for~~ Section 6.1.1 for t~~t~~he second samples obtained in Section 6.1.2 will be tested for quality requirements as

Commented [BDA10]: DB, MM, where is the quarterly sampling requirement? How many samples tested per year to remain on the list?

Commented [BDA11]: Add e-ticketing here.

Commented [MMA12]: Is this where we want to specify a frequency (i.e. quarterly, annually, etc.)?

Commented [MMA13]: Should this be MP 106.00.03 instead?

Commented [MMA14]: Need to define "quality" tests. See Section 4.2.2.

in section 6.1.1. If the second sample does not meet quality requirements, MCS&T will review the Producer/Suppliers past test results over the last 5 years.

~~6.1.3~~6.1.4 If the source has had zero failing quality test results a third sample will be obtained from the Producer/Supplier by MSC&T and tested for quality as stated in section 6.1.5. In the event the source does have failing results in the past 5 years the source will be contacted with the results and informed they are being taken off the approved Producer/Supplier list. ~~specifications, at the discretion of MCS&T personnel, a third sample may be obtained from the Pproducer/Ssupplier by MSC&T and tested for quality.~~

~~6.1.4~~6.1.5 ~~For the third Field sample, f~~Follow t~~The~~he same protocol ~~in~~for Section 6.1.1 ~~for the~~ third sample obtained in Section 6.1.4~~3~~. will be tested for quality. If the third sample does not meet quality requirements, ~~specifications~~ the following course of action shall be taken: .MCS&T shall notify the Producer/Supplier of the failing results of the third sample and inform the Producer/Supplier of their removal from the approved source list.

6.2 Communication of sample information shall be implemented as follows:

6.2.1 The P~~p~~roducer/S~~s~~upplier shall be notified of what aspect(s) of the samples did not meet Specification requirements~~the deficiency~~, either in writing or via electronic communication (i.e. email).

6.2.2 The 10 District Material Supervisors, the Regional Construction Engineers, the Director of Contract Administration, and the Director of MCS&T shall be notified of what aspect(s) of the samples did not meet Specification requirements ~~the deficiency~~ via electronic communication (~~i.e.~~i.e., email).

6.3 The P~~p~~roducer/S~~s~~upplier of the material in question~~substandard product~~ is then responsible for mitigating the deficiency~~inquency~~ and improving the production quality to comply with the ~~corresponding governing s~~Specifications. Mitigation of substandard materials is not the responsibility of MCS&T; only the verification of the quality of material provided by the P~~p~~roducer/S~~s~~upplier shall be the responsibility of MCS&T.

6.4 The fallowing procedure shall be used by a Producer/Supplier desiring to ~~A supplemental sampling program shall be implemented to confirm the mitigation of the deficiency and shall be coordinated as follows~~return to the Commercial and Potential Skid Resistant source list:

6.4.1 The Producer/Supplier shall supply three passing quality test results from an AASHTO re:source accredited laboratory for quality testing. Once the passing tests have been reviewed by MCS&T personnel, a sampling plan will be implemented by MCS&T to resample the Producer/Supplier.

6.4.2 The sampling plan will consist of six (6) samples to be obtained, either by MCS&T or by a representative of MCS&T and tested for quality. The first three (3) samples shall be obtained every six (6) days of production. The second three (3) samples will be obtained randomly over the fallowing four (4) weeks after the first three (3) samples have been obtained and tested.

6.4 If the samples in Section and 6.4.2 all meet the Specification requirements , the Producer/Supplier shall be notified of compliance, and they shall be included on the next List of Commercial and Potential Skid Resistant Aggregate

a) 6.4.1 If the Pproducer/Ssupplier was previously included on the List of Commercial and Potential Skid Resistant Aggregate Sources, a series of three (3) consecutive samples shall be obtained, either by a WVDOH District technician or if necessary, by a representative of MCS&T. Each of thesenew samples shall be obtained every six (6) days of production to test the quality of the new material. If there is no constant flow of production, then the samples shall be obtained from each stockpile produced (minimum stockpile size of approximately 2000 tons).

b) 6.4.2 After three samples have been tested for full quality, and if they are found to comply with the governing sSpecifications, random, intermittent sampling of the material shall be performed by the adjacent District and sent to MCS&T for verification of quality. The frequency of the intermittent sampling of the material shall be determined by up to the discretion of MCS&T.

c) 6.4.3 If the most recent samples in Section 6.4.1 and 6.4.2 all meet the Specification requirements comply with the corresponding specifications concerning the material, the Pproducer/Ssupplier shall be notified of compliance, conformance and they shall be included on the List of Commercial and Potential Skid Resistant Aggregate Sources for the next fiscal quarter.

d) 6.4.4 If the material continues to fails to meet the corresponding sSpecifications requirements, further action shall be taken, up to and including removal of the Pproducer/Ssupplier from the List of Commercial and Potential Skid Resistant Aggregate Sources.

6.5 If any of the aforementioned quality samples fail quality testing and a new field sample cannot be obtained due to the source not being accessible (due to seasonal closure, lack

Commented [MMA15]: At what point did we remove them from the list? Did we want to remove them in Section 6.2 or 6.3 until they have shown us that they have mitigated the problem, or do we want to say "shall remain on the …"?

Commented [MMA16]: District in which the Producer/Supplier is located?

Commented [MMA17]: At what point did we remove them from the list? Did we want to remove them in Section 6.2 or 6.3 until they have shown us that they have mitigated the problem, or do we want to say "shall remain on the …"?

~~of material for sampling, etc.), then the Pproducer/Ssupplier with be removed from the List of Commercial and Potential Skid Resistant Aggregate Sources until the resampling can be completed.~~

6.4.3 ~~Acceptance protocol detailed in sSection 4 of this MP shall be re-implemented once the deficiency has been mitigated to WVDOH specification minimums and the new materials will be considered for testing.~~

Commented [MMA18]: Does this only apply when a Producer/Supplier is removed (Sections 6.4.4 and 6.5) or any time that mitigation is required (Section 6.3)?

~~6.6~~6.4.4 If any one of the six (6) samples in section 6.4.2 fails to meet quality requirements sampling will be terminated and the producer/Supplier will start at section 6.4.1 again.

7. DOCUMENTATION

7.1 All samples obtained by MCS&T shall be assigned a corresponding laboratory reference number for record keeping, ensuring proper access by MCS&T personnel to pertinent information regarding the materials provided by the ~~p~~Producers/~~s~~Suppliers.

7.2 In the event of recurring failure to meet ~~repeat non-conformance of~~ WVDOH ~~s~~Specifications, the following procedure shall be implemented:

7.2.1 ~~7.2.1~~ A record of communication between the Division and the ~~P~~producer/~~S~~supplier's contact shall be retained for future reference.

~~a)~~

~~b)~~7.2.2 ~~7.2.2~~ The sample (or samples) failing to meet ~~quality sS~~pecification~~s~~ requirements shall be packaged and stored for later access by MCS&T personnel for future reference. Such samples will be stored for no longer than one year from the date testing was performed. The sample containers shall display the lab reference number, the date on which the tests were conducted, the type of material tested, and data revealing what ~~s~~Specification~~s~~ requirements were not met~~out of compliance~~.

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MP 700.00.56 Steward – Aggregate Section
RLS:R

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

MATERIALS PROCEDURE

STANDARD METHOD OF MICROSCOPIC DETERMINATION OF AIR-VOID CONTENT

1. PURPOSE

1.1 To obtain quantitative information concerning air voids, matrix, fine aggregate, and coarse aggregate in hardened concrete.

2. SCOPE

2.1 By using the linear traverse method of point counts, ~~we can determine~~ the relative composition of hardened concrete cylinders or cores on a percentage basis can be determined.~~.~~

3. EQUIPMENT

3.1 A large stone saw.

3.2 A lapidary grinding apparatus.

3.3 A linear traveler apparatus.

3.4 A reflecting illumination system.

3.5 A binocular microscope with a cross hair type reticle. (Magnification preferably in the 10x, 30x, and 60x range).

3.6 Miscellaneous: Silicon carbide grinding material, grit numbers 120, 240, 400 and 600, a set of 4 mechanical specimen counters, or a wet polishing device with similar grit values ranging from 120 to 600, a 305 mm ruler, and a ~~magic~~ permanent marker.

4. PROCEDURE FOR PREPARATION OF CONCRETE SPECIMENS

4.1 The concrete specimens sh~~ould~~all be cut on the large stone saw so as to bisect the cylinder along its longitudinal dimension. Care sh~~ould~~all be taken in avoiding, if ~~possible~~possible, the steel reinforcing bars encountered in bridge deck cores.

4.2 Select the better half of the specimen and make a cut perpendicular to its long axis, 102 mm below the top surface of bridge deck core specimens. If the specimen is a concrete cylinder a 102 mm section from the middle of the cylinder is cut and used for point counting. These operations are done so that the linear traveler specimen holder can accommodate the specimen.

4.3 All portions of the specimen are retained for possible later inspection.

4.4 That portion of the specimen prepared in Section 4.2 is now polished, first using silicon carbide grit number 120, in order to obtain a uniform surface, and subsequent polishing by silicon carbide grit numbers 240, 400 and 600 to obtain a smooth, highly polished surface.

5. OPERATIONAL PROCEDURES USING THE LINEAR TRAVELER

5.1 The polished specimen is placed on the specimen holder of the linear traveler.

5.2 After the specimen is centered on the specimen holder, the specimen shall~~should~~ be leveled, so as to minimize refocusing.

5.3 A right vertical margin and a left vertical margin shall~~should~~ be drawn on the polished surface of the specimen. The placement of each margin is dependent upon the horizontal limits of the linear traveler and the irregularity of the boundaries of the specimen. If an irregularity exists, the corresponding margin is placed along the inner edge of the irregularity.

5.4 A light source shall~~should~~ be directed onto the specimen surface for illumination of the visual field.

5.5 The ~~binocular~~binocular microscope assembly ~~should~~ shall be positioned so that the technician can observe the entire distance between margins as the linear traveler moves horizontally.

5.6 Horizontal movement of the linear traveler is accomplished ~~by pushing the horizontal motion control switch. The direction of horizontal motion is controlled by the directional selector lever located to the left of the specimen holder and in front of the motor housing~~according to the manufacturer's specifications or recommendations. Automated travelers will transition after the previous point is recorded.

5.7 Vertical movement of a manual ~~the~~ linear traveler is accomplished ~~by manually cranking the lower left hand wheel located directly beneath the specimen holder.~~according to the manufacturer's recommendation. For automated travelers, the vertical movement will be executed once the horizontal traveler is returned to the home position.

5.8 By using the controls of the linear traveler, position the specimen while viewing through the microscope at 10x, 30x or 60x magnification, so that the vertical cross hair is in~~on~~ line with one of the vertical margins and the horizontal cross hair is approximately 3.2 mm below the specimen, or 3.2 mm below the deepest penetration of an irregular edge.

5.9 Readjust the light source so as to obtain an adequate field illumination.

5.10 Adjust the ~~directional selector lever~~horizontal linear traveler so that the technician views that portion of the specimen between the margins as the linear traveler moves horizontally.

5.11 Focus the microscope on the specimen surface (periodic refocusing may be necessary).

5.12 Push the horizontal motion control switch so that the linear traveler moves one unit and stops.

5.13 At the intersection of the cross hairs, decide whether the material is an air void, matrix, fine aggregate (-4.75 mm) or coarse aggregate (+4.75 mm) and record the decision on a mechanical specimen counter properly designated.

5.14 Repeat procedures set forth in Sections 5.12 and 5.13 for the entire width of the specimen between the margins.

5.15 When the vertical cross hair reaches a margin after traversing the specimen, reverse the horizontal direction on a manual traveler ~~using the directional selector lever and crank the vertical control wheel two complete revolutions clockwise.~~according to the manufacturer's specifications. For an automatic traveler, follow the manufacturer prompts to return the horizontal traveler to the beginning of the traverse, and follow the manufacturer prompt to allow the vertical traveler to transition to the next row for testing.

5.16 Repeat procedures set forth in Sections 5.14 and 5.15 until the total number of point counts indicated on the mechanical specimen counter equals 600.

6. COMPOSITION PERCENTAGES

6.1 Each category such as air void content, matrix, fine aggregate (-4.75 mm), and coarse aggregate (+4.75 mm), is expressed as a percentage of total number of point counts.

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MP 700.03.50 Steward – Cement and Concrete Section
RLS:T

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS DIVISION

MATERIALS PROCEDURE

PROCEDURE FOR DETERMINING THE RANDOM LOCATION OF COMPACTION TESTS

1. PURPOSE

1.1 This procedure provides methods for determining the random locations for compaction tests.

2. SCOPE

2.1 This procedure is applicable for locating all compaction tests.

3. EQUIPMENT

3.1 Measuring tape, approximately 50 feet.

4. DEFINITIONS

4.1 Test Section- A test section shall be 100 feet long (in an unrestricted area) by the width of the placed material. Test sections are used to determine the maximum density and optimum moisture content of the material using the roller pass method. There are five test subsections in a test section. In a restricted area, the test section shall be the largest area possible within the bounds of the placed material.

~~3.1~~4.2 Lot- A lot shall be 2,000 feet long by the width of the material being placed. Lots are used for quality control and testing purposes on a project. There shall be five sublots in a lot, and the compaction results from the sublots are compared to the test section results. (e.g. lot and sublot results are considered to be relative density, which is due to comparing those results to the maximum density results gathered from the test section.)

~~4.~~5. PROCEDURE

~~4.1~~5.1 Compaction test site locations are to be randomly located along the roadway centerline (length) and offset (width) randomly from this reference line. Some test site locations, such

as pipe backfill, require random selection of lifts for the tests and a random determination of the side of the pipe backfill to test.

~~4.2~~5.2 Selection of random numbers

~~4.2.1~~5.2.1 Determine the number of test sites which will be required for the lot or test section.

~~4.2.2~~5.2.2 The table of random numbers (Table I attached) or a calculator, which will generate random numbers, can be used.

~~4.2.3~~5.2.3 The table of random numbers contains 5 sections with 2 columns of numbers in each section.

~~4.2.3.1~~5.2.3.1 The first column of numbers in each section is for determining the test site along the centerline. The second column of numbers is for determining the distance from the centerline (offset). Either column of numbers can be used for selecting lifts to be tested.

~~4.2.3.2~~5.2.3.2 To use the table, select a random point on the table by tossing a pencil upon the page or blindly pointing out a location with the finger. The selection of random numbers will consist of a pair of random numbers. Once the point is located, select the number in the first column for the length and the corresponding number in the right column for the width. When more than one pair of random numbers is needed, continue selecting the pairs of numbers down the page. If the bottom of the page is reached, go to the top of the next section to the right or to the top of the first section on the left side of the page if the bottom of the right most section of the page is reached. When selecting lifts to be tested, only single random numbers are needed and can be obtained from any of the columns of numbers.

5.2.3.3 To use a calculator, which will generate random numbers, select all numbers needed for a test site before selecting numbers for additional test sites.

~~4.2.3.3~~5.2.3.4 Round to the nearest whole number when calculating the test site location. If the test site falls on the edge of the lot or sublot, move 2 feet into the lot and perform the test at that location. Alternatively, a new set of random numbers can be used to avoid this occurrence.

~~4.3~~5.3 Location of test sites

~~4.3.1~~5.3.1 There are many variations in the required number of tests and the physical dimensions of the area to be tested.

~~4.3.2~~5.3.2 Random location of tests on a single lift that rectangular in shape (Example 1 of Attachment).

~~4.3.2.1~~5.3.2.1 Generally, the Materials Procedure used for testing a material and/or Specifications requires a lot, portion of a lot, or a test section to determine the maximum compacted density of a material to be divided into equal sublots or subsections when more than one test is required.

~~4.3.2.2~~5.3.2.2 Divide the length of the area along the centerline by the number of tests to determine the length of each sublot or subsection.

~~4.3.2.3~~5.3.2.3 From the beginning station number, add the length of the subsection or sublot to the station number to determine the station number for the beginning of the next sublot or subsection. Next add the length of the subsection or sublot to this station number to determine the station number at the beginning of the next subsection or sublot. Continue this procedure until the beginning station numbers for all subsections or sublots have been calculated.

~~4.3.2.4~~5.3.2.4 Select the random numbers according to ~~4.2 through 4.2.3.3~~section 4.2.

~~4.3.2.5~~ Multiply the length of the subsections or sublots by the random numbers selected for the length.

~~4.3.2.6~~5.3.2.5 Add the values to the corresponding station numbers for the beginning of each subsection or sublot. The station numbers locate the test sites along centerline.

~~4.3.2.7~~ Next multiply the width of the test section or lot by the random numbers selected for the offset.

~~4.3.2.8~~5.3.2.6 Determine the offset distance of the lot or test section from the centerline when the centerline is not within the area to be tested. This will usually be a constant value. Always calculate the offset by working from the side nearest the centerline. Add each of the values calculated in 4.34.2.7 to the constant value. The values establish the offset distance of each test site from the centerline. Designate ~~rather~~ if the offset is left or right of centerline.

5.3.2.7 When the centerline is contained within the area to be tested, the offset can be calculated from the left or right side of the test area and test location designated in relation to centerline.

~~4.3.3~~5.3.3 Random location of test sites on a single lift that is irregular in shape (Example 2 –attached).

~~4.3.3.1~~5.3.3.1 Determine the dimensions of the area to be tested.

~~4.3.3.2~~5.3.3.2 Determine the minimum dimensions of a rectangle that will contain the area to be tested and has two sides parallel to centerline.

~~4.3.3.3~~5.3.3.3 Divide the rectangle into the desired number of subsections or sublots and randomly locate the test sites locations as in sections 4.3.2. ~~– 4.3.2.8 above.~~ If a test site location falls outside the area to be tested, obtain a new set of random numbers for the test site and recalculate the test site location. Continue this procedure until the test site falls within the area to be tested.

5.3.4 Random selection of lifts to be tested (Example 3 attached).

5.3.4.1 When testing certain materials, especially backfill material, where an area to be backfilled will constitute a lot of material to be tested, a random selection of lifts shall be tested.

5.3.4.2 Determine the projected number of lifts to be contained within the lot. Divide the number of lifts by the number of tests in the lot. If the value is not an even number, assign an additional lift to the first sublot and continue to assign a lift to each consecutive sublot until all remaining lifts have been assigned to a sublot.

5.3.4.3 By starting with the bottom lift, number the lifts in the lot, select a single random number for each test site.

5.3.4.4 Multiply each random number by the number of lifts in each sublot and round the values to whole numbers. Each value designates which lift in each sublot that will be tested.

5.3.4.5 Once the lifts to be tested have been selected, the random location of the test site on the lift can be determined.

5.3.4.6 The test site can be found by multiplying the length of the back fill by the random number selected from the table.

5.3.5 Random selection of the side of backfill for pipe culverts.

5.3.5.1 When a lot of pipe backfill is being tested, tests should be performed on both sides of the pipe. The side to be tested can be randomly selected by using the random numbers selected for the location of the tests along the pipe. If the random number is less than 0.500, the test is on the left side and greater than or equal to 0.500 on the right side of the pipe.

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~~4.3.3.4~~

~~4.3.2.1 When testing certain materials, especially backfill material, where an area to be backfilled will constitute a lot of material to be tested, a random selection of lifts to be tested is required.~~

~~4.3.2.2 Determine the projected number of lifts to be contained in the lot. Divide the number of lifts by the number of tests in the lot. If the value is not an even number, assign an additional lift to the first sublot and continue to assign a lift to each consecutive sublot until all remaining lifts have been assigned to a sublot.~~

~~4.3.2.3 By starting with the bottom lift, number the lifts in the lot.~~

~~4.3.2.4 Select a single random number for each test site.~~

~~4.3.2.5 Multiply each random number by the number of lifts in each sublot and round the values to whole numbers. Each value designates which lift in each sublot that will~~

~~be tested.~~

~~4.3.3.5 Once the lifts to be tested have been selected, the random location of the test site on the lift can be determined.~~

~~4.3.3.6 Random selection of the side of backfill for pipe culverts.~~

~~4.3.3.6.1 When a lot of pipe backfill is being tested, tests should be performed on both sides of the pipe. The side to be tested can be randomly selected by using the random numbers selected for the location of the tests along the pipe. If the random number is less than 0.500, the test is on the left side and greater than 0.500 on the right side of the pipe.~~

~~MP 712.21.26 Steward – Asphalt Section~~
~~RLS:J~~
~~ATTACHMENT~~

TABLE 1 RANDOM NUMBERS

.858	.082	.886	.125	.263	.176	.551	.711	.355	.698
.576	.417	.242	.316	.960	.819	.444	.323	.331	.179
.687	.288	.835	.636	.596	.174	.866	.685	.066	.170
.068	.391	.739	.002	.159	.423	.629	.631	.979	.399
.140	.324	.215	.358	.663	.193	.215	.667	.627	.595
.574	.601	.623	.855	.339	.486	.065	.627	.458	.137
.966	.529	.757	.308	.025	.836	.200	.055	.510	.656
.608	.910	.944	.281	.539	.371	.217	.882	.324	.284
.215	.355	.645	.460	.719	.057	.237	.146	.135	.903
.761	.883	.771	.388	.928	.654	.815	.570	.539	.600
.869	.222	.115	.447	.658	.989	.921	.924	.560	.447
.562	.036	.302	.673	.911	.512	.972	.576	.838	.014
.481	.791	.454	.731	.770	.500	.980	.183	.385	.012
.599	.966	.356	.183	.797	.503	.180	.657	.077	.165
.464	.747	.299	.530	.675	.646	.385	.109	.780	.699
.675	.654	.221	.777	.172	.738	.324	.669	.079	.587
.279	.707	.372	.486	.340	.680	.928	.397	.337	.564
.338	.917	.942	.985	.838	.805	.278	.898	.906	.939
.316	.935	.403	.629	.130	.575	.195	.887	.142	.488
.011	.283	.762	.988	.102	.068	.902	.850	.569	.977
.683	.441	.572	.486	.732	.721	.275	.023	.088	.402
.493	.155	.530	.125	.841	.171	.794	.850	.797	.367
.059	.502	.963	.055	.128	.655	.043	.293	.792	.739
.996	.729	.370	.139	.306	.858	.183	.464	.457	.863
.240	.972	.495	.696	.350	.642	.188	.135	.470	.765

EXAMPLE 1~~I ENGLISH~~

Length of test section = 100 ft Width of section = 10 ft
Number of tests required = 5
4 equal subsections 100/5 = 20 ft
Test section starts at station 5+46

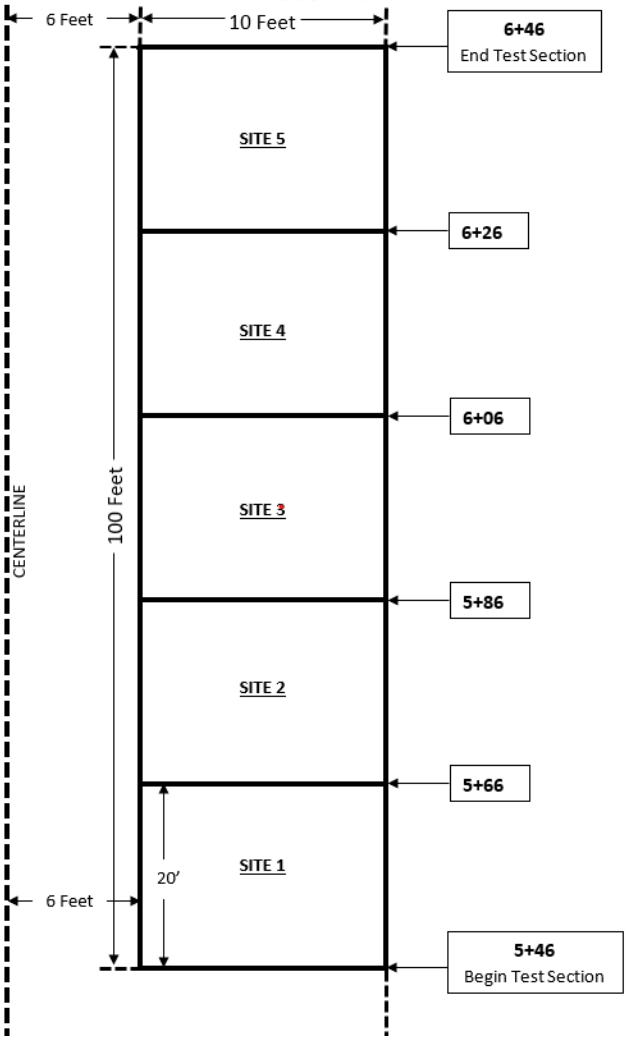
Station number at the beginning of each subsection
A. ~~1.~~ 5+46
B. ~~2.~~ 5+46 + 20 = 5+66
C. ~~3.~~ 5+66 + 20 = 5+86
D. ~~4.~~ 5+86 + 20 = 6+06
E. ~~5.~~ 6+06 + 20 = 6 +26

Random Numbers

	Length	Width
A.	~~1.~~ .869	.222
B.	~~2.~~ .562	.036
C.	~~3.~~ .481	.791
D.	~~4.~~ .599	.966
E.	~~5.~~ .464	.747

Multiply the length of each subsection by the random numbers for the length.
A. ~~1.~~ 20 x .869 = 17
B. ~~2.~~ 20 x .562 = 11
C. ~~3.~~ 20 x .481 = 10
D. ~~4.~~ 20 x .599 = 12
E. ~~5.~~ 20 x .464 = 9

Add the values to the beginning station numbers of each subsection to determine the station number for each test.
A. ~~1.~~ 5+46 + 17 = 5+63
B. ~~2.~~ 5+66 + 11 = 5+77
C. ~~3.~~ 5+86 + 10 = 5+96
D. ~~4.~~ 6+06 + 12 = 6+18
E~~5~~. 6+26 + 9 = 6 +35



Multiply the width of each subsection by the random numbers for the width.

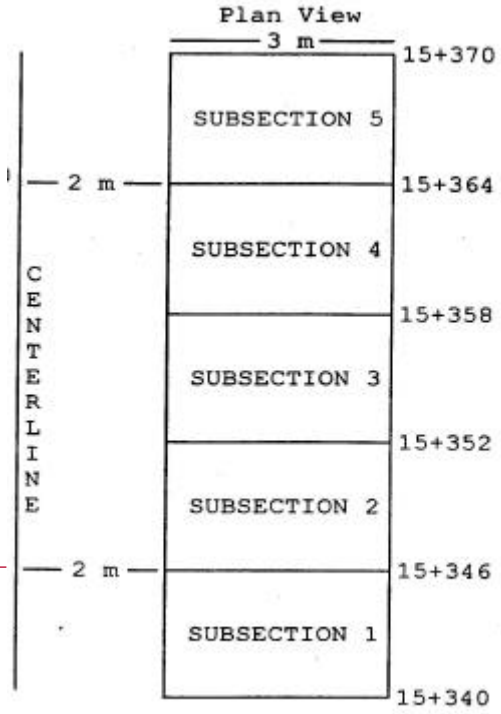
A. ~~1.~~ 10 x .222 = 2
B. ~~2.~~ 10 x .036 = 0
C. ~~3.~~ 10 x .791 = 8
D. ~~4.~~ 10 x .966 = 10
E. ~~5.~~ 10 x .747 = 7

Add the values to the constant distance the test section is from the centerline and label the values as right of centerline .

A. 6 + 2 = 8 ft right of centerline
B. 6 + 0 = 0 ft right of centerline (Test shall still be taken fully in the sublot)
C. 6 + 8 = 14 ft right of centerline
D. 6 + 10= 16 ft right of centerline
E. 6 + 7 = 13 ft right of centerline

~~EXAMPLE I~~
~~METRIC~~

~~Length of test section = 30.00 m~~
~~Width of section = 3.00 m Number of tests required = 5~~
~~5 equal subsections 30/5 = 6 m Test section starts at station 15+340~~



~~Station number at the beginning of each subsection~~

1. ~~15+340~~
2. ~~15+340 + 6 = 15+346~~
3. ~~15+346 + 6 = 15+352~~
4. ~~15+352 + 6 = 15+358~~
5. ~~15+358 + 6 = 15+364~~

~~Random Numbers~~

~~Length~~	~~Width~~
~~1. .869~~	~~.222~~
~~2. .562~~	~~.036~~
~~3. .481~~	~~.791~~
~~4. .599~~	~~.966~~
~~5. .464~~	~~.747~~

~~Multiply the length of each subsection by the random numbers for the length.~~

1. ~~6.00 x .869 = 5.2~~
2. ~~6.00 x .562 = 3.4~~
3. ~~6.00 x .481 = 2.9~~
4. ~~6.00 x .599 = 3.6~~
5. ~~6.00 x .464 = 2.8~~

~~Add the values to the beginning station numbers of each subsection to determine the station number for each test site.~~

1. ~~15+340 + 5.2 = 15+345.2~~
2. ~~15+346 + 3.4 = 15+349.4~~
3. ~~15+352 + 2.9 = 15+354.9~~
4. ~~15+358 + 3.6 = 15+361.6~~
5. ~~15+364 + 2.8 = 15+366.8~~

~~Multiply the width of the test section by the random numbers for the width.~~
~~1. 3.00 x .222 = 0.7~~
~~2. 3.00 x .036 = 0.1~~
~~3. 3.00 x .791 = 2.4~~
~~4. 3.00 x .966 = 2.9~~
~~5. 3.00 x .747 = 2.2~~

~~Add the values to the constant distance the test section is from the centerline — and label the values as right of centerline.~~
~~1. 2.00 + 0.7 = 2.7 m rt of centerline~~
~~2. 2.00 + 0.1 = 2.1 m rt of centerline~~
~~3. 2.00 + 2.4 = 4.4 m rt of centerline~~
~~4. 2.00 + 2.9 + 4.9 m rt of centerline~~
~~5. 2.00 + 2.2 = 4.4 m rt of centerline~~

EXAMPLE 2 ~~METRIC~~

The shaded area designates the lift to be tested. For this example, 2 sublots are required with 1 test in each sublot.

Since the area to be tested is not rectangular in shape, place the smallest rectangle around the area that will include all the shaded area.

Divide the rectangle into 2 equal areas (160 feet long by 90 feet wide).

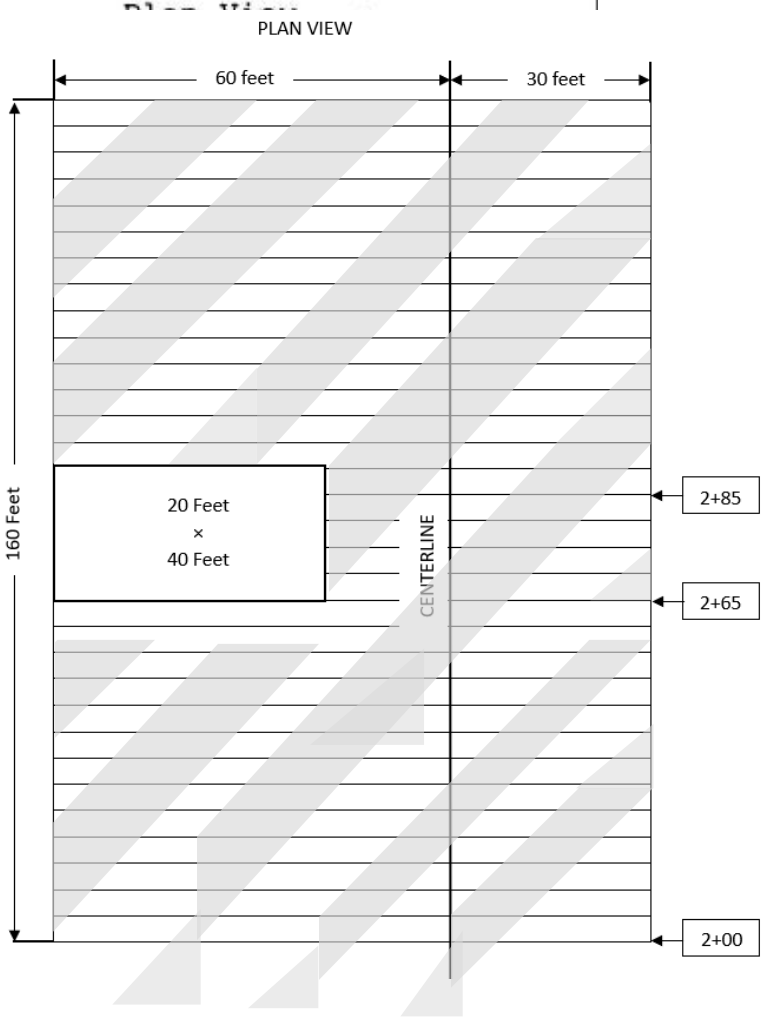
Since the centerline is located within the area to be tested, the offset can be calculated and measured from either side.
For this example, work from the right side.

Determine the station number for the beginning of ~~-~~each sublot.

~~-~~Sublot No. 1 2~~.~~+00
Sublot No. 2 2+00 + 80 = 2+80

Random Numbers
Since there is the possibility that the location of a ~~-Length Width~~ test site may fall outside the area to be tested, an additional set of random numbers was selected.

	Length	Width	
A.	.902	.850	~~additional set of random numbers was selected.~~
B.	.275	.023	
C.	.794	.850	



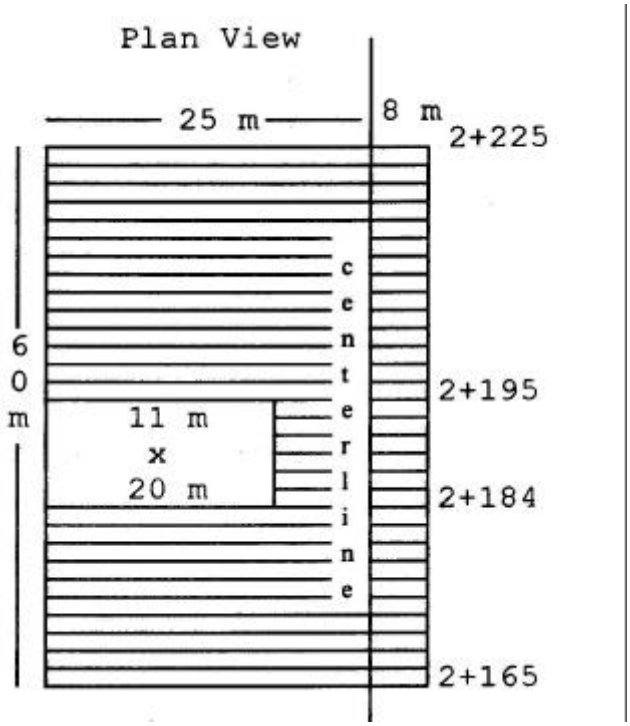
Multiply the random number by the length of the sublot (80 x .902 = 72 feet). Add the value of the beginning station number (2+00 + 72 = 2+72). Multiply the width of the sublot by the random number (90 x .850 = 76 feet). By working from the right side, it is 30 feet to the centerline, therefore the test site is 76 – 30 = 46 feet to the left of centerline. The test site falls outside the test area.

By using the next set of random numbers, calculate the test site location.
80 x .275 = 22 feet
2+00 + 22 = 2+22
90 x .023 = 2 feet
30 – 2 feet = 28 feet right of centerline

The test site for sublot 1 now falls within the test area.

Calculate the test location for sublot 2.
80 x .794 = 64 feet
2+80 + 64 = 3+44
90 x .850 = 76 feet
76 - 30 = 46 feet left of centerline

EXAMPLE 2
METRIC



The shaded area designates the lift to be tested. For this example, 2 sublots are required with 1 test in each sublot.

Since the area to be tested is not rectangular in shape, place the smallest rectangle around the area that will include all the shaded area.

Divide the rectangle into 2 equal areas (30 m long by 33 m wide).

Since the centerline is located within the area to be tested, the offset can be calculated and measured from either side. For this example, work from the right side.

Determine the station number for the beginning of each sublot.

Sublot No. 1 2.+165
Sublot No. 2 2+165 + 30 = 2+195

Random Numbers Since there is the possibility that the location Length Width of a test site may fall outside the area to be

.902	.850
.275	.023
.794	.850

tested, an additional set of random numbers was selected.

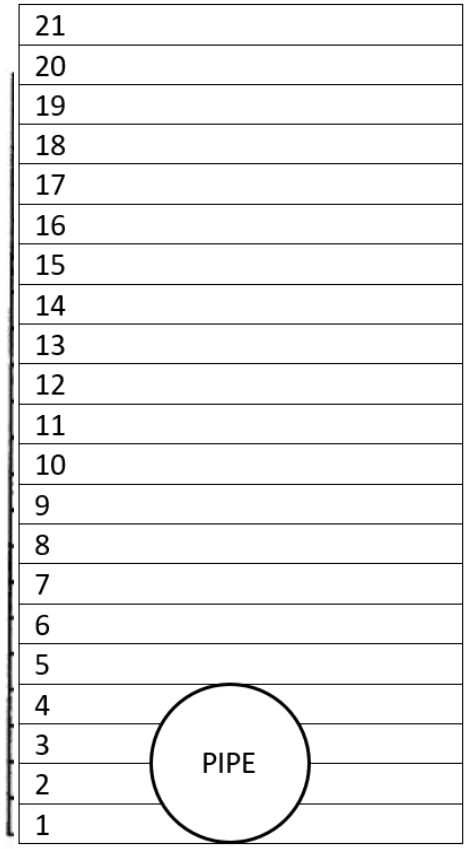
Multiply the random number by the length of the sublot (30 x .902 = 27.1 m). Add the value of the beginning station number (2+165 + 27.1 = 2+192.1). Multiply the width of the sublot by the random number (33 x .850 = 28.1 m). By working from the right side, it is 8 m to the centerline, therefore the test site is 28.1 – 8 = 20.1 m to the left of centerline. The test site falls outside the teSt area.

By using the next set of random numbers, calculate the test site location. 30 x .275 = 8.2 m 33 x .323 = 0.8 m
2+165 + 8.2 = 2+173.2 8 – 0.8 m = 7.2 m right of centerline The test site for sublot 1 now falls within the test area.

Calculate the test location for sublot 2
30 x .794 = 23.8 m 33 x .850 = 28.0 m
2+195 + 23.8 = 2+218.8 28 – 8 = 20 m left of centerline

EXAMPLE 3

CROSS SECTION OF PIPE BACKFILL



21 lifts of material are required to backfill the pipe.

All of the backfill material is included in 1 lot. There are 5 tests required with 1 test in each sublot.

Divide the number of lifts by the number of sublots to determine the number of lifts in each sublot (21/5 = lifts with 1 lift left over). This includes the lift in sublot number 1.

Sublot Number 1	Lifts 1 – 5
Sublot Number 2	Lifts 6 - 9
Sublot Number 3	Lifts 10 - 13
Sublot Number 4	Lifts 14 - 17
Sublot Number 5	Lifts 18 – 21

Random numbers

A. ~~1.~~ .599
B. ~~2.~~ .464
C. ~~3.~~ .675
D. ~~4.~~ .279
E. ~~5.~~ .338

Multiply the number of lifts in the sublot by the random numbers.

The values determine which lift in each sublot to test.

~~1.~~ A. 5 x .599 = 3	Test lift 3 in sublot number 1, Lift number 3
~~2.~~ B. 4 x .464 = 2	Test lift 2 in sublot number 2, Lift number 7
~~3.~~ C. 4 x .675 = 3	Test lift 3 in sublot number 3, Lift number 12
~~4.~~ D. 4 x .279 = 1	Test lift 1 in sublot number 4, Lift number 14
~~5.~~ E. 4 x .338 = 1	Test lift 1 in sublot number 5, Lift number 18

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

MATERIALS PROCEDURE

PROCEDURE FOR DETERMINING AN ADJUSTED PAY QUANTITY RESULTING FROM EXCESS MOISTURE IN AGGREGATES

1. PURPOSE

1.1 To provide a method to determine adjusted pay quantity to be used in those cases where excess moisture in aggregate has been confirmed. In this method, the pay quantity will be considered to be the net weight of the aggregate determined in Tons ~~Megagrams~~ delivered.

2. SCOPE

2.1 This procedure is applicable to aggregate furnished ~~under~~ for Purchase Order Contracts.~~Maintenance Purchasing Requisitions~~.

3. DEFINITION OF TERMS

3.1 Normal Moisture Content - the moisture content (on the basis of ASTM Method C-566) of stocked aggregate as it would generally exist under field conditions over an extended period of time.

4. PROCEDURE

4.1 In the event it has been determined by ASTM Method C-566 that an aggregate type has a moisture content in excess of that which is listed and designated as "Normal Moisture Content" for that type in Table 1, the pay quantity represented shall be adjusted in accordance with 4.2.

TABLE 1- NORMAL MOISTURE CONTENT MOISTURE PERCENTAGE

TYPE	CLASS 1 & 2	GRADED**	FINE
Limestone	5.0	1.0	5.0
Gravel	3.5	1.0	
Sand			5.0
Sandstone	5.0	1.0	5.0
Slag*	6.0	2.1	7.0
Cinders			10.0
Boiler Slag			10.0
Steel Stag	4.0	1.0	5.0

*Blast Furnace Slag
**AASHTO Sizes No. 1 through No. 9, Class 7 Gabions and Shot Rock

4.2 The adjusted pay quantity shall be calculated by comparing the normal moisture content with the actual moisture content.

The adjusted pay quantity calculation would be:

$$\boldsymbol{APQ} = ~~\textit{Megagrams}~~\underline{\textit{Tons}} \times \left(\frac{\boldsymbol{1 + M_N}}{\boldsymbol{1 + M_A}}\right)$$

Where: $APQ = Adjusted\,Pay\,Quantity$

$~~\textit{Megagrams}~~\underline{\textit{Tons}} = Net\,Weight\,Delivered$

$$M_N = \frac{Normal\ Moisture\ Content}{100}$$

$$M_A = \frac{Actual\ Moisture\ Content}{100}$$

4.3 Example

Net weight of graded limestone delivered = 13.6 ~~Megagrams~~

Tons

Actual moisture content = ___3 percent

Normal moisture content =__-1 percent

$$APQ = 13.6 \times \left(\frac{1 + .01}{1 + .03}\right)$$

$$APQ = 13.6 \times \left(\frac{1.01}{1.03}\right)$$

$$APQ = 13.6 \times (0.98058)$$

$$APQ = 13.3\ \textit{~~Megagrams~~Tons}$$

In this case the adjusted pay quantity would be 13.3 ~~Megagrams~~ Tons instead of ~~the~~ 13.6 ~~Megagrams~~Tons.

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MP 700.00.22 Steward – Aggregate & Soils Section
RLS:M

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

MATERIALS PROCEDURE

GUIDE FOR QUALITY CONTROL AND ACCEPTANCE PLANS FOR PURCHASE ORDER CONTRACTS FOR STONE AND AGGREGATE

1. PURPOSE

1.1 Testing of highway construction materials has traditionally been a two phased activity; that is, that done by industry in their Quality Control Program and that done by the purchaser to determine the acceptability of the material. In Purchase Order contracts for stone and aggregate, the vendor (whether or not he or she is actually the producer) is by positive statement in the contract specifications responsible for the gradation of all items except abrasives; and the Division of Highways, as purchaser, is responsible for material acceptance. The purpose of this Materials Procedure is to present guideline for adequate Quality Control and Acceptance Plans.

2. QUALITY CONTROL PLAN

2.1 A quality Control Plan shall be prepared by the vendor and submitted to the Division prior to delivery of any material. The Plan shall clearly describe the methods by which the Quality Control Program will be conducted. As a minimum, the Quality Control Plan should include the following:

2.1.1 Name of company official responsible for Quality Control, and name and qualifications of technician conducting the tests.

2.1.2 Listing of items to be controlled and tests to be performed. Each item should be listed separately.

2.1.3 The Plan should detail the vendor's proposed sampling location, sampling and testing procedure and testing frequency. In the event the vendor is not the producer, sampling location, sampling and testing procedure and test frequency proposed by the producer shall be included.

2.1.4 The Documentation Plan: The methods by which the vendor will document and distribute test results shall be described:

2.1.4.1 Forms and Distribution: All forms used to record the vendor's test data shall be approved prior to use by the Division. Gradation test data will be recorded on Form T300 in the manner intended. In the event the vendor elects to use a form other than T300 said form must be approved by the Division prior to use. The laboratory number (supplied by the Division) assigned to the vendor's test data document will always begin with a "C" for all quality control sample results. In the event the vendor is not the producer, the vendor shall provide the completed test data forms provided by the producer, and in the proper sequence (consecutive tests) including

quantities thereof. All test data forms shall include the vendor's (and/or the producer's) identification and be legibly signed by the technician that conducted the test. A copy of all forms shall be delivered by the vendor to the Division. Tests results must be delivered as they are finished to assure that all the results for material delivered are completed and distributed by the fulfillment of the State Contract Purchase Order (SCO).

2.1.5 A detailed plan of action regarding the disposition of non-specification material: Such a plan shall provide for immediate notification of all parties involved in the event failing material is detected.

3. ACCEPTANCE PLAN

3.1 The contract specification states the vendor is responsible for providing test results to the gradation of the materials delivered (except abrasives); acceptance may be ~~on the basis of~~based on these test results, ~~provided~~provided, and certified by the vendor. Acceptance may also be accomplished by an independent sampling and testing program conducted by the Division and at the appropriate sampling frequency given in the contract specifications, or a combination of both the vendor's test results and the Division's test results. In this case (combination acceptance), the Divisions independent samples and tests may be directly compared to the vendor's results only if all sampling locations and testing procedures are the same.

3.2 Sampling and testing for quality ~~(LA, soundness, etc.)~~ of all items is the responsibility of MCS&T or a ~~representative~~ of MCS&T~~the Division~~. Quality testing consist of one or more of the fallowing tests. (Los Angeles Abrasion, Sodium Sulfate Soundness, Liquid Limit, Plasticity Index, and Deleterious Material) See applicable test in section 702 and 703 in the WV DOH Standard Specifications.

~~3.2~~

Commented [DB1]: Reference the "Full Quality" MP.

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MP 700.00.51 Steward – Aggregate & Soils Section
RLS:M

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

MATERIALS PROCEDURE

PROCEDURE FOR DETERMINING A REDUCED UNIT PRICE TO BE PAID FOR SELECT MATERIAL FOR BACKFILLING WHICH DOES NOT CONFORM TO GRADING REQUIREMENTS OF GOVERNING SPECIFICATIONS

1. PURPOSE

1.1 To define a range of nonconformance in the grading of aggregates used for Select Material for backfilling which would require a special investigation (DMIR) of the aggregate ~~necessitate~~or ~~-~~its removal from the project, and provide a procedure for reducing the price to be paid for said aggregate. When more than one sample is taken in succession, this procedure is applicable to MP 300.00.51: "Procedural Guidelines for Maintaining Control Charts". In some cases, however, because of the nature of the item, only one sample is taken. In this regard a control chart may not be ~~necessary~~necessary, and conformance will be based on the results of the single sample.

2. SCOPE

2.1 This procedure shall apply only to those aggregates specified for use as Select Material for Backfilling.

3. DEFINITION OF TERMS

3.1 Sublot - The quantity of material represented by a single test value.

3.2 LOT - The quantity of material represented by an average test value.

3.3 In those cases where only one sample is taken to represent the total quantity the sublot and LOT will be considered the same.

4. DESIGNATION OF QUANTITIES FOR EQUITABLE PRICE ADJUSTMENT

4.1 When an average gradation test value, or three individual test values, fall outside the limits of the Specifications, the LOT of material represented thereby is considered to be nonconforming to the extent that the last of its sublots is nonconforming. When a lot of material is nonconforming, then the last sublot contained therein shall have its price adjusted in accordance with Table 1. In no event, however, shall a sublot of material have its price adjusted more than once, and the first adjustment which is determined shall apply.

4.2 When only one sample is taken to represent the total quantity of material used, and any sieve value falls outside the limits of the specification, the material represented thereby is considered to be nonconforming. This material shall have its price adjusted in accordance with Table 1.

5. DEGREE OF NONCONFORMANCE

5.1 When a sublot of material is to have its price adjusted, the percentage point difference between the nonconforming test value and the specification limit shall be determined for each sieve determined to be nonconforming (nonconforming as described in 4.1 above), and this value shall be compared to Table 1. The total measure of the degree of nonconformance is, therefore, the sum of nonconformance on the two sieve sizes of the sublot.

Table 1

Degree of Nonconformance	Percent of Contract Price to be Reduced
1.0 to 3.0	2
3.1 to 5.0	4
5.1 to 8.0	7
8.1 to 12.0	11
Greater than 12.0	*

~~Table 1~~

~~Degree of Nonconformance~~	~~Designated Action~~
~~1.0 to 3.0~~	~~Reduced Price 2%~~
~~3.1 to 5.0~~	~~" " 4%~~
~~5.1 to 8.0~~	~~" " 7%~~
~~8.1 to 12.0~~	~~" " 11%~~

6. DETERMINATION OF EQUITABLE ADJUSTMENT

6.1 When the total degree of nonconformance has been established and it is 12.0 or less, the designated action shall be initiated from Table 1. ~~—~~When the degree of nonconformance for a sublot is greater than 12.0, a special investigation (DMIR) shall be performed within 14 calendar days of determining the degree of nonconformance. If the special investigation is not performed in 14 calendar days, said sublot will not be incorporated into the project, and in fact, removed from the project as soon as possible.

7. METHOD OF ACCOUNTING AND CHANGE ORDER PREPARATION

7.1 Equitable reductions for nonconformance will be determined, for each lot or sublot. These adjustments may be processed with a single change order when the item is complete by tabulating the data for all nonconforming sublots, and preparing the change order for the total dollar adjustment shown on the tabulation. A copy of the tabulation should accompany and be made a part of the change order.

7.2 Dollar reduction shall be calculated by (A) quantity ×~~x~~ (B) % reduction from Table 1 ×~~x~~ (C) unit contract price. (A sample tabulation sheet is attached).

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MP 212.02.20 Steward – Aggregate & Soils Section
RLS:M
ATTACHMENT

Equitable Reduction Procedure

TABULATION OF EQUITABLE REDUCTIONS (partial)

Sublot Identity (Note 1)	Quantity (A)	Degree of Nonconformance	Price Reduction (B)	Unit Contract Price (C)	Dollar Reduction From Contract (A)×(B)×(C)
	800 FT^3	7.5	7%	3.50	196.00
	200 FT^3	2.6	2%	3.50	14.00
	500 FT^3	5.0	4%	3.50	70.00

Subtotal (1) (Note 2) $280.00

	1000 FT^3	1.2	2%	3.50	70.00
	1000 FT^3	11.7	11%	3.50	385.00

Subtotal (2) (Note 2) $455.00

Total Reduction (Note 3) $735.00

Note 1: Station numbers may also be used to identify sublots.

Note 2: These subtotals should be made at the end of contract pay periods, and the subtotal amounts deducted from contract payments on a current basis.

Note 3: This total reduction should be processed in one change order when the construction of the item is complete.

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

MATERIALS PROCEDURE

CONTRACTOR'S QUALITY CONTROL FOR SURFACE WATER AND SAMPLING PROCEDURES FOR QUALITY DETERMINATION

1. PURPOSE

1.1 The purpose of this procedure is to establish practices for the Contractor's Quality Control System for surface waters. This procedure is intended to be used in designing an adequate Quality Control Plan for the sampling, testing, and evaluation of surface water quality during construction.

1.2 This procedure includes the requirements for methods to be used in collecting samples and conducting testing. Also, procedures are established that outline actions to be taken if the water quality is not maintained.

2. REFERENCED DOCUMENTS

2.1 *Other Standards:*

a. ~~MP 642..40.20~~EPA Quality Assurance Project Plan Development Tool,www.epa.gov/quality/quality-assurance-project-plan-development-tool, Quality Assurance Project Plan Development Tool | US EPA

b. West Virginia Administrative Regulations, State Water Resources Board, Chapter 20-5 and 20-5A, Series I

c. Environmental Water: Quality Check Form (Attachment 2)

Commented [1]: MP 642.40.20 Analysis of Water has been deactivated. The EPA QA tool is used to assist in the development of a QA plan that meets EPA requirements for projects that involve surface or groundwater monitoring and/or the collection and analysis of water samples.

3. REQUIREMENTS AND GUIDELINES

3.1 General Requirements: The Contractor will design a Quality Control Plan to include tests, methods, and frequency of sampling. The plan will be submitted to the Engineer at the Pre-Construction Conference and a plan must be approved by the District Materials Section before construction may begin. The Contractor's Quality Control results of the surface water testing, both field and laboratory, will be documented and copies will be provided to the Engineer throughout the life of the contract.

3.1.1 The Quality Control Plans shall be updated as needed during the life of the contract. The updating will be done by the Contractor as directed by the project Engineer/Supervisor. The updating shall be approved by the District Construction Division.

3.1.2 The Contractor will assign a qualified technician to each project to perform and document the sampling and testing.

3.1.2.1 A qualified technician is defined as a person who is knowledgeable and trained in the sampling and testing of surface waters for those tests as stated in Section 4.3 of this procedure. A resume of the technician's experience in the water quality sampling and testing must accompany the Quality Control Plan. If found inadequate, the technician will be replaced by the Contractor or be given additional training so that sampling and testing is adequately performed.

3.2 Quality Control Plan: The plans will clearly describe the methods by which the Quality Control Program will be conducted. As a minimum, and acceptable plan will include the following:

3.2.1 Name of company official for the specific project who is responsible for the Quality Control and liaison with the Division project personnel. Also the name of the person(s) actually conducting sampling and testing. Sampling and testing will be conducted by a qualified technician and such duties are to be this person's primary assignment.

3.2.2 The tests and type of equipment to be used in sampling and testing will be listed along with accepted methods.

3.2.3 The number and locations of sampling points shall be identified. This may need to be updated frequently during the course of the project.

4. QUALITY CONTROL BY THE CONTRACTOR

4.1 Quality Control testing of the surface waters will be performed by the Contractor. Sampling and testing will be conducted on those surface waters within the Division of Highways project areas and in adjacent surface waters that may be affected by construction on these projects.

4.1.1 The Contractor will ensure that a precipitation gauge is located on the project. A daily record will be kept of precipitation. This record will be submitted to the project with any test results that cover the same time period.

4.2 Points of Sampling

4.2.1 Water quality will be determined on flowing streams and/or other surface waters to be affected by construction.

4.2.1.1 The Contractor will monitor the quality of the water upstream and downstream from the limits of construction.

4.2.1.2 In cases of major highway construction, streams will be sampled above and below structures, such as bridges, large sediment control devices, or a series of smaller devices.

4.2.1.3 Streams outside the construction limits that receive flow from construction affected streams are to be sampled. This sampling will be conducted on the receiving stream above and below the mouth of the stream affected by construction. Sampling on the receiving stream will not have to be conducted when the distance of the affected stream from the construction limits to the receiving stream is greater than one-half mile, unless it is observed that pollution is carried a greater distance to enter the receiving stream.

4.2.2 Samples will be taken approximately 15 m above and 30 m below construction limits, structures, sediment control devices and the confluence of streams.

4.2.2.1 When mixing has not created visible homogeneous conditions within approximately 30 m below a confluence, sampling will be conducted at the nearest point where visible homogeneity exists throughout the cross section. This location is to be recorded. When homogeneity does not exist within approximately ~~304~~30 m below confluence, a minimum of three samples are to be taken along the cross section at this point. Additional samples may be necessary if determined by the Engineer.

Commented [2]: 30 m?

4.2.3 Samples should not be taken from areas of heavy aeration, agitation, or stagnation, unless for specific circumstances and tests.

4.2.4 Under some conditions, points of sampling may have to be located at a specific spot to determine influx of concentrated substances or isolated sources of pollution.

4.2.5 Grab samples will be appropriate in most cases. Depth of samples will be from just below the surface to 9 m below depending on the depth of the stream.

4.2.5.1 Containers for grab samples may be either soap and water cleaned glass or plastic, fitted with plastic screw caps. Containers will be able to hold at least 500 ml.

4.3 Testing

4.3.1 The following tests will be conducted using ~~MP 642.40.20~~the EPA Quality Assurance Project Plan Development Tool (Section 2.1.a):
pH
Tubidity

Testing for pH and turbidity will be conducted within thirty (30) minutes after the samples have been collected. The Engineer will be notified immediately after testing when limits have been exceeded.

4.3.1.1 For other tests that may be specified in the contract document, the Contractor will utilize ~~MP 642.40.20~~the EPA Quality Assurance Project Plan Development Tool (Section 2.1.a).

4.3.2 The Contractor's attention is directed to the "Limits as per W.Va. Administrative Regulations" attachment. Under the turbidity limit it is noted that this control factor may not apply if the sediment control plans are submitted to the appropriate cooperative. This may result in a waiver approval by the cooperative with concurrence of the chief for streams other than trout streams. The cooperative, as mentioned above, is the Soil Conservation District that has control in the area of construction. The chief, as mentioned above, is the head of the Water Resources Division of the Division of Natural Resources.

4.3.2.1 The waiver approval may contain limits for turbidity. If the waiver does not contain limits for turbidity, then the following limits shall apply. Turbidity shall not exceed 20 Nephelometric Turbidity Units (NTU) over background (I) turbidity when the background is 50 NTU or less, or have more than a 20 percent increase in turbidity (plus 20 NTU minimum) when the background turbidity is more than 50 NTU.

4.3.2.2 The continuation of the waiver, for the duration of the project construction period, will be based on the adherence of the Contractor to the control plan submitted.

4.3.2.3 The Engineer shall be monitoring the water quality data to determine compliance with the specifications and sediment control plan to determine if the methods of control need revision, maintenance, or adjustment.

4.4 Frequency and Duration of Sampling

4.4.1 In normal weather conditions, water quality sampling and testing will be conducted daily at each site, when testing indicates that pollution problems exist, sampling and testing will be conducted once per work shift.

(1) Background water quality is the quality of water entering the project area or the quality of the receiving body of water upstream from the discharge point of project affected water.

4.4.2 During periods of no precipitation (greater than once a week), when it is evident by the Contractor's ~~is~~ testing that pollution is not being created beyond standard limits at a site, and with the concurrence of the Engineer, water quality sampling and testing may be limited to a weekly frequency at these sites. Visual observations are to be made daily to determine that conditions have not significantly changed. If a change is noted visually, testing is to be conducted and the frequency revised as needed.

4.4.3 During in-stream construction, when visual inspection indicates possible pollution, water quality sampling and testing will be conducted at least once per work shift.

4.4.4 During periods of project shut down, sampling will be conducted at least once per week.

4.5 Documentation of Results

4.5.1 Water quality will be maintained on the Division's form entitled "Environmental Water: Quality Check" or on a Contractor's form containing the same information as the Division's form. The completed forms will be provided to the Project Engineer on a daily basis.

5. ACCEPTANCE PROCEDURE

5.1 Acceptance shall be the responsibility of the Division. Acceptance may be accomplished by testing a sample obtained by and tested by the Contractor, by observation of Contractor's sampling and testing, or sampling and testing independent of the Contractor's

5.1.1 Testing or observation frequency should be equal to approximately 10% of the frequency of the Contractor's sampling and testing listed in the Quality Control Plan. Normally, some sampling and testing shall be independent of the Contractor's testing.

5.1.2 When discrepancies exist between the Contractor's data and the Division's findings, the Division and Contractor shall individually test a sample in an attempt to locate and correct the problem. These samples shall be taken at the same times and location. The investigation of the problem is to be mutually cooperative.

5.2 Water quality which is affected by actions of the Contractor resulting in violations will require actions to be taken. The water quality requirements are contained in the West Virginia Administrative Regulations, State Water Resources Board, Chapter 20-5 and 20-5A, the limits specified by the cooperative or this Material Procedure. Action will be taken by the Contractor to reduce the pollution to acceptable limits (for such limits, see attachment or section (4.3.2.1)). The action may include, but are not necessarily limited to, the following: (1) Work in the area of influence will be reduced or stopped until the cause, such as rain, had abated to a degree that pollution is within acceptable levels and/or (2) appropriate Best Management Practices will be utilized to reduce the pollution to an acceptable level.

5.2.1 If the Contractor does not take action to control the population, the Engineer may stop construction work, other than pollution control work, on the project until adequate measures are taken to control the pollution.

_____

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Attachments

Attachment 1

**Limits as Per West Virginia Administrative Regulations,
State Water Resource Board, Chapters 20-5 and 20-5A**

pH - No Value shall be below 6.0 ~~n~~or above 9.0

Turbidity - No point or non-point source to West Virginia~~;~~'s waters shall contribute a net load of suspended matter such that the turbidity exceeds 10 NTU over background turbidity when the background is 50 NTU or less, or have more than 10 percent increase in turbidity (plus 10 NTU minimum) when the background turbidity is more than 50 NTU.

This Limitation shall apply to all earth disturbance activities and shall be determined by measuring stream quality directly above and below the area where drainage from such activity enters the affected stream. Any earth disturbance activity continuously or intermittently carried on the same or associated persons on the same stream or tributary segment shall be allowed a single net loading increase.

This regulation shall not apply to those activities at which Best Management Practices in accordance with the State's adopted 208 Water Quality Management Plan are being utilized on a site specific basis as determined by the appropriate 208 cooperative with concurrence of the chief or an approved Federal or State Surface Mining Permit is in effect. The exemption shall not apply to trout waters.

Attachment 2

ENVIRONMENTAL WATER: QUALITY CHECK FORM

PROJECT_____COUNTY_____DISTRICT_____

LAB. NUMBER _____

DATE SAMPLED/TESTED _____

SAMPLED BY _____

SAMPLING OBSERVED BY DISTRICT: YES NO

RAINFALL (24 HRS.) _____"(inches)

	SITE#	SITE#	SITE#	SITE#	SITE#
STATION	_____	_____	_____	_____	_____
OFFSET	_____	_____	_____	_____	_____
TURBIDITY	_____	_____	_____	_____	_____
pH	_____	_____	_____	_____	_____
IRON	_____	_____	_____	_____	_____
WATER TEMP. °C	_____	_____	_____	_____	_____
AIR TEMP. °C	_____	_____	_____	_____	_____

REMARKS:

_____

_____

_____

_____

_____
Technician's Signature

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

MATERIALS PROCEDURE

FIELD SAMPLING AND TESTING OF SURFACE WATER FOR QUALITY DETERMINATION

1. PURPOSE

1.1 This procedure sets forth guidelines for collecting surface water samples within the limits of Division of Highways projects and in adjacent surface waters that may be affected by construction on these projects.

1.2 The procedure establishes general and specific methods to be utilized in determination of sampling points, duration of sampling and how to collect samples. Or also discusses necessary equipment and tests.

2. REFERENCED DOCUMENTS

a. MP 642.03.50 "Contractor's Quality Control for Surface Water and Sampling Procedures for Quality Determination"

~~1.3~~2.1 Applicable Documents:

~~a. MP 642.40.20~~EPA Quality Assurance Project Plan Development Tool, www.epa.gov/quality/quality-assurance-project-plan-development-tool, Quality Assurance Project Plan Development Tool | US EPA

~~b. MP 642.03.50~~

~~2.~~3. EQUIPMENT

~~2.1~~3.1 Chemically inert glass and/or plastic bottles (depending on the test to be performed) or 1 liter capacity fitted with screw caps will be used for chemical analyses samples.

~~2.1.1~~3.1.1 All containers will be machine or hand washed with suitable cleaning compound or biodegradable soap. After washing, containers will be well rinsed with clean tap water and finally with distilled water to remove any residue of the cleaning compound or soap.

~~2.2~~3.2 Containers used for samples for biological test determination by the Central Laboratory shall be 100 ml plastic bottles with screw caps. The bottles and caps must be able to withstand sterilization procedures.

~~2.3~~3.3 Plastic or rubber gloves when sampling in certain contaminated waters (for example, sewage waters).

~~2.4~~3.4 Rubber boots if required for sampling in deep water.

~~2.5~~3.5 Materials Control, Soils and Testing (MCS&T) Division personnel will need equipment to determine pH, temperature, dissolved oxygen, specific conductivity, total alkalinity, and total acidity. District personnel will need equipment for determination of pH, temperature, and turbidity.

~~3.~~4. SOURCE OF SAMPLES

~~3.1~~4.1 Samples may be obtained from streams, springs, drainage from coal mines and other waste, or other sources that may affect water quality.

~~3.2~~4.2 Generally, all perennial streams should be sampled. In certain cases, sources that are of an intermittent nature may require sampling when flows are present and if it is likely that the source will have a significant effect on the quality of receiving water and the stream flow.

~~3.3~~4.3 Drainage from coal mines or coal waste piles should be sampled if this drainage is disrupted, channelized by the highway construction, or it is contributing to the flow of water that passes through the project or proposed project, but is not located within the project limits.

~~3.4~~4.4 Springs or other special sources should be sampled especially if the supply is for human consumption and/or other public, recreational or natural resources uses in the immediate area.

~~3.5~~4.5 When possible, samples to be taken prior to construction or in the design phase of a project should be obtained when flows are considered to be in low or normal conditions, except as noted in Section 4.2.

~~4.~~5. POINTS OF SAMPLING

~~4.1~~5.1 Samples should not be taken from areas of stagnation, heavy aeration, or agitation unless for special circumstances and tests.

~~4.2~~5.2 Samples shall not be taken from the confluence of streams. Samples shall be taken a minimum of 15 m above and 30 m below such points. When mixing has not created visible homogeneous conditions within 30 m below a confluence, sampling will be conducted at the nearest spot where visible homogeneity exists.

4.2.15.2.1 When conditions are such that homogeneity does not exist within 305 m downstream from confluence, sufficient samples should be obtained to delineate any differences. These points of sampling are to be recorded.

4.35.3 Under some conditions, to be determined by the sampler, points of sampling may have to be located at a specific spot to determine influx of concentrated substances or isolated sources of pollution.

5.6. FREQUENCY AND DURATION OF SAMPLING

5.16.1 Samples Collected by MCS&T Division Personnel: Sampling will be conducted in the design phase of a project. At least three (3) samples should be obtained at different times prior to construction at each of the sources outlined in Section 4.1 if encountered in the project area.

5.26.2 Samples Collected by District Personnel During Construction: Sampling by District personnel will be conducted as an acceptance procedure when MP 642.03.50 is in effect on a project. See MP 642.03.50 for sampling requirements.

5.2.16.2.1 In some cases, MP 46642.03.50 may not be in effect on a project. Sampling will be conducted if it is determined that construction activity could result in a disturbance of the water source drainage area. Sampling frequency will be daily.

5.2.1.16.2.1.1 When construction is not active, but conditions are such that erosion and pollution can still occur, sampling will be conducted daily.

5.2.1.26.2.1.2 When construction is not active, but conditions are such that erosion and pollution are not likely to occur, sampling will be conducted weekly.

5.36.3 Monitoring will be continued throughout the life of the project.

6.7. VOLUME OF SAMPLES

6.17.1 Samples collected for testing in the MCS&T Division Central Laboratory will be on the quantities as set forth in ~~MP 642.40.20~~EPA Quality Assurance Project Plan Development Tool (Section 2.1.a) for each test required.

6.27.2 The quantity of water for field testing by MCS&T Division personnel shall be 1 liter.

6.37.3 The quantity of water for District testing shall be a minimum of 500 ml.

6.47.4 A minimum sample for biological testing will be 100 ml.

~~6.5~~7.5 Appropriate preservation methods and quantities for all tests are listed in ~~MP 642.40.20~~EPA Quality Assurance Project Plan Development Tool (Section 2.1.a).

~~7.~~8. SAMPLING

~~7.1~~8.1 Individual grab samples will be appropriate in most cases.

~~7.2~~8.2 Generally, sampling from the steam bank will be acceptable. In certain cases, however, grab or composite samples collected from a boat or structure may be necessary.

~~7.3~~8.3 The samples should be taken at least an arm's length in depth or half the steam depth.

~~7.3.1~~8.3.1 In some sources too shallow for submerging the sample bottle, water will have to be dipped or a hole dug large enough to allow submergence of a sample bottle. When a hole is dug, a minimum of 15 minutes must pass before the sample is taken. However, in some cases where stream flow and volume is low or turbidity is not equalized, a longer waiting period will be necessary,

~~7.4~~8.4 The mouth of the sample bottle should be held in such a manner that the flow of water will not pass over the hand before entering the bottle.

~~7.5~~8.5 The container used for chemical test samples should be rinsed two or three times with the water to be collected before taking the sample. Rinse water is to be poured out downstream of the site.

~~7.6~~8.6 The sample will be capped and sealed as soon as possible after sampling to limit exposure to the atmosphere.

~~7.7~~8.7 Containers used for biological test samples will be kept sterile at all times. The bottle will be submerged and the cap taken off underwater when taking the sample. The container will be capped after filling while still underwater.

~~7.8~~8.8 Samples shall be handled prior to analysis in a manner that protects the substances to be tested.

~~8.~~9. TESTING

~~8.1~~9.1 The following tests will be conducted by MCS&T Division Personnel in the field at the sample site: 1) pH, 2) dissolved oxygen, 3) specific conductivity, 4) total alkalinity, 5) total acidity, and 6) water temperature.

~~8.2~~9.2 Tests to be conducted in the field by District personnel will be pH and water temperature.

~~8.2.1~~9.2.1 The turbidity of the samples will be determined in the District laboratory.

~~9.~~10. SHIPPING SAMPLES

~~9.1~~10.1 Samples collected for testing by the Central Laboratory will be delivered to the MCS&T Division.

~~9.1.1~~10.1.1 Samples shall be scheduled to arrive within the limits of the holding times as indicated in ~~MP 642.40.20~~EPA Quality Assurance Project Plan Development Tool (Section 2.1.a).

~~10.~~11. DOCUMENTATION

~~10.1~~11.1 Water quality results for samples taken by MCS&T Division personnel will be maintained on the Division's appropriate forms.

~~10.2~~11.2 Water quality results for samples taken by District personnel may be maintained on the Division's form entitled " Environmental Water: Quality Check" (see MP 462.03.50 Attachment 2)

Commented [1]: See Attachment

~~11.~~12. ASSISTANCE

~~11.1~~12.1 Personnel from the MCS&T Division will provide training for District personnel in all aspects of the work made necessary by this MP.

~~11.2~~12.2 Assistance in planning and developing a testing program for a particular project or projects will also be provided by this Division.

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

RLS:Mpp

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

MATERIALS PROCEDURE

CHEMICAL ANALYSIS OF ALUMINUM ALLOYS

1. PURPOSE

1.1 To provide a method to determine the chemical analysis of Aluminum Alloys by Atomic Absorption Spectroscopy (AAS) and Gravimetric analysis.

1.2 This procedure is applicable to Aluminum Alloys furnished under Section 66.1.2.1.1.1, 661.2.1.1.2, 661.2.1.2, 661.2.1.3 and 661.2.1.4 of the West Virginia Division of Highways Standard Specifications for Roads and Bridges.

2. REFERENCED DOCUMENTS

~~ASTM E1024~~
~~ASTM E1479~~
~~ASTM E34~~
~~ASTM C114~~
~~Ravenswood Aluminum Technical Method Number 100, Sheet Number 1100.00 thru Number 1100.12.~~
a. ASTM C114 Standard Test Methods for Chemical Analysis of Hydraulic Cement

3. ATOMIC ABSORPTION ~~SPECTROPHOTOMETER METHOD~~ AND GRAVIMETRIC ANALYSIS.

3.1 ~~With the exception of Silicon, which will be determined by Gravimetric Analysis (Section 4.2), all required c~~Chemical analysis under this procedure will be conducted by using Atomic Absorption ~~Spectro-photometer~~and gravimetric methods. The calibration of standards and identification of factors affecting accuracy, precision and sensitivity are in accordance with ~~calibrated in accordance with~~ ASTM E1024 and ASTM E1479. ~~This method covers the analysis and percentage determination of the following metals: Fe (Iron), Cu (Copper), Mn (Manganese), Cr (Chromium), Zn (Zinc), Ti (Titanium), Mg (Magnesium) Ni (Nickel).~~

3.2 Reagents Needed

3.2.1 Hydrochloric Acid (HCL), specific gravity 1.19.

3.2.2 Hydrogen Peroxide (H_2O_2), 30 percent solution.

3.3 Preparation of Standards

3.3.1 NBS and Alcoa Aluminum Standards are prepared that will bracket alloys received in the laboratory for analysis.

3.3.2 Weigh out 1.0000 plus or minus 0.0005 grams of allow, place in a 1,000 mL volumetric flask, add 40 mLs 1 plus 1 HCL. After violent reaction ceases, add 2 mLs

H_2O_2 to the flask~~, place on pad on hot plate~~ and heat to dissolve. ~~finish dissolution (5 minutes).~~ Cool, dilute to mark, mix thoroughly, and analyze metals by Atomic Absorption ~~using working standards~~.

4. GRAVIMETRIC ANALYSIS METHOD

4.1 This method covers the analysis and percentage determination of Silicone. ~~The method used for analysis is in accordance with the Ravenswood Aluminum Technical Method Number 100: Sheet Number 1100.11 thru number 1100.12~~

4.2 Reagents and Equipment Needed

4.2.1 Mixed Acid Solution - Mix in order given: 700 mL H_2O, plus 500 mL 1:1 sulfuric (H_2SO_4), 400 mL nitric acid (HNO_3), 400 mL hydrochloric acid (HCL). Let cool after each acid addition. Store in plastic bottles.

4.2.2 Sulfuric Acid (H_2SO_4) - 10%

4.2.3 Hydrogen Peroxide (H_2O_2) - 3%

4.2.4 Number 4~~0~~1 Whatman (or equivalent) filter paper

4.2.5 Porcelain Crucible - 15 to 30 mL capacity

4.2.6 Muffle furnace conforming to ASTM C114~~, Section 4.2.7~~

4.3 PROCEDURE

4.3.1 Weigh one gram sample into a 250 mL Erlenmeyer wide mouth flask.

4.3.2 Add 35 mL mixed acid solution slowly (for ½ g sample use 17.5 mL and for 2 g sample use 70 mL of mixed acid solution).

NOTE: Carry through a reagent blank.

4.3.3 Evaporate to fumes after sample is completely in solution. Continue to fume until all heavy fumes have been driven from the bottom of the flask.

4.3.4 Remove from hot plate and cool to touch.

4.3.5 Add 50 mL 10% H_2SO_4 (80 mL 10% H_2SO_4 for 2 g sample).

4.3.6 Add several drops 3% H_2O_2.

4.3.7 Place on hot plate and heat until all soluble salts are in solution (Everything is in solution now but silicon).

4.3.8 Filter through Number 4~~0~~1 Whatman (or equivalent) filter paper.

4.3.9 Wash flasks three times with hot water (police if necessary) and pour through filter also.

4.3.10 Wash filter papers about ten times with hot water. Wash the papers approximately another five times ~~or until the papers are acid free to the taste~~.

4.3.11 Place filter papers in clean porcelain crucibles.

NOTE: Crucibles should have no pits or traces of previous ignitions.

4.3.12 Burn for 45 minutes in a muffle furnace at 982°C.

4.3.13 Cool crucibles to room temperature. Carefully empty ash on keyboard, balance pan, and weigh.

4.4 CALCULATION

The percent of the silicon content will be calculated as follows:

$$\% \text{ Si} = \frac{(\text{weight } SiO_2 - \text{blank})\ (0.4672)\ (100)}{\text{Sample Weight}}$$

or use Silicon chart (0.1 g samples only). See Table 1 Attachment

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TABLE 1 ATTACHMENT
SILICON

WT ASH	% Si	WT ASH	% Si	WT ASH	% Si	WT ASH	% Si	WT ASH	% Si	WT ASH	% Si
.0010	.05	.0031	.14	.0052	.24	.0073	.34	.0094	.44	.0115	.54
.0011	.05	.0032	.15	.0053	.25	.0074	.35	.0095	.44	.0116	.54

.0012	.06	.0033	.15	.0054	.25	.0075	.35	.0096	.45	.0117	.55
.0013	.06	.0034	.16	.0055	.26	.0076	.36	.0097	.45	.0118	.55
.0014	.07	.0035	.16	.0056	.26	.0077	.36	.0098	.46	.0119	.56
.0015	.07	.0036	.17	.0057	.27	.0078	.36	.0099	.46	.0120	.56
.0016	.08	.0037	.17	.0058	.27	.0079	.37	.0100	.47	.0121	.57
.0017	.08	.0038	.18	.0059	.28	.0080	.37	.0101	.47	.0122	.57
.0018	.08	.0039	.18	.0060	.28	.0081	.38	.0102	.48	.0123	.57
.0019	.09	.0040	.19	.0061	.28	.0082	.38	.0103	.48	.0124	.58
.0020	.09	.0041	.19	.0062	.29	.0083	.39	.0104	.49	.0125	.58
.0021	.10	.0042	.20	.0063	.29	.0084	.39	.0105	.49	.0126	.59
.0022	.10	.0043	.20	.0064	.30	.0085	.40	.0106	.50	.0127	.59
.0023	.11	.0044	.21	.0065	.30	.0086	.40	.0107	.50	.0128	.60
.0024	.11	00045	.21	.0066	.31	.0087	.41	.0108	.50	.0129	.60
.0025	.12	.0046	.22	.0067	.31	.0088	.41	.0109	.51	.0130	.61
.0026	.12	.0047	.22	.0068	.32	.0089	.42	.0110	.51	.0131	.61
.0027	.13	.0048	.22	.0069	.32	.0090	.42	.0111	.52	.0132	.62
.0028	.13	.0049	.23	.0070	.33	.0091	.43	.0112	.52	.0133	.62
.0029	.14	.0050	.23	.0071	.33	.0092	.43	.0113	.53	.0134	.63
.0030	.14	.0051	.24	.0072	.34	.0093	.43	.0114	.53	.0135	.63

$$\% \text{ Si} = \frac{(\text{weight } SiO_2 - \text{blank})\ (0.4672)\ (100)}{\text{Sample Weight}}$$

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

MATERIALS PROCEDURE

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

Commented [DB1]: Add reference to the APL MP.

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 Connectors.

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~~affect 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.

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.

3.4 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~~3.4.2 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~~3.4.3 This approved list of manufacturers of welded stud shear connectors shall be available to all Contractors on Department of Highways projects by navigating to the WVDOH MCS&T Webpage[1].

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Director
Materials Control, Soils and Testing Division

MP 615.20.01 Steward – Metals Section
RLS:H

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

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

MATERIALS PROCEDURE

PORTLAND CEMENT AND BLENDED HYDRAULIC CEMENT MILL CERTIFICATION

1. PURPOSE

1.1 To provide the Division's acceptance procedures for portland cement and blended hydraulic cements.

2. SCOPE

2.1 This procedure shall apply to all portland cement and blended hydraulic cement production mills which furnish cement to Division projects, except that the Division may elect to use other control procedures when special conditions dictate the need for more stringent control.

3. APPLICABLE SPECIFICATIONS

3.1 All items under this procedure shall meet the requirements of Section 701 of the WVDOH Standard Specifications for Roads and Bridges. This section specifically includes ASTM C150 for portland cement and ASTM C595 for blended hydraulic cements. In addition, samples will be obtained in accordance with ASTM C183.

4. PROCEDURE

Cement mills which produce cement for use in Division projects shall be identified as Certified or Non-Certified, as outlined below.

4.1 CERTIFIED

To be considered for certification, the manufacturer shall do the following:

4.1.1 Submit a certified statement to Materials Control, Soils and Testing Division that all cement shipped to Division projects will conform to the specification requirements. The certified statement shall be signed by a representative of the manufacturer having legal authority to bind the company.

4.1.2 Maintain records of production control tests, for each type of cement which may be supplied to WVDOH projects, for a period of at least five years and make them available to the Division upon request.

4.1.3 Have mill laboratory facilities inspected by the Cement and Concrete Reference Laboratory (CCRL). A copy of the CCRL report on the mill laboratory inspection shall be provided to the Division, accompanied by documentation of resolution of any discrepancies noted in the CCRL report.

4.1.3.1 Each mill shall continue to participate in the CCRL inspection program at the normal inspection frequency scheduled by CCRL, typically 24-36 months. Each mill shall submit a copy of that inspection report to this Division accompanied by documentation of resolution of any discrepancies noted in the CCRL report.

4.1.4 Submit to the Materials Division test data developed on the type(s) of cement to be certified. This data must consist of test results developed from each day's production over the most recent fifty production days. The required tests are for all the standard chemical and physical requirements listed in ASTM C150 and/or ASTM C595. Each complete battery of tests shall represent not more than twenty-four hours of continuous production per finish mill.

4.1.4.1 In the case of Type III cement, blended hydraulic cement, or other cement which is not produced on a regular basis, if there are not fifty production days for that type of cement in the previous two-year period, then the data for that type of cement shall consist of test results from at least the last twenty-six production days, unless otherwise approved by the Division.

4.1.5 The quality history of a cement plant seeking certification will be determined using the data submitted by the manufacturer as specified in 4.1.4 or 4.1.4.1. Statistical limits, as defined in ASTM C183, will be developed from this data. When an acceptable quality history has been determined, the Division will compare test data developed on production grab samples taken by Division representatives, to the statistical limits established by the mill's production data.

4.1.6 When a cement mill has met the above criteria and has been designated by the Division as Certified, the manufacturer will be required to submit test data on a monthly basis in the same manner as described in 4.1.4.

4.1.6.1 As required in Section 4.1.4, all Certified cement mills shall submit test results, for all tests, developed from each day’s production, to Materials Division, except for the results for the Insoluble Residue test. Once a cement mill has been Certified, and if, during the previous three-month period, none of the Insoluble Residue test results from that Certified cement mill exceed 0.75%, then that Certified cement mill may reduce the frequency of Insoluble Residue test result submittal to one test per week of production, instead of one test per day of production. If any Insoluble Residue test result from that Certified cement mill (including results from samples obtained by the Division), is greater than 0.75%, then the frequency of Insoluble Residue test result submittal from that Certified cement mill shall immediately be increased back to one test per day of production, until another three-month period has elapsed, with no Insoluble Residue test results greater than 0.75% from that Certified cement mill.

4.1.6.2 When ASTM C1038 testing is performed due to higher SO_s content, as outlined in Table 1 of ASTM C150 and/or Table 1 of ASTM C595, the Certified cement mill performing that testing shall perform a minimum of one test per month on the sample with the highest SO_s content for that month.

4.1.6.3 In the case of Type III cement, blended hydraulic cement, or other cement, which is not produced on a regular basis, if no cement of this type was produced in a particular

month(s), then the Cement Manufacturer shall submit a written statement noting this to Materials Division.

4.1.7 Division representatives will take paired samples from a certified plant's production at a frequency dependent upon the variability of test data. The frequency will generally be such that the sampling is accomplished at least once ~~a quarter~~ every four-month period, approximately.

4.1.7.1 In the case of Type III cement, blended hydraulic cement, or other cement, which is not produced on a regular basis, if no cement of this type was produced in a ~~quarter~~ four-month period, then the Cement Manufacturer shall submit a written statement noting this to Materials Division, and Division representatives will not be required to take paired samples ~~that quarter~~ for that four-month period.

4.1.7.2 The paired samples will be obtained, tested, and evaluated in accordance with applicable ASTM procedures.

4.1.7.3 Two consecutive pairs of test values failing to meet the statistical control criteria may be considered cause to remove the mill from the certified group.

4.1.7.4 If any individual sample fails to meet the requirements of the applicable ASTM Specification, the mill may be removed from the certified group.

4.1.7.5 If a certification is removed, it may be reinstated at the discretion of the Division when sufficient sampling and testing has been conducted to ensure statistical control.

4.1.8 When all requirements for certification have been met, the manufacturer may ship cement of the type certified to Division projects. Records of quantities of cement shipped to West Virginia projects must be maintained by the manufacturer for a minimum of three years and made available to the Division upon request.

4.1.9 The manufacturer and the Division's District Materials offices will be notified of all changes in the status of a mill's certification.

4.1.10 Once each ~~quarter~~ month, or anytime the list is updated, the Materials Division will provide the District with a list of all currently certified cement mills.

4.2 Non-Certified

A cement mill defined as non-certified may supply cement to the Division projects from approved LOTs.

4.2.1 The Division will sample, test, approve, and seal LOTs of cement for use in Division projects. Samples will be obtained in accordance with ASTM C183 except that one grab sample shall be secured for each 400 tons (360 Mg) in the sampling of bulk storage at points of discharge, while the cement is flowing through the openings. All of the applicable chemical and physical tests noted in ASTM C150 and/or ASTM C595 will be conducted by the Division laboratories.

4.2.1.1 Any individual sample failing to meet all of the applicable ASTM requirements will result in rejection of the entire LOT of cement.

4.2.2 When a LOT of cement has been sampled, tested, and found to meet all specification requirements, the Division will notify the manufacturer of approval and a WVDOH approval number will be assigned to the LOT.

4.2.3 A manufacturer may make shipments from approved LOTs upon notification of Division approval. When such shipments are made, the manufacturer shall provide documentation as follows:

a) Project to which material is shipped (if available)
b) Silo number from which material drawn
c) Location of shipping origin
d) Contractor (i.e. consignee)
e) WVDOH approval number assigned to silo
f) Identification of carrier
g) Quantity of material in shipment
h) Type of material

4.2.3.1 This documentation may be provided in the form of bills of lading and shall have the following distribution:

a) 1 copy sent to Materials Control, Soils and Testing Division
b) 1 copy sent to accompany shipment and to be left at the destination to become the property of the Division

4.2.3.2 Records of quantities of cement shipped to West Virginia projects must be maintained by the manufacturer for a minimum of three years and made available to the Division upon request.

4.2.3.3 A balance sheet shall be maintained by the manufacturer for each LOT of cement approved for shipment to West Virginia projects. This balance sheet shall provide the following information:

a) The silo number
b) The Division approval number assigned to the silo
c) The test quantity
d) Separate entries for each shipment made from the silo showing bill of lading number and quantity.
e) The balance left in the test quantity after each shipment

The manufacturer may not ship material in excess of the test quantity plus five percent (5%).

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Director
Materials Control, Soils & Testing Division

MP 701.01.10 Steward – Cement and Concrete Section
RLS:T

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

MATERIALS PROCEDURE

DETERMINING APPLICATION RATE OF GROUND AGRICULTURE LIMESTONE BASED ON PH TESTS

1. PURPOSE

1.1 To provide guidance and instruction in determining the application rate of agricultural limestone to specific areas, based on pH, prior to seeding.

1.2 This procedure is applicable to all projects and is intended to be used in the field.

2. DEFINITIONS

a. **Section** - An entire cut, fill, or median area, or any portion thereof, to receive either permanent or temporary seeding.

b. **pH** - The acidity or alkalinity of a substance expressed as a numerical value.

c. **Average pH** - The average of individual pH determinations from each section.

3. PROCEDURE

3.1 All pH determinations shall be made in accordance with instructions that accompany soil reaction kits furnished by this Division to the District Materials Organization.

3.2 For through cuts or through fill slope sections, the average pH will be determined from a total of six individual readings. If both sides of the roadway are seeded concurrently, three of the individual readings shall be made on each side.

3.3 For side hill cut and side hill fill sections, the average pH will be determined from six individual readings from each side of the roadway.

3.4 For medians, the average pH will be determined from six tests for each section. Place 20g (grams) of the soil from the evaporating dish or crucible in the 50 milliliter beaker.

3.5 For all other miscellaneous sections not listed above, the average pH will be determined from two tests.

4. DETERMINING APPLICATION RATES OF AGRICULTURAL LIMESTONE

4.1 Using the average pH, as set forth in ~~paragraph~~Section 3.0~~4~~, each section will be limed at the rates specified in Table 1 for the type of soil and seed mixture.

5. DOCUMENTATION

5.1 Results of pH determinations and locations will be documented on the attached worksheet(s), with one copy being forwarded to the Materials Control, Soils and Testing Division by the District Materials Organization.

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Attachments

TABLE 1

RATES FOR APPLYING AGRICULTURAL LIMESTONE

(Pounds per Acre)

Soil pH	Degree of Acidity	Crownvetch and Lawn Mixture (mixtures C_1, C_2 D)		Sericea Lespsdeza and K_{31} Fescue (mixtures A and B)	
		Sandy Soil	All Others	Sandy Soil	All Others
7 +	Neutral to Alkaline	0	0	0	0
6.0 to 6.9	Slightly Acidic	1000	2000	0	0
5.5 to 5.9	Medium	2000	4000	1000	1000
4.5 to 5.4	Strong	3000	5000	1500	2000
3.5 to 4.4	Very Strong	Not Suitable for Crownvetch		3000	4000
<= 3.4	Toxic to most Plants	Not Suitable for Crownvetch		5000	8000

West Virginia Division of Highways

Field Determination of pH

Project:				County:		
Date:				Signature:		
Section Sta. to Sta.	Right and/or left	Cut or fill	pH Values	Average pH	Sandy or Other	Appl. Rate
			1= 2= 3= 4= 5= 6= ∑=			
			1= 2= 3= 4= 5= 6= ∑=			
			1= 2= 3= 4= 5= 6= ∑=			
			1= 2= 3= 4= 5= 6= ∑=			

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

MATERIALS PROCEDURE

QUALITY ASSURANCE OF FERTILIZER AT SOURCE FERTILIZER ACCEPTANCE CRITERIA

1. PURPOSE

1.1 To provide an interpretation of existing specifications governing fertilizers used on Division projects.

1.2 The interpretation set forth herein shall apply to all fertilizer operations.

1.3 Provide instructions for use by Division field personnel as to acceptance and documentation of material.

2. REFERENCED DOCUMENTS

2.1 West Virginia Fertilizer Law, West Virginia Department of Agriculture, Agricultural Materials : West Virginia Department of Agriculture (wv.gov), WV State Code - Chapter 19, Article 15, West Virginia Code (wvlegislature.gov).

3. CRITERIA FOR ACCEPTANCE

3.1 Specifications governing fertilizers as set forth in West Virginia Division of Highways Standard Specifications for Roads and Bridges shall be interpreted to mean that all fertilizers utilized on Division projects shall be a commercial fertilizer meeting the definitions and requirements of the West Virginia Fertilizer Law as well as any applicable federal laws and regulations

4. DOCUMENTATION

4.1 Coverage for fertilizers shall be obtained by entering the type, quantity, and brand on the HL-440.

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

MATERIALS PROCEDURE

PROCEDURE FOR APPROVING PAINT FORMULATIONS AND PRODUCTION BATCHES

1. PURPOSE

1.1 To establish a procedure for approving paint formulations and to set forth procedures for sampling, testing, and shipping of batches once the formulation is approved.

1.2 This procedure shall apply to manufacturers who furnish paint to the Division.

2. REFERENCED DOCUMENTS

a. West Virginia Department of Transportation, Division of Highways, Standard Specifications Roads & Bridges

b. MP 711.00.20 - Paint Testing Methods

c. MP 711.20.59 - Inorganic Zinc Primer Quality Assurance Procedures

d. MP 711.20.60 - Intermediate Field Coat for Zinc Rich Systems

e. MP 711.22.22 - Inorganic Zinc Rich Low VOC System

f. ASTM D3925 - Sampling Liquid Paints and Related Pigment Coatings

3. FORMULATION QUALIFICATION

3.1 The manufacturer shall have test equipment and qualified personnel necessary to test the material for compliance with the specifications

3.2 The manufacturer shall submit the Division of Highways a one liter sample of each formulation. The sample should be sent to:

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION
190 DRY BRANCH DRIVE
CHARLESTON, WEST VIRGINIA 25306

3.2.1 Accompanying the sample shall be one liter of thinner for each product, along with product data sheets and material safety data sheets for each.

3.2.2 The appropriate specification number should be identified for each material submitted.

3.2.3 The color of top coats shall be one of those specified in Subsection 711.20.4. Each color or shade of top coat shall constitute a separate formulation.

3.2.4 The formulation will be tested in accordance with Section 711 by the Division of Highway's laboratory. The Division will notify the manufacturer of the results.

4. BATCH APPROVAL

4.1 Unless otherwise specified, paints will be tested and approved on a batch-to-batch basis. Each batch that meets the specification requirements will receive an individual approval number.

4.2 Sampling shall be conducted in accordance with ASTM D3925. Tests shall be conducted in accordance with M~~aterials P~~rocedure _711.00.20. It is the paint manufacturer's obligation to notify the Division when a batch will be ready for sampling.

4.2.1 Process control tests such as weight per gallon, viscosity, and grind are to be witnessed by the Division's representative prior to shipment of samples to the Division of Highways' laboratory Failure of any of these tests will result in the batch being rejected at the manufacturer's facility. The batch will then have to be reworked and assigned a revised batch number prior to sampling.

4.2.2 Two one-liter samples of each batch will be obtained by the Division's representative. One is to be retained by the sampler at a location away from the manufacturing facility. The other is to be submitted by the representative to the address in Section ~~4.2~~3.2 of this Materials Procedure.

4.2.3 The retained sample may be disposed of once the approval has been obtained on the batch. Disposal is to be in accordance with the local Environmental Protection Agency's policies.

5. APPROVAL OF SMALL QUANTITIES

5.1 When the quantity of material is 200 liters or less (50 Gallons or less), the Division may elect to accept the material based on certified test data from the manufacturer or passing test results from the WVDOH laboratory. No preliminary tests are required.

6. PROCEDURES FOR SHIPPING

6.1 The manufacturer shall include the following information on each shipping document: name and location of the company, type of material, quantity, date shipped, approval number issued by MCS&T Division, batch number, and date of manufacture.

6.2 A copy of the shipping document shall be submitted to the Division of Highways at the address shown in Subsection ~~4.2~~3.2 of this Materials Procedure.

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Materials Control, Soils and Testing Division

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

MATERIALS PROCEDURE

INORGANIC ZINC PRIMER QUALITY ASSURANCE PROCEDURE

1. PURPOSE

1.1 To establish a procedure for certifying inorganic zinc paint suppliers and to set forth sampling, testing, and shipping procedures for certified and noncertified suppliers.

1.2 This procedure shall apply to all suppliers of inorganic zinc paint. Both certified and non-certified sources shall follow the sampling, testing, documentation, and shipping instructions of this materials procedure.

2. REFERENCED DOCUMENTS

a. MP 711.00.20 - Paint Testing Methods

b. ASTM D3925 - Sampling Liquid Paints and Related Pigment Coatings

c. AASHTO M300 - Standard Specification for Inorganic Zinc Primer

3. PROCEDURE

3.1 Initial Requirements for Certification

3.1.1 The supplier shall submit a written request for certification stating that all material shipped to the Division will conform to specifications. This request is to be signed by an authorized representative of the company.

3.1.2 A Quality Control Program adequate to ensure that the material complies with specifications.

3.1.3 Test equipment and qualified personnel necessary to test the material for compliance with specifications. The laboratory may be at a location other than the place of manufacture. The laboratory shall be approved by the Division.

3.1.4 A satisfactory record of compliance with the specifications.

3.1.5 Once the requirements for certification have been met, the Division will notify the supplier. Shipments may then be made using the procedure given in ~~Paragraph 6.1~~Section 6.

4. SAMPLING AND TESTING

4.1 The sampling and testing is divided into two phases as follows:

4.1.1 Phase One consists of the suppliers Quality Control testing and the Division's optional monitor sample tests.

4.2 Phase One Sampling and Testing: Sampling shall be conducted in accordance with ASTM D3925. Testing shall be conducted by the test methods required by AASHTO M300. When the test method is not mentioned in AASHTO M300, the test shall be conducted by the methods in MP 711.00.20.

4.2.1 The supplier shall test material which is produced to meet the AASHTO M300 specification. All tests required by the M300 specification shall be conducted and the test data shall be sent to the Division. Work sheets and panels shall be maintained for 1 year and be available to the Division's representative upon request.

4.2.2 The supplier shall submit to the Division on a semi-annual basis, test results on a batch of previously qualified product (approved code number).

4.2.3 At the Division's option, monitor samples will be tested at periodic intervals for specification compliance. Actual sampling frequency will vary in accordance with such factors as the past history of the material.

4.3 Phase Two Sampling and Testing: Shall consist of field samples and independent assurance samples. The samples shall be tested by the Division for all requirements of the governing specifications.

5. PROCEDURES FOR SHIPPING

5.1 Certified Source

5.1.1 The supplier shall include the following information on the shipping invoice: Name and location of company, type of material, quantity, date shipped, suppliers certification number, batch code number, date of manufacture, and a statement that the material meets AASHTO M300 Specifications.

5.2 Non-Certified Source

5.2.1 Each batch or LOT shall be sampled and tested. The quantity represented by the sample shall be the quantity in the vat at the time of sampling, or if the material is

stored in drums or pails, the quantity of the particular batch on hand at time of sampling.

5.2.2 Tests shall be conducted by a Division approved laboratory. The Division may elect to use the supplier's test results, in combination with their own test results.

5.2.3 If the sample meets specifications, shipments may be made until the entire batch or LOT has been shipped. Notification of shipment is to be made by phone to the Materials Control, Soils and Testing Division prior to shipment.

5.2.4 Material which has been tested and does not meet specifications may not be shipped until it has been reworked, retested, and meets specifications.

5.3 Documentation Required of Non-Certified Suppliers

5.3.1 Shipments will be made in accordance with ~~6.1.1~~5.1.1 of this procedure except that the following additional information will be required on the shipping documents: Batch number and date sampled. If the material has been tested and meets specifications, the invoice shall list the Division's laboratory number assigned to that sample.

6. CERTIFICATION OF COMPLIANCE

6.1 Samples taken in accordance with Section ~~5~~4.3, which fail to meet specifications, shall be reviewed by this Division to determine the cause of failure. This investigation shall include a review of the suppliers test records.

6.2 Two consecutive failing samples shall be cause to remove the supplier from the certified list. The supplier shall show proof by actual test data that the cause of failure has been found prior to recertification.

6.3 During the decertification period, the supplier may have his material sampled and tested on a batch-by-batch basis in accordance with Section ~~6~~5.2.

6.4 When the quantity of material is 189 Liters or less, the Division may elect to accept the material based on certified test data from the supplier, or passing test results from a Division approved laboratory.

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

MATERIALS PROCEDURE

INTERMEDIATE FIELD COAT FOR ZINC RICH SYSTEMS

1. PURPOSE

1.1 To establish a procedure for certifying intermediate field coat products and to set forth procedures for sampling, testing, and shipping said products.

1.2 This procedure shall apply to all manufacturers of intermediate field coats for Zinc Rich Systems.

2. REFERENCED DOCUMENTS

a. MP 711.00.20 - Paint Testing Methods

b. ASTM D3925 - Sampling Liquid Paints and Related Pigment Coatings

3. PROCEDURE

3.1 Initial Requirements for Certification

3.1.1 The manufacturer shall have test equipment and qualified personnel necessary to test the material for compliance with the specifications.

3.1.2 The manufacturer shall submit to the Division of Highways a one liter sample of intermediate coat along with one liter of top coat meeting the requirements of 711.20.4. The color of the top coat shall be one of those specified in Subsection 711.20.4. The samples should be sent to:

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION
190 DRY BRANCH DRIVE
CHARLESTON, WEST VIRGINIA 25306

3.1.3 The intermediate field coat shall meet the manufacturer's specifications and shall be compatible with the primer (Subsection 711.6.2 or 711.20.2) and the top coat (711.20.4).

3.1.3.1 Accompanying the sample shall be one liter of thinner for each product, along with product data sheets and material safety data sheets for each.

3.1.3.2 Each color or shade of top coat shall constitute a separate formulation.

3.1.4 Testing of the paint system shall be performed by the Division prior to certification. The Division will notify the manufacturer of the results of testing. If the results are satisfactory, an individual approval number will be assigned for each intermediate coat. If the results are not satisfactory, no certification will be issued.

4. SAMPLING AND TESTING

4.1 Monitor samples will be tested by the Division at periodic intervals for specification compliance. Sampling frequency will be dependent upon the historical compliance of the material with the specifications.

4.2 sampling shall be conducted in accordance with ASTM D 3925. Tests shall be conducted in accordance with MP 711.00.20.

5. PROCEDURES FOR SHIPPING

5.1 The manufacturer shall include the following information on each shipping document: name and location of the company, type of material, quantity, date shipped, current product certification number issued by MCS&T, batch number, and date of manufacture.

5.2 A copy of the shipping document shall be submitted to the Division of Highways at the address shown in Subsection ~~4~~3.1.2 of this Materials Procedure.

6. CERTIFICATION COMPLIANCE

6.1 Samples taken in accordance with Section ~~5~~4.0 which fail to meet specifications shall be reviewed by this Division to determine the cause of failure. This investigation shall include a review of the manufacturers test records. If this review is positive, then another sample will be tested. If this sample passes, no change in the certification will be necessary.

6.2 Two consecutive failing samples shall be cause to remove the product from the certified list. The manufacturer shall show proof by actual test data that the cause of failure has been found prior to recertification.

6.3 During the decertification period, the manufacturer may have his material sampled and tested on a batch by batch basis in accordance with the requirements of Section ~~5~~4.2.

6.4 When the quantity of material is 200 liters or less (50 gallons or less), the Division may elect to accept the material based on certified test data from the manufacturer or passing test results from the DOH laboratory.

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DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS & TESTING DIVISION

MATERIALS PROCEDURE

ZINC RICH LOW VOC SYSTEMS

1. PURPOSE

1.1 To establish a procedure for approval of zinc rich low VOC systems, and to set forth procedures for sampling, testing, and shipping said products.

1.2 This procedure shall apply to all manufacturers who furnish zinc rich low VOC systems to the Division.

2. REFERENCED DOCUMENTS

a. MP 711.00.20 - Paint Testing Methods

b. ASTM D3925 - Sampling Liquid Paints and Related Pigment Coatings

c. West Virginia Department of Transportation, Division of Highways, Standards Specifications Roads and Bridges

3. PREREQUISITES FOR CERTIFICATION

3.1 The manufacturer shall submit to the Division of Highways:

3.1.1 A one quart (one liter) sample of primer, formulated to meet the requirements of sub-section 711.22.2 of the Standard Specifications for Roads and Bridges.

3.1.2 A one quart (one liter) sample of intermediate coat (if part of the system), formulated to meet the requirements of sub-section 711.22.3 of the Standard specifications for Roads and Bridges.

3.1.3 A one quart (one liter) sample of top coat, formulated to meet the requirements of sub-section 711.22.4. The color of the topcoat shall be one of those specified in sub-section 711.20.4 of the Standard Specifications for Roads and Bridges.

3.1.4 The samples should be sent to:

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION
190 DRY BRANCH DRIVE
CHARLESTON, WEST VIRGINIA 25306

3.1.5 A one quart(one-liter) container of thinner should accompany the sample for each product, along with product data sheets and material safety data sheets for each.

3.1.6 Each color or shade of topcoat shall constitute a separate formulation for sampling.

3.2 Testing of the paint system shall be performed in the Division of Highways laboratory. The Division will provide the manufacturer the results of the testing. If the results are satisfactory, an individual approval number will be assigned for each low VOC system.

4. SAMPLING AND TESTING

4.1 The Division will take samples of the components of each approved system at periodic intervals and tested for specification compliance. Sampling frequency will be dependent upon the historical compliance of the material with the specifications. The minimum frequency will be every two years.

4.1.1 Sampling shall be conducted in accordance with ASTM D3925.

4.1.2 The Division reserves the right of pull monitor samples from the job site for testing to verify conformance with the specification requirements.

4.2 Tests shall be conducted in accordance with Materials Procedure 711.00.20.

4.2.1 If the test data indicates that the material does not meet the requirements, an investigation shall be conducted to determine the cause of failure of the samples. This investigation shall include, but not be limited to, a review of the manufacturer's quality control test records and may involve re-testing by the Division.

4.2.2 Two consecutive failing samples tested by the Division shall be cause to remove the system from the certified list. Before a system can be considered for reapproval, the manufacturer shall provide data, which demonstrates that the cause of failure has been found and corrected.

4.3 The manufacturer may have material sampled by the Division and tested on a batch-by-batch basis in accordance with the requirements of Section ~~5~~4.2.

4.4 When the quantity of material is 50 gallons (200 liters) or less, the Division may elect to accept the material based on certified test data from the manufacturer.

5. PROCEDURES FOR SHIPPING

5.1 The manufacturer shall include the following information on each shipping document: name and location of the company, type of material, quantity, date shipped, current product or batch approval number (issued by Contract Administration Division - Materials Section), batch number, and date of manufacture.

5.2 The shipping document shall accompany the system to its final destination and a copy of the shipping document shall be submitted to the Division of Highways at the address shown in sub-section ~~4~~3.1.4 of this Materials Procedure.

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MATERIALS CONTROL, SOILS & TESTING DIVISION

MATERIALS PROCEDURE

TEST METHODS FOR WOOD CELLULOSE FIBER MULCHES

1. PURPOSE

1.1 This procedure was developed to establish standard test methods to determine the moisture content, net dry weight (mass), water holding capacity, pH, and color of wood cellulose fiber mulch as packaged.

1.2 This procedure is applicable to all wood cellulose fiber mulches used for vegetation establishment.

2. APPARATUS AND EQUIPMENT

2.1 Scale capable of weighing 50 kg accurately to the nearest 50 grams.

2.2 Scale capable of weighing accurately to the nearest 0.1 gram.

2.3 Oven capable of maintaining a temperature of 100 ± 2ºC.

2.4 Three 4-liter containers.

2.5 Three pieces of 75 µm (No. 200) mesh of sufficient size to cover containers.

2.6 One 75 µm (No. 200) standard 203.2 mm (8 inch.) diameter sieve.

2.7 Aluminum foil to be used to cover sieve.

2.8 One 1-liter graduated glass beaker.

2.9 Pan of sufficient size and depth to partly submerge the 203.2 mm (8 inch.) diameter sieve.

2.10 Demineralized water.

2.11 Sink and draft free area to drain sample.

2.12 One 250 mL beaker.

2.13 One 100 mL graduated cylinder.

2.14 Wooden tongue depressors.

3. PROCEDURES

3.1 Moisture Content

3.1.1 Weigh the unopened container (bag) of mulch as received and record the weight. This weight will be used to determine the Net Dry Weight (43.2.2). The moisture content shall be reported as the average of three samples from a single mulch container (bag). One sample will be taken from the top, center, and bottom of the bag.

3.1.2 For each sample, loosely fill a 4 liter container of known weight with mulch to approximately 25 mm (1") from the top.

3.1.3 Weigh each sample immediately and cover the containers with a piece of 75 µm mesh to prevent loss of mulch from container while drying.

3.1.4 Dry all samples in the oven at 100 ± 2ºC until constant weight is achieved.

3.1.5 Cool the samples to room temperature, then remove the 75 µm mesh from each sample and weigh containers and mulch.

3.1.6 The percent (%) moisture (as received) for each sample is determined by the following formula:

$$\% \text{ Moisture} = (A - B / B - C) \times 100$$

where: A = original weight of container and mulch (grams)
B = weight of container and dry mulch (grams)
C = weight of empty container (grams)

3.1.7 Final percent moisture is reported as the average of the three samples.

3.2 Net Dry Weight

3.2.1 The Net Dry Weight (NDW) of the packaged mulch is determined by the following formula:

$$NDW = X - [(X \cdot Y) / 100]$$

where: X = weight of packaged mulch as determined in Section 43.1.1.
Y = percent average moisture as determined in Section 43.1.7

3.2.2 Compare the calculated NDW with the net dry weight printed on the mulch container.

3.2.3 If the NDW is less than the net dry weight as recorded on the mulch container, the contractor shall supply extra material to make up the difference.

3.3 Water Holding Capacity

3.3.1 Determine the average percent moisture content in accordance with Section 43.1.

3.3.2 Obtain and weigh-out a quantity of "as received" mulch equivalent to 12.0 grams of oven-dry mulch. The weight of the "as received" mulch is determine by the following formula:

"as received" weight = 12.0 / [1 - (% Average moisture / 100)]

3.3.3 Weigh "as received" mulch to the nearest 0.1 gram and place mulch in a 1-liter beaker. Add 800 ml of demineralized water (room temperature) to the beaker. Stir until the mulch is thoroughly mixed with the water. Allow to stand for 30 minutes.

3.3.4 Thoroughly wet a clean 75 µm (No. 200) 203.2 mm (8 inch.) standard diameter sieve. Cover the top of the sieve with aluminum foil or other material to prevent evaporation. Prop (or lean) the sieve up against something at an angle of 30º to 45º and allow to "drain" for 10 minutes, after which remove the aluminum foil cover and wipe any excess water from the outside of the sieve and weigh immediately to the nearest 0.1 gram.

3.3.5 Place the sieve in a pan of sufficient depth to allow enough water to be added to cover mesh area. Pour the beaker contents onto the sieve. Use additional water to remove any mulch as necessary from the beaker. To the pan add water as needed to float the mulch inside of the sieve, being careful not to lose any mulch over the side of the sieve. Stir so the mulch will form a uniform mat over the mesh area upon removal from the pan. Carefully cover the sieve with aluminum foil to prevent evaporation and remove sieve from pan.

3.3.6 As before, prop or lean the sieve at an angle of 30º to 45º and allow to "drain" for 10 minutes. Remove cover and wipe any excess water from the outside of sieve and weigh immediately to the nearest 0.1 gram.

3.3.7 Obtain the weight of the wet mulch by subtracting the sieve weight (43.3.4) from the total weight (43.3.6).

3.3.8 Calculate the percent water holding capacity by using the following formula:

% Water Holding Capacity =
[(Weight of Wet Mulch - 12)/Weight of Wet Mulch] x 100

3.4 Potential of Hydrogen (pH)

3.4.1 The pH of the mulch will be determined using a pH meter and electrode capable of determining pH to 0.1 units and having automatic temperature compensation.

3.4.2 For each sample, weigh 10 ± 0.1 grams of mulch into a 250 mL beaker. Measure 100 mL of demineralized water with the graduated cylinder and pour into beaker containing the mulch.

3.4.3 Using a wood tongue depressor, press the mulch into the water so that the mulch has absorbed the water.

3.4.4 Let set for approximately one hour.

3.4.5 Calibrate the pH meter as per the manufacturer's instructions, place the electrode into the wet mulch and record the pH after the reading has stabilized.

3.5 Color

3.5.1 The determination of mulch color will be by visual inspection only. The color will be recorded on the laboratory worksheet to the nearest primary or secondary color.

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

MATERIALS PROCEDURE

SEED ACCEPTANCE CRITERIA

1. PURPOSE

1.1 To provide an interpretation of existing Specifications governing seed used on Division projects.

1.2 The interpretation set forth herein shall apply to all seeding operations.

1.3 To provide instructions for use by Division field personnel as to acceptance and documentation of material.

2. CRITERIA FOR ACCEPTANCE

2.1 Specifications governing seed varieties as set forth in the West Virginia Division of Highways Standard Specifications Roads and Bridges shall be interpreted to mean that all seeds utilized on Division projects shall be a commercial variety meeting the definitions and requirements of the West Virginia Seed Law as well as any applicable Federal laws and regulations.

2.2 Each container of any variety of seed used on Division projects will bear a "vendors tab" of analysis. Said tag will contain such information as LOT number, germination, purity, weed seed, etc.

2.3 Seed bearing a vendor tag with a test analysis date in excess of twelve (12) months (excluding the month of test) is not to be used, and shall be removed from the project.

2.4 All stored material shall be inspected. Those containers exhibiting improper storage shall not be used and are to be removed from the project.

2.5 If the claimed analysis, listed on the vendors tag, is below that set forth in Specification requirements, then adjustments to the application rate shall be made. Such adjustments shall be in accordance with ~~Paragraph 4~~Section 3.

3. ADJUSTING FOR APPLICATION RATE

3.1 Subsequent to receipt of seed at job site, the project engineer or supervisor will compare the test results shown on the vendor tags with those of the governing Specification requirements.

3.1.2 If the percent germination and/or percent purity of each seed is below that of the project Specification requirements, the seed weight per hectare shall be computed for adjustments as follows. (The equation yielding the maximum kilos of speed per acre shall govern).

3.1.2.1 $\frac{(GS)\ (WS)}{Gt} = Wn$

GS = Percent germination specified.

Gt = Percent germination on vendor tag.

WS = Kilo of seed per hectare as specified on plans, or special provisions.

Wn = The required kilos of seed per acre.

3.1.2.2 $\frac{(PS)\ (WS)}{Pt} = Wn$

PS = Percent purity specified.

Pt = Percent purity on vendor tag.

WS = Kilos of seed per hectare as specified on plans or special provisions.

Wn = The required kilos of seed per hectare.

3.1.3 If the percent germination and percent purity indicated on the vendor tags exceed the governing Specification requirements, the above formula does not apply.

3.1.4 If a maximum percent weed seed content is specified, and the percent weed seed stamped on the vendor tag exceeds the specified limit, the seed is not to be used, and shall be removed from the project.

4. CRITERIA FOR ACCEPTANCE

4.1 Coverage for seed shall be obtained by entering the following information from the vendors tag on Form HL-440.

4.1.1 Name of vendor.

4.1.2 Lot number.

4.1.3 Type of Seed.

4.1.4 Quantity.

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DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

QUALITY CONTROL OF STEEL FENCE POST STUDDED TEE

1. PURPOSE

~~To~~ This document provides acceptance procedures for certified and non-certified sources of studded tee type steel line fence posts for use with farm field fence.

2. SCOPE

This procedure is applicable to studded tee type steel fence posts.

3. REFERENCED DOCUEMNTS

West Virginia Division of Highways Standard Specifications, Roads, and Bridges.

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

Materials Procedure 700.00.01 - Sampling and Testing of Materials at the Source.

~~3.~~4. GENERAL

To become ~~certified (~~a Division ~~approved~~ Approved ~~source~~ Source ~~- Section 4.4)~~, it is the manufacturer's responsibility to maintain a Quality Control System assuring only material meeting the governing specification is supplied.

When fence posts are obtained from a supplier rather than the producer, the responsibility for maintaining the Quality Control System is not relieved.

~~4.~~5. MANUFACTURER'S CERTIFICATION

A prospective manufacturer shall submit their product to the Materials Control, Soils and Testing Division using the HL-468 form as per MP 106.00.02[1].

A manufacturer that has demonstrated, via test data developed by the Division, the ability to supply specification fence posts on a regular basis will be considered for certification.

When a manufacturer has met the above criteria, personnel from the Division (or their representative) will visit and inspect the complete manufacturing process. At that time, the manufacturer will randomly sample and test at least one galvanized post. This

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

Commented [BDA1]: Where does this connect to the standard specifications?

Commented [BDA2]: Please clarify this

sample will be taken and tested in the presence of the Division's representative. Additional samples may also be taken and tested by the Division as deemed necessary.

Tests to be conducted: AASHTO M 281 and M 111.

When the manufacturer's Quality Control Program is approved, a laboratory number will be issued for that manufacturer and placed on ~~an~~ the Division's ~~approved~~ Approved ~~source~~ Product ~~list~~List[2].

~~4.1.1~~5.1.1 After certification (approval), the Division may request the manufacturer to submit randomly selected test data representing material shipped.

~~4.1.2~~5.1.2 Division representatives will visit the manufacturer at least once a year, at which time a sample will be chosen at random for a test. At the discretion of the Division this

~~4.1.3~~5.1.3 sample may be tested at the manufacturing site and observed by the Division, or the sample may be tested at the Division's facilities.

~~4.1.4~~5.1.4 Any deviation of test results from the specifications will require additional sampling and testing. This ~~and~~ may be considered cause to remove the manufacturer from the certified status.

After certification, the manufacturer submits with each shipment to a project or supplier, a document identifying the manufacturer, the approved source laboratory number, length of posts, quantities, and project number. When a supplier receives fence posts from an approved source, the supplier must identify the manufacturer and the approved source laboratory number shipping documents to the project.

Upon receipt at the project, the project will record the following on Form HL- 440:

1. Material - Studded Tee Posts with Accessories
2. Quantity - For each length •
3. ~~1.~~ Name ~~– Of~~ of certified source.
4. ~~2.~~ Approved Source Laboratory Number - In effect when the material was received.

Commented [BDA3]: What does the project do with this? Submit to MCST or put in the P/W folder?

Commented [BDA4]: What/where is this document? Show link or include as attachment.

Commented [BDA5]: Do you mean where the product was shipped from? (The producer/supplier?)

Commented [BDA6]: Perhaps just remove?

~~5.~~6. NON-CERTIFIED MANUFACTURERS

Non-certified manufacturers or other suppliers may supply studded tee posts to the Division from approved LOTs only. Each shipment must be sampled, tested, and identified in accordance with MP 700.00.01[3]. A sample for each shipment will be randomly selected by the Division or their representative. In the event of failure, two samples will be selected and tested. Should one of these samples fail, the LOT ~~will~~ shall be rejected. Documentation for acceptable posts will be in accordance with MP 700.00.01.

[2] https://transportation.wv.gov/highways/mcst/Pages/APL_By_Number.aspx
[3] https://transportation.wv.gov/highways/mcst/Pages/MP-700s.aspx

~~6.~~7. DIVISION DOCUMENTATION

Project personnel will review all shipping documents to ~~assure~~ensure quantities are correct and all information is included. The posts must be inspected for damage. Damage Material ~~will~~ shall be rejected.

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Materials Control, Soils and Testing Division

MP 709.46.50 Steward – Metals Section
RLS:Hd

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

MATERIALS PROCEDURE

PROCEDURAL GUIDELINES FOR MAINTAINING CONTROL CHARTS FOR PORTLAND CEMENT CONCRETE

1. PURPOSE

1.1 To establish guidelines for developing and maintaining control charts to evaluate consistency, percent entrained air, strength characteristics, and the total solids A or optimized aggregate gradation of portland cement concrete.

2. SCOPE

2.1 These procedures shall be applicable in all instances in which they can be reasonably and logically applied. For consistency, air, and strength, the applicability will normally depend on the quantity of material used, the continuity of delivery, etc. Control charts for total solids A or optimized aggregate gradation shall be maintained for all concrete designs used on state work by a concrete producer.

3. GENERAL PROCEDURE

3.1 ~~Control charts will be maintained at locations where the test samples are taken.~~

Control charts shall be maintained at the project office or at the testing site where applicable.

3.2 ~~Control charts will be prepared on a 10 x 10 cross section paper with a width of approximately 560 mm for the sheet presenting the charts for consistency, percent entrained air, and strength characteristics. A separate sheet of sufficient width shall be used to accommodate the control charts for the total solids A for concrete mix designs. A chart length of approximately 760 mm should be displayed at all times. When standard cross section sheets are used, the most recent sheet will be displayed and the previous sheets will be placed chronologically in a holder.~~

Charts for consistency, air, and strength shall have the item number and/or description of the material noted on the top of the chart and will be visible at all times. Charts will have the design number and class of concrete visible at all times.

3.3 ~~Charts for consistency, air, and strength shall have the item number and/or description of the material noted on the top of the chart and will be visible at all times. charts will have the design number and class of concrete visible at all times.~~

Commented [DB1]: The purpose of the MP change is to include the guidelines for the preparation of control charts when using computers or as deemed appropriate by the Division. The last time this MP updated was in 1995 when only paper charts were in practice.

4. CHART PREPARATION

4.1 ~~At the beginning and end of each sheet (or the length of the displayed portion), vertical red lines will be drawn between the limits of the specification or tolerance; an arrow will be placed at the end of the vertical lines; the specification limits will be written above and below the arrows and the name of the property being graphed and the scale will be indicated between the limits on the left edge of the chart. See Appendix 1 and 2 for typical arrangements.~~

Control charts may be prepared by hand on paper, computer generated, or as deemed appropriate by the Division.

4.1.1 When standard cross section sheets are used, the most recent sheet will be displayed, and the previous sheets will be placed chronologically in a holder

4.1.2 At the beginning and end of each sheet (or the length of the displayed portion), vertical red lines will be placed between the limits of the specification or tolerance; an arrow will be placed at the end of the vertical lines; the specification limits will be noted above and below the arrows and the name of the property being graphed and the scale will be indicated between the limits on the left edge of the chart. See Appendix 1 and 2 for typical arrangements.

4.2 **~~Scale~~ Hand Drafted Charts**

4.2.1 ~~Consistency - One division of vertical scale will represent 5.0 mm of slump, or 5.0 mm of ball penetration (25 mm - 50 mm).~~

Hand drafted charts will be prepared on a 10 x 10 grid with a width of approximately 22 in for the sheet presenting the charts for consistency, percent entrained air, and strength characteristics. A separate sheet of sufficient width shall be used to accommodate the control charts for the total solids A or optimized aggregate gradation for concrete mix designs. A chart length of approximately 30 in should be displayed at all times.

4.2.2 ~~Air Content - One division of vertical scale will represent one-tenth of a percentage point of entrained air (25 mm - 1%).~~

The general construction of the control charts shall be the same as described in section 4.4 and 4.5.

4.2.3 ~~4.2.3 Strength - One division of vertical scale will represent 1 MPa (25 mm = 10 MPa) compressive or 69 KPa (25 mm = 1 MPa) flexural strength.~~

4.2.4 ~~4.2.4 Total solids A - One division of vertical scale will represent .01 (25 mm = 0.1) when the coarse aggregate size is 57, 7, 78, or 8 and .02 (25 mm = 0.2) when the coarse aggregate size is Number 3.~~

4.3 **~~Plotting Test Data~~ Computer Generated Charts**

4.3.1 ~~Symbols and Color Code - Individual test values will be plotted in blue using the symbol " o ", with the circle being approximately 2.5 mm in diameter. Average test values for consistency, percent air, and strength as well as the averages of consecutive five test values for total solids A shall be plotted in red using the symbol " o ", with the square being approximately 2.5 mm on each side. Independent Assurance test values developed by the Division, including record samples, will be plotted in green using the symbol " r " with the sides of the triangle being approximately 2.5 mm.~~

Standard computer-generated charts allowing hand plotting, or computer plotting of individual data may be used.

4.3.2 ~~Arrangement of Data - All data developed on a production day will be plotted on one heavy, vertical line, however, when two or more individual test values developed on the same production day have the same magnitude, the symbols may be plotted side-by-side on the same horizontal division line. All test data for a characteristic developed on a production day, exclusive of any independent testing conducted by the Division, will be averaged, and the average value plotted on the same vertical line as the individual test values. When an average value and an individual test value have the same magnitude, the plotted symbols may be superimposed.~~

When charts are computer generated, they shall be printed in color with data plotted to scale; and displayed as described in 4.4 and 4.5 except it shall be printed on 8 ½ “x11” paper.

4.3.3 ~~When individual test values fall outside the specification limits, an arrow will be placed on the plotted symbol pointing in the direction of the specification limit.~~

4.3.4 ~~As test data are developed on following production days, it will be plotted on successive heavy vertical lines, 25 mm apart, progressing from left to right across the control chart. As successive averages for consistency, percent air, and strength characteristic are plotted, the symbol " o " will be connected with a heavy red solid line. For total solidsA control chart the moving average is the average of five consecutive test values and is determined by starting with the fifth test value and averaging it with the four preceding test values. The moving average of five symbol " o " will be connected with a heavy red solid line. Individual test values will have the symbol " o " connected with a dashed blue line.~~

4.3.5 ~~At the bottom of the cross section paper and immediately to the left of the heavy vertical line on which the test data are plotted, the date of sampling and initials of the individual plotting the test data will be recorded.~~

4.4 Scale

4.4.1 Consistency - One division of vertical scale will represent $^1/_4$ in. of slump ($^1/_{10}$ in. - ¼ in.)

4.4.2 Air Content - One division of vertical scale will represent one-tenth of a percentage point of entrained air (1 in. - 1%).

4.4.3 Strength - One division of vertical scale will represent 100 PSI (1 in. = 1000 PSI) compressive or 10 PSI (1 in. = 100 PSI) flexural strength.

4.4.4 Total solids A or optimized aggregate gradation - One division of vertical scale will represent .01 (1 in. = 0.1) when the coarse aggregate size is 57, 7, 78, or 8 and .02 (1 in. = 0.2) when the coarse aggregate size is Number 3.

4.5 Plotting Test Data

4.5.1 Symbols and Color Code - Individual test values will be plotted in blue using the symbol "O", with the circle being approximately 0.1 in. in diameter. Average test values for consistency, percent air, and strength as well as the averages of consecutive five test values for total solids A shall be plotted in red using the symbol, "□" with the square being approximately 0.1 in. on each side. Independent Assurance test values developed by the Division, including record samples, will be plotted in green using the symbol "△" with the sides of the triangle being approximately ~~0.~~1 in.

4.5.2 Arrangement of Data - All data developed on a production day will be plotted on one heavy, vertical line, however, when two or more individual test values developed on the same production day have the same magnitude, the symbols may be plotted side-by-side on the same horizontal division line. All test data for a characteristic developed on a production day, exclusive of any independent testing conducted by the Division, will be averaged, and the average value plotted on the same vertical line as the individual test values. When an average value and an individual test value have the same magnitude, the plotted symbols may be superimposed.

4.5.3 When individual test values fall outside the specification limits, an arrow will be placed on the plotted symbol pointing in the direction of the specification limit.

4.5.4 As test data are developed on following production days, it will be plotted on successive heavy vertical lines, 1 in. apart, progressing from left to right across the control chart. As successive averages for consistency, percent air, and strength characteristic are plotted, the symbol "□" will be connected with a heavy red solid line. For total solids A control chart the moving average is the average of five consecutive test values and is determined by starting with the fifth test value and averaging it with the four preceding test values. The moving average of five symbol "□" will be connected with a heavy red solid line. Individual test values will have the symbol "O" connected with a dashed blue line.

4.5.5 At the bottom of the cross section paper and immediately to the left of the heavy vertical line on which the test data are plotted, the date of sampling and initials of the individual plotting the test data will be recorded.

5. FAILING TESTS

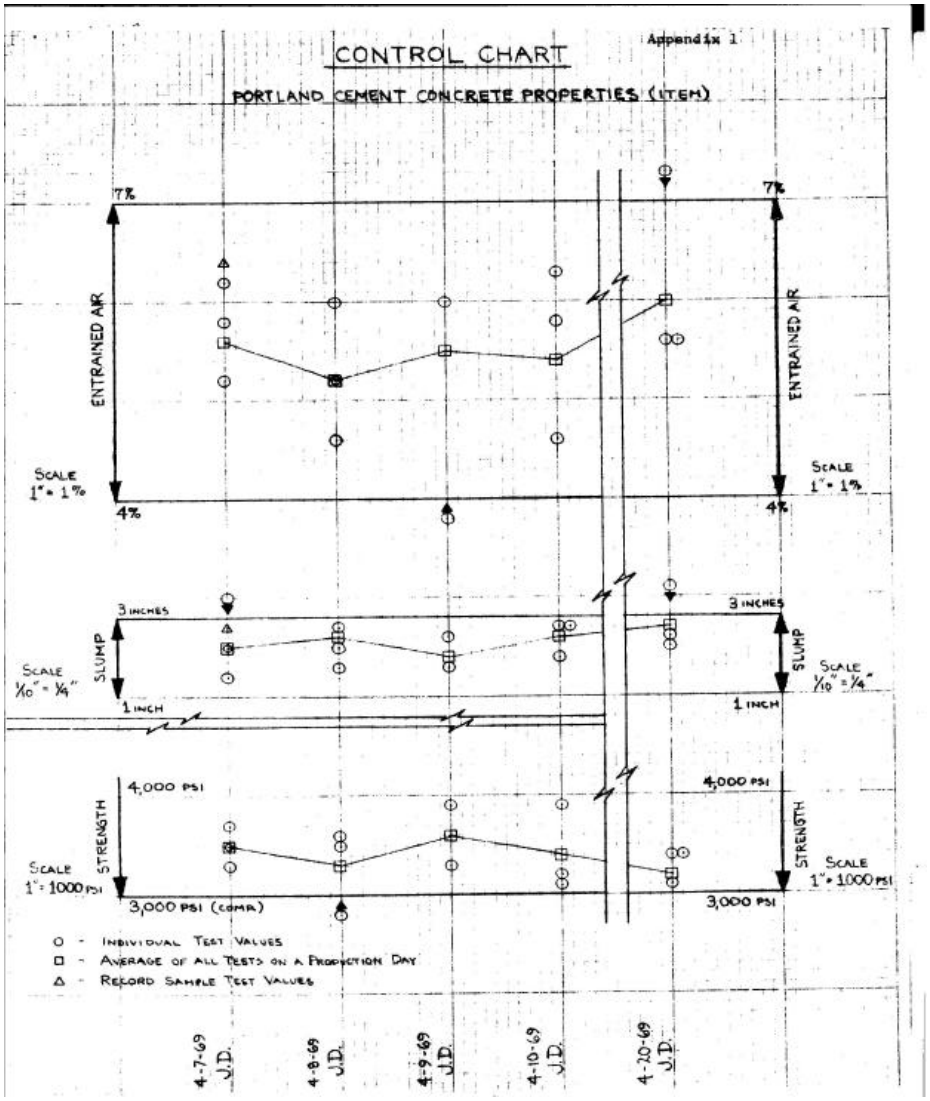
5.1 When individual test values fall outside the specification limits, this information will immediately be made available to the supervisory personnel of both the Contractor and the Division.

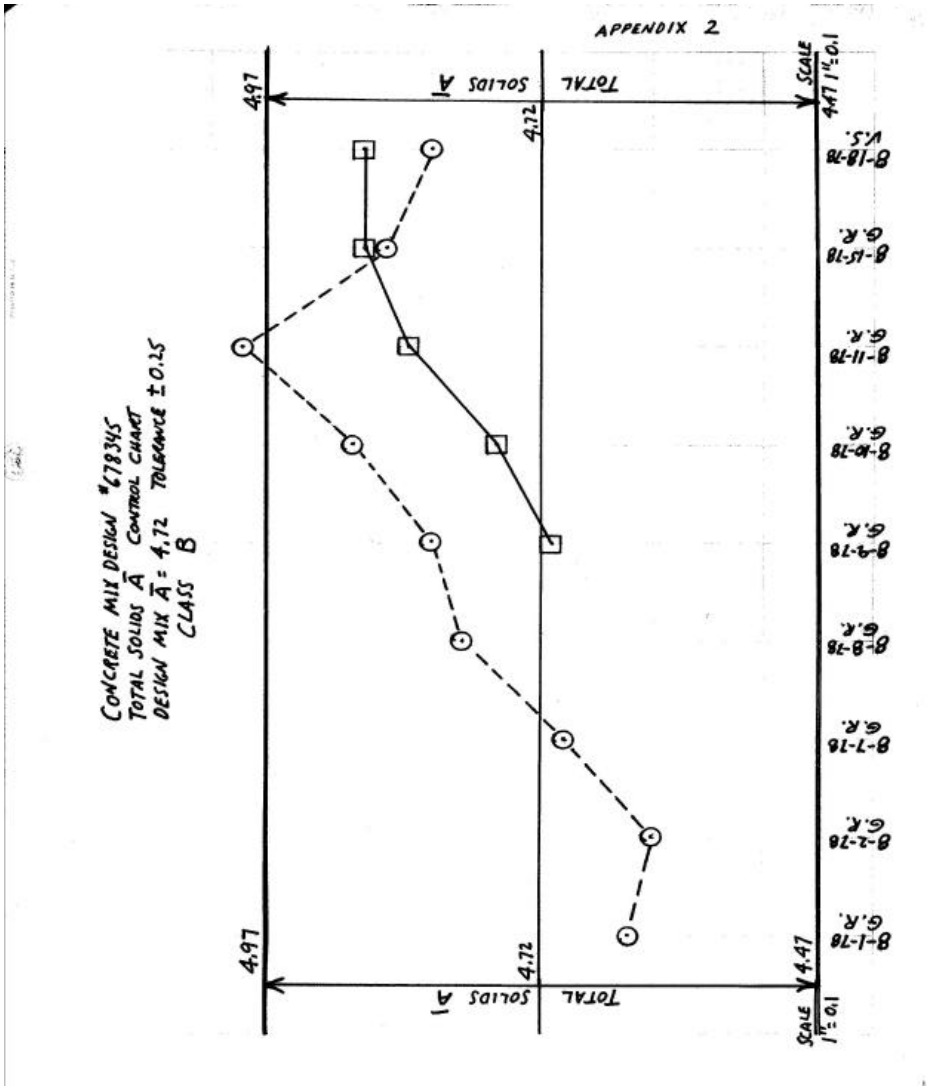
5.2 Should the moving average of any five consecutive gradation tests of the total solids have an Ā ~~fall~~ outside the specified design mix A tolerance, action required by the Specification will be taken. When appropriate action has been taken to bring the Ā back within tolerance, the first individual production sample that is within tolerance shall be used to start a new moving average.

5.2.1 Should the moving average of any five consecutive combined aggregate gradation tests have a working range outside of the limits sets forth on Table 601.3.2.4.1B, action required by the Specification will be taken. When appropriate action has been taken to bring the working range back within tolerance, the first individual production sample that is within tolerance shall be used to start a new moving average.

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

MP 601.03.52 Steward – Cement and Concrete Section
RLS:T
ATTACHMENT


CONTROL CHART
Appendix 1
PORTLAND CEMENT CONCRETE PROPERTIES (LTEM)
7%
4%
ENTRAINED AIR
SCALE 1" = 1%
3 INCHES
1 INCH
SLUMP
SCALE 1/10" = 1/4"
4,000 PSI
3,000 PSI (COMB)
STRENGTH
SCALE 1" = 1000 PSI
O - INDIVIDUAL TEST VALUES
□ - AVERAGE OF ALL TESTS ON A PRODUCTION DAY
△ - RECORD SAMPLE TEST VALUES
4-7-69 J.D.
4-8-69 J.D.
4-9-69 J.D.
4-10-69 J.D.
4-20-69 J.D.


APPENDIX 2
CONCRETE MIX DESIGN #178345
TOTAL SOLIDS $\bar{A}$ CONTROL CHART
DESIGN MIX $\bar{A}$ = 4.72 TOLERANCE ±0.25
CLASS B
TOTAL SOLIDS A
4.97
4.72
4.47
SCALE 1" = 0.1
B-18-78 V.S.
B-15-78 G.R.
B-11-78 G.R.
B-10-78 G.R.
B-9-78 G.R.
B-8-78 G.R.
B-7-78 G.R.
B-2-78 G.R.
B-1-78 G.R.

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

MATERIALS PROCEDURE

GUIDELINES FOR ESTABLISHING AND MAINTAINING APPROVED PRODUCT LISTS OF MATERIALS, SYSTEMS AND SOURCES

1. PURPOSE

1.1 To establish general guidelines for establishing and maintaining approved product lists of material producers, distributors and sources, commonly known as the Approved Product List (APL), which are frequently on WVDOH projects.

1.2 This Materials Procedure (MP) is distinguished from MP 106.00.02 "Procedure for Evaluating Products/Processes for Use in Highway Construction" which outlines the procedure for considering completely new products that have not yet been specified, considered in construction plans, notes, or other construction documents. This MP outlines the creation of an APL for a material which already has significant usage on construction projects and have been accepted using other methods as defined further in this document.

2. SCOPE

2.1 This procedure shall apply to all sources and materials that are suitable for acceptance with a reduced testing frequency. Because of the uniqueness or complexity of some products, additional MPs may be necessary to supersede the requirements of this procedure.

3. REFERENCED DOCUMENTS

3.1 West Virginia Division of Highways Standard Specifications, Roads, and Bridges.

3.2 Materials Procedure 106.00.02 - Procedure for Evaluating Products/Processes for Use in Highway Construction.

3.3 DD-105 - Specification, Publication, and Material Procedures Approval.

4. DEFINITIONS

4.1 Champion: This is typically the appropriate Materials Control Soils and Testing (MCS&T) Division Group Supervisor or their designee. Champions may originate from other DOH Organizations/Agencies if applicable. They shall put forth and recommend the new APL to the Director of MCS&T or their designee.

4.2 ST-1: Special Testing Form 1, this is the acceptance method for a material which does not otherwise have an acceptance method such as being on an APL, be designate by the Specifications, or a MP.

4.3 Historic Usage: Documentation of a positive acceptance record of the product via the usage of ST-1.

4.4 AASHTO: American Association of State Highway and Transportation Officials

4.34.5 AASHTO Product Evaluation and Audit Solutions, formerly known as NTPEP.

5. REQUISITES FOR THE CREATION OF AN NEW APL

5.1 A clear acceptance criterion, such as those listed in the following sections shall be established to govern the acceptance of the product. In order for a product or system to be considered as a candidate for a new APL, one or more of the following acceptance criteria shall be met:

5.1.1 WVDOH Specifications, Materials Procedures or other State Acceptance Criteria.

5.1.2 Approval by a WVDOH Committee, or Applicable Task Force, such as the "Roadway Departure Task Force."

5.1.3 Testing and or approval via information gathered from national testing or auditing agencies ~~such as NTPEP~~.

5.1.4 Historic usage and approval on projects by ST-1s, special provisions, etc.

5.1.5 Consistent satisfactory compliance of the product with the WVDOH Specifications.

6. APPROVAL CRITERIA

6.1 Approval shall be granted by the Director, to a material or source providing at least one of the following criteria are met:

6.1.1 The manufacturer of the material has developed and operates under a Division approved Quality Control Plan that sufficiently controls the quality of the material to the extent that the possibility of a substandard material being produced and shipped is substantially reduced, if not eliminated.

6.1.2 The record of Specification compliance of the material or source is satisfactory to the Division.

6.1.3 The manufacturer has successfully undergone an evaluation of manufacturing and quality control processes that has led to certification or accreditation by a Division recognized accreditation agency.

6.1.4 Acceptance or approval of a particular material by an AASHTO national and/or regional test program.

~~6.1.3.1~~6.1.4.1 In the instance where a producer/supplier has a product which has a satisfactory audit from the AASHTO Product Evaluation and Auditing Solutions, has national usage and the test data falls within the applicable specification limits of ASTM or AASHTO, at the discretion of the Director, this product may be added to its respective approved product list.

~~6.1.4~~6.1.5 Acceptable evaluation by field-testing of a material or product design analysis.

6.2 Unless otherwise directed by the Director, acceptance criteria shall be documented and maintained by the Materials Lab Coordinator~~, or Materials Control Group~~. This acceptance criteria shall be available in the MCS&T ProjectWise folder so other employees will be able to consistently review the approval criteria and duplicate ~~approval~~the approval process.

7. RETENTION OF APPROVED STATUS

7.1 All approved materials or sources shall be subject to validation through periodic inspection and/or review to determine if the approved product(s) ~~are maintaining~~maintains the same characteristics and quality as those originally approved.

7.1.1 This inspection and validation shall be performed at a frequency determined by ~~either the~~the respective MCS&T ~~Champion~~ Section Supervisor~~of the material specific MP~~. Once the process has been completed, each re-approved source shall retain its issued approval/lab number unless the product has changed from its original state enough to warrant a new number (For example, a new, updated version of the product.)

7.1.2 If a product is not validated within the guidelines established above, the product will be removed from the APL and a letter issued to the company.

7.1.3 Re-approval verification shall be based on one or more of the following criteria:

7.1.3.1 Satisfactory results from testing random samples collected at the source, supplier, or from a Division project.

7.1.3.2 Re-inspection of the manufacturing and quality control processes.

7.1.3.3 Satisfactory statistical evaluation of routine quality control test data supplied by the manufacturer.

7.1.3.4 Certified statement from the manufacturer that the approved product is being manufactured under the same design, formulation, manufacturing process and quality control processes that were in effect when product or source was originally approved.

7.1.3.5 Continued presence on an accepted national/regional program such as ~~NTPEP~~APEAS.

7.2 In the instance where a company has changed its name, but retains the originally approved product, including the same design, formulation, manufacturing process and quality control processes, the product shall retain the original approval number. The WVDOH Approved Product List shall be updated to include the new name with the original approval number.

~~7.1.4~~7.2.1 If the product is changed in any physical way (aside from a different name label or stamp), the product shall be treated as a completely new product.

8. DOCUMENTATION AND AVAILABILITY OF APLS

8.1 The new or updated APL shall be submitted to the Director for approval. Once approved, the APL will be uploaded to the MCS&T Webpage[1] and distributed to the District Materials Supervisors and any other interested parties.

8.1.1 All manufacturers or distributors of approved materials shall be required to reference their approval/lab number on the shipping documents (typically invoices) that accompany the approved material to the project.

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RLS:B

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

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

MATERIALS PROCEDURE

CHEMICAL ANALYSIS FOR pH OF SOIL

1. PURPOSE

1.1 To establish a procedure to perform the chemical analysis of soil.

1.2 To establish a procedure to determine its pH and organic contents.

2. REFERENCED DOCUMENTS

a. Standard Methods of Chemical Analysis, F.J. Welcher, Editor, Sixth Edition, Pages 2310 - 2337.

b. AASHTO T-267, Determination of Organic Content in Soils by Loss on Ignition.

c. Test method 1:1 Soil-Water Ratio in Standard methods of Chemical Analysis, Page 2329.

3. CHEMICAL ANALYSIS pH TESTING PROCEDURE

3.1 Required Reagents (Liquid substance for analysis): Distilled, freshly boiled water.

3.2 Apparatus: One (1) pH meter with electrodes capable of measuring to the nearest 0.1 pH unit. Buffer solutions of pH 4.0, 7.0 and 10.0. Dry and freshly ground soil. A 50-ml beaker and stirring utensil. One (1) drying oven capable of measuring 110+/-5°C (230+/-9°F). One (1) Evaporating dish or oven crucible.

3.3 Test Method 1:1: Dry the soil overnight in an evaporating dish or crucible inside the drying oven at 105+/- 4°C (221+/-7°F)

3.4 Place 20 g (grams) of the soil from the evaporating dish or crucible in the 50-ml beaker.

3.5 Add 20 ml of distilled water to the soil and stir with the stirring utensil at regular intervals for 1 hour.

3.6 Standardize the pH meter prior to measuring the soil.

3.7 Measure the pH of the mixture. (Stir well just before submerging the electrodes into the mixture).

4. CALCULATION

4.1 The pH content shall be expressed as a percentage of the mass of the oven-dried soil and shall be calculated as follows:

Percent pH = (A-B/A-C) x 100

Where:

A = Mass of the 50-ml beaker and oven dried soil (before adding distilled water and buffer solution), to the nearest 0.01 g.

B = Mass of the 50-ml beaker and oven dried soil (after adding distilled water and buffer solution), to the nearest 0.01 g, and

C = Mass of the 50 ml beaker, to the nearest 0.01g.

4.2 Calculate the percentage of pH to the nearest 0.1 percent.

5. ORGANIC CONTENT ANALYSIS OF SOIL

5.1 Use apparatus and test method (Ignition Procedure) in AASHTO T-267 Determination of Organic Content in Soils by Loss on Ignition.

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MP 207.06.20 Steward – Environmental and Coatings Section
RLS:P