Materials Procedures Committee Regular Meeting

Meeting Time/Date: April 16th, 10:00 AM

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

Online Meeting: Google Meet Video Conference

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

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

WVDOH ORGS\MCS&T (0077) - FM\Materials Procedure Committee\MP Committee Meeting Files\2025\2025 04 16 MP Meeting

Files Available on Webpage:

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

Materials Procedures – Approved at Last Meeting

1. 212.02.20 - 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
2. 718.00.00 - Sewer and Waterline Materials Procedure
3. 715.14.01 - Quality Assurance of Laminated Elastomeric Bridge Bearing Pads with Internal Shims
4. 401.02.29 - Guide For Quality Control and Acceptance Requirements for Superpave Asphalt Mixtures
5. 100.00.00 - Preparing Materials Procedures
6. 109.00.22 - Procedure for the Submission and Documentation of Quality Control Test Results

Materials Procedures - Old Business

Number	Champion	Title	Description
1* -106.10.50	Brayack	WVDOH Buy America Acceptance Guidelines	Removes waiver for Manufactured Materials in anticipation of FHWA Update.
2* - 700.04.22	Allison	Method for Approving Devices Used for Testing Density and/or Moisture Content of In-Place Material	Process for creating approved list for Density/Moisture Devices
3* - 307.00.50	Ross	Guide for Quality Control and Acceptance Plans for Subgrade, Base Course, and Aggregate Items	Addition of Trail Surface Aggregate

4* - 679.02.99	Kukaua	Calibration of Concrete Continuous Mobile Mixer	New Document. Kiana to discuss.
5* - MA-1	Whelan	Operating and Emergency Procedures for Nuclear Gauges	Reconfirmation/update of practices
6* - ML-25	Ross	Procedure for Monitoring the Activities Related to Sieve Analysis of Fine and Coarse Aggregate	Reconfirmation/update of practices
7* - 711.03.23	Thaxton	Mix Design for Portland Cement Concrete	Replacing the Rapid Chloride Permeability test with the Surface Resistivity Test, and the SAM testing requirements for Mix Design approval.
8* - 601.00.49	Kukaua	Method of Test for Determining the Condition of Concrete Bridge Decks	New Document. Kiana to discuss.
9* 700.00.54	Brayack	Procedure for Evaluating Quality Control Sample Test Results with Verification Sample Test Results	Significant Updates, Dan to discuss.
10* 106.03.50	Harper	General Information Guide for Technician and Inspector Certification Program (TICP)	Changing 3 to 5 years for certification, adds apprentice program.

Materials Procedures – Editorial Edits

None on this agenda

Materials Procedures - New Business with Significant or Process Updates

1& 700.00.50	Wagner	Method for Acceptance of Compaction Testing	Laura to Discuss

Note 1: * Denotes this MP is up for Vote

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

Comments

Comments are due April 9th, 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: May 28th

Meeting Time/Date: 10:00 AM, June 18, 2025

Meeting Location: MCS&T (Tentative)

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 2025:

June 18, August 20, October 15, December 17

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

MATERIALS PROCEDURE

WVDOH BUY AMERICA ACCEPTANCE GUIDELINES

1. PURPOSE

1.1 To set forth instructions for compliance with both State and Federal Buy America Requirements (henceforth referred to as "Buy America Requirements"), as listed in this document.

2. REFERENCED DOCUMENTS

2.1 PUBLIC LAW 117–58—NOV. 15, 2021, Infrastructure Investment and Jobs Act.

2.2 Build America, Buy America Act (BABA).

2.3 23 U.S.C. 313 and 23 CFR 635.410 "Buy America Requirements".

2.4 2 CFR part 184 Buy America Preferences for Infrastructure Projects.

2.5 M-22-11 Initial Implementation Guidance on Application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure.

2.6 M-24-02 Implementation Guidance on Application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure.

2.7 Chapter 5, Article 19 and Chapter 5A, Article 3, Section 56 of the West Virginia Code, entitled "West Virginia American Steel Act of 2001."

2.8 West Virginia Notary Handbook, Current Edition.

2.9 MP 106.10.51 – WVDOH Buy America Waiver Guidelines.

3. ACCEPTANCE OF MATERIALS

3.1 This procedure applies to the following:

1. Steel and Iron
2. Manufactured Products
3. Construction Materials
4. Section 70917(c) Materials

3.2 An article, material, or supply shall only be classified into a single category listed in Section 3.1. In some cases, an article, material, or supply may not fall under any of these categories. Classification of the category must be made based on the status of article, materials, or supply at the time it is brought to the work site for incorporation into the project. The work site is generally the location of the project at which the materials will be incorporated. An article, material, or supply permanently incorporated into a project must meet the Buy America Preference for only the single category in which it is classified.

3.3 A Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to a project. As such, it does not apply to

tools, equipment, and supplies, such as temporary scaffolding brought to the construction site and removed at or before the completion of the project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished project but are not an integral part of the structure or permanently affixed to the project.[1]

3.3.1 Buy America preference does not apply to materials such as temporary paint or temporary traffic control devices.

3.3.2 Glass added to a permanent paint product requires a Certificate of Compliance.

4. STEEL AND IRON

4.1 Pursuant to Buy America Requirements, all manufacturing processes for steel and iron ~~materials~~ products must take place in the United States.

4.2 Definition

4.2.1 "Iron or steel products" means articles, materials, or supplies that consist wholly or predominantly of iron or steel or a combination of both.

4.2.1.1 "Predominantly of iron or steel or a combination of both" means that the cost of the iron and steel content exceeds 50 percent of the total cost of all its components. The cost of iron and steel is the cost of the iron or steel mill products (such as bar, billet, slab, wire, plate, or sheet), castings, or forgings utilized in the manufacture of the product and a good faith estimate of the cost of iron or steel components.

4.3 Standard

4.3.1 This includes all processes from the initial melting stage through application of coatings occurs in the United States.

5. MANUFACTURED PRODUCTS

Commented [DB1]: Work with Janie to create PSP for Projects that this is applicable (Obligation date is known to WVDOH not the Contractor)

5.1 Pursuant to Buy America Requirements, all Manufactured Materials are required to be produced in the United States. All manufacturing processes shall occur in the United States.

~~5.1 The Federal Highway Administration (FHWA) has a longstanding waiver in effect exempting Manufactured Products from Buy America Requirements.~~

5.2 Definition

~~5.1.1~~5.2.1 Manufactured products means articles, materials, or supplies that have been processed into a specific form and shape, or combined with other articles, materials, or supplies to create a product with different properties than the individual articles, materials, or supplies. If an item is classified as an iron or steel product, an excluded material, or other product category as specified by law or in 2 CFR part 184, then it is not a manufactured product. However, an article, material, or supply classified as a manufactured product may include components that are iron or steel products, excluded materials, or other product categories as specified by law or in 2 CFR part 184. Mi

[1] M-24-02: Memorandum for the Heads of Executive Departments and Agencies, Implementation Guidance on Application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure, Page 4

xtures of excluded materials delivered to a work site without final form for incorporation into a project are not a manufactured product.

~~5.1.2 Manufactured products means:~~

~~1. Articles, materials, or supplies that have been:~~
~~A. Processed into a specific form and shape;~~
~~B. or Combined with other articles, materials,~~
~~C. or supplies to create a product with different properties than the individual articles, materials, or supplies.~~

~~2. If an item is classified as an iron or steel product, or a construction material, then it is not a manufactured product. However, an article, material, or supply classified as a manufactured product under 2 CFR 184.4(e) and paragraph (1) of this definition may include components that are construction materials, iron or steel products, or Section 70917(c) materials.~~

5.3 Standard for Projects Obligated on or after October 1st, 2025 (Final Assembly Standard)

5.3.1 Pursuant to Buy America Requirements, all manufactured products used in the project are produced in the United States; this means the final assembly of the manufactured product was manufactured in the United States.

5.4 Standard for Projects Obligated on or after October 1st, 2026 (55 Percent Standard)~~Standard~~

~~5.1.3~~5.4.1 Pursuant to Buy America Requirements, all manufactured products used in the project are produced in the United States; this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard that meets or exceeds this standard has been established under applicable law or regulation for determining the minimum amount of domestic content of the manufactured product.[2]

~~5.1.3.1~~5.4.1.1 In determining whether the cost of components for manufactured products is greater than 55 percent of the total cost of all components, use the following instructions:

1. For components purchased by the manufacturer, the acquisition cost, including transportation costs to the place of incorporation into the manufactured product (whether or not such costs are paid to a domestic firm), and any applicable duty (whether or not a duty-free entry certificate is issued).
2. For components manufactured by the manufacturer, all costs associated with the manufacture of the component, including transportation costs as described in paragraph (1), plus allocable overhead costs, but excluding profit. Cost of components does not include any costs associated with the manufacture of the manufactured product.

[2] M-24-02: Memorandum for the Heads of Executive Departments and Agencies, Implementation Guidance on Application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure, Page 15-16.

6. CONSTRUCTION MATERIALS.

6.1 Pursuant to Buy America Requirements, all Construction Materials are required to be produced in the United States. All manufacturing processes for the Construction Materials shall occur in the United States.

6.2 Definition

6.2.1 Construction materials means articles, materials, or supplies that consist of only one of the items listed in Section 6.2.1.1, except as provided in Section 6.2.1.2. To the extent one of the items listed in Section 6.2.1.1 contains as inputs other items listed in this section, it is nonetheless a construction material.

6.2.1.1 The listed items are:

1. Non-ferrous metals;
2. Plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables);
3. Glass (including optic glass);
4. Fiber optic cable (including drop cable);
5. Optical fiber;
6. Lumber;
7. Engineered wood; and
8. Drywall.

6.2.1.2 Minor additions of articles, materials, supplies, or binding agents to a construction material do not change the categorization of the construction material.

6.3 Standard

6.3.1 The Buy America Preference applies to the following construction materials incorporated into projects. Each construction material is followed by a standard for the material to be considered "produced in the United States."

1. Non-ferrous metals. All manufacturing processes, from initial smelting or melting through final shaping, coating, and assembly, occurred in the United States.
2. Plastic and polymer-based products. All manufacturing processes, from initial combination of constituent plastic or polymer-based inputs, or, where applicable, constituent composite materials, until the item is in its final form, occurred in the United States.
3. Glass. All manufacturing processes, from initial batching and melting of raw materials through annealing, cooling, and cutting, occurred in the United States.
4. Fiber optic cable (including drop cable). All manufacturing processes, from the initial ribboning (if applicable), through buffering, fiber stranding and jacketing, occurred in the United States. All manufacturing processes also include the standards for glass and optical fiber, but not for non-ferrous metals, plastic and polymer-based products, or any others.
5. Optical fiber. All manufacturing processes, from the initial preform fabrication stage through the completion of the draw, occurred in the United States.

6. Lumber. All manufacturing processes, from initial debarking through treatment and planing, occurred in the United States.
7. Drywall. All manufacturing processes, from initial blending of mined or synthetic gypsum plaster and additives through cutting and drying of sandwiched panels, occurred in the United States.
8. Engineered wood. All manufacturing processes from the initial combination of constituent materials until the wood product is in its final form, occurred in the United States.

6.3.2 Except as specifically provided, only a single standard under this section should be applied to a single construction material.

7. SECTION 70917(C) MATERIALS

7.1 The standards developed under BABA 70915(b) (1) shall not include cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives as inputs of the construction material. These are referred to as 70917(C) materials.

7.2 Definition

7.2.1 Section 70917(c) materials means cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives. See section 70917(c) of the Build America, Buy America Act.

7.3 These materials are exempt from Buy American Requirements.

8. BUY AMERICA COMPLIANCE.

8.1 On a given project, the Division shall not accept, approve, authorize, or make any payments to any Contractor not fully compliant with Buy America.

8.1.1 When Buy America Requirements apply, the Contractor shall furnish a notarized Certificate of Compliance signed by their official with knowledge and authority to certify that all applicable materials and products to be incorporated into the project, including those of any subcontractors and suppliers, are compliant with Buy America Requirements. This shall be done prior to the permanent incorporation of the materials into the project.

8.1.2 The notarized Certificate of Compliance shall contain the following information:

8.1.2.1 Title: Buy America Certification of Compliance.

8.1.2.2 The Name, Address and Contact Information for the Contractor.

8.1.2.3 A contractor statement that demonstrates compliance with Buy America Requirements.

8.1.2.4 The Contract ID for the Material (if applicable).

8.1.2.5 Both the Federal and State Project Number for the Material (if applicable).

8.1.2.6 The name of the material referenced in the Certificate of Compliance. This material name shall be a clear, common name for the material as stated in the proposal. Part Numbers, etc., may also be on the document if the contractor wishes.

8.1.2.7 The Line Item for the Material (if applicable).

8.1.2.8 The Bid and/or Placed Quantity of the Material.

8.1.2.9 Signature of the Contractor and date.

8.1.2.10 A list of materials on the project that "Buy America" applies but are not Buy America compliant.

8.1.2.11 If the notarization occurs in the state of West Virginia, t~~T~~he document must be notarized as per the "West Virginia Notary Handbook."

8.1.2.11.1 If the notarization does not occur in West Virginia, the document must be notarized as per the respective state of origin's Notary Handbook equivalent.

8.2 Attachment 1 shows a sample Certificate of Compliance.

8.2.1 Multiple items may be listed on the Certificate of Compliance, though all the information for each line must be on the document.

8.2.2 A list of these materials may be referenced on an attached page as long as that page is also signed and notarized.

9. BUY AMERICA WAIVERS

9.1 Buy America Waivers are outlined in MP 106.10.51 as per "§ 184.7 Federal awarding agency's issuance of a Buy America Preference waiver" and "23 CFR 635.410(c)".

10. BUY AMERICA MATERIALS

10.1 Attachment 2 includes a list of materials and products used in WVDOH construction projects and the applicability of Buy America Requirements. This attachment also shows each category of each based on Section 3.1 of this document. Finally, if the material is not applicable to Buy America Requirements, justification is given. Example exemptions are as follows:

~~1. Historic Waiver: Manufactured Product is waived by FHWA as per Section 5 of this Document.~~

~~2.~~1. Temporary Material: Material is not permanently incorporated into the project.

10.1.1 This materials and products list may be updated by the Director of MCS&T as needed to ensure compliance with Buy America Requirements. Any update to this form will

be in accordance with guidance from and through an affirmation process with FHWA.

10.1.2 Attachment 3 includes OMB Memorandum M-24-02[3], dated October 25, 2023, for additional guidance and as the source material for WVDOH's compliance.

[3] https://www.whitehouse.gov/wp-content/uploads/2023/10/M-24-02-Buy-America-Implementation-Guidance-Update.pdf

11. DOCUMENTATION OF BUY AMERICA CERTIFICATION OF COMPLIANCE

11.1 The Certificate of Compliance shall be placed in the QC Plan Folder in ProjectWise (or the current WVDOH approved document retention software) under the contract.

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

MP 106.10.50 Steward – Materials Control Section
ATTACHMENTS

Buy America Certification of Compliance

Acme Construction Company
123 Main Street
Charleston, WV 25302

Ship Date: 10/31/2023

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

This Certification of Compliance is for the material and project listed below:

CID: 22000005R1
Federal Number: B-0010(000)X
State Number: U002-00-1.00

Line: 0020	Widget, Part Q^{i}	500 Cubits
Line: 0025	Widget, Part H^{r}	300 Cubits

Non-Compliant Buy America Materials

Line: 0055	Widget, Part I^{z}	300 Cubits

Janie Doe, Contractor President

Attachment 2: Full document is available at the WVDOH MCST Toolbox[4].

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

DOH-M-22 WVDOH Buy America Requirement Materials

AWP Material Code	Material Description	Category	CoC Required	Notes
206.003.003.X	Base Reinforcement, Geogrid, Type 1,2	Construction Material	Yes	
211.004.000	Unclassified, Borrow Excavation	Section 70917(c) Material	No	
211.005.000	Rock Borrow Excavation	Section 70917(c) Material	No	
212.002.000	Select Material for Backfill	Section 70917(c) Material	No	
218.003.003	Riprap, Grouted	Section 70917(c) Material	No	
218.003.006	Slope Protection, Concrete	Section 70917(c) Material	No	
219.003.000.0X	CLSM -Type A,B,C - Controlled Low Strength Material	Section 70917(c) Material	No	
311.002.000.X	Free Draining Base Course, Open Graded - Asphalt/Cement	Section 70917(c) Material	No	
401.002.00X	Asphalt Mix, All Types	Section 70917(c) Material	No	
405.002.001.X	Type A,B,C - Chip Seal Aggregate	Section 70917(c) Material	No	
406.PSP.000	High Friction Surface Treatment	Construction Material	Yes	
412.002.001	Bituminous Patching Winter Grade	Section 70917(c) Material	No	
420.001.001	Asphalt, Micro Surfacing	Section 70917(c) Material	No	
420.002.002.X	Aggregate, 2,3FA, Fine, Micro-Surfacing	Section 70917(c) Material	No	
494.PSP.001	Asphalt, Cold In-Place Recycled	Section 70917(c) Material	No	
501.003.001.0X	Concrete, Pavement, All Types	Steel and Iron	Yes	*1
514.003.000	Concrete, Roller Compacted	Steel and Iron	Yes	*1
601.003.00X.0X	Concrete, All Classes	Section 70917(c) Material	No	
601.008.009	Stay-in-Place Fabricated Metal Forms	Steel and Iron	Yes	
601.PSP.001	Polymer, Fiberglass Reinforced (FRP)	Manufactured Material	Yes	
601.PSP.002	Epoxy Resin Injection System	Construction Material	Yes	
601.PSP.003	Epoxy Bonding Compound	Construction Material	Yes	
602.002.000.3	Reinforcing Bars, Uncoated Corrosion Resistant Rebar	Steel and Iron	Yes	
602.007.003	Reinforcing Bars, Splice Connector	Steel and Iron	Yes	
603.002.000.0X	Concrete Members (All Precast/Prestressed)	Steel and Iron	Yes	*1
603.006.002.2	Concrete, Class S-P, Self Consolidating	Section 70917(c) Material	No	
603.PSP.001	Post Tension Rod, Steel	Steel and Iron	Yes	
604.002.000	Concrete for Pipe Culvert	Section 70917(c) Material	No	
604.PSP.001	Pipe, Polyethylene Liner	Steel and Iron	Yes	
605.002.000	Concrete Manholes & Inlets (Precast)	Steel and Iron	Yes	
605.002.000	Concrete Manholes & Inlets (Precast)	Steel and Iron	Yes	*1
605.002.000.01	Steel, Welded Grates for Inlets	Steel and Iron	Yes	
605.002.000.0X	Inlet, All Types	Steel and Iron	Yes	*1
605.002.000.0X	Manhole, All Types	Steel and Iron	Yes	*1
605.002.000.14	Slot Inlet Riser, Perforated	Steel and Iron	Yes	
605.002.000.16	Lift Station & Valve Vault	Steel and Iron	Yes	
607.002.000.01	End Terminal, Flared or Tangent Steel	Steel and Iron	Yes	
607.002.000.02	Blockout, Polymer	Construction Material	Yes	
607.002.000.03	Blockout, Non Plastic	Construction Material	Yes	
607.PSP.000	High Tension Cable Barrier	Steel and Iron	Yes	
607.PSP.001	Cable End Terminal	Steel and Iron	Yes	
609.002.000	Concrete, Sidewalk	Steel and Iron	Yes	*1
609.002.001	Detectable Warning Surface	Construction Material	Yes	
610.002.000	Asphalt Curb	Section 70917(c) Material	No	
612.002.001.X	Tunnel Liner, Steel Plate Pipe, 2/4 Flange	Steel and Iron	Yes	
614.007.000	Lagging, Concrete	Steel and Iron	No	
615.000.000.01	Steel Superstructure, Truss/Arch	Steel and Iron	Yes	
615.000.000.02	Steel Superstructure	Steel and Iron	Yes	
615.000.000.03	Expansion Dam, Steel, Tooth Type	Steel and Iron	Yes	
615.000.000.04	Expansion Dam, Steel, Strip Seal Type	Steel and Iron	Yes	
615.000.000.05	Expansion Dam, Steel, Modular Type	Steel and Iron	Yes	
615.000.000.06	Bearing Assemblies, Steel	Steel and Iron	Yes	
615.000.000.07	Steel Girders	Steel and Iron	Yes	
615.000.000.08	Steel Crossframes	Steel and Iron	Yes	
615.000.000.09	Steel Diaphragms	Steel and Iron	Yes	
615.003.003	Shear Stud Connector, Steel	Steel and Iron	Yes	
616.009.000	Piles, Concrete (Precast)	Steel and Iron	No	
617.004.000	Pipe Railing, Steel	Steel and Iron	Yes	
617.005.000	Railing, Steel, Ferrous Metal	Steel and Iron	Yes	
617.006.000	Railing, Aluminum, Pedestrian	Construction Material	Yes	
620.000.000.01	Culvert, Concrete, Reinforced, Cast In Place, All Types	Steel and Iron	Yes	*1
620.000.000.02	Culvert, Concrete, Three-Sided Structure (Precast)	Steel and Iron	Yes	*1
620.000.000.03	Culvert, Concrete, Arch-Topped, (Precast)	Steel and Iron	Yes	*1
620.000.000.04	Culvert, Concrete, Flat-Topped, (Precast)	Steel and Iron	Yes	*1

DOH-M-22 WVDOH Buy America Requirement Materials

AWP Material Code	Material Description	Category	CoC Required	Notes
620.000.000.05	Culvert, Concrete, Reinforced, Two Piece, (Precast)	Steel and Iron	Yes	*1
621.002.001	Flooring Steel Grid, Open Type	Steel and Iron	Yes	
621.002.002	Flooring, Steel Grid, Filled	Steel and Iron	Yes	
623.002.000	Shotcrete, Monofilament Polypropylene Fibers for Pneumatically Applied Mortar	Manufactured Material	Yes	
625.004.003	Steel, Casing Pipe for Drilled Caissons	Steel and Iron	Yes	
625.004.004	CSL (Crosshole Sonic Logging) Testing Tubes for Caissons	Steel and Iron	Yes	
626.004.003	Retaining Wall, Cast In Place	Steel and Iron	Yes	*1
626.005.001	Retaining Wall (Precast)	Steel and Iron	Yes	*1
626.005.001.01	Retaining Wall, MSE, Wall Panels	Steel and Iron	Yes	*1
626.005.001.02	Retaining Wall, MSE Modular Block	Steel and Iron	Yes	*1
626.005.001.03	Retaining Wall, MSE Wire Face	Steel and Iron	Yes	*1
626.005.001.123	Modular Block Sealant	Construction Material	Yes	
626.006.001.3	Retaining Wall, Granular Backfill	Section 70917(c) Material	No	
626.006.002	Retaining Wall, Concrete, Cast in Place	Steel and Iron	Yes	*1
627.PSP.001	Expansion Joint, Foam	Construction Material	Yes	
631.002.000	Electrical, Miscellaneous	Steel and Iron	Yes	*1
632.002.001	Horizontal Drain	Steel and Iron	Yes	
633.002.000	Gutter, Invert Pipe	Steel and Iron	Yes	
633.004.000	Gutter, Concrete	Section 70917(c) Material	No	
633.006.000	Gutter, Dumped Rock	Section 70917(c) Material	No	
634.002.000	Cribbing, Concrete	Steel and Iron	Yes	*1
636.002.001.01	Traffic Control Devices	Temporary Item	No	
636.002.001.02	Warning Lights	Temporary Item	No	
636.002.001.03	Traffic Cones	Temporary Item	No	
636.004.000	Dust Palliatives	Temporary Item	No	
638.002.000	Survey Marker	Steel and Iron	Yes	
638.006.000	Outlet Marker	Steel and Iron	Yes	
642.006.000	Compost Filter Sock	Construction Material	Yes	
645.001.001	Elasticized Expanded Polystyrene - E-EPS	Construction Material	Yes	
645.001.003	Impervious Membrane	Construction Material	Yes	
645.002.001	Soil Reinforcement, Geosynthetic	Section 70917(c) Material	Yes	
645.002.002	Backfill Material	Section 70917(c) Material	No	
651.002.000	Topsoil	Section 70917(c) Material	No	
657.002.001	Supports, Beams	Steel and Iron	Yes	
657.002.006	Supports, Pipe, Steel	Steel and Iron	Yes	
657.002.008	Support, Sign, Steel, Anchor Bolt, Roadway	Steel and Iron	Yes	
657.002.010	Supports, Tubular, Steel	Steel and Iron	Yes	
657.002.011.1	Supports, Steel, Channel Bar (U Channel)	Steel and Iron	Yes	
657.002.011.2	Supports, Steel, Breakaway Splice Devices	Steel and Iron	Yes	
658.002.000	Sign Support, Steel, Overhead	Steel and Iron	Yes	
658.002.007	Sign Support, Steel, Anchor Bolt O-H	Steel and Iron	Yes	
661.002.001.1	Signs, Aluminum, Flat Sheet Finished	Manufactured Material	Yes	
661.002.001.2	Signs, Aluminum, Extruded Panel Finished	Manufactured Material	Yes	
661.002.001.3	Sign Hardware	Steel and Iron	Yes	
661.002.015	Delineators, XS1 Bicycle Rail	Construction Material	Yes	
662.002.007.1	Luminaires, Roadway, Area, Underpass, Sign Light	Manufactured Material	Yes	
662.002.007.2	Signs, Internally Illuminated LED	Manufactured Material	Yes	
662.002.013.1	Pole, Steel, Lighting Support	Steel and Iron	Yes	
662.002.013.1.6	Lighting Support, Steel, Anchor Bolt	Steel and Iron	Yes	
662.002.013.2	Lighting Support, Steel, High Mast Type	Steel and Iron	Yes	
662.002.013.4	Luminaire Support Arm, Steel, Type 1 & 2	Construction Material	Yes	
662.002.013.5	Luminaire Support Arm, Steel, Type 3	Construction Material	Yes	
662.002.013.6	Lighting Pole, Aluminum	Construction Material	Yes	
662.002.013.7	Luminaire Support Arm, Aluminum	Construction Material	Yes	
662.002.014	Navigation Lighting System	Manufactured Material	Yes	
667.PSP.000	LED Dynamic Message Sign	Manufactured Material	Yes	
679.002.002.1	Concrete, Latex Modified	Section 70917(c) Material	No	
679.002.002.2	Concrete, Microsilica	Section 70917(c) Material	No	
688.005.004	Soluble Salt Removers	Section 70917(c) Material	No	
689.000.000	Metalizing, Steel Coating	Construction Material	Yes	
701.001.000.7	Cement, Type UHR	Section 70917(c) Material	No	
701.001.000.8	Cement, Portland, Type 1 Low - Alkali	Section 70917(c) Material	No	
701.001.000.X	Cement, Portland, All Types	Section 70917(c) Material	No	

DOH-M-22 WVDOH Buy America Requirement Materials

AWP Material Code	Material Description	Category	CoC Required	Notes
701.003.000	Cement, Type 1L - Blended Hydraulic	Section 70917(c) Material	No	
701.004.000	Cement, Masonry	Section 70917(c) Material	No	
704.00X.00X.0X	Aggregate - All Types/Classes	Section 70917(c) Material	No	
705.004.000.0X	Asphalt, Emulsion, All Types	Section 70917(c) Material	No	
705.005.000.0X	Asphalt, Liquid, All Types	Section 70917(c) Material	No	
705.007.000	Asphalt, Dampproofing and Water-Proofing	Section 70917(c) Material	No	
705.008.000	Asphalt, Dampproofing and Water-Proofing, Primer	Section 70917(c) Material	No	
705.011.000.0X	Asphalt, Liquid, All Types	Section 70917(c) Material	No	
707.001.001	Type M Admixture, Concrete, Air-Entraining	Section 70917(c) Material	No	
707.002.002.01.1	Type D Admixture, Concrete Water-Reducing And Retarding	Section 70917(c) Material	No	
707.002.002.01.2	Type G Admixture, Concrete Water-Reducing And Retarding,	Section 70917(c) Material	No	
707.002.002.01.3	Admixture, Citric Acid (Retarder)	Section 70917(c) Material	No	
707.003.001.1	Type A Admixture, Concrete, Water-Reducing	Section 70917(c) Material	No	
707.003.001.2	Type F Admixture, Concrete, Water-Reducing	Section 70917(c) Material	No	
707.004.001	Fly Ash - SCM, Supplementary Cementitious Material	Section 70917(c) Material	No	
707.004.002	Slag Cement - SCM, Supplementary Cementitious Material	Section 70917(c) Material	No	
707.004.003	Silica Fume - SCM, Supplementary Cementitious Material	Section 70917(c) Material	No	
707.004.004	Natural - SCM, Supplementary Cementitious Material	Section 70917(c) Material	No	
707.005.000	Admixture, Latex	Section 70917(c) Material	No	
707.006.000	Burlap, Polyethylene Coated	Temporary Item	No	
707.007.000	Burlap, Jute or Kenaf	Temporary Item	No	
707.008.000	Curing, Concrete, Waterproof Paper	Temporary Item	No	
707.009.000	Curing, Concrete, Liquid Membrane Compound	Temporary Item	No	
707.010.000	Curing, Concrete, White Poly Sheeting	Temporary Item	No	
707.011.000	Coating, Epoxy Resin Protection, Type 3, Grades 1 or 2, Class B or C	Construction Material	Yes	
707.012.002	Sealer, Concrete	Construction Material	Yes	
707.013.001	Type C Admixture, Concrete, Accelerating	Section 70917(c) Material	No	
707.014.001	Admixture, Concrete, Water-Reducing & Accelerating, Type E	Section 70917(c) Material	No	
707.015.001	Type D - Admixture, Concrete, Hydration Control Stabilizing	Section 70917(c) Material	No	
707.016.001	Coating Materials, Concrete Protection	Construction Material	Yes	
707.017.001	Type S Admixture, Concrete, Specialized	Section 70917(c) Material	No	
707.018.001	Admixture, Concrete, Foaming Agent	Section 70917(c) Material	No	
708.001.001	Expansion Joint, Cork	Manufactured Material	Yes	
708.001.002	Expansion Joint, Bituminous Fiber	Manufactured Material	Yes	
708.002.001	Joint Seals, Preformed Elastomeric, Neoprene	Construction Material	Yes	
708.002.002	Expansion Joint, Sponge Rubber	Manufactured Material	Yes	
708.003.000	Joint Sealant, Hot-Poured for Concrete and Asphalt Pavements	Manufactured Material	Yes	
708.004.001.X	Sealant, Silicone Joint, All Types	Construction Material	Yes	
708.004.002	Joint, Back-up Material	Manufactured Material	Yes	
708.009.000	Bitumen Sealant, Concrete and Masonary	Section 70917(c) Material	No	
708.010.001	Waterstops (Elastomer Material), Polyvinylchloride	Construction Material	Yes	
708.010.002	Waterstops (Elastomer Material), Rubber	Construction Material	Yes	
708.PSP.001	Neoprene Sheet for Semi-Integral Abutments	Manufactured Material	Yes	
709.000.000	Steel, Miscellaneous	Steel and Iron	Yes	
709.000.000.0	Welding Electrodes, Piles	Steel and Iron	Yes	
709.001.000.1	Reinforcing Bar, Steel Rebar	Steel and Iron	Yes	
709.001.000.2	Reinforcing Bar, Steel, Epoxy Coated, Coaters Rebar	Steel and Iron	Yes	
709.001.000.3	Epoxy Powders for Rebar	Construction Material	Yes	
709.002.000.1	Reinforcement, 7-Wire Strand, Prestressing	Steel and Iron	Yes	
709.002.000.2	Reinforcement, Steel Bar, High Strength, Prestressing	Steel and Iron	Yes	
709.003.000	Bolt, Steel, Wire Mesh, Hook, Expansion	Steel and Iron	Yes	
709.004.000.1	Wire, Steel, Reinforcement	Steel and Iron	Yes	
709.004.000.2	Welded Wire, Steel, Reinforcement	Steel and Iron	Yes	
709.005.000	Pavement Reinforcement, Expanded Metal	Steel and Iron	Yes	
709.006.000	Bar or Rod Mats, Steel, Fabricated	Steel and Iron	Yes	
709.007.000	Bolt, Joint Tie Bolt Assembly, (J-Hook)	Steel and Iron	Yes	
709.008.000	Structural Metal, Steel, High Strength Low Alloy	Steel and Iron	Yes	
709.010.000.1	Gray Iron Castings	Steel and Iron	Yes	
709.010.000.2	Iron Castings, Ductile Iron Castings	Steel and Iron	Yes	
709.012.000.1	Structural and Eyebar, Steel, (Piling)	Steel and Iron	Yes	
709.012.000.2	Lagging, Steel	Steel and Iron	Yes	
709.015.000	Dowel Bars and Dowel Baskets, Assemblies, Coated	Steel and Iron	Yes	
709.017.000	Pipe, Steel, Welded & Seamless	Steel and Iron	Yes	

DOH-M-22 WVDOH Buy America Requirement Materials

AWP Material Code	Material Description	Category	CoC Required	Notes
709.018.002	Copper Alloy Castings for Name Plates For Bridges	Steel and Iron	Yes	
709.021.000	Pipe, Steel, Floor Drains & Down-Spouts	Steel and Iron	Yes	
709.024.002	Bolt, Steel, High Strength A325 / A449	Steel and Iron	Yes	
709.024.003	Nut, Steel, High Strength	Steel and Iron	Yes	
709.024.004	Washer, Steel, High Strength	Steel and Iron	Yes	
709.036.000	Aluminum Alloy, Bolts, Nuts, and Set Screws	Steel and Iron	Yes	
709.037.000	Aluminum Alloy, Washers	Steel and Iron	Yes	
709.042.000	Steel, Galvanized Pipe or Tubing for Horiontal Drains	Steel and Iron	Yes	
709.045.000	Guardrail Posts, Galvanized Steel	Steel and Iron	Yes	
709.046.000	Post, Braces & Grate Frames, Fence, Steel	Steel and Iron	Yes	
709.046.000.1	Post, Studded Tee	Steel and Iron	Yes	
709.050.000	Pile Points, Steel (Piling)	Steel and Iron	Yes	
709.051.000	Sign Support Surface Mount Bracket, Breakaway Device	Steel and Iron	Yes	
709.052.000	Sign Support, Omni-Directional Breakaway Device, Steel Beam,	Steel and Iron	Yes	
709.053.000	Supports, Steel, Tubular	Steel and Iron	Yes	
709.054.000	Sign Support Back to Back U-Channel, Breakaway Device	Steel and Iron	Yes	
709.055.000	Sign Support Bracket - Barrier Wall	Steel and Iron	Yes	
710.002.002	Hardwood, Structural	Construction Material	Yes	
710.002.003	Hardwood, Bridge Decking	Construction Material	Yes	
710.002.004	Graded Material	Section 70917(c) Material	No	
710.003.000	Preservative Treatment	Manufactured Material	Yes	
710.004.000	Wood Preservers	Construction Material	Yes	
710.005.000	Post, Wood, Guardrail, Rectangular	Construction Material	Yes	
710.005.000.4	Post, Wood for Fence and Signs	Construction Material	Yes	
710.006.000	Plywood	Construction Material	Yes	
710.007.000	Common Lumber	Construction Material	Yes	
710.008.000	Poles, Service and Lighting, Wood	Construction Material	Yes	
711.005.000	Concrete Protective Coatings And Stain	Construction Material	Yes	
711.006.000.1	Paint, Zinc Primers, Organic	Construction Material	Yes	*2
711.006.000.2	Paint, Zinc Primers, Inorganic	Construction Material	Yes	*2
711.012.000	Paint, Epoxy Coatings	Construction Material	Yes	*2
711.022.000	Paint, Zinc Rich Low VOC System	Construction Material	Yes	*2
711.022.003	Paint, Intermediate Coat	Construction Material	Yes	*2
711.022.004	Paint, Top Coat	Construction Material	Yes	*2
711.040.000	Paint, Temporary, White, Yellow Traffic	Temporary Item	No	
711.041.000.1	Paint, White or Yellow, Fast-Dry Traffic	Construction Material	Yes	*2
711.041.000.2	Paint, Yellow, Fast-Dry Traffic	Construction Material	Yes	*2
712.004.000	Guardrail, Fasteners and Anchor Bolts, Stains for Galvanized Steel	Steel and Iron	Yes	
712.004.001	Guardrail Splice Bolt	Steel and Iron	Yes	
712.004.002	Guardrail Post Bolt	Steel and Iron	Yes	
712.004.003	Guardrail Nuts	Steel and Iron	Yes	
712.004.004	Guardrail Washers	Steel and Iron	Yes	
712.004.005	Guardrail Beam, Steel	Steel and Iron	Yes	
712.004.007	Guardrail End, Steel	Steel and Iron	Yes	
712.005.000	Guardrail, Fasteners and Anchor Bolts, Zinc-Aluminum-Magnesium Alloy Coating	Steel and Iron	Yes	
712.008.001	Fence, Steel, Chain-Link	Steel and Iron	Yes	
712.009.000.1	Fence, Wire, Steel, Right of Way, Zinc Coated (Galvanized) Class 1 Coating	Steel and Iron	Yes	
712.009.000.2	Fence, Wire, Steel, Right of Way, Zinc Coated (Galvanized) Class 3 Coating	Steel and Iron	Yes	
712.010.000	Barbed Wire, Coated Steel	Steel and Iron	Yes	
712.011.000	Fence, Safety	Steel and Iron	Yes	
713.002.000	Pipe and Pipe Arch, Metallic Coated Corrugated Steel	Steel and Iron	Yes	
713.003.000	Pipe and Pipe Arch, Asphalt Coated Corrugated Steel	Steel and Iron	Yes	
713.005.001	Pipe, Fiber Bonded Full Bituminous Coated Steel	Steel and Iron	Yes	
713.018.000	Box Culvert, Aluminum Alloy Structural Plate	Steel and Iron	Yes	
713.020.000	Pipe, End Sections for Corrugated Steel Pipe and Pipe Arch	Steel and Iron	Yes	
713.024.000	Pipe and Pipe Arch, Aluminum Coated Corrugated Steel	Steel and Iron	Yes	
714.002.000	Pipe, Reinforced Concrete Culvert, Storm Drain & Sewer, Class III, IV, V	Steel and Iron	Yes	*1
714.003.000	Pipe, Concrete, Arch, Storm Drain & Sewer	Steel and Iron	Yes	*1
714.004.000	Pipe, Reinforced Concrete, Eliptical Culvert, Storm Drain & Sewer	Steel and Iron	Yes	*1
714.005.000	Pipe, Perforated Concrete	Steel and Iron	Yes	*1
714.007.000	Box Culverts, Reinforced Concrete, Precast	Steel and Iron	Yes	*1
714.008.000	Concrete End Sections	Steel and Iron	Yes	*1
714.017.000	Pipe, Polypropylene, Dual Wall, 12-60 Inches	Construction Material	Yes	

DOH-M-22 WVDOH Buy America Requirement Materials

AWP Material Code	Material Description	Category	CoC Required	Notes
714.018.000	Pipe, High Density Polyethylene, Steel Reinforced	Steel and Iron	Yes	*1
714.019.000.1	3-6 inches Perforated Pipe, High Density Polyethylene, Profile Wall	Construction Material	Yes	
714.019.000.2	3-10 inches Non Perforated Pipe, High Density Polyethylene, Profile Wall	Construction Material	Yes	
714.019.000.3	12-60 inches Pipe, High Density Polyethylene, Profile Wall	Construction Material	Yes	
714.020.000	Pipe, Perforated Plastic Semicircular	Construction Material	Yes	
714.022.000	Pipe, Polyvinyl Chloride (PVC)	Construction Material	Yes	
714.023.000	Box Culverts, Concrete, Precast Reinforced	Steel and Iron	Yes	*1
714.024.000	Pipe, Storm Drain, Non-Asbestos, Fiber-Cement	Steel and Iron	Yes	
715.001.000	Chloride, Calcium	Temporary Item	No	
715.002.000	Chloride, Sodium	Temporary Item	No	
715.004.001	Cementitious Materials, PCC Concrete Repair Materials	Section 70917(c) Material	No	
715.004.002	Non-Cementitious Materials, Concrete Repairs	Section 70917(c) Material	No	
715.005.000	Cement Grout, Pakaged Dry, Hydraulic, Non-Shrink	Section 70917(c) Material	No	
715.005.000.1	Plant Produced Grout	Section 70917(c) Material	No	
715.006.000	Lime, Hydrated	Section 70917(c) Material	No	
715.007.000	Water for Hydraulic Cement	Section 70917(c) Material	No	
715.008.000	Fabric, Waterproofing	Construction Material	Yes	
715.009.003.6	Delineator Post, Soil Mounted Plastic	Manufactured Material	Yes	
715.009.003.7	Delineator Post, Guardrail Mounted Plastic	Manufactured Material	Yes	
715.009.003.8	Delineator - Type B1	Manufactured Material	Yes	
715.011.00X	Geotextile - Eng Fabric, All Types	Construction Material	Yes	
715.011.010	Engineering Fabric for Pumped Sediment and Erosion Control (Dewatering Device)	Manufactured Material	Yes	
715.012.000	Concrete, Miscellaneous Uses	Section 70917(c) Material	No	
715.013.000	Fabric Pads, Preformed	Construction Material	Yes	
715.014.000	Bearing Pads, Elastomeric, Plain & Reinforced	Steel and Iron	Yes	*1
715.015.000	Neoprene Sheeting for Miscellaneous Items	Construction Material	Yes	
715.016.000.001	Brick, Clay or Shale, Sewer Brick	Section 70917(c) Material	No	
715.016.000.002	Brick, Clay or Shale, Building Brick	Section 70917(c) Material	No	
715.017.000	Brick, Concrete	Section 70917(c) Material	No	
715.018.000	Concrete Units, Masonry	Section 70917(c) Material	No	
715.019.000.01	Concrete Units, Manholes and Inlets (Precast) Special	Steel and Iron	Yes	*1
715.019.000.04	Inlet, All Types	Steel and Iron	Yes	*1
715.019.000.0X	Manhole, All Types (Precast)	Steel and Iron	Yes	*1
715.019.000.14	Lift Station & Valve Vault (Precast)	Steel and Iron	Yes	*1
715.020.000	Precast Concrete Median Barriers (Temporary)	Steel and Iron	Yes	*1
715.022.000	Precast Concrete Median Barriers (Permanent)	Steel and Iron	Yes	*1
715.023.000	Gabion Baskets	Steel and Iron	Yes	*1
715.024.002.X	Matting for Erosion Control, All Types	Construction Material	Yes	
715.025.000	Limestone, Ground Agricultural	Section 70917(c) Material	No	
715.026.001	Fertilizer, Seeding	Temporary Item	No	
715.026.002	Fertilizer, Landscape Planting	Temporary Item	No	
715.027.001.1	Mulch, Straw, Seeding	Temporary Item	No	
715.027.001.2	Mulch, Wood Cellulose, Seeding	Temporary Item	No	
715.027.001.3	Mulch Binder, Chemical, Seeding	Temporary Item	No	
715.027.002	Mulch Materials, Landscape Plantings	Temporary Item	No	
715.028.000	Seed	Temporary Item	No	
715.029.000	Inoculating Bacteria	Temporary Item	No	
715.033.000	Vines and Ground Cover Plants	Temporary Item	No	
715.034.000	Seedling Plants	Temporary Item	No	
715.035.000	Trees and Shrubs	Temporary Item	No	
715.036.000	Asphaltum Base Paint for Tree Surgery	Temporary Item	No	
715.037.001	Tree Stakes	Steel and Iron	Yes	
715.037.002	Wire, Guying and Staking Plants	Steel and Iron	Yes	
715.037.003	Hose, Guying and Staking Plants	Temporary Item	No	
715.037.004	Twine, Tying Wrapped Tree Trunks	Temporary Item	No	
715.037.005	Tree Wrap	Temporary Item	No	
715.037.006	Anti-Desiccant - Emulsion Protective Film	Temporary Item	No	
715.038.000	Manhole Steps	Steel and Iron	Yes	
715.039.000	Elastomeric Gasket & Sealing Material	Construction Material	Yes	
715.040.002	Pavement Preformed Marking Material, Type V	Manufactured Material	Yes	
715.040.006.1	Raised Pavement Markers, Type P-2, RPM	Manufactured Material	Yes	
715.040.006.2	Raised Pavement Marker, Type R-4, RPM	Manufactured Material	Yes	
715.041.001	Traffic Safety Devices, Attenuating Type V	Steel and Iron	Yes	*1

DOH-M-22 WVDOH Buy America Requirement Materials

AWP Material Code	Material Description	Category	CoC Required	Notes
715.041.001.01	Reflective U-Channel Strips	Construction Material	Yes	
715.041.001.02	Channelizer Cones	Temporary Item	No	
715.041.00X	Traffic Safety Devices, Attenuating All Types	Steel and Iron	Yes	*1
715.042.000.1	Traffic Signal Materials & Equipment	Steel and Iron	Yes	*1
715.042.000.2	Traffic Signals, Miscellaneous	Manufactured Material	Yes	
715.042.005.2	Loops (LPS)	Steel and Iron	Yes	*1
715.042.005.3	Closed Circuit Television (PAS-CCTV)	Manufactured Material	Yes	
715.042.005.4	Pedestrian Detector with Audible	Manufactured Material	Yes	
715.042.005.5	Radar Advance Digital Detection (RADD)	Manufactured Material	Yes	
715.042.005.6	Video Detection Cameras (VTDS)	Manufactured Material	Yes	
715.042.006.2	Signal Sections (V12) (V12P) (G16)	Steel and Iron	Yes	*1
715.042.009.1.2	Signal Supports, Mast Arm	Steel and Iron	Yes	
715.042.009.1.3	Supports, Signal, Video Arm	Steel and Iron	Yes	
715.042.009.2	Signal Supports, Strain Types C1, C1L, C2 and C2L	Steel and Iron	Yes	
715.042.009.2.2	Signal Supports, Anchor Bolts	Steel and Iron	Yes	
715.042.009.4.1	Signal Supports, Aluminum, Pedestal E-1	Steel and Iron	Yes	
715.042.009.4.2	Signal Support, Steel, Pedestal E-2	Steel and Iron	Yes	
715.042.009.4.3	Signal Support, Steel, Pedestal E-3	Steel and Iron	Yes	
715.042.010.1	Conduit, Rigid, Type R	Construction Material	Yes	
715.042.010.2	Conduit, Flexible, PVC Cover	Construction Material	Yes	
715.042.010.3	Conduit, Type P (Polyvinyl Chloride)	Construction Material	Yes	
715.042.011.X	Junction Box, All Types, All Duty, Cast in Place	Steel and Iron	Yes	*1
715.045.000	Bentonite	Section 70917(c) Material	No	
716.001.001	Random Material	Section 70917(c) Material	No	
716.001.001.1	Soil	Section 70917(c) Material	No	
716.001.001.2	Granular Material	Section 70917(c) Material	No	
716.001.001.3	Shale, Soft	Section 70917(c) Material	No	
716.001.002	Rock	Section 70917(c) Material	No	
716.001.003	Shale, Hard	Section 70917(c) Material	No	
716.001.004	Borrow Material	Section 70917(c) Material	No	
718.000.000.1	Waterline Items	Steel and Iron	Yes	
718.000.000.2	Sewerline Items	Construction Material	Yes	
718.001.000	Pipe, Ductile Iron	Steel and Iron	Yes	
718.005.000	Pipe, Plastic (PVC) Waterline	Construction Material	Yes	
718.007.000	Pipe, Plastic (Polyethylene) Waterline	Construction Material	Yes	
718.009.000	Service Line, Copper	Construction Material	Yes	
718.010.000	Gate Valves	Steel and Iron	Yes	*1
718.011.000	Valve Box	Steel and Iron	Yes	*1
718.012.000	Pipe, Casing, Water/Sewer	Steel and Iron	Yes	*1
718.013.000	Fire Hydrants	Steel and Iron	Yes	*1
718.014.000	Meters	Steel and Iron	Yes	*1

Note *1 - Steel/Iron in this Material are Subject to Buy America Requirements.

Note *2 - Glass Beads in Paint Require a CoC.

Note: A CoC is only required if the material is permanently incorporated into the project.

Note: AWP Material Code is for internal use only.

Steel and Iron
Manufactured Products
Construction Materials
Section 70917(c) Materials

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

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

1. PURPOSE

1.1. THE WVDOH HAS A LONG HISTORY OF USING NUCLEAR MOISTURE/DENSITY GAUGES AND IS FAMILIAR WITH THE TEST PROCEDURES, RELIABILITY, MAINTENANCE, AND CALIBRATION PROCEDURES OF SUCH DEVICES. IN RECENT YEARS, MORE DEVICES HAVE COME TO MARKET THAT ARE LOW OR NON-NUCLEAR. THIS MP IS IN PLACE ~~T~~to establish procedures ~~used~~ to approve the use of any testing device~~s~~ for Density and/or Moisture ~~of~~ for in-place material on WVDOH projects.

2. SCOPE

2.1. THIS MP APPLIES TO MOISTURE AND DENSITY TESTING DEVICES USED FOR ACCEPTANCE TESTING, AS WELL AS ANY TIME SUCH DEVICES MIGHT BE USED WHEN QUALITY CONTROL TESTING RESULTS ARE USED FOR ACCEPTANCE.~~To establish procedures used to approve the use of testing devices for Density and/or Moisture of in-place material on WVDOH projects.~~

3. REFERENCED DOCUMENTS

3.1. West Virginia Department of Transportation Specifications

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

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

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

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

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

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

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

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

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

Commented [4]: Added the specs

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

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

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

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

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

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

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

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

4.3. The testing device must be suitable for each application. The testing device must be capable of providing wet density, dry density, and moisture of asphalt, soil, and aggregates.

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

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

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

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

5. APPROVAL PROCESS

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

5.2. The WVDOH will evaluate each brand/model of moisture/density testing device as needed. Evaluations shall be based~~base~~ on ~~according to~~ the requirements listed in Section 4 and ~~compared to~~ the manufacturer's documentation. WVDOH ~~and~~ reserves th

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

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

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

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

Commented [10]: Added sentence to address this

Commented [11]: Stating precise and repeatable is redundant

Commented [12]: Combine with 4.4

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

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

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

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

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

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

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

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

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

Commented [22]: specify "testing" devices.

Commented [23]: What is the Evaluation Process?

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

e right to reject or remove any ~~brand or model~~device from the approval list. ~~without further explanation~~.

~~4.1.~~5.3. Devices that meet all of the requirements of this MP will be evaluated first as a QC device. Upon satisfactory field performance as a QC device, it will be listed as a QA device. The brand and model can be found on the appropriate approved list on the MCS&T website.

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

~~Humbolt HS-5001 series~~

~~Troxler 3430/3440 series~~

~~Instrotek 3500 series~~

~~Instrotek Xplorer 2~~

~~Instrotek/CPN MC-1~~

~~5.1.6. Instrotek/CPN MC-3Process TBD~~

~~**6.7. APPROVAL OF DEVICES FOR TESTING OF DENSITY AND/OR MOISTURE OF IN-PLACE MATERIAL**~~

~~6.1.~~7.1. ~~Process TBD~~

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

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

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

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

MATERIALS PROCEDURE

GUIDE FOR QUALITY CONTROL AND ACCEPTANCE PLANS FOR SUBGRADE, BASE COURSE, AND AGGREGATE ITEMS

1. PURPOSE

1.1 The purpose of this Materials Procedure (MP) is to establish minimum requirements for the Contractor's Quality Control (QC) Program and Acceptance Plan. It is intended that these requirements be used as a procedural guide in detailing the inspection, sampling, and testing deemed necessary to maintain compliance with the material and Specification requirements.

1.2 To establish procedural guidelines for approval and documentation of the Master QC Plan.

2. SCOPE

2.1 This procedure is applicable to Aggregate items placed in the field. It outlines the quality control procedures for items used and includes procedures for approving and using a Master and/or Project Specific Quality Control (QC) Plan. This procedure also aids in documentation and retention of the QC Plan in ProjectWise.

3. REFERENCED DOCUMENTS

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

3.2 MP 300.00.51 - Procedural Guidelines for Maintaining Control charts for Aggregate Gradations

3.3 MP 700.00.54 - Procedure for Evaluating Quality Control Sample Test Results with Verification Sample Test Results

3.4 MP 700.00.06 - Aggregate Sampling Procedures

3.5 ML-25, Procedure for Monitoring the Activities Related to Sieve Analysis of Fine and Coarse Aggregate

3.6 WV Division of Highways Construction Manual, Current Edition

4. GENERAL REQUIREMENTS

4.1 The Contractor shall provide and maintain a QC system that will provide reasonable assurance that all materials and products submitted to the District for acceptance will conform to the contract requirements whether natural, manufactured or processed by the Contractor or procured from suppliers, subcontractors, or vendors. The Contractor shall perform or have performed the inspections and tests required to substantiate product conformance to contract document requirements and shall also perform or have performed all inspections and tests otherwise required by the contract. The Contractor's QC

inspections and tests shall be documented and shall be available for review by the Engineer/District throughout the life of the contract. The Contractor shall maintain standard equipment and qualified personnel as required by the Specifications to assure conformance to contract requirements. Procedures will be subject to the review of the District before the work is started.

5. QUALITY CONTROL PLAN

5.1 The Contractor shall prepare a QC Plan detailing the type and frequency of inspection, sampling, and testing deemed necessary to measure and control the various properties of materials and construction governed by the Specifications. As a minimum, the sampling and testing plan shall detail sampling location, sampling techniques, and test frequency to be utilized. Attachment #1 shows guidelines for the QC Plan. QC sampling and testing performed by the Contractor may be utilized by the District for acceptance.

5.1.1 A QC Plan must be developed by the Contractor and submitted to the Engineer/District prior to the start of construction on every project. Acceptance of the QC Plan by the Engineer/District will be contingent upon its concurrence with these guidelines.

5.2 As work progresses, an addendum(s) may be required to the QC Plan to keep the QC program current. Personnel may be required to show proof of certification for testing.

5.3 QC Plan Guidelines: The QC plan shall include but not be limited to the following information:

5.3.1 Name of company official responsible for QC program. Contact phone number(s) and email(s) shall be included in the cover letter.

5.3.2 List certified personnel as specified in Section 106 of the Specifications, whether from the submitting company, consultant testing firm, or both.

5.3.3 List of the Aggregate items to be controlled by QC Plan.

5.3.4 Sampling and Testing Plan: As a minimum, the sampling and testing plan should detail sampling locations, test methods, and test frequencies to be used. To facilitate the District's monitoring activities, which are described in Section 7.1, all completed gradation samples must be retained by the Contractor until further disposition is designated by the District Materials Supervisor. The QC Plan should state where and how these samples will be maintained. Applicable sections of Materials Letter ML-25 should be used for guidance.

5.3.5 Testing Facility: The plan shall state the specific location where the samples(s) will be tested and retained.

5.3.6 Documentation Plan: The Contractor's plan to document and distribute test results shall be described.

5.3.7 Forms and Distribution: Approved processing forms available on the MCS&T Webpage[1] shall be used to record the test data. Gradation tests will be recorded on Form T300. The lab

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

oratory reference number will always start with a "C" for all QC samples taken and tested by the Contractor. One copy of each completed form should be retained by the Contractor until the work is completed and accepted. The original signed copy of the test data is to be delivered to the District Materials Supervisor. To be an effective QC function, tests must be completed and results distributed in a regular and timely manner. The plan, therefore, must state what action will be taken in the event that testing and reporting are not completed in a reasonable period of time - preferably within 72 hours after the sample is taken (at the discretion of the District).

5.3.8 Control Charts: The Specifications require the plotting of gradation test results on control charts using the moving average concept as described in MP 300.00.51. The QC Plan should state where and how the charts shall be maintained and made available to District personnel. These charts are part of the District's acceptance procedures and must be available to the District when the project is completed or at the request of the District personnel. At the Contractor's request, the requirement of Control Charts may be waived on a per project basis. The Contractor will submit a written request to the District asking that the Control Charts be waived. The District will make a determination based on the size of the project and the number of gradation tests required.

5.3.9 Disposition of Non-Specification Material: The Contractor shall provide a detailed plan of action for the immediate notification of all parties involved in the event that nonconforming situations are detected.

5.3.10 Delivery Tickets

Each truckload of aggregate delivered at the project shall be accompanied by delivery ticket with all the following information:

1. Ticket number
2. Producer/Supplier Code
3. Producer/Supplier Name
4. Producer/Supplier Location
5. Contract Identification Number (CID #)
6. Federal Project Number (If applicable)
7. State Project Number
8. Date/Time
9. Material Code/Name
10. License Number of Haul Unit or Truck Number
11. Load Number
12. Gross Truck Weight
13. Tare Truck Weight
14. Net Weight
15. Weighperson's Name certifying that all information on the ticket is correct.

The following information shall be documented on the ticket by the project:

1. Contract Item Number
2. Contract Line Number

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

5.3.11 Types of QC Plans

5.3.11.1 QC Plans which are intended for use on more than one project shall be defined as Master QC Plans. Section 6.1 outlines the procedures for Master QC Plan submittal and approval.

5.3.11.2 QC Plans which are intended for use on a single project shall be defined as Project Specific QC Plans. Project Specific QC Plans shall contain a cover letter which includes the following: project description, CID#, and Federal and/or State Project Number.

5.3.11.3 A contractor may submit a project specific cover letter referencing the Master QC plan instead of a Project Specific QC Plan.

5.3.11.4 Once any QC Plan is approved for a project, the key-date shall be entered in Site Manager by the appropriate District Materials personnel. The first date entered shall be the date the Project QC Plan letter is received. The second date shall be when the District approves the QC Plan for use on the project.

6. MASTER QUALITY CONTROL PLAN

6.1 The intent of a Master QC Plan is to facilitate the approval process in a more uniform manner. The Contractor may submit a Master QC when their workload in a given District is routinely repetitive for the year. Testing includes both performing the test and submitting the results as per MP 109.00.21.

6.1.1 The Contractor may submit a new Master Aggregate Items QC Plan each year to each District in which they have or expect to have work (see Attachment #2 for an example). If the Contractor does not have work or does not have a history of work in a given District for the year, then a Master Field QC Plan shall not be submitted to that District.

6.1.2 The District will review the submitted Master QC Plan to see if it meets the requirements for the Aggregate Items in the QC Plan as per Section 5.3. If accepted, the District shall assign a laboratory reference number to the Master QC Plan for future referencing. The District will acknowledge approval of each Master QC Plan to the Contractor by letter (see Attachment #3 for an example), which will include the laboratory reference number and a copy of the approved Master QC Plan. This will then be scanned and placed in ProjectWise under the appropriate District's Org for that Contractor and/or Producer/Supplier.

6.1.3 Once a project has been awarded, if a Contractor elects to use the approved Master Aggregate Items QC Plan on that project, the Contractor shall submit a letter requesting to use the Master QC Plan for that project. This letter must be on the Contractor's letterhead, be addressed to the District Engineer/Manager or their designee, and contain the following information: project number, CID#, project description, type of QC Plan, and the laboratory reference number for the Master QC Plan. (See Attachment #4 for an example).

6.1.4 The District shall review the referenced Master QC Plan to ensure it covers all items in the project. If the referenced Master QC Plan is found to be insufficient for some items on the project, the District shall request the Contractor to submit additional information for QC of those items as an addendum on a project specific basis. When the District is satisfied with the QC Plan for this project, a letter shall be sent to the Contractor acknowledging

approval (see Attachment #5 for an example), with the following attached: the Contractor's project QC Plan request letter and the Master QCP approval letter. This shall then be placed in the project's incoming-mail mailbox in ProjectWise.

6.1.5 A Master QC Plan that has been approved for project use shall be good for the duration of that project, even if that project continues into future calendar years.

6.1.6 For the use of District Personnel, the District approval letter for this project must state the ProjectWise link to the referenced Master QC Plan for that Contractor. For example, WVDOT ORGS > District Organization #> Materials > Year>Master QC Plans, etc.

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

7. ACCEPTANCE PLAN

7.1 Per 307.2 of the Specifications, the acceptance (verification) sampling and testing is the responsibility of the District and QC tests are the responsibility of the Contractor. Acceptance activities (sampled and tested at the frequency given in Section 7.1.2) may be accomplished by conducting verification sampling and testing completely independent of the Contractor and, in some cases, by witnessing tests performed by the Contractor, or by a combination of the two. The following guidelines provide a system, which should result in sufficient confidence in the Contractor's documentation of their QC operations to permit acceptance of the material in accordance with the procedure set forth in the Specifications.

7.1.1 The District shall review all information supplied by the Contractor on the QC Plan. Note, in particular, the qualifications of the sampler, tester, the location, and other qualifying statements about the testing facility. In the event that little qualifying information is supplied or has been demonstrated by the testing facility: Prior to work, the District (or their representative) shall review the availability, type, and suitability of the testing equipment and verify all calibrations. This information should be documented and kept available at the District Materials Section.

7.1.2 The District shall sample and test, completely independent of the Contractor, at a frequency equal to or greater than ten (10) percent of the frequency for testing given in the approved QC Plan. Witnessing the Contractor's sampling and testing activities may also be a part of the acceptance procedure, but only to the extent that such tests are considered "in addition to" the ten (10) percent independent tests.

7.1.3 Plot the results of gradation tests performed by the District on the Contractor's QC charts with a red circle, but do not include these values in the moving average. When the Contractor's tests are witnessed, circle the Contractor's test result on the control chart with red. These values are used in the moving average calculations. The laboratory number will always start with an "M" for all acceptance (verification) samples taken and tested in this manner by the District, and will always start with a "0" for all of the Contractor's tests, which are witnessed by the District.

7.1.4 Evaluate the results of acceptance (verification) tests, whether performed or witnessed by the District, in accordance with MP 700.00.54.

7.2 If the evaluation indicates similarity with the QC test(s), the control chart will be considered acceptable to that point.

7.2.1 If dissimilarity is determined, an immediate investigation shall be conducted in an effort to determine the cause. Until the situation is resolved, any samples held in accordance with ML-25 will be retained and may be used in whatever manner deemed appropriate during the investigation.

7.3 Implement ML-25 for aggregate gradations.

8. ABSENT TESTING OF MATERIAL

8.1 If the Contractor fails to perform testing of the material in accordance with the Contractor's Division Approved Quality Control Plan, payment for the portion of the item represented by the absent test shall be withheld, pending the Engineer's decision whether or not to allow the material to remain in place. Testing includes both performing the test and submitting the results as per MP 109.00.21.

8.1.1 If the Engineer allows the material to remain in place, the Division shall not pay for the material represented by the absent test. However, the Division shall pay for the cost of the placement of the material, including labor and equipment. The invoice or material supplier cost (if applicable), determined at the time of shipment, shall be used to calculate the cost of material when evaluating the total cost of labor and equipment.

_____

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

MP 307.00.50 Steward – Aggregate and Soils Section
MM: R
ATTACHMENTS

ATTACHMENT #1 - GUIDELINES FOR CONTRACTOR'S QUALITY CONTROL

Item Description	Property	Minimum Frequency
207 Subgrade	Gradation	One (1) sample per day of placement. Note 1
	~~Atterburg~~ Atterberg Limits	From an approved aggregate source: one (1) test at the beginning of placement and then each 10,000 tons. Not from an approved aggregate source a minimum of one (1) test per 6 days placement.
212 select Material for Backfill	Gradation	Minimum of one (1) sample per day of Placement. Note 1
307 Crushed Aggregate	Gradation	One (1) sample per each one-half (1/2) day placement. Note 1
	~~Atterburg~~ Atterberg limits	One(1) test at the beginning of placement and then each 10,000 tons thereafter
	Other tests as requested by the Division or required by the contract documents: percent crushed particles, unit weight, etc.	As requested by the Division or required by the contract documents.
307 Aggregate Shoulder course for Resurfacing Projects	Gradation	One (1) sample per day of placement. Note 1
	~~Atterburg~~ Atterberg limits	One (1) test at the beginning of placement and then each 10,000 tons thereafter
	Other tests as requested by the Division or required by the contract documents: percent crushed particles, unit weight, etc.	As requested by the Division or required by the contract documents.

ATTACHMENT #1 GUIDELINES FOR CONTRACTOR'S QUALITY CONTROL (CONTINUED)

315 Trail Surface Aggregate	Gradation	Minimum of one (1) sample per half day of placement.
	Atterberg Limits	From an approved aggregate source: one (1) test at the beginning of placement and then each 10,000 tons. Not from an approved aggregate source a minimum of one (1) test per 6 days placement.
604 Class 1 Aggregate	Gradation	Minimum of one (1) sample per day of placement. Note 1
606 Aggregate for Underdrain	Gradation	Minimum of one (1) sample per day of placement. Note 1
609 Bed Course Material	Gradation	Minimum of one(1) sample per day of placement. Note 1
626 Aggregate	Gradation	Minimum of one (1) sample per day of placement. Note 1
	~~Atterburg~~Atterberg Limits	From an approved aggregate source: one (1) test at the beginning of placement and then each 10,000 tons. Not from an approved aggregate source a minimum of one (1) test per 6 days placement.
636 Aggregate	Gradation	One (1) sample per each one-half (1/2) day of placement. Note 1: Note 2
	~~Atterburg~~ Atterberg Limits	One (1) test at beginning of placement and then each 10,000 tons thereafter. Note 2

Note 1: In the event project activities are such that relatively small quantities of material are being placed per placement date, and to prevent over sampling, the Engineer may approve the following alternate sampling method: A minimum of One (1) sample per six (6) consecutive days shall be taken to represent up to each 170 cubic yards (250 tons). Sampling is to be done on the first day of aggregate placement. In this case the sample shall be taken at a random time and place

Note 2: When Aggregate for maintaining traffic is not to be part of any succeeding base or pavement course, the appropriate aggregate size shall be determined by the Engineer. If the aggregate is from an approved source, then it shall be accepted by visual inspection. If the Contractor elects to use aggregate from an unapproved source, test results shall be provided to show that the liquid limit and plasticity index meet the requirements in Table 704.6.2B

***** ATTACHMENT #2 - EXAMPLE GUIDE FOR AGGREGATE ITEMS QUALITY CONTROL PLAN *****

The Acme Company
20 First St.
Somewhere, WV XXXXXXX

Mr/./Ms/Mrs. _____
WV Division of Highways
District ___ Engineer/Manager
_____, WV

RE: "year"__ Master Aggregate Items QC Plan
DISTRICT: _____

Dear Mr./Ms/Mrs. _____

We are submitting our Master QC Plan for Aggregate Items , developed in accordance with the (year) WVDOH Standards and Specifications, (year)WVDOH Supplemental specifications, MP300.00.51, MP 700.00.54, ML-25, and AASHTO Testing standards.

The Quality Control Program is under the direction of _____ . They can be contacted by telephone number _____, email _____ and/or in person.

1.) All testing will be performed by qualified personnel as per WVDOH Specification Section 106 Control of Materials. Proof of personnel certification shall be provided to WVDOH inspectors upon request.

2.) Specify items to be controlled and the methods by which each item will be tested (For example:207,307…etc) Attachment #1 summarizes the different materials, minimum frequencies, and the appropriate test procedure or method for controlling each material.

- 207 Items - 212 Items -307 Crushed Aggregate Items - ETC>>>>>

3.) List the location (address) and lab where testing will be performed.

4.) State the method and means by which that Contractor will document and distribute test results.

5.) State what forms will be used for tests the time frame for completing testing and distributing of test information to District Materials.

6.) Specify in the QC Plan where and how the charts will be maintained and made available to Division/District personnel. Control Charts will use the moving average concept as described in MP 300.00.51.

7.) Specify a plan of action providing for immediate notification of all parties involved in the event that nonconforming material situations are detected.

Very Truly Yours,

_____

Title

********** ATTACHMENT #3 WVDOH LETTERHEAD **********

ACME Company
20 First St.
SOMEWHERE, WV #####

RE: Aggregate Items Master QC Plan
Description: (Year) Construction Season

Dear Mr./Ms/Mrs. _____,

Your Master Aggregate Quality Control Plan **(M#-#####)** for _____has been reviewed and found to be acceptable for the following items:

- 207 Aggregate Items
- 212 Aggregate Items
- 307 Aggregate Items
- ETC

As work progresses throughout the season, an addendum(s) may be required to this QCP to keep the QC program current. **Also note that personnel may be required to show proof of certification for testing. Please use Lab Reference # M#-###### when corresponding about this QC plan**. Please make sure that all appropriate personnel have a copy of this plan in their possession.

Very Truly Yours,

_____
Title

********** ATTACHMENT #4 - EXAMPLE **********

THE ACME COMPANY INC.
20 First St.
Somewhere, WV XXXX

Mr./Ms/Mrs _____
WV Division of Highways
District ___ Engineer/Manager
_____, WV _____

Subject: Aggregate Items QC plan
For project

Fed. Project No _____
State Project No. _____
Contract ID No. _____
Description _____

Dear Mr./Ms/Mrs. _____,

We would like to use our approved Aggregate Items Master Quality Control Plan, reference number _____ for the project referenced above. We feel that all items on the referenced project are covered by the Master Quality Control Plan for Aggregate Items.

The QC Plan is under the direction of _____, _____(title), and will be the Company's contact representative to the Division of Highways District Materials and Construction Departments. They can be contacted in person at the project, by telephone _____ or at email account _____.

Very Truly Yours,

_____
Title

********** **ATTACHMENT #5 - WVDOH LETTERHEAD** **********

THE ACME COMPANY INC.
20 First St.
Somewhere, WV XXXXX

RE: _____ Aggregate Items QC Plan

Project CID#: ########
Fed/State Project #: ####- ## - ####.##
Description: Falling Slide
County : XXXXXXX

Dear Mr./Ms/Mrs. _____,

Your request to use your Master Aggregate Items Quality Control Plan **(M# - ######)** for Aggregate Items on the project referenced above, has been reviewed and found to be acceptable for the following items:

- 207 Aggregate Items
- 212 Aggregate Items
- 307 Aggregate Items
- ETC

As work progresses throughout this project an addendum(s) may be required to this QCP to keep the QC program current. **Please use M# - ###### when corresponding about this QC plan. Also note that personnel may be required to show proof of certification for testing.** Please make sure that all appropriate personnel have a copy of this plan in their possession.

For Division/District use

The Master Quality Control Plan can be reviewed in ProjectWise at this Link:

WVDOT ORG>D0#>year>MASTER QC PLANS>Contractors or Plant>Contractor Name>Name of Quality Control Plan

Very Truly Yours,

_____
Title

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

MATERIALS PROCEDURE

CALIBRATION OF CONCRETE CONTINUOUS MOBILE MIXER

1. PURPOSE

1.1. To provide a test procedure for the calibration of concrete continuous mobile mixers.

2. SCOPE

2.1. This procedure covers the calibration of continuous type mixers (concrete mobiles) used in producing latex modified concrete.

3. REFERENCE DOCUMENTS

3.1. Specifications Section 679 - Overlaying Portland Cement Concrete Bridge Decks

4. CALIBRATION

4.1. This calibration procedure shall be performed at the start of every project.

5. PRE-CALIBRATION INSPECTION

5.1. All aggregate and cement bins should be empty and thoroughly cleaned.

5.2. The main conveyor belt should be thoroughly cleaned, including the chain.

5.3. Be certain all bin vibrators function properly.

5.4. Be certain the cement meter-feeder wheel is thoroughly cleaned.

5.5. Check spring tines to make sure they are properly tensioned on cement meter-feeder.

5.6. Be certain that all blades on the cross-auger in the cement bin are in-place and straight.

5.7. Make sure the cement bin aeration system is functioning properly. The control valve should be depressed for about 10 seconds to fluff the cement in the bin prior to the calibration and prior to concrete production at the jobsite.

5.8. Make sure that the connections at both ends of the drive cable connecting the meter register and the cement feeder shaft are tight and the cable is free of kinks.

5.9. Make sure that the concrete mobile is properly grounded. A build up of static electricity may prevent normal flow of the cement.

5.10. Make sure that the cement bin breather hole is open to free atmospheric pressure.

6. CEMENT CALIBRATION

6.1. Check that the aggregate bins are completely empty.

6.2. Fill the cement bin at least one half full of cement being used on the project.

6.3. Check that the discharge tube at bottom of the cement bin is cleaned and clear of residue.

6.4. Run the machine until uniform cement output is achieved.

6.5. Insert designated baffle into the mixer hopper to divert the cement into a container.

6.6. Obtain a container large enough to hold at least two bags of cement.

6.7. Measure the weight of the dry, clean container and place it under the conveyor so that it will catch all the cement discharge.

6.8. Set the counter to 0.

6.9. Run the machine for 100 to 150 continuous counts. Engage the main clutch to make the concrete-mobile operative and start the stopwatch at precisely the same time as starting the machine.

6.10. Watch the cement meter register and when it registers the predetermined count, immediately disengage the main clutch and stop the watch simultaneously.

6.11. Weigh the container and record the net weight of cement, the elapsed time, and the meter count onto Attachment 1.

6.12. Repeat steps 6.7-6.11 at least four additional times to total 5 samples

6.13. Based on the five “runs” calculate the “cement meter count” and “discharge time” for 94 lbs. (1 bag) of cement.

6.14. Follow the calculation on Attachment 1 to determine the dial setting.

6.15. Remove all the remaining cement from the mobile mixer bin.

7. SAND CALIBRATION

7.1. Ensure the clutch is disengaged.

7.2. Fill the aggregate bin with the sand being used on the project.

7.3. Be sure the concrete mobile is operating at the specified operating speed (check the tachometer).

7.4. Obtain the tare weight of the container used to catch the sand.

7.5. Set the gate to 3 for a “low” starting point.

7.6. Charge the belt with sand by allowing at least 5 linear feet of loaded belt to discharge on the ground. Ensure the sand is discharging consistently.

7.7. Position the container under the conveyor discharge so that it will catch the material and reset the counter meter to 0.

7.8. Engage the main conveyor control and allow it to operate for approximately 100 counts.

7.9. Weigh the container and record the gate setting, the net weight of the sand and the meter count on Attachment 1.

7.10. Repeat until consistent counts to consistent weight are achieved.

7.11. Acquire 3 samples for the lower gate setting.

7.12. Reset the gate to 7 for “High” gate setting.

7.13. Charge the belt with sand by allowing at least 5 linear feet of loaded belt to discharge on the ground. Ensure the sand is discharging consistently.

7.14. Repeat until consistent counts to consistent weight are achieved. With the higher gate setting, only 50 counts are necessary.

7.15. Acquire 3 samples for the high gate setting.

7.16. Follow the calculation on Attachment 1 to determine the dial setting.

7.17. Accurately plot on Attachment 1.

7.18. Remove all the remaining sand from the mobile mixer bin.

8. STONE CALIBRATION

8.1. Follow the same procedure as for calibrating the sand discharge.

8.2. Remove all the remaining stone from the mobile mixer bin.

9. WATER CALIBRATION

9.1. Insure all units are empty

9.2. Locate the total gallons of water required on the approved mix design.

9.3. Obtain the tare weight of the container being used to catch the discharge.

9.4. Adjust the flow setting to the best estimate required to discharge the target weight of water in the time found during the cement calibration.

9.5. Position the container so that it will catch all of the water discharge.

9.6. Discharge the water for the calibrated time found during the cement calibration into a suitable container.

9.7. Weigh the container and record the net weight of water.

9.8. Repeat the process at that dial setting until 5 acceptable readings are recorded.

9.9. Determine the net weight of water. The weight of water is required to be accurate within 1%.

10. LATEX CALIBRATION

10.1. Locate the total gallons of latex required on the approved mix design.

10.2. Follow the calculation on Attachment 1 to determine the target weight of latex.

10.3. Adjust the flow setting to the estimated required to discharge the target weight of latex in the time found during the cement calibration.

10.4. Discharge the latex for the calibrated time into a suitable container and determine the weight of the latex.

10.5. Repeat the process at the dial setting until five consecutive, suitable readings are recorded.

10.6. Follow the calculation on attachment 1 to determine the dial setting. If the weight is within the tolerance for latex (1%), then record the flow setting and the weight of the latex. If it is not within tolerance, discard the results and adjust the dial setting accordingly.

11. ADMIXTURE CALIBRATION

11.1. Obtain the cement discharge time, in seconds, found during cement calibration.

11.2. Calculate the cement discharge time in minutes.

11.3. Calculate the dilution rate for the admix.

11.3.1. It is necessary to dilute both admixtures. Admixtures are diluted by mixing 5 parts of water to 1 part of admixture; however; some contractors prefer to dilute the air entraining admixture at the rate of 3 parts of water to 1 part of admixture. The dilution and mixing solution shall be done before the solution is put into the tanks.

11.3.2. The process of diluting admixtures should be observed by the inspector. The dispensing system should be clean and free of admixture solutions from other jobs prior to adding a new admixture solution to tanks.

11.3.3. Fill the admixture system with the proper part solutions to be used on the job.

11.3.4. Set the air pressure regulator gauge at 15 psi for standard units or 25 psi for magnum units.

11.3.5. Using a calibrated vial, with ounce or milliliters and a discharge time of one minute, establish a flowmeter setting that will deliver the calculated flow rate.

11.3.6. If a concrete-mobile handbook is available the flowmeter diagrams for LO-FLOW and HI-FLOW systems can be used to obtain an initial flowmeter setting.

11.3.7. Having established a flowmeter setting, obtain 3 one minute samples and record each volume. If each individual test has no more than 1% variation from the average flow rate, the unit admixture system is acceptable.

11.3.8. Follow the calculations on Attachment 1 to calibrate the liquid admixture.

12. FIBER FEEDER CALIBRATION

12.1. Insert package of fibers into the fiber feeder.

12.2. Extend the cylinder until the fibers engage the finger assembly.

12.3. Measure the height of the tube.

12.4. Measure from the top of the tube to the top of the plunger.

12.5. Complete the calculation on Attachment 1 for the total inches per minute travel rate.

12.6. Divide total inches per minute travel rate by 4.

12.7. Adjust cylinder flow rate to the halfway mark.

12.8. Have one person run the fiber feeder control and stopwatch while another person measure the rate of travel on the cylinder.

12.9. Start the fiber feeder and run for 15 seconds.

12.10. The distance traveled should be the same as the calculated total inches per minute. If less, adjust the flow rate up, if more adjust the flow rate up. Follow the calculation on Attachment 1 to determine the dial setting

12.11. Once the corrected flow rate is established, lock the adjuster in place.

13. YIELD TEST

13.1. There shall be one yield test per truck per day of batching. Also a yield test should be performed by the Contractor prior to deck placement for each mixing unit, when each unit is moved from the job site for recharging, when the source of stockpiled materials is changed and when there is reason to believe the calibration may be erroneous.

13.2. A minimum of 2 cubic yards is required to be batched.

13.3. Fill the mixing unit with project materials, including admixtures.

13.4. Check all gate, valve and flow meter setting for conformance with those established in the calibration steps.

13.5. Determine the cement meter count to deliver the minimum. of 2 cubic yards of concrete using the calculations on Attachment 1.

13.6. Place the box beneath the mix conveyor to catch all the concrete discharged by the unit.

13.7. Set the mix conveyor at an angle of at least 45 degrees.

13.8. Ensure the count meter register is 0.

13.9. Engage the mix conveyor and main conveyor simultaneously to discharge concrete until the meter equals that for 2 cubic yards or the box becomes full.

13.10. Strike off the concrete in the box and record the exact count. The count must be within 2% of the count calculated during calibration.

13.11. Batch a load of concrete using the previously determined calibration settings and total counts.

13.12. Completely fill the box with concrete while noting the total number of counts used.

13.13. This value must be within 1% of the calibrated counts that were determined earlier. If it is within tolerance, then it becomes the new calibrated total count. If they still don't fall within the required range, the calibration process must be redone.

Cement Calibration Sheet

COUNTY		PROJECT No.	
CONTRACTOR		DATE	
TRUCK No.		CALIBRATED BY	
SERIAL #			
UNIT SERIES		CEMENT TYPE	
	(50,100,130,150, or 200)	CEMENT SOURCE	

TRIAL #	COUNTS	GROSS WT	TARE WT	NET WT	TIME (sec.)
1				0.00	
2				0.00	
3				0.00	
4				0.00	
5				0.00	
TOTALS	0.00	0.00	0.00	0.00	0.00
	A			**B**	**C**

Lbs./count = $\frac{\text{Total Lbs.}}{\text{Total Counts}} = \frac{\mathbf{B}}{\mathbf{A}} =$ **#DIV/0!** **(D)**

Counts/bag = $\frac{\text{94 Lbs.}}{\text{Lbs./count}} = \frac{\mathbf{D}}{94} =$ **#DIV/0!** **(E)**

Counts/sec. = $\frac{\text{Total Counts}}{\text{Total Sec.}} = \frac{\mathbf{A}}{\mathbf{C}} =$ **#DIV/0!** **(F)**

Sec./Bag = $\frac{\text{Counts/bag}}{\text{Counts/sec}} = \frac{\mathbf{E}}{\mathbf{F}} =$ **#DIV/0!** **(G)**

Aggregate Calibration Sheet

DATE	
CALIBRATED BY	
TRUCK No.	
SERIAL #	
TYPE OF AGGREGATE	sand

TRIAL #	GATE SETTING	COUNTS	GROSS WT	TARE WT	NET WT	Moisture Content	Adjusted Weight
1. LOW					0.00		0.00
2. LOW					0.00		0.00
3. LOW					0.00		0.00
4. LOW					0.00		0.00
5. HIGH					0.00		0.00
6. HIGH					0.00		0.00
7. HIGH					0.00		0.00
8. HIGH					0.00		0.00

LOW SETTING

Total Counts for Low Setting =	0.00
Total Pounds for Low Setting =	0.00

Lbs./count = Total Lbs. / Total Counts = **#DIV/0!**

HIGH SETTING

Total Counts for High Setting =	0.00
Total Pounds for High Setting =	0.00

Lbs./count = Total Lbs. / Total Counts = **#DIV/0!**

Aggregate Calibration Sheet

DATE _____

CALIBRATED BY _____

TRUCK No. _____

SERIAL # _____

TYPE OF AGGREGATE stone

TRIAL #	GATE SETTING	COUNTS	GROSS WT	TARE WT	NET WT	Moisture Content	Adjusted We
1. LOW					0.00		0.00
2. LOW					0.00		0.00
3. LOW					0.00		0.00
4. LOW					0.00		0.00
5. HIGH					0.00		0.00
6. HIGH					0.00		0.00
7. HIGH					0.00		0.00
8. HIGH					0.00		0.00

LOW SETTING

Total Counts for Low Setting = 0.00

Total Pounds for Low Setting = 0.00

Lbs./count $= \frac{\text{Total Lbs.}}{\text{Total Counts}} =$ **#DIV/0!**

HIGH SETTING

Total Counts for High Setting = 0.00

Total Pounds for High Setting = 0.00

Lbs./count $= \frac{\text{Total Lbs.}}{\text{Total Counts}} =$ **#DIV/0!**

eigh

Aggregate Calibration Sheet

DATE _____

CALIBRATED BY _____

TRUCK No. _____

SERIAL # _____

TYPE OF AGGREGATE _____

TRIAL #	GATE SETTING	COUNTS	GROSS WT	TARE WT	NET WT	Moisture Content	Adjusted We
1. LOW					0.00		0.00
2. LOW					0.00		0.00
3. LOW					0.00		0.00
4. LOW					0.00		0.00
5. HIGH					0.00		0.00
6. HIGH					0.00		0.00
7. HIGH					0.00		0.00
8. HIGH					0.00		0.00

LOW SETTING

Total Counts for Low Setting = 0.00

Total Pounds for Low Setting = 0.00

Lbs./count $= \frac{\text{Total Lbs.}}{\text{Total Counts}} =$ **#DIV/0!**

HIGH SETTING

Total Counts for High Setting = 0.00

Total Pounds for High Setting = 0.00

Lbs./count $= \frac{\text{Total Lbs.}}{\text{Total Counts}} =$ **#DIV/0!**

eigh

Aggregate Calibration Sheet

DATE _____

CALIBRATED BY _____

TRUCK No. _____

SERIAL # _____

TYPE OF AGGREGATE _____

TRIAL #	GATE SETTING	COUNTS	GROSS WT	TARE WT	NET WT	Moisture Content	Adjusted We
1. LOW					0.00		0.00
2. LOW					0.00		0.00
3. LOW					0.00		0.00
4. LOW					0.00		0.00
5. HIGH					0.00		0.00
6. HIGH					0.00		0.00
7. HIGH					0.00		0.00
8. HIGH					0.00		0.00

LOW SETTING

Total Counts for Low Setting = 0.00

Total Pounds for Low Setting = 0.00

Lbs./count $= \frac{\text{Total Lbs.}}{\text{Total Counts}} =$ **#DIV/0!**

HIGH SETTING

Total Counts for High Setting = 0.00

Total Pounds for High Setting = 0.00

Lbs./count $= \frac{\text{Total Lbs.}}{\text{Total Counts}} =$ **#DIV/0!**

eigh

Volumetric Concrete Dispenser Mix Design Worksheet

OWNER | Unit Serial # 0

YOUR MIX DESIGN (This sheet must be filled out for each mix design)

MIX DESIGN | Date

(max 8 characters)

Materials of one cubic yard:

Cement		LBS.		Cement Discharge Speed		**#DIV/0!**	Counts per Bag of Cement
				(In Percent)			
Cement	0.0	BAGS	#DIV/0!	Cubic Yard Discharge Time (Minute)			
Aggregate	**Name**			Aggregate # Desired (enter 1, 2, 3, or 4)			Lbs of Aggregate
1	sand			Aggregate 1			
2	stone			Aggregate 2			
3	0						
4	0						
Latex		Gallons					
	Dilution	Oz/bag					
Admix # 1							
Admix # 2							
Admix # 3							

1. Determine the count per cubic yard.

0.0 bags/cubic yard x **#DIV/0!** counts per bag = **#DIV/0!** count per cubic yard.

2. AGGREGATE 1: Divide the lbs. of fine aggregate per cubic yard by the count per cubic yard.

0 lbs. fine aggregate divided by **#DIV/0!** counts per cu. yd.= **#DIV/0!** lbs. per count.

GATE SETTING (from graph) **#DIV/0!**

3. AGGREGATE 2: Divide the lbs. of coarse aggregate per cubic yard by the count per cubic yard.

0 lbs. coarse aggregate divided by **#DIV/0!** counts per cu. yd.= **#DIV/0!** lbs. per count.

GATE SETTING (from graph) **#DIV/0!**

Description	1/0/1900					
Total	**#DIV/0!**	**Counts / Cubic Yard**				
Cement	**#DIV/0!**	**lbs./ Count**		**Dial**		
Aggregate 1	**#DIV/0!**	**lbs./ Count**		**Setting**	**Oz/Min**	
Aggregate 2	**#DIV/0!**	**lbs./ Count**	**Admix # 1**	**#DIV/0!**	**#DIV/0!**	**Low**
Water	**#DIV/0!**	**lbs./ Count**	**Admix # 2**	**#DIV/0!**	**#DIV/0!**	**High**
Aggregate 1 Gat	**#DIV/0!**		**Admix # 3**	**#DIV/0!**	**#DIV/0!**	**High**
Aggregate 2 Gat	**#DIV/0!**					
Latex Setting	**#DIV/0!**					
Water Meter						

Latex Calibration Sheet

DATE	
CALIBRATED BY	
TRUCK No.	
SERIAL #	
TYPE OF FIBER	

Total Gallons Latex Required = (refer to mix design)

Target Weight of Latex

(Total Gallons Latex Required) x (Specific Gravity of Latex) = 0 x 8.4 = #DIV/0!

Number of cement bags required in mix design

Actual Weight of Latex

CONTAINER WT	TARE WT	NET WT	TIME (sec.)
		0.00	

Tolerance: Within 1%

Fiber Calibration Sheet

DATE

CALIBRATED BY

TRUCK No.

SERIAL #

TYPE OF FIBER

Lbs./yard of Fiber **(A)** = (refer to manufacturer)

Discharge Time of a yard of concrete:

$$\frac{\text{(Seconds/Bag of cement) x (bags of cement per yard)}}{60} = \frac{\quad \times \quad}{60} = 0.00 \text{ Minutes/yard}$$

Total Inches of Compressed Fiber in Tube:

Height of tube - Measurement to top of plunger - 1/4" = - - 0.25 = -0.25 Inches of compressed fiber in the tube

Lbs. of Compressed Fiber per Inch:

$$\frac{\text{Total Inches of Compressed Fiber}}{\text{Total Lbs. of Fiber in Tube}} = \frac{-0.25}{} = \text{\#DIV/0!} \text{ Inches/Lb. of Fiber}$$

Inches per Yard:

(Inches per Lb.) x (Lbs. per yard required) = #DIV/0! x 0 = #DIV/0! Inches/ yard

Rate of Cylinder Travel:

$$\frac{\text{Inches per Yard}}{\text{Minutes per Yard}} = \frac{\text{\#DIV/0!}}{0.00} = \text{\#DIV/0!} \text{ Inches/minute}$$

$$\text{Inches per 15 Seconds} = \frac{\text{\#DIV/0!}}{4} = \text{\#DIV/0!} \text{ Inches/ 15 seconds}$$

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

MATERIALS PROCEDURE

OPERATING AND EMERGENCY PROCEDURES FOR NUCLEAR GAUGES

1. THE FOLLOWING NOTICES MUST BE POSTED:

1.1 This Notice (MA-1)

1.2 Nuclear Regulatory Commission (NRC) Form 3 (latest revision)

1.3 Regulatory Guide 8-13

1.4 NRC Regulations Part 21

1.5 Appendix G Operating, Emergency, and Security Proceures

~~1.5~~1.6 The notices must be posted in District Materials Laboratories, field offices, near storage areas, and all other areas where employees may be exposed to radiation from nuclear gauges. The notices must be located where employees can easily read them.

~~1.6~~1.7 The NRC license, Parts 19 and 20 of the NRC regulations are available for all gauge users to read upon request. Copies are maintained at all District Materials Laboratories and Materials Control, Soils and Testing Division.

2. DOSIMETERS

2.1 All personnel who use, transport, or are near a nuclear gauge, must wear a dosimeter.

2.2 Only one employee may use a dosimeter during a ~~one~~ three-month (quarterly) exposure period.

2.3 The dosimeter must not be stored near gauges, heat, strong light, or in a vehicle.

2.4 The dosimeters must be promptly changed when new dosimeters are received and the used dosimeters returned to Materials Control, Soils and Testing Division.

3. STORAGE OF NUCLEAR GAUGES

3.1 Nuclear gauges must not be stored in project field offices during work hours except as noted below.

3.1.1 A nuclear gauge may be placed in a field office during work hours for emergency charging. If employees are in the field office, the gauge must be at least 10 feet (3 m) from designated work areas. The field office must be locked if personnel are not present.

3.1.2 Only one gauge may be in the field office for emergency charging at one time.

3.2 If a gauge is stored in the field office during non-working hours, the source handle must be locked and the gauge locked in the shipping case. The case must be chained and locked in place or locked in a closet and the field office locked. Other storage areas on the project must meet the same requirements.

3.2.1 There may be cases when it is necessary to charge a gauge during non-work hours. In this case, the source handle must be locked and the gauge chained in place.

3.3 When a gauge is stored on a project, this is only temporary storage and extreme care must be taken to insure that employees and the public are not exposed to unnecessary radiation. The central storage area in each District and at Materials Control, Soils and Testing Division are the only permanent designated storage areas. Gauges should be stored at these facilities at all times when feasible. During periods when a gauge is not being used on a project, it must be stored in the storage building.

3.4 If it is necessary to leave a gauge in a vehicle overnight, the gauge must be locked in place, the vehicle locked, and parked in a fenced Division of Highways facility.

3.5 All storage areas, whether permanent or temporary, must be periodically checked for radiation levels. The radiation levels must be near background levels for the area.

3.6 All storage areas must be checked and evaluated on a regular basis to insure that the area is secure and all reasonable precautions have been taken to prevent a gauge from being stolen.

4. TRANSPORTATION OF NUCLEAR GAUGES

4.1 A gauge must be transported with the source handle locked and the gauged locked in the shipping case.

4.2 A gauge must be placed as far from the driver and passengers as possible. Transporting a gauge in the cab of a pickup, for example, is strictly prohibited.

4.3 The shipping case must be secured and locked to the vehicle to prevent movement and provide security measures.

4.4 The cargo area and vehicle must be locked at all times when the vehicle is not directly attended. Transporting a gauge in the back of an open pickup or a vehicle that cannot be locked is strictly prohibited.

4.5 The shipping papers for a gauge must be visible in the driver's compartment and in reach of the driver. The shipping papers must be removed from the vehicle if a gauge is not being transported.

4.6 All necessary precautions must be taken to prevent a gauge from being lost or stolen while being transported.

5. USE OF THE NUCLEAR GAUGE

5.1 When the source is extended from the shielded position, keep the gauge between the user and the exposed source. Place the source in the test hole as fast as possible keeping the gauge at arms length.

5.2 While the gauge is counting, move a few feet from the gauge.

5.3 Never touch the lower portion of the source rod.

5.4 Never remove the source rod from the gauge.

5.5 A gauge must be under the constant surveillance of the user when removed from the transport vehicle or place of storage.

5.6 Keep all unauthorized personnel away from the gauge.

5.7 Never place a gauge in an area where it can be damaged, run over, etc.

5.8 The gauge source handle must be locked when the gauge is not being used for testing.

6. CARE OF NUCLEAR GAUGES

6.1 Never allow the gauge to get wet.

6.2 Never store a gauge in a damp area.

6.3 Always keep the gauge clean. Periodically clean the shutter block and cavity in the bottom of the gauge. The source rod must be in the storage position. Always work at arms length during all cleaning operations.

6.4 It is the users responsibility to prevent a gauge from being damaged or abused.

7. TRAINING REQUIREMENTS

7.1 All gauge users must be properly trained in the use of nuclear gauges and in radiation safety before being allowed to use gauges without direct supervision.

7.2 All nuclear gauge users must have hazardous materials training at least every three years.

7.3 The training requirements and documentation necessary to verify training is specified in the NRC license. These requirements must be strictly enforced.

8. EMERGENCY PROCEDURES

8.1 In case of gauge is physically damaged, the following procedures are to be followed:

(a) Rope off the area and keep all personnel a minimum of

50 feet (15 m) from the gauge.

(b) Do not touch, move, or disturb the gauge.

(c) Make sure someone qualified remains outside the roped-off area at all times to insure that the gauge isn't touched or moved.

(d) Contact the District personnel in charge of the gauges and radiation safety.

Name: _____ Telephone Number: _____

Name:_____ _____ Telephone Number:

(e) District personnel shall immediately contact the Radiation Safety Officer at Materials Control, Soils and Testing Division at ~~558-3045~~ 304-558-3160.

8.2 If a gauge is lost or stolen, immediately notify the personnel listed above.

9. CONTRACTORS' GAUGES

9.1 Division personnel shall follow the safety requirements contained herein and any other appropriate safety procedures when near a contractor’s gauge.

9.2 Contractors are licensed by the NRC to possess and use their equipment. It is their responsibility to use the equipment in a safe manner.

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

MATERIALS PROCEDURE

PROCEDURE FOR MONITORING THE ACTIVITIES RELATED TO SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

1. PURPOSE

1.1 To provide for management a means for checking the adequacy of equipment, procedures and testing techniques employed in the conduct of Sieve Analysis of Fine and Coarse Aggregate. For further emphasis, it is restated that this procedure is designed solely to provide a method for monitoring activities relative to sieve analysis and shall not be used in a manner that would revise or modify acceptance testing procedures for aggregate as set forth in other procedures and instructions.

2. SCOPE

2.1 This procedure shall be applied to the extent that all activities related to the sieve analysis of fine and coarse aggregate which are regularly conducted outside the District Central Laboratory shall be monitored. These activities are frequently performed at project sites, portland cement concrete batch plants and central mix plants, bituminous concrete plants and district sublabs.

3. PROCEDURE

3.1 All aggregate samples which have been tested for sieve analysis at locations other than the District Central Laboratory shall be retained until further disposition is determined by the District Materials Engineer/Supervisor. Care shall be taken to prevent loss of material when placing the weighed portions of the original sample into a clean, leak proof bag. If the original sample bag is used for this purpose, it should be leak proof and clean. Each sample shall be positively identified with a District Laboratory Number or a field sample number or both, whichever is available, and other information as necessary for complete identification. The gradation work sheet should completely identify the sample and a copy of this document placed in the sample bag would be quite adequate.

3.2 Approximately once each week, the District Materials Engineer/Supervisor or his authorized representative shall visit each location at which sieve analyses of fine and coarse aggregates have been conducted, and he shall select from the total LOT of samples which have been tested and accumulated since his last visit at least one sample to be tested in the District Central Laboratory. It is most important that the sample selection be made by the District Materials Engineer/Supervisor or his authorized representative in as random a manner as possible and without influences that would tend to give particular samples a greater chance of being selected. To aid in accomplishing the foregoing, all aggregate samples from which the selection is to be made should be prominently displayed, and a frequent check should be made to ascertain that the collection of displayed samples is complete.

3.3 Each aggregate sample shall be tested in the District Central Laboratory using the sieves and test procedures set out in the governing specification for the item represented by the sample.

The following statement shall be written on the work sheets:

"MONITOR" test made to check lab. no. where the District Laboratory Number for the original test is written in the blank space. Obtain a copy of the original gradation test report and keep it with the MONITOR test work sheets. No formal reporting of the MONITOR test work sheets. No formal reporting of the MONITOR test data need be done. Testing should be done at the earliest practical time in order to expedite the evaluation.

NOTE: If the MONITOR sample has previously been washed in conformance with the AASHTO T-11 test procedure, then this procedure need not be employed in the District Central Laboratory. Accordingly, the quantity lost in the initial application of the AASHTO T-11 shall be considered the total minus #200 sought and this quantity shall be added to the weight of the MONITOR sample prior to making test computations.

3.4 The MONITOR test data shall be compared with the original test data in the following manner:

3.4.1 Determine the differences in test values for each of the specification sieves by subtracting the smaller test value from the larger test value.

3.4.2 Obtain the sum of the differences in test values.

3.4.3 Determine the average difference in test values by dividing the sum of the differences as described in 3.4.2 above by a whole number corresponding to the number of sieves used in the gradation test. The value thus obtained will be called the AVERAGE TEST DIFFERENCE (ATD).

3.5 The following guide shall be used as an aid in evaluating the ATD and determining appropriate actions to be taken.

3.5.1 If the value of the ATD is equal to or less than 2.5

(ATD □ 2.5), the comparison would probably be considered favorable and no further investigation would be made. As a consequence, the testing technician should be instructed to discard the LOT of samples from which the MONITOR sample was selected.

3.5.2 If the value of the ATD is greater than 2.5 but equal to or less than 4 (2.5 < ATD □ 4), the comparison would probably be considered questionable and approximately one third of the remaining samples in the LOT from which the MONITOR sample was selected should be tested and they should each comply with the requirement set out in 3.5.1 above. If each of the latter tests does comply, then the action set out in 3.5.1 should be taken. If each of the latter tests does not comply, then all remaining samples should be tested and the action set out in 3.5.3 below should be taken.

3.5.3 If the value of the ATD is greater than 4 (ATD > 4), all remaining samples in the LOT from which the MONITOR sample was selected should be tested. A sufficiently thorough investigation should be made by the District Materials Engineer/Supervisor to allow him to make a judgement regarding the cause for the unfavorable test comparison. The results of this investigation and all pertinent test data will be

reported in a District Materials Inspection Report (DMIR). The investigation and reporting shall be accomplished at the earliest practicable time so that the situation may be most expeditiously resolved. The Materials Control, Soils and Testing Division should be consulted when the action set out in this article is to be taken.

3.6 At the end of each fourth evaluation period, approximately four weeks, the District Materials Engineer/Supervisor shall prepare a report entitled "Implementation of Procedures for Monitoring Activities Related to the Sieve Analysis of Fine and Coarse Aggregate". The report will generally consist of a single page on which six columns of information or data is recorded as follows:

3.6.1 Column 1 shall be headed "Test Location". Give job location, or plant or sublab location where tests were conducted.

3.6.2 Column 2 shall be headed "Date of last Monitor Sample Selection".

3.6.3 Column 3 shall be headed "Date of this Monitor Sample Selection".

3.6.4 Column 4 shall be headed "Number of Samples in LOT". Give the number of samples in LOT from which the Monitor sample was selected.

3.6.5 Column 5 shall be headed "Standard Aggregate Size". Give item number for base course materials.

3.6.6 Column 6 shall be headed "Average Test Difference". Report value of ATD to nearest 0.1. The reports shall be identified as having been issued in accordance with this memorandum, ML-25.

3.7 The reports described in article 3.5.3 and subsection 3.6 shall be distributed as follows:

3.7.1 District Materials Inspection Report: 1 copy to District Materials File

1 copy to MCS&T Division

1 copy to Construction Division

1 copy to District Engineer, if requested

3.7.2 Four-Week Reports:

1 copy to District Materials File 1 copy to MCS&T Division

1 copy to Construction Division 1 copy to District Engineer

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

ML-25 Steward – Aggregate and Soils Section

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

MATERIALS PROCEDURE

MIX DESIGN FOR PORTLAND CEMENT CONCRETE

1. PURPOSE

1.1 To establish a procedure for testing the physical properties of a proposed mix design.

1.2 To establish criteria for evaluating the test data to arrive at acceptable batch proportions for an approved mix design.

2. SCOPE

2.1 This procedure shall apply to the design of all portland cement concrete which is required by the specifications to be batched in accordance with an approved mix design. This procedure shall also apply to the design of self-consolidating concrete (SCC) specified in Section 603, but not to normal (non-SCC) concrete specified in Section 603.

3. REFERENCED DOCUMENTS

3.1 AASHTO Standards:

1. M 201, Standard Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
2. R 18, Standard Practice for Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
3. R 39, Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
4. R 76, Standard Practice for Reducing Samples of Aggregate to Testing Size
5. T 11, Standard Method of Test for Materials Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
6. T 19, Standard Method of Test for Bulk Density (Unit Weight) and Voids in Aggregate
7. T 22, Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens
8. T 27, Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
9. T 84, Standard Method of Test for Specific Gravity and Absorption of Fine Aggregate
10. T 85, Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate
11. T 119, Standard Method of Test for Slump of Hydraulic Cement Concrete
12. T 121, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

13. T 152, Standard Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method
14. T 196, Standard Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method
~~15.~~ 15. T 197, Standard Method of Test for Time of Setting of Concrete Mixtures by Penetration Resistance
~~16.~~ 16. T 231, Standard Practice for Capping Cylindrical Concrete Specimens

~~17.~~ 17. T 358 Surface Resistivity Indication of Concrete's Ability to Resist Chloride Ion Penetration ~~T 277, Standard Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration~~
18. T309, Standard Method of Test for Temperature of Freshly Mixed Portland Cement Concrete
~~18.~~19. T395 Standard Method of Test for Characterization of the Air-Void System of Freshly Mixed Concrete by the Sequential Pressure Method

3.2 ASTM Standards:

1. C 1231, Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Cylindrical Concrete Specimens
2. C 1567 Standard Test Method for Determining the Potential Alkali Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)

3.3 WVDOH Materials Procedures[1]:

1. MP 700.00.06, Aggregate Sampling Procedures
2. MP 603.06.20, Test Method for the Determination of Bond Strength Between Prestressing Steel Strand and Self-Consolidating Concrete (SCC)

3.4 WVDOH Forms:

1. WVDOH Form T 301E, A-Bar Calculation Worksheet
2. Optimized Aggregate Gradation (OAG) Worksheet
3. Excel Spreadsheet for 711.03.23

4. TEST PROCEDURE

4.1 With the exception of SCC produced in accordance with Section 603, mix designs shall be performed in accordance with the applicable requirements of AASHTO R39 (ASTM C 192) by a Division Approved Laboratory. To obtain Division approval, a laboratory must be accredited by the AASHTO Accreditation Program for AASHTO R18 for the following Standards: AASHTO M201 (ASTM C511), AASHTO R39 (ASTM C192), AASHTO T22 (ASTM C39), AASHTO T119 (ASTM C143), AASHTO T121 (ASTM C138), AASHTO T152 (ASTM C231), AASHTO T196 (ASTM C173), AASHTO T197 (ASTM C403), AASHTO T231 (ASTM C617) or ASTM C1231, ~~AASHTO T277 (ASTM C1202)~~, AASHTO T309 (ASTM C1064),

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

AASHTO T11 (ASTM C117), AASHTO T19 (ASTM C29), AASHTO T27 (ASTM C136), AASHTO T84 (ASTM C128), AASHTO T85 (ASTM C127), ~~and~~ AASHTO R76 (ASTM C702), AASHTO T 358. In addition, all personal performing the SAM test must be certified by the Division to run AASHTO T395. A listing of these laboratories, that are approved to develop concrete mix designs for the Division, is available on the WVDOH, MCS&T Web Page2. Requests to be placed on that list of Division Approved Concrete Mix Design Labs shall be sent to the following e-mail address: DOHMCSnTconcretelab@wv.gov. To be placed on that list, all Division Approved Laboratories shall agree to allow the WVDOH, CCRL, and AASHTO re:source to freely share information about assessment reports, proficiency samples, corrective actions, quality management system, and personnel competency and certification records.

4.2 The following information for each of the materials listed below that are to be used in the proposed mix design shall be listed in Attachments 1 and 6-ASR. For mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1, the following information for each of the materials listed below that are to be used in the proposed mix design shall be listed in Attachments 1 OAG and 6-ASR OAG. The Ā requirements will not apply for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1. Attachments 1 S-P and 6-ASR shall be used for SCC produced in accordance with Section 603.

4.2.1 Mix Design Component Materials

Cement:	Type, Materials Code, SiteManager Materials Code, Source and Location, Source Code, Producer/Supplier Code, Specific Gravity, Alkali Content
Supplementary Cementitious Material (SCM):	Type, Materials Code, SiteManager Materials Code, Source and Location, Source Code, Producer/Supplier Code, Specific Gravity, Alkali Content
Chemical Admixtures:	Type, Materials Code, SiteManager Materials Code, Source and Location, Source Code, Producer/Supplier Code
Coarse Aggregate:	Type, Materials Code, SiteManager Materials Code, Size, Source and Location, Source Code, Producer/Supplier Code, Specific Gravity, Absorption, A-Bar, Unit Weight, ASR Aggregate Reactivity Class
Fine Aggregate:	Type, Materials Code, SiteManager Materials Code, Source and Location, Source Code, Producer/Supplier Code, Specific Gravity, Absorption, A-Bar, Fineness Modulus, ASR Aggregate Reactivity Class

The mass and volume of each material that is to be used in each batch shall be listed in Attachment 2. Attachment 2 OAG shall be used for those mix designs which meet the

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

requirements for optimized aggregate gradation in Section 601.3.2.4.1. Attachment 2 S-P shall be used for SCC produced in accordance with Section 603.

4.2.2 The aggregate correction factor, as defined in AASHTO T 152, shall be listed in Attachment 3. Attachment 3 OAG shall be used for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1. Attachment 3 S-P shall be used for SCC produced in accordance with Section 603.

4.2.3 The completed WVDOH form T301E, A-Bar calculation worksheet, used to establish the target A-Bar, shall be included in the mix design submittal package. An A-Bar calculation worksheet is not required to be included with the mix design submittal package for SCC produced in accordance with Section 603 and those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1. The completed optimized aggregate gradation (OAG) worksheet shall be included in the mix design submittal package.

4.2.4 Information (i.e. raw data) pertaining to the compressive strength test results of each cylinder shall be included in the mix design submittal package. This raw data shall include the specimen test age, date tested, cylinder ID, average cylinder diameter, maximum load applied to the cylinder, type of fracture, and compressive strength of the cylinder.

~~4.2.4~~

~~4.3~~ All classes of the concrete (except Class H, concrete for specialized overlays, and SCC produced in accordance with Section 603) for the proposed mix design shall be batched in at least five separate batches. Two of the batches shall be proportioned to produce a mix having a minimum cement factor. Two of the batches shall be proportioned to produce a mix having a minimum cement factor equal to the specified minimum cement factor plus one bag of cement [94 lb. (42.6 kg)]. These batches at the minimum cement factor plus one bag of cement shall be proportioned at a different water-cement ratio (w/c) that the batches at the minimum cement factor. A fifth batch shall also be proportioned to produce a mix at the minimum cement factor, but this batch shall be proportioned at a different water-cement ratio than the previous four batches. The slump tolerance in Section 4.4 shall not apply to this fifth batch. All batches described above shall maintain the same replacement percentage of SCMs including plus one bag.

4.3.1 The Sequential Air Meter (SAM) test shall be performed for each trail batch of any mix design used on bridge decks. The average SAM number shall be recorded on Attachment 3, and must be less than or equal to 0.20 psi for establishment of the mixture proportions in accordance with AASHTO T 395 for mix design approval.

~~4.3.1~~4.2.5 Class H concrete, concrete for Ssspecialized Oeverlays, as set forth in Section 679 of the specifications, and SCC produced in accordance with Section 603 for the proposed mix design shall be batched in at least two separate batches.

The batches for Class H concrete shall be produced at the cement factor for Class H concrete that is required in the specifications. ~~Two rapid chloride permeability~~The surface resistivity tests shall be performed~~, i~~n accordance with AASHTO T ~~277~~358,

specified in Section 601.3 shall be performed, at the same test age, on each of these batches, and the same method of curing shall be used for all the test specimens.

The batches for specialized concrete overlays shall be produced at or above the minimum cement factor specified in Section 679.2.2.1 or 679.2.2.2. ~~Two rapid chloride permeability tests specified in Section 679.2.2~~ The surface resistivity test shall be performed, at the same test age, on each of these batches, and the same method of curing shall be used for all the test specimens.

The information (i.e. raw data), from which each ~~rapid chloride permeability~~surface resistivity ~~test~~ result was derived, shall also be included in the mix design submittal package.

The batches for SCC for prestressed concrete members shall be produced as outlined in Section 603.6.2.1 and at the cement factor required in Section 603.6.3.1.

~~4.4~~4.3 Each batch of concrete shall be tested in the plastic state for air, consistency and yield. Each batch shall be adjusted as necessary to produce a plastic concrete having an air content, consistency, and yield equal to the specified value plus or minus a reasonable laboratory working tolerance. The following tolerances shall be used as a guide for all classes of concrete except SCC produced in accordance with Section 603: Air Content, ± ½ percent; Consistency, ± ½ in. (± 12 mm) of slump; Yield, ± 2 percent.

~~4.4.1~~4.3.1 For SCC produced in accordance with Section 603, testing shall begin at the time immediately after the mixing sequence is completed. This time shall be designated as T_0. Temperature, air content, consistency, T_{50}, VSI, passing ability, rapid assessment of static segregation resistance, segregation resistance, unit weight, and yield tests shall be conducted on these batches and shall be within the tolerances set forth in Table 603.6.2.1A.

Air Content, consistency, and passing ability tests shall be conducted every thirty minutes until either the air content falls below the target value by more than 1.5%, the slump flow falls below the target spread by more than 2.0 inches (50 mm), or the J-Ring value falls below the target value by more than 1.5 inches (38 mm). For each time of testing, these values shall be plotted versus time after batching. Linear interpolation shall be used to determine the exact time when either the air content falls below the target value by more than 1.5%, the slump flow falls below the target spread by more than 2.0 inches (50 mm), or the J-Ring value falls below the target value by more than 1.5 inches (38 mm). The elapsed time, after T_0, when this occurs shall be noted as the "Workable Period" and shall be recorded in Attachment 2 S-P. This workable period shall be used as the time frame in which the entire member shall be construction, reference Section 603.6.7.

~~4.5~~4.4 When the properties of a concrete batch have been established within acceptable limits, seven 4 by 8 in. (100 by 200 mm) cylinders shall be made from each batch produced in Section 4.3 (or 4.3.1) and tested in compression at the following ages: one cylinder at age 24 hours ± 2 hours (the exact age to the nearest hour at time of test shall be noted

on the report); one cylinder at age 3 days; one cylinder at age 7 days; one cylinder at age 14 days; and three cylinders at age 28 days. The values of the physical properties of each mix produced in Section 4.3 (or 4.3.1) shall be the average of the physical properties established in the first two mixes produced at the minimum cement factor, the average of the physical properties established in the two mixes produced at the minimum cement factor plus one bag of cement, and the physical properties of the fifth batch at the minimum cement factor and different water-cement ratio. These values shall be listed in Attachment 3. 4 by 8 in. (100 by 200 mm) cylinders shall be permitted for SCC produced in accordance with Section 603. The results of these tests shall be listed in Attachment 3 S-P.

~~4.5.1~~4.4.1 The following properties of each batch of concrete produced in Sections 4.3 (or 4.3.1) shall be listed in Attachment 2: A-bar of total solids, consistency, air content, unit weight and yield, water-cement ratio, and temperature. The following properties of each batch of concrete produced in Sections 4.3 (or 4.3.1) shall be listed in Attachment 2 OAG, for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1: optimized aggregate gradation (OAG) worksheet, consistency, air content, unit weight and yield, water-cement ratio, and temperature.

~~4.5.2~~4.4.2 For SCC produced in accordance with Section 603, from one of the SCC trial batches required in 603.6.2.1, six more cylinders shall be fabricated for modulus of elasticity testing, eight more cylinders shall be fabricated for creep testing, three specimens shall be fabricated for length change testing, three specimens shall be fabricated for surface resistivity testing ~~rapid chloride permeability testing~~, and three specimens shall be fabricated for freeze-thaw resistance testing. Casting of all Class S-P specimens to be used for hardened concrete property testing shall be done in one lift without rodding or vibration. Curing and testing parameters for these specimens are noted in Section 603.6.2.1. These results of these tests shall be listed in Attachment 2 S-P.

Also, from one of the SCC trial batches required in 603.6.2.1, a prestressing strand bond strength test, in accordance with MP 603.06.20, shall be conducted, and the result shall be recorded in Attachment 3 S-P.

~~4.6~~4.5 Mix design submittal packages including Attachments 1, 2, 3 and 6-ASR, A-bar worksheet(s), and raw data pertaining to the compressive strength and surface resistivity ~~rapid chloride permeability~~ tests shall be submitted to the WVDOH District Materials Section in which the Source (i.e. Concrete Batch Plant) is located. Mix design submittal packages, for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1 including Attachments 1 OAG, 2 OAG, 3 OAG and 6-ASR OAG, optimized aggregate gradation worksheet, and raw data pertaining to the compressive strength and ~~rapid chloride permeability~~ surface resistivity tests shall be submitted to the WVDOH District Materials Section in which the Source (i.e. Concrete Batch Plant) is located. These submittal packages may be submitted to the District electronically, and MCS&T Division may be copied on the electronic submittal also, as this may expedite the process. All mix concrete mix designs, except SCC mix

designs, that are sent to MCS&T Division shall be submitted electronically to the following e-mail address: DOHConcreteMixDesign@wv.gov.

SCC mix designs, produced in accordance with Section 603, shall be submitted directly to MCS&T Division and shall include Attachments 1 S-P, 2 S-P, 3 S-P and 6-ASR.

~~4.6.1~~4.5.1 In the case of mix design submittals for a single mix design which is used at multiple concrete plants, one submittal package (for the same design) may be used for multiple concrete plants. All the concrete plants at which the mix design is being used shall be noted on Attachment 1, and each WVDOH Materials Section in which the concrete plants are located shall be included on the submittal. Attachment 1 OAG shall be used in leu of Attachment 1, for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1. This submittal will be reviewed by MCS&T Division, and if the mix design is approved, a separate lab number will be assigned to the mix design for each location at which it is approved.

5. ACCEPTANCE CRITERIA

5.1 If the standard deviation of the concrete plant production has been established, the mix design must have an average laboratory compressive strength, based on the 4 by 8 in. (100 by 200 mm) cylinder results equal to or greater than the "Design 28-Day Compressive Strength" required by the specifications plus two times the standard deviation. Data used to establish the standard deviation shall be taken from the Division's data bank and shall consist of at least 30 individual test results obtained from recent plant production of concrete with proportions similar to the design mix. Information relative to the statistics for a particular plant will be furnished to the Contractor upon request.

5.2 If the standard deviation of the concrete plant production has not been established, or in the case of mobile mixer units, the mix design must have an average laboratory compressive strength equal to or greater than the "Design 28-Day Compressive Strength" plus 1,300 psi (9 MPa). The Division shall note the Plant Compressive Strength Standard Deviation, at the time of the mix design approval, in Attachment 3.

5.2.1 Note that the "Design 28-Day Compressive Strength" required by the Specifications is the minimum field strength sought in 4 by 8 in. (100 by 200 mm) cylinders representing the concrete being placed in the field and should not be confused with the laboratory compressive strengths required for design. The compressive strength, required in Section 5.1 or 5.2 for mix design approval, shall be noted as the “Mix Design Approval Strength”.

5.3 SCC mix designs, produced in accordance with Section 603, shall meet the mix design requirements as set forth in this MP and not the ACI mix requirements as specified in Section 603.6.2, except for the compressive strength “overdesign” requirements. SCC mix designs, produced in accordance with Section 603, shall meet the compressive strength “overdesign” requirements of ACI 301 Chapter 4.

6. PROPORTIONING DESIGN MIX

6.1 If the average of the batches produced in Section 4.3 (or 4.3.1), with the specified minimum cement factor, satisfies the acceptance criteria of Section 5, then it will be considered acceptable as the mix design for the class of concrete being designed.

6.2 If the average of the batches produced in Section 4.3 with the specified minimum cement factor does not satisfy the acceptance criteria of Section 5, then a linear compressive strength-cement factor relationship will be established using the average 28-day compressive strength, based on the 4 by 8 in. (100 by 200 mm) cylinder results, of the batches with the minimum cement factor and the average 28-day compressive strength of the batches with the minimum cement factor plus one bag of cement. This relationship will be interpolated to determine a cement factor [to the nearest 1 lb. (0.45 kg)] which would cause the acceptance criteria to be satisfied. This interpolated cement factor will be considered acceptable for proportioning the mix design for the class of concrete being designed.

6.2.1 If neither of the averages of the batches produced in Section 4.3 satisfies the acceptance criteria of Section 5, then that proposed mix design cannot be considered as acceptable, and a new mix design will be required.

6.2.2 Section 6.2 does not apply to Class H concrete, specialized overlay concrete, and SCC produced in accordance with Section 603. Therefore, if the average compressive strength of the Class H, specialized overlay concrete batches, or SCC produced in accordance with Section 603, in Section 4.3.1 does not satisfy the acceptance criteria of Section 4, then that proposed mix design cannot be considered as acceptable, and a new mix design will be required.

6.3 The submittal for a proposed mix design shall include completed copies of Attachments 1 and 3. It shall also include a completed copy of Attachment 2 for each of the batches at the minimum cement factor. It shall also include a completed copy of Attachment 2 for each of the batches at the minimum cement factor plus one bag of cement, and a completed copy of Attachment 2 for the batch at the minimum cement factor with a different water-cement ratio(i.e. fifth batch), when applicable. Attachments 1 OAG, 2 OAG, and 3 OAG shall be used in leu of Attachments 1, 2, and 3 respectively, for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1. All pertinent information supporting these attachments and pertaining to the information in them shall be submitted also. Upon approval of the subject mix design, the Division shall include a copy of Attachment 4 or 5 in ProjectWise, along with the approved mix design.

SCC mix design submittals, produced in accordance with Section 603, shall include completed copies of Attachments 1 S-P and 3 S-P. They shall also include a completed copy of Attachment 2 S-P for both batches produced in the mix design. All pertinent information supporting these attachments and pertaining to the information in them, including the test results pertaining to the workable period as outlined in Section 4.4.1, shall be submitted also.

6.4 Although the Contractor has satisfied all requirements for concrete design and a mix design has been approved by the Engineer, the Contractor may still be required to adjust the approved mix design in the field as necessary to maintain all properties within the limits of the specification. These field adjustments shall include increasing the cement factor above the value specified in the approved mix design if such an adjustment would be necessary to cause the strength of the field placed concrete to conform to the requirements of the specification. These field adjustments shall also include the addition of water in the field for slump adjustment. The procedure for determining the maximum amount of water, which may be added to an approved concrete mix in the field, is outlined in the following sections.

6.4.1 Using the three different water-cement ratios from the batches produced in Section 4.3 and the corresponding 28-day compressive strengths from Section 4.5, the Excel file in Attachment 4 of this MP shall be used to create a best-fit line through these three points.

6.4.2 The water-cement ratio that corresponds to the Mix Design Approval Strength, as outlined in Section 5.1 or 5.2, shall be determined from the Excel file in Attachment 4 of this MP. The maximum water that is allowed to be added to an approved concrete mix in the field, shall be the amount of water, which corresponds to that water-cement ratio (i.e. the water-cement ratio that corresponds to the Mix Design Approval Strength). This maximum water amount shall be shown in Attachment 4. However, under no circumstance, shall the total amount of water in a mix, including field additions, exceed the amount of water corresponding to the maximum water content noted in Table 601.3.1A (i.e. under no circumstances shall the water-cement ratio in Table 601.3.1A be exceeded).

6.4.3 For existing approved mix designs, for which there are only two different water-cement ratios, Attachment 5 shall be used to determine the maximum water, that is allowed to be added to that approved concrete mix in the field. Attachment 4 shall be used to determine the maximum water, that can be added in the field, for all other mixes.

6.4.4 For Class H mixes and concrete mixes for specialized overlays, as set forth in Section 679 of the specifications, no additional water beyond what was used in the approved mix designs shall be added in the field.

7. MIX DESIGN RE-APPROVAL

7.1 Each mix design shall remain approved for a period of three years from the date of approval, after which the mix design may be re-approved for an additional three years based on re-qualification tests outlined in Section 7.2 and conducted at the Concrete Producer or a Division Approved Laboratory, meeting the requirements of Section 4.1. If a mix design is used often enough (at least fifteen air content, slump, and compressive strength tests for the previous three-year period), the re-qualification tests shall not be required, and the mix design may be re-approved based on the actual field tests performed during the previous three-year period.

Re-approval of SCC mix designs, produced in accordance with Section 603, shall be re-approved as outlined in Section 603.6.2.

The mix design shall meet the ASR requirements in Section 601.3.1.1 according to the most recent aggregate reactivity, alkali content of cement and SCM, and CaO content of fly ash from the Division Approved Products Lists APLs. A mix design using an SCM replacement level below that required in Table 601.3.1.1.1.4.2b of the Specifications may evaluate the effectiveness of SCM to prevent deleterious expansion as described in Section 601.3.1.1.1.6 to meet the ASR requirements.

7.1.1 When a Concrete Producer desires to have a mix design re-approved, he shall submit a written request to the WVDOH District Materials Section in which that plant is located noting such and including the current mix design lab numbers to be evaluated. The WVDOH District Materials personnel shall verify if there are a minimum of fifteen air content, slump, and compressive strength tests for that mix design in the previous three-year period.

7.1.2 If there are at least fifteen air content, slump, and compressive strength tests for that mix design in the previous three-year period, then the WVDOH District Materials personnel shall notify MCS&T Division that the subject mix design may be re-approved based on the criteria in Section 7.1. MCS&T Division shall then update the approval date of the subject mix design.

7.1.3 If there are not at least fifteen air content, slump, and compressive strength tests for that mix design in the previous three-year period, then the WVDOH District Materials personnel shall notify the Concrete Producer that the subject mix design must be re-approved as outlined in Section 7.2.

7.2 The following procedures shall be used to re-approve concrete mix designs that do not meet the criteria in Section 7.1.

7.2.1 The Concrete Producer shall provide a statement to the Engineer verifying that all sources of materials used in the approved mix designs are unchanged and the same as used in the original approved mix design. All materials shall meet the applicable sections of the specifications. The original mix design shall meet the ASR requirements in Section 601.3.1.1 according to most recent aggregate reactivity, alkali content of cement and SCM, and CaO of fly ash from the Division APLs.

7.2.2 Coarse and fine aggregate samples shall be obtained at the Concrete Producer's facility in accordance with MP 700.00.06, and the following tests shall be conducted on those aggregate samples by a WVDOH certified Aggregate Inspector: specific gravity (both coarse and fine aggregate), combined A-bar of total solids, absorption (both coarse and fine aggregate), fineness modulus (fine aggregate), and unit weight (coarse aggregate). The results of these tests shall be used by a WVDOH certified PCC Technician at the Concrete Producer or a Division Approved Laboratory, to establish a new target A-bar for the mix design and, if necessary, to adjust any batch volumes. Combined aggregate gradation shall be conducted in leu of combined A-bar of total solids for those mix designs with the optimized aggregate gradation. The working range on each sieve from

cumulative combined percent retained from aggregate gradation shall be in accordance with Table 601.3.2.4.1B from Section 601.3.2.4.1.

7.2.3 The Concrete Producer shall then, at the Producer's facility and in the presence of WVDOH District Materials personnel, produce a representative batch (acceptable to both the Producer and the WVDOH personnel) in accordance with Sections 601.6 and 601.7 of no less than 6 yd^3 (4.6 m^3) of the concrete mix subject for re-approval. This batch shall be tested for air content, slump, unit weight and yield. Also, three 4 by 8 in.(100 by 200 mm) 28-day compressive strength specimens, and if applicable, two ~~rapid chloride permeability~~ surface resistivity specimens (each to be tested at an age of 90 days or earlier and the average result used) shall be fabricated and tested from this batch.

7.2.3.1 In lieu of the batch produced at the Producer's facility, as outlined in Section 6.2.3, a batch may be produced at a Division Approved Laboratory. This batch does not need to be witnessed by WVDOH personnel. The size of this batch shall be the same as the size of the batches produced for new laboratory mix designs. If there are any changes to either the coarse or fine aggregate, certified laboratory personnel may perform the testing and mix adjustments as stated in Section 7.2.2.

7.3 The Concrete Producer or Division Approved Laboratory Personnel shall record the results of all tests required and the proportions used in the batch outlined in Section 7.2 in the applicable sections of Attachments 1, 2, and 3. Attachments 1 OAG, 2 OAG, and 3 OAG shall be used in leu of Attachments 1, 2, and 3 respectively, for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1. The Concrete Producer or Division Approved Laboratory Personnel shall then submit those attachments, along with the test data required in Section 7.2.2 to the WVDOH District Materials section, who will then forward them to MCS&T Division for evaluation. Based on these results, the existing mix design will either be re-approved (possibly with slight adjustments), or the current mix design will be considered to have expired, and a new mix design will be required. When a mix design is re-approved by MCS&T Division, the laboratory approval number for that mix shall not be changed, but the approval date (the "Date Sampled") shall be revised.

7.3.1 For mix design re-approval purposes, the compressive strength of the representative batch produced at the Producer, as outlined in Section 7.2.3, must meet or exceed the "Design 28-day Compressive Strength" in Section 601.3, but it does not have to meet the "overdesign" acceptance criteria outlined in Section 5.

7.3.1.1 If a laboratory batch is produced in lieu of a batch at the Producer, as outlined in Section 7.2.3.1, then the compressive strength of that batch must have a compressive strength which exceeds the "Design 28-Day Compressive Strength" required by the specifications by the value (f'_{cr}) obtained from the formula below. The criteria used to establish the standard deviation is outlined in Section 5.1.

$$f'_{cr} = f'_c + \sigma$$

Where:

f'_{cr} = Required compressive strength of the batch produced in Section 7.2.3.1 (expressed in psi)
f'_c = Design 28-Day Compressive Strength (expressed in psi)
σ = Concrete Plant Standard Deviation (outlined in Section 5.1)

7.3.2 For mix design re-approval purposes the~~, the average of the two rapid chloride permeability~~surface resistivity test ~~-~~results from the representative batch produced in Section 7.2.3 or 7.2.3.1 must be be equal to or greater than 30 kΩ-cm~~1,000 coulombs or less~~ in order for the mix design to be re-approved.

~~7.3.2~~

7.3.3 If a mix design has expired, it may still be used on projects which have started before the mix design expired. However, after its date of expiration, a mix design may not be used on any new projects; a new mix design shall be required for these projects.

8. CHANGING A COMPONENT MATERIAL USED IN A MIX DESIGN

8.1 Whenever more than one component material in an approved mix design is changed simultaneously, a new laboratory mix design, in accordance with Section 4 shall be required. This option is not permitted for SCC mix designs produced in accordance with Section 603.

8.1.1 There are circumstances when one component material in an approved mix design may be changed to another WVDOH approved component material without requiring a new laboratory mix design. Those circumstances, and the subsequent steps which must be taken for that component material change to be approved, are outlined in the following sections.

8.2 The changes, outlined below, to any of the following component materials are permitted provided the requirements in Section 8.3 are met. Only one component material may be changed at a time, otherwise a new laboratory mix design in accordance with Section 4 shall be required. When changing the type and/or source of any one component material, minor adjustments to the quantities of other component materials in the mix design are permitted, to maintain desired mix properties. When changing the type and/or source of any one component material, the mix design shall meet the ASR requirements in Section 601.3.1.1 according to the most recent aggregate reactivity, alkali content of cement and SCM, and CaO of fly ash from the APLs. ASTM C1567 testing in accordance with Section 601.3.1.1.1.6 may be used to evaluate the effectiveness of SCM to prevent deleterious expansion if the SCM minimum replacement requirements of Table 601.3.1.1.1.4.2b are not met.

8.2.1 Cement: The source of cement may be changed provided the requirements of Section 8.3 are met. A change from a Type I cement to a Type IL cement (or from a Type IL cement to a Type I cement) may also be considered a single component material change.

8.2.2 Supplementary Cementitious Material (SCM): The source and/or type of SCM may be changed provided the requirements of Section 8.3 are met.

8.2.3 Chemical Admixture: The source and/or type of any individual admixture (*i.e*., air entraining, water reducing, or water-reducing and retarding, *etc*.) may be changed provided the requirements of Section 8.3 are met. If more than one admixture is used in a mix design, a change to an individual component material means a change in only one of those admixtures. If more than one admixture is used in a mix design, and a change to one of these admixtures is desired (a change to an individual component material), then the source of the new admixture must still be the same as the source of the rest of the admixtures in the mix (*i.e*., water-reducing admixture A from Source X may be changed to water-reducing admixture B from Source X.)

8.2.4 Latex Admixture: The source of latex admixture may be changed provided the requirements of Section 8.3 are met.

8.2.5 Fine Aggregate: The source of fine aggregate may be changed provided the requirements of Section 8.3 are met. However, if the type of fine aggregate changes (*i.e.*, silica sand to limestone sand or natural sand to manufactured sand), a new laboratory mix design in accordance with Section 3 shall be required.

8.2.6 Coarse Aggregate: The source of coarse aggregate may be changed provided the requirements of Section 8.3 are met. However, if the type or size of coarse aggregate changes (*i.e.,* river gravel to limestone or #57 limestone to #67 limestone), a new laboratory mix design in accordance with Section 4 shall be required.

8.3 When a change to any individual component material in an approved mix design, as outlined in Sections 8.1.1 and 8.2, is desired, the Concrete Producer shall, at the Producer's facility and in the presence of WVDOH District Materials personnel, produce two separate representative batches (acceptable to both the Producer and the WVDOH personnel) in accordance with Sections 601.6 and 601.7. Each of these batches shall be no less than 3 yd^3 (2.3 m^3), shall be batched at the target cement factor, and shall consist of the concrete mix with the proposed material change. The proportions for these batches shall be determined by a WVDOH certified PCC Technician.

8.3.1 If there is a change to either the coarse or fine aggregate, then a sample of the new material shall be obtained at the Concrete Producer's facility in accordance with MP 700.00.06, and the following tests shall be conducted by a WVDOH certified Aggregate Inspector on that aggregate sample: specific gravity, solid A-bar of the new material and A-bar of total solids, absorption, fineness modulus (fine aggregate), and unit weight (coarse aggregate). The results of these tests shall be used by a WVDOH certified PCC Technician at the Concrete Producer to establish a new target A-bar for the mix and, if necessary, to adjust any batch volumes. Combined aggregate gradation shall be conducted in leu of solid A-bar of the new material and A-bar of total solids for those mix designs with the optimized aggregate gradation. The results of these tests shall be used by a WVDOH certified PCC Technician at the Concrete Producer to establish a new target Combined % Retained for the mix, if necessary, to adjust any batch volumes.

8.3.2 In lieu of the two batches produced at the Producer's facility, as outlined in Section 8.3, two batches may be produced at a Division Approved Laboratory, meeting the requirements of Section 4.1. These batches do not need to be witnessed by WVDOH personnel. The sizes of these batches shall be the same as the size of the batches produced for new laboratory mix designs, and their proportions shall be determined by certified laboratory personnel. If there are any changes to either the coarse or fine aggregate, certified laboratory personnel may perform the testing and mix adjustments as stated in Section 8.3.1.

8.3.3 All of the information pertaining to the materials used in these batches shall be listed in Attachments 1, 2, 3 and 6-ASR as outlined in Section 4.2. Attachments 1 OAG, 2 OAG, and 3 OAG shall be used in leu of Attachments 1, 2, and 3 respectively, for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1.

8.3.4 Both batches of concrete shall be tested in the plastic state for air, consistency, and yield. Each batch shall be adjusted as necessary to produce a plastic concrete having an air content, consistency, and yield equal to the specified value plus or minus the following tolerances: Air content, ± 1 percent; Consistency, ± 1 in. (± 25 mm) of slump; Yield, ± 2 percent.

8.3.4.1 If laboratory batches are produced in lieu of batches at the Producer, as outlined in Section 8.3.2, then the batch tolerances specified in Section 4.4 shall apply.

8.3.5 When the properties of a concrete batch have been established within acceptable limits, 3 - 4 in by 8 in. (100 by 200 mm) cylinders shall be made from each batch produced in Section 8.3 and tested in compression at an age of 28 days. The values of the physical properties of this new mix design (with the component material change) shall be the average of the physical properties established in the two batches produced in Section 8.3. These values shall be listed in the column for the mix with the "Minimum Cement Factor" in Attachment 3. Attachment 3 OAG shall be used in leu of Attachment 3, for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1.

The following properties of each batch of concrete produced in Section 8.3 shall be listed in Attachment 2: A-bar of total solids, consistency, air content, unit weight and yield, water-cement ratio, and temperature. For those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1, the following properties of each batch of concrete produced in Section 8.3 shall be listed in Attachment 2 OAG: optimized aggregate gradation (OAG) worksheet, consistency, air content, unit weight and yield, water-cement ratio, and temperature.

8.4 When it is desired to change a component material in a mix which requires the surface resistivity ~~rapid chloride permeability~~ test (Class H, K ~~–~~concrete and specialized concrete overlays as outlined in Section 679), ~~a minimum of one permeability~~ specimens shall be fabricated from each of the batches produced in Section 8.3. The average value of these ~~permeability~~ surface resistivity specimens shall be no ~~more~~ less than ten percent ~~greater than the~~of the mix designs ~~permeability~~ surface resistivity

value, required in the applicable specification, when tested at the time frame specified in the applicable specification.

8.4.1 If laboratory batches are produced in lieu of batches at the Producer, as outlined in Section 8.3.2, then the average value of these ~~permeability~~ surface resistivity specimens shall be less than or equal to the mix design ~~permeability~~ surface resistivity value required in the applicable specification, when tested at the time frame specified in the applicable specification.

8.5 The average compressive strength of the two batches produced at the Producer in Section 8.3 must have an average compressive strength which exceeds the "Design 28-Day Compressive Strength" required by the specifications by the value (f'_{cr}) obtained from the formula below. The criteria used to establish the standard deviation is outlined in Section 5.1.

$$f'_{cr} = f'_c + 2.33\sigma - 500$$

Where:
f'_{cr} = Required average compressive strength of the batches produced in Section 8.3 (expressed in psi)
f'_c = Design 28-Day Compressive Strength (expressed in psi)
σ = Concrete Plant Standard Deviation (outlined in Section 4.1)

8.5.1 If laboratory batches are produced in lieu of batches at the Producer, as outlined in Section 8.3.2, then the average compressive strength of these batches must have an average compressive strength which exceeds the "Design 28-Day Compressive Strength" required by the specifications by the value (f'_{cr}) obtained from the formula below. The criteria used to establish the standard deviation is outlined in Section 5.1.

$$f'_{cr} = f'_c + 2\sigma$$

8.5.2 If the average compressive strength of the two batches produced in Section 8.3 (f'_{cr}) is less than the "Design 28-Day Compressive Strength" (f'_c) required by the specifications, the new mix (with the component material change) cannot be considered as acceptable, unless the requirements of Section 8.7 are met.

8.6 It is not required, but if the Concrete Producer desires, two additional separate batches may be produced, at the same time that the two batches in Section 8.3 are being produced. These two additional batches shall be acceptable to both the Producer and the WVDOH personnel and shall be produced in accordance with Sections 601.6 and 601.7. Each of these batches shall be no less than 3 yd^3 (2.3 m^3), shall be batched at the target cement factor plus one bag of cement [94 lb. (42.6 kg)], and shall consist of the concrete mix with the proposed material change.

8.6.1 In lieu of the two batches produced at the Producer's facility, as outlined in Section 8.7, two batches at the target cement factor plus one bag of cement [94 lb. (42.6 kg)] may be produced at a Division Approved Laboratory, meeting the requirements of Section 4.1. These batches, produced at a Division Approved Laboratory, do not need

to be witnessed by WVDOH personnel. The sizes of these batches shall be the same as the size of the batches produced for new laboratory mix designs, and their proportions shall be determined by certified laboratory personnel.

8.6.2 Production of these two additional batches is not an option for Class H concrete or specialized overlay concrete.

8.6.3 Both batches of concrete shall be tested in the plastic state for air, consistency, and yield. Each batch shall be adjusted as necessary to produce a plastic concrete having an air content, consistency, and yield equal to the specified value plus or minus the following tolerances: Air Content, ± 1 percent; Consistency, ± 1 in. (± 25 mm) of slump; Yield, ± 2 percent.

8.6.3.1 If laboratory batches are produced in lieu of batches at the Producer, as outlined in Section 8.7.1, then the batch tolerances specified in Section 4.4 shall apply.

8.6.4 When the properties of a concrete batch have been established within acceptable limits, three 4 by 8 in. (100 by 200 mm) cylinders shall be made from each batch produced in Section 8.7 and tested in compression at an age of 28 days. The values of the physical properties of this new mix design (with the component material change) shall be the average of the physical properties established in the two batches produced in Section 8.7. These values shall be listed in the column for the mix with the "Minimum Cement Factor + 1 Bag" in Attachment 3. Attachment 3 OAG shall be used in leu of Attachment 3, for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1.

The following properties of each batch of concrete produced in Section 8.7 shall be listed in Attachment 2: A-bar of total solids, consistency, air content, unit weight and yield, water-cement ratio, and temperature. For those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1, the following properties of each batch of concrete produced in Section 8.7 shall be listed in Attachment 2 OAG: optimized aggregate gradation (OAG) worksheet, consistency, air content, unit weight and yield, water-cement ratio, and temperature.

8.6.5 If the average of the batches produced in Section 8.3, with the specified target cement factor, does not satisfy the acceptance criteria set forth in Section 8.6, then a linear compressive strength-cement factor relationship will be established using the average 28-day compressive strength [based on the 4 by 8 in. (100 by 200 mm) cylinder results] of the batches with the target cement factor (Section 8.3) and the average 28-day compressive strength of the batches with the target cement factor plus one bag of cement (Section 8.7). This relationship will be interpolated to determine a cement factor [to the nearest 1 lb. (0.45 kg)] which would cause the acceptance criteria to be satisfied. This interpolated cement factor will be considered acceptable for proportioning the design mix for the class of concrete being designed.

8.6.6 If neither of the averages of the batches produced in Sections 8.3 or 8.7 satisfy the acceptance criteria in Section 8.6, then that proposed component material change

cannot be considered as acceptable, and a new laboratory mix design will be required to make a change in component materials.

8.7 The submittal for a proposed mix design change, as outlined in Section 8, shall include completed copies of Attachments 1 and 3. It shall also include a completed copy of Attachment 2 for each of the batches produced in Section 8. Attachments 1 OAG, 2 OAG, and 3 OAG shall be used in leu of Attachments 1, 2, and 3 respectively, for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1. All pertinent information supporting these attachments and pertaining to the information in them shall be submitted also. The lab numbers of the original mix design shall be included in the submittal. This new mix design shall be submitted to the District in the same manner as a normal mix design, and it shall then be forwarded to MCS&T Division for review and approval. If approved, a new lab number will be assigned to this mix design, and it shall, from that point forward be treated as a new mix design.

8.8 No additional component material changes are permitted to this mix design (without a new laboratory mix design) until there are a minimum of 20 consecutive field test results, from this new mix design, which meet or exceed the design compressive strength requirements. Once there are 20 consecutive field test results, from this new mix design, which meet or exceed the design compressive strength requirements, this mix design is eligible for another component material change in accordance with Section 8.

9. REPLACEMENT OF FLY ASH WITH CEMENT OR ANOTHER APPROVED SOURCE OF FLY ASH IN A MIX DESIGN

9.1 When an issue arises with a fly ash source or any other circumstance arises which causes a Concrete Producer to discontinue the use of a source of fly ash in an approved mix design, an equal volume of cement, or an equal volume of fly ash from a different WVDOH approved fly ash source, may be substituted for the fly ash in that mix. This option is not permitted for SCC mix designs produced in accordance with Section 603.

9.1.1 This option of replacing fly ash with cement, or fly ash from a different approved source, does not apply to Class H concrete and concrete for specialized overlays, as set forth in Section 679 of the specifications.

9.2 The Concrete Producer shall notify the WVDOH District Materials personnel that it is desired to replace the fly ash in an approved concrete mix design with an equal volume of cement or fly ash from a different approved source. The WVDOH District Materials personnel may then approve this change on a temporary basis. Field test data, as outlined in the following sections, shall be used to approve this mix design change as a permanent new mix design. The change on a temporary basis and permanent new mix design shall meet the ASR requirements in Section 601.3.1.1 according to the most recent aggregate reactivity, alkali content of cement and SCM, CaO of fly ash from the APLs. Evaluation of the effectiveness of SCM in accordance with 601.3.1.1.1.6 may

be used if SCM replacement level does not meet the minimum replacement level described in Table 601.3.1.1.1.4.2b.

9.2.1 When fly ash from a different approved source is being substituted for the existing source of fly ash in an approved mix design, tests to determine the air content of the plastic concrete shall be performed at the Concrete Producer's facility and at the job site, in the presence of WVDOH personnel, on at least the first three batches of concrete produced with this different approved source of fly ash.

9.3 Two batches of concrete, produced with this mix containing either all cement or fly ash from a different approved source shall then be tested in the presence of WVDOH District Materials personnel. Both of these batches of concrete shall be tested in the plastic state for air, consistency, and yield. Each batch shall have an air content, consistency, and yield equal to the specified value plus or minus the following tolerances: Air content, ± 1 percent; Consistency, ± 1 in. (± 25 mm) of slump; Yield, ± 2 percent.

9.3.1 Three 4 by 8 in. (100 by 200 mm) cylinders shall be made from each batch outlined in Section 9.3 and tested in compression at an age of 28 days. The values of the physical properties of this new mix design (with the fly ash replacement) shall be the average of the physical properties established in the two batches produced in Section 9.3. These values shall be listed in the column for the mix with the "Minimum Cement Factor" in Attachment 3.

The following properties of each batch of concrete produced in Section 9.3 shall be listed in Attachment 2: A-bar of total solids, consistency, air content, unit weight and & yield, water-cement ratio, and temperature. For those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1, the following properties of each batch of concrete produced in Section 9.3 shall be listed in Attachment 2 OAG: optimized aggregate gradation (OAG) worksheet, consistency, air content, unit weight & yield, water-cement ratio, and temperature.

9.4 The average compressive strength of the two batches produced in Section 9.3 must have an average compressive strength, which exceeds the "Design 28-Day Compressive Strength" required by the specifications.

9.5 The submittal for a mix design change from a mix containing fly ash to a mix using either only cement as the cementitious material or fly ash from a different approved source, as outlined in Section 9, shall include completed copies of Attachments 1, 3 and 6-ASR. It shall also include a completed copy of Attachment 2 for each of the batches produced in Section 9.3. Attachments 1 OAG, 2 OAG, and 3 OAG shall be used in leu of Attachments 1, 2, and 3 respectively, for those mix designs which meet the requirements for optimized aggregate gradation in Section 601.3.2.4.1. All pertinent information supporting these attachments and pertaining to the information in them shall be submitted also. This mix design change submittal shall be submitted to the District in the same manner as a normal mix design, and it shall then be forwarded to MCS&T Division for review and approval. A new lab number will be assigned to this mix design, and it shall, from that point forward be treated as a new mix design,

using only cement as the cementitious material, or using fly ash from a different approved source along with the original source of cement as the cementitious materials.

10. ADDITION OF HYDRATION CONTROL STABILIZING ADMIXTURES TO EXISTING MIX DESIGNS

10.1 Approved Hydration Control Stabilizing Admixtures, as specified in Section 707.15, designed to stop the hydration of cement in a concrete mix, enabling an extension to the allowable discharge time from a truck mixer as outlined in Section 601.7 of the Specifications may be added to an existing approved concrete mix design in accordance with the procedures outlined in this Section. This option is not permitted for SCC mix designs produced in accordance with Section 603.

10.2 Two separate batches of concrete shall be produced as outlined in Section 8.3. These concrete batches shall be tested as outlined in Sections 8.3 and 8.4.

10.2.1 Additional testing, as outlined in the second, third, and fourth paragraphs of Section 707.15.2.1, shall also be performed on one of the batches produced in Section 9.2 to verify that the allowable concrete discharge time may be extended.

10.3 If the requirements set forth in Section 8.6 are met, then the procedures set forth in Sections 8.8 and 8.9 shall be followed, and the existing mix shall be approved for use with the hydration control stabilizing admixture, and a new lab number will be assigned to this mix design.

10.4 No additional changes to the existing mix design are permitted at the time that these concrete batches are being produced for the acceptance of the addition of the hydration control stabilizing admixture to the existing mix design.

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

MM:Td

ATTACHMENTS

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SUPERSEDES: MAY 2024
REVISED: JANUARY 2025
ATTACHMENT 1

Source:		Facility:	
Source Code:		Facility Code:	
Class of Concrete:		Material Code:	
Design Laboratory:		Date:	

Cementitious Material Data			
Data	Cement	Supplementary Cementitious Material (SCM) 1	Supplementary Cementitious Material (SCM) 2
Name			
Type			
Material Code			
Source			
Source Code			
Facility			
Facility Code			
Specific Gravity			

Admixture Data				
Data	Air Entrainment	Additional Admixture 1	Additional Admixture 2	Additional Admixture 3
Name				
Type				
Material Code				
Source				
Source Code				
Facility				
Facility Code				

Aggregate Data		
Data	Coarse Aggregate	Fine Aggregate
Class/Size		
Type		
Material Code		
Source		
Source Code		
Facility		
Facility Code		
Specific Gravity		
A-Bar		
Absorption		
Fineness Modulus		
Unit Weight		

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ATTACHMENT 2

Source: _____
Facility: _____
Design Laboratory: _____
Class of Concrete: _____
Date: _____

Check The Appropriate Box For Designated Batch:	Minimum Cement Factor		Mininimum Cement Factor + 1 Bag		Minimum Cement Factor with Different w/c	Additional Batch
	Batch 1	Batch 2	Batch 1	Batch 2		

Material	Mass	Units	Volume		Units
Cement		lb (kg)			ft^3 (m^3)
SCM 1		lb (kg)			ft^3 (m^3)
SCM 2		lb (kg)			ft^3 (m^3)
Latex Admixture		lb (kg)	gal (L)		ft^3 (m^3)
Water		lb (kg)	gal (L)		ft^3 (m^3)
Air Content, by volume		%			ft^3 (m^3)
Coarse Aggregate		lb (kg)			ft^3 (m^3)
Fine Aggregate		lb (kg)			ft^3 (m^3)
Total		lb (kg)			ft^3 (m^3)
Air Entrain. Admixture		oz/Cwt (mL/100kg)			fl. oz. (mL)
Chemical Admixture 1		oz/Cwt (mL/100kg)			fl. oz. (mL)
Chemical Admixture 2		oz/Cwt (mL/100kg)			fl. oz. (mL)
Chemical Admixture 3		oz/Cwt (mL/100kg)			fl. oz. (mL)

Mixture Test Data							
$\bar{A}$ Total Solids	W/C Ratio	Cement Factor (ft^3)	Temperature	Consistency	Air Content	Unit Weight	Yield

Compressive Stength, psi (MPa)		
Specified Test Age:	Actual Test Age (hours)	4" x 8" (100 x 200 mm) Strengths
24 ± 2 Hours		
3 Days		
7 Days		
14 Days		
28 Days		
28 Days		
28 Days		
Avg. 28 Day Strength		#DIV/0!

SAM #

Surface Resitivity Test	
Sample	Result (kΩ-cm)
A	
B	
C	
Batch Average Result (kΩ-cm)	

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ATTACHMENT 3

SUMMARY

Source: _____

Facility: _____

Design Laboratory: _____

Class of Concrete: _____

Corresponding Design 28-day Compressive Strength from Table 601.3.1A (psi): _____

Corresponding Maximum Water Content from Table 601.3.1A: _____

Date: _____

	Minimum Cement Factor		Minimum Cement Factor + 1 Bag		Minimum Cement Factor with Different w/c	
Material	Mass	Units	Mass	Units	Mass	Units
Cement		lb (kg)		lb (kg)		lb (kg)
SCM 1		lb (kg)		lb (kg)		lb (kg)
SCM 2		lb (kg)		lb (kg)		lb (kg)
Water		lb (kg)		lb (kg)		lb (kg)
Coarse Aggregate		lb (kg)		lb (kg)		lb (kg)
Fine Aggregate		lb (kg)		lb (kg)		lb (kg)
Total		lb (kg)		lb (kg)		lb (kg)
Air Entrain. Admixture		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)
Chemical Admixture 1		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)
Chemical Admixture 2		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)
Chemical Admixture 3		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)
Total A-Bar Solids						
Water Cement Ratio						
Cement Factor		ft^3 (m^3)		ft^3 (m^3)		ft^3 (m^3)
Temperature		^OF (^OC)		^OF (^OC)		^OF (^OC)
Consistency		inches (mm)		inches (mm)		inches (mm)
Air Content		%		%		%
Unit Weight		lb/ft^3 (kg/m^3)		lb/ft^3 (kg/m^3)		lb/ft^3 (kg/m^3)
Yield		ft^3 (m^3)		ft^3 (m^3)		ft^3 (m^3)
Aggregate Correction Factor per AASHTO T 152		%		%		%

Compressive Strength, psi (Mpa)	Minimum Cement Factor Batch	Minimum Cement Factor + 1 Bag Batch	Minimum Cement Factor with Different w/c
1 Day			
3 Days			
7 Days			
14 Days			
28 Days			
28 Days			
28 Days			
Avg. 28 Day Strength	#DIV/0!	#DIV/0!	#DIV/0!
Plant Standard Deviation at time of Mix Design Approval (psi):			
Average SAM Number:		Average Resistivity (kΩ-cm):	
Average Value of Rapid Chloride Permeability Test (Coulombs):			

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ATTACHMENT 4

Fields will be Automatically Filled After Attachment 3 is Completed	28-day Compressive Strength (Known Y-Value)	Water/Cementitious Material Ratio (Known X-Value)
Average Strength of Two Batches at Target (Minimum) Cement Factor (from Field D49 in Attachment 3)	#DIV/0!	0
Average Strength of Two Batches at Target (Minimum) Cement Factor + 1 Bag (from Field H49 in Attachment 3)	#DIV/0!	0
Strength of Batch at Target (Minimum) Cement Factor but with Different w/c (from Field L49 in Attachment 3)	#DIV/0!	0
	Result of Best-Fit Line (Slope) #VALUE!	Result of Best-Fit Line (Y-Intercept) #VALUE!

Class of Concrete =	0
Maximum Water Content from Table 601.3.1A =	0
Target (Minimum) Cement Factor (lbs.) = (from Fields D19, D20, and D21 of Attachment 3)	0
Design Compressive Strength (psi) from Table 601.3.1A =	0
Plant Compressive Strength Standard Deviation (psi) =	0
Mix Design Approval Strength (psi) =	0
w/c that corresponds to the Mix Design Approval Strength =	#VALUE!
Maximum w/c Allowed in the Field =	**#VALUE!**
Total Maximum Pounds of Water Allowed in the Mix (Including Field Adjustments), at the Target (Minimum) Cement Factor) =	**#VALUE!**
Total Maximum Gallons of Water Allowed in the Mix (Including Field Adjustments), at the Target (Minimum) Cement Factor) =	**#VALUE!**

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ATTACHMENT 5

Fields will be Automatically Filled After Attachment 3 is Completed	28-day Compressive Strength (Known Y-Value)	Water/Cementitious Material Ratio (Known X-Value)
Average Strength of Two Batches at Target (Minimum) Cement Factor (from Field D49 in Attachment 3)	#DIV/0!	0
Average Strength of Two Batches at Target (Minimum) Cement Factor + 1 Bag (from Field H49 in Attachment 3)	#DIV/0!	0
	Result of Best-Fit Line (Slope) #VALUE!	Result of Best-Fit Line (Y-Intercept) #VALUE!

Class of Concrete =	0
Maximum Water Content from Table 601.3.1A =	0
Target (Minimum) Cement Factor (lbs.) = (from Fields D19, D20, and D21 of Attachment 3)	0
Design Compressive Strength (psi) from Table 601.3.1A =	0
Plant Compressive Strength Standard Deviation (psi) =	0
Mix Design Approval Strength (psi) =	0
w/c that corresponds to the Mix Design Approval Strength =	#VALUE!
Maximum w/c Allowed in the Field =	**#VALUE!**
Total Maximum Pounds of Water Allowed in the Mix (Including Field Adjustments), at the Target (Minimum) Cement Factor) =	**#VALUE!**
Total Maximum Gallons of Water Allowed in the Mix (Including Field Adjustments), at the Target (Minimum) Cement Factor) =	**#VALUE!**

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ATTACHMENT 6-ASR

Class of Concrete, Precast/Prestress Member	

Cementitious Material Data			
Data	Cement	Supplementary Cementitious Materials (SCM) 1	Supplementary Cementitious Materials (SCM) 2
Mass (lb/kg)			
Alklai Content (%)			
CaO (%)(Fly Ash Only)			

Aggregate Material Data		
Data	Reactivity	Most Reactivity
Coarse Aggregate		
Fine Aggregate		

1	Level of Prevention		If Level of Prevention is "V", stop here.

For Class H Concrete, Skip 2,3,4 and 5.

For Evaluation of the Effectiveness of SCM or/and Lithium Nitrate Admixture (ASTM C1567), skip 2,3,4, and 6. If concrete mix using a 100 percent lithium nitrate admixture dosage, skip 2,3,4,5, and 6.

2	Alkali Content of Concrete (Option 1)	0.00	lb/yd³ (kg/m³)
3	Replacement Level of SCM (Option 2)		%

4	For Prevention Level "Z" Only		
	Alkali Content of Concrete		%
	Replacement Level of SCM		%

5	Evaluation of the Effectiveness of SCM or/and Lithium Nitrate Admixture (ASTM C1567)		
	Data	Evaluation with Reactive Fine Aggregate	Evaluation with Reactive Coarse Aggregate
	Expansion results (%)		
	SCM (%)		
	Replacement of SCM in Mix Design (%)		
	Lithium Nitrate Admixture Dosage Rate (%)		

6	Option chosen from Specification Table 601.3.1C for Class H Concrete	

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ATTACHMENT 1 S-P

Source:		Facility:	
Source Code:		Facility Code:	
Class of Concrete:		Material Code:	
Design Laboratory:		Date:	

Cementitious Material Data			
Data	Cement	Supplementary Cementitious Material (SCM) 1	Supplementary Cementitious Material (SCM) 2
Name			
Type			
Material Code			
Source			
Source Code			
Facility			
Facility Code			
Specific Gravity			

Admixture Data				
Data	Air Entrainment	Additional Admixture 1	Additional Admixture 2	Additional Admixture 3
Name				
Type				
Material Code				
Source				
Source Code				
Facility				
Facility Code				

Aggregate Data		
Data	Coarse Aggregate	Fine Aggregate
Class/Size		
Type		
Material Code		
Source		
Source Code		
Facility		
Facility Code		
Specific Gravity		
Absorption		
Fineness Modulus		
Unit Weight		

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ATTACHMENT 2 S-P

Source:
Facility:
Design Laboratory:
Class of Concrete:
Date:

Check the Appropriate Box for the Designated Batch:	Batch 1	Batch 2	Additional Batch

Material	Mass	Units	Volume		Units
Cement		lb (kg)			ft^3 (m^3)
SCM 1		lb (kg)			ft^3 (m^3)
SCM 2		lb (kg)			ft^3 (m^3)
Water		lb (kg)	gal (L)		ft^3 (m^3)
Air Content, by volume		%			ft^3 (m^3)
Coarse Aggregate 1		lb (kg)			ft^3 (m^3)
Coarse Aggregate 2		lb (kg)			ft^3 (m^3)
Fine Aggregate		lb (kg)			ft^3 (m^3)
Total		lb (kg)			ft^3 (m^3)
Air Entrain. Admixture		oz/Cwt (mL/100kg)			fl. oz. (mL)
Chemical Admixture 1		oz/Cwt (mL/100kg)			fl. oz. (mL)
Chemical Admixture 2		oz/Cwt (mL/100kg)			fl. oz. (mL)
Chemical Admixture 3		oz/Cwt (mL/100kg)			fl. oz. (mL)

Mixture Test Data at T_0

W/C Ratio	Cement Factor, ft^3 (m^3)	Concrete Temperature, °F (°C)	Slump Flow, in. (mm)	Air Content, %	Unit Weight, lb/ft^3 (kg/m^3)	Yield, ft^3 (m^3)	$T_{50,\ seconds}$
VSI	J-Ring, in. (mm)	Rpd. Asmnt. of Static Seg. Resist., in. (mm)	Segregation Resistance, %	Workable Period, minutes			

Compressive Strength Test, psi (Mpa)

Test Age:	24 ± 2 hours	3 days	7 days	14 days	28 days	28 days	28 days
Actual Test Age (hours)							
Compressive Strength							
Average 28-day Compressive Strength:					#DIV/0!		

Modulus of Elasticity Test, psi (Mpa)

Test Age:	3 days	7 days	14 days	28 days	28 days	28 days
Actual Test Age (hours)						
Modulus of Elasticity						
Average 28-day Modulus of Elasticity:				#DIV/0!		

Length Change (Shrinkage), % Length Change

Test Age	Initial Reading	Reading at End of 28-day Curing Period	4 days after 28-day curing period	7 days after 28-day curing period	14 days after 28-day curing period	28 days after 28-day curing period
Specimen 1						
Specimen 2						
Specimen 3						
Average Length Change (Shrinkage) after 28-days of water curing and 28-days of Air Storage:						#DIV/0!

Surface Resitivity Results

Sample	Results (kΩ-cm)
A	
B	
C	
Average Results (kΩ-cm)	

SAM#

Freeze-Thaw Resistance

	# of Cycles Completed	Durability Factor
Specimen 1		
Specimen 2		
Specimen 3		
Average Durability Factor:		#DIV/0!

Creep Testing

Age at Initial Loading (hours):		Comp. Str. Cylinder 1, psi (Mpa):		Comp. Str. Cylinder 2, psi (Mpa):		Initial Load, psi (Mpa):	
Initial Elastic Strain at Time of Initial Loading (Determined within 2 minutes after Initial Loading):							
	Loaded Cylinders - Total Strain	Control Cylinders - Drying Strain	Load Induced Strain	Load Induced Strain per Unit Stress	Creep Strain	Creep Strain per Unit Stress	Creep Coefficient
90 days After Initial Loading:							

MP 711.03.23
SUPERSEDES: MAY 2024
REVISED: JANUARY 2025
ATTACHMENT 3 S-P

SUMMARY

Source: _____
Facility: _____
Design Laboratory: _____
Class of Concrete: _____
Date: _____

	Mix Properties	
Material	Average Value from Two Trial Batches	Units
Cement		lb (kg)
SCM 1		lb (kg)
SCM 2		lb (kg)
Water	gal (L)	lb (kg)
Coarse Aggregate 1		lb (kg)
Coarse Aggregate 2		lb (kg)
Fine Aggregate		lb (kg)
Total Batch Weight		lb (kg)
Air Entrain. Admixture		oz/Cwt (mL/100kg)
Chemical Admixture 1		oz/Cwt (mL/100kg)
Chemical Admixture 2		oz/Cwt (mL/100kg)
Chemical Admixture 3		oz/Cwt (mL/100kg)
Water Cement Ratio		
Cement Factor		ft^3 (m^3)
Temperature		^{O}F (^{O}C)
Slump Flow		inches (mm)
Air Content		%
Unit Weight		lb/ft^3 (kg/m^3)
Yield		ft^3 (m^3)
T_{50}		seconds
VSI		
J-Ring		inches (mm)
Rapid Assessment of Static Segregation Resist.		inches (mm)
Segregation Resistance		%
Aggregate Correction Factor per AASHTO T 152		%

Compressive Strength, psi (Mpa)	Avg.Compressive Strength of both Trial Batches
24 ± 2 hours	
3 Days	
7 Days	
14 Days	
28 Days	
28 Days	
28 Days	
Avg. 28 Day Strength	#DIV/0!

Prestressing Strand Bond Strength Test (in accordance with MP 603.06.20) Check Applicable Box	
Pass:	
Fail:	

Average SAM Number	
Average Resistivity (kΩ-cm)	

MP 711.03.23
REVISED: JANUARY 2025
ATTACHMENT 1 OAG

Source:		Facility:	
Source Code:		Facility Code:	
Class of Concrete:		Material Code:	
Design Laboratory:		Date:	

Cementitious Material Data			
Data	Cement	Supplementary Cementitious Material (SCM) 1	Supplementary Cementitious Material (SCM) 2
Name			
Type			
Material Code			
Source			
Source Code			
Facility			
Facility Code			
Specific Gravity			

Admixture Data				
Data	Air Entrainment	Additional Admixture 1	Additional Admixture 2	Additional Admixture 3
Name				
Type				
Material Code				
Source				
Source Code				
Facility				
Facility Code				

Aggregate Data				
Data	Coarse Aggregate (I)	Coarse Aggregate (II)	Fine Aggregate (I)	Fine Aggregate (II)
Class/Size				
Type				
Material Code				
Source				
Source Code				
Facility				
Facility Code				
Absorption				
Fineness Modulus				
Unit Weight				

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REVISED: JANUARY 2025
ATTACHMENT 2 OAG

Source:
Facility:
Design Laboratory:
Class of Concrete:
Date:

Check The Appropriate Box For Designated Batch:	Minimum Cement Factor		Mininimum Cement Factor + 1 Bag		Minimum Cement Factor with Different w/c	Additional Batch
	Batch 1	Batch 2	Batch 1	Batch 2		

Material	Mass	Units	Volume		Units
Cement		lb (kg)			ft^3 (m^3)
SCM 1		lb (kg)			ft^3 (m^3)
SCM 2		lb (kg)			ft^3 (m^3)
Latex Admixture		lb (kg)	gal (L)		ft^3 (m^3)
Water		lb (kg)	gal (L)		ft^3 (m^3)
Air Content, by volume		%			ft^3 (m^3)
Coarse Aggregate (I)		lb (kg)			ft^3 (m^3)
Coarse Aggregate (II)		lb (kg)			ft^3 (m^3)
Fine Aggregate (I)		lb (kg)			ft^3 (m^3)
Fine Aggregate (II)		lb (kg)			ft^3 (m^3)
Total		lb (kg)			ft^3 (m^3)
Air Entrain. Admixture		oz/Cwt (mL/100kg)			fl. oz. (mL)
Chemical Admixture 1		oz/Cwt (mL/100kg)			fl. oz. (mL)
Chemical Admixture 2		oz/Cwt (mL/100kg)			fl. oz. (mL)
Chemical Admixture 3		oz/Cwt (mL/100kg)			fl. oz. (mL)

Mixture Test Data							
–	W/C Ratio	Cement Factor (ft^3)	Temperature	Consistency	Air Content	Unit Weight	Yield

Compressive Stength, psi (MPa)		
Specified Test Age:	Actual Test Age (hours)	4" x 8" (100 x 200 mm) Strengths
24 ± 2 Hours		
3 Days		
7 Days		
14 Days		
28 Days		
28 Days		
28 Days		
Avg. 28 Day Strength		#DIV/0!

SAM #

Surface Resitivity Test	
Sample	Results (kΩ-cm)
A	
B	
C	
Results (kΩ-cm)	

MP 711.03.23
REVISED: JANUARY 2025
ATTACHMENT 3 OAG

SUMMARY

Source: _____

Facility: _____

Design Laboratory: _____

Class of Concrete: _____

Corresponding Design 28-day Compressive Strength from Table 601.3.1A (psi): _____

Corresponding Maximum Water Content from Table 601.3.1A: _____

Date: _____

	Minimum Cement Factor		Minimum Cement Factor + 1 Bag		Minimum Cement Factor with Different w/c	
Material	Mass	Units	Mass	Units	Mass	Units
Cement		lb (kg)		lb (kg)		lb (kg)
SCM 1		lb (kg)		lb (kg)		lb (kg)
SCM 2		lb (kg)		lb (kg)		lb (kg)
Water		lb (kg)		lb (kg)		lb (kg)
Coarse Aggregate (I)		lb (kg)		lb (kg)		lb (kg)
Coarse Aggregate (II)		lb (kg)		lb (kg)		lb (kg)
Fine Aggregate (I)		lb (kg)		lb (kg)		lb (kg)
Fine Aggregate (II)		lb (kg)		lb (kg)		lb (kg)
Total		lb (kg)		lb (kg)		lb (kg)
Air Entrain. Admixture		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)
Chemical Admixture 1		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)
Chemical Admixture 2		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)
Chemical Admixture 3		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)		oz/Cwt (mL/100kg)
Water Cement Ratio						
Cement Factor		ft^3 (m^3)		ft^3 (m^3)		ft^3 (m^3)
Temperature		^OF (^OC)		^OF (^OC)		^OF (^OC)
Consistency		inches (mm)		inches (mm)		inches (mm)
Air Content		%		%		%
Unit Weight		lb/ft^3 (kg/m^3)		lb/ft^3 (kg/m^3)		lb/ft^3 (kg/m^3)
Yield		ft^3 (m^3)		ft^3 (m^3)		ft^3 (m^3)
Aggregate Correction Factor per AASHTO T 152		%		%		%

Compressive Strength, psi (Mpa)	Minimum Cement Factor Batch	Minimum Cement Factor + 1 Bag Batch	Minimum Cement Factor with Different w/c
1 Day			
3 Days			
7 Days			
14 Days			
28 Days			
28 Days			
28 Days			
Avg. 28 Day Strength	#DIV/0!	#DIV/0!	#DIV/0!

Plant Standard Deviation at time of Mix Design Approval (psi): _____

Average SAM Number: _____ Average Resistivity (kΩ-cm): _____

Average Value of Rapid Chloride Permeability Test (Coulombs): _____

Cure Method: _____ Standard _____ Accelerated _____ Age (Days): _____

MP 711.03.23
REVISED: JANUARY 2025
ATTACHMENT 6-ASR OAG

Class of Concrete, Precast/Prestress Member	

Cementitious Material Data			
Data	Cement	Supplementary Cementitious Materials (SCM) 1	Supplementary Cementitious Materials (SCM) 2
Mass (lb/kg)			
Alklai Content (%)			
CaO (%)(Fly Ash Only)			

Aggregate Material Data		
Data	Reactivity	Most Reactivity
Coarse Aggregate (I)		
Coarse Aggregate (II)		
Fine Aggregate (I)		
Fine Aggregate (II)		

1	Level of Prevention		If Level of Prevention is "V", stop here.

For Class H Concrete, Skip 2,3,4 and 5.

For Evaluation of the Effectiveness of SCM or/and Lithium Nitrate Admixture (ASTM C1567), skip 2,3,4, and 6. If concrete mix using a 100 percent lithium nitrate admixture dosage, skip 2,3,4,5, and 6.

2	Alkali Content of Concrete (Option 1)	0.00	lb/yd³ (kg/m³)
3	Replacement Level of SCM (Option 2)		%

4	For Prevention Level "Z" Only		
	Alkali Content of Concrete		%
	Replacement Level of SCM		%

5	Evaluation of the Effectiveness of SCM or/and Lithium Nitrate Admixture (ASTM C1567)				
	Data	Fine Aggregate (I)	Fine Aggregate (II)	Coarse Aggregate (I)	Coarse Aggregate (II)
	Expansion results (%)				
	SCM (%)				
	Replacement of SCM in Mix Design (%)				
	Lithium Nitrate Ad. Dosage Rate (%)				

6	Option chosen from Specification Table 601.3.1C for Class H Concrete

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

MATERIALS PROCEDURE

METHOD OF TEST FOR DETERMINING THE CONDITION OF CONCRETE BRIDGE DECKS

1. PURPOSE

1.1. To provide a method of testing to determine the condition of concrete bridge decks.

2. SCOPE

2.1. This procedure is applicable to concrete bridge decks.

3. REFERENCE DOCUMENTS

3.1. ASTM C39: Test Method for Compressive Strength of Cylindrical Concrete Specimens

3.2. ASTM C42: Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

3.3. ASTM C876: Standard Test Method for Corrosion Potentials of Uncoated Reinforcing Steel in Concrete

3.4. ASTM C1152: Standard Test Method for Acid-Soluble Chloride in Mortar and Concrete

3.5. ASTM D4580: Standard Practice for Measuring Delamination in Concrete Bridge Decks by Sounding

3.6. ASTM D6432: Standard Guide for Using the Surface Ground Penetrating Radar Method for Subsurface Investigation

3.7. ASTM E11: Standard Specifications for Woven Wire Test Sieve Cloth and Test Sieves

3.8. AASHTO T-260: Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials

4. EQUIPMENT

4.1. Chain Drag Test

4.1.1 Chains, steel rods, or hammers capable of producing a clear ringing sound when dragged or tapped over non-delaminated concrete and a dull or hollow sound over delaminated concrete.

4.1.2 Measuring tape capable of measuring 150 to 300 ft.

4.1.3 Measuring tape capable of measuring 12 to 25 ft.

4.1.4 Chalk for marking delaminated areas.

4.2 Potential Corrosion Test

4.2.1 Potential corrosion meter capable of generating the data required to produce the report seen in Section 11 of ASTM C876.

4.2.2 Minimum 2-gallon container of distilled water, free of contaminates.

4.3 Core Sampling

4.3.1 Core drill capable of obtaining cylindrical core specimens through steel reinforced concrete.

4.3.2 4 in. diameter diamond impregnated drill bit.

4.3.3 Saw capable of trimming ends of cores and sectioning cores into 1 in. high cylindrical specimens. This saw shall be capable of cutting cores without introducing cracks or dislodging aggregate particles. Ensure cores are properly stabilized using core holders to prevent movement during sawing.

4.3.4 A grinder or pulverizer capable of grinding concrete and aggregate material fine enough to pass through an 850-µm (No. 20) sieve.

4.3.5 850-µm (No. 20) sieve complying with ASTM E11.

4.3.6 Containers capable of maintaining samples in an uncontaminated state.

4.4 Crack Mapping

4.4.1 Measuring tape capable of measuring 150 to 300 ft.

4.4.2 Measuring tape capable of measuring 12 to 25 ft.

4.4.3 Crack width gauge

4.5 Ground Penetrating Radar

4.5.1 A transmitter and receiver antenna in compliance with ASTM D6432

4.5.2 A radar control unit in compliance with ASTM D6432

4.5.3 Suitable data storage and display devices in compliance with ASTM D6432

5. PROCEDURE

5.1. The bridge deck and all lanes should be surveyed before beginning tests to create a plan of action and ensure the safest approach with traffic control.

5.2. Chain Drag Test

5.2.1 Run the 150 to 300 ft measuring tape longitudinally along bridge, repositioning if bridge length exceeds tape length

5.2.2 Drag chains over the entirety of the deck surface. Delaminated areas produce a dull or hollow sound.

5.2.3 Using a 12 to 25 ft. measuring tape, locate the exact location and record delaminated area on grid paper seen in Attachment 3.

5.3 Potential Corrosion Test

5.3.1 Unpack and assemble the concrete corrosion potential meter.

5.3.2 Unscrew the top of the reference electrode and add sufficient copper sulphate crystals into the tube. Fill the tube with distilled water, cap and shake to mix. Ensure the mixture is in a supersaturated state by adding enough copper sulphate to have undissolved crystals after shaking.

5.3.3 Connect the electrode to the meter by pressing the adapter plate onto the bottom of the LC-4.5, securing it with velcro pads. Screw the 15 in. intermediate electrode extension into the threaded receptacle on the adapter plate. Add more extensions until the meter is at comfortable height, reaching from the ground to the hands of the operator.

5.3.4 Plug the adaptor plate pigtail into the negative (black) terminal on the meter.

5.3.5 Place the function switch of the LC-4.5 meter to the DC position. Place the range selector switch to the 2V scale. Place the input resistance selector switch to the 200 meg-ohm position.

5.3.6 Clamp the vice-grip pliers onto the exposed rebar and clip one end of the 250-foot test lead to the pliers. Plug the end of the lead into the positive (center, red) terminal on the LC-4 meter.

5.3.7 This connection must be made to the rebar in the panel being tested. A minimum 1 in. area of the epoxy coating on the epoxy coated rebar will need to be removed in order for the entire clamp to be in contact with the rebar.

5.3.8 Place the reference electrode assembly against the prepared location on the concrete surface adjacent to the marked spot. If the electrical connection to the rebar is good, and the concrete and interface sponge are wet enough, a steady reading (measurement) between -0.010V and -0.600V should be obtained on the meter within 3-5 seconds. A slight variation in the last digit (thousandth place) can be normal. If the test setup is working satisfactorily, it should be possible to go back to a location and obtain an identical reading within ± 0.020V of the original reading.

5.3.9 Placing tape measures longitudinally and laterally, lay out a grid of the test location covering the entire area which is to be tested. (Tests do not have to be made directly over the rebars).

5.3.10 Take potential readings every 3 ft. by 3 ft. over the entire bridge deck. The sponge contacting the electrode must be kept moist during the entire test.

5.3.11 Record the results of each reading on the grid paper in Attachment 4.

5.3.12 Results generated shall be presented according to Section 9 of ASTM C876.

5.4 Core Samples

5.4.1 Compressive Strength Test

5.4.1.1 At least 1 location per lane shall be selected to obtain compressive strength cores. If the bridge deck only contains 1 lane of traffic, at least 2 locations shall be selected to obtain compressive strength cores. The chosen location should avoid the wheel path of traffic and permit the retrieval of the core underneath the bridge. The selected location will not be over the support beams of the bridge. The cores should be 4 in. diameter and the entire thickness of the bridge deck.

5.4.1.2 Each core shall be labeled with its core number, bridge name, route, lane type, and direction of traffic.

5.4.1.3 Once the cores are obtained, using diamond impregnated bits, the compressive strength should be tested following the procedures of ASTM C42 and ASTM C39

5.4.2 Chloride Potential

5.4.2.1 At least 1 location per lane shall be selected to obtain chloride potential cores. The chosen location should avoid the wheel path of traffic and permit the retrieval of the core underneath the bridge. The selected location will not be over the support beams of the bridge. The cores should be 4 in. diameter and the entire thickness of the bridge deck.

5.4.2.2 Cores obtained in 5.4.2.1 will be cut into one (1) in. thick disc specimens, maintaining their four (4) in. diameters.

5.4.2.3 Each 1 in. cylindrical slice shall be pulverized individually into material fine enough to pass through a 850-µm (No. 20) sieve and placed into its own individual container. Do not mix or contaminate the sample with material from another sample disc. Each individual container should be labelled with the core number and the depth it represents.

5.4.2.4 The concrete dust in the labelled sample container will be tested for chloride content following Sections 9 and 10 of ASTM C1152.

5.4.2.5 Record the test results in the format of the table in Attachment 7.

5.5 Crack Mapping

5.5.1 Walk the entire area of the bridge deck looking for any cracks, longitudinally and laterally.

5.5.2 Using a tape measure, record the location and length of each crack on the grid paper in Attachment 3.

5.5.3 Using a crack width gauge, record the average width of each crack on the grid paper in Attachment 3.

5.6 Ground Penetrating Radar

5.6.1 Refer to Section 6 in ASTM C6432 for the procedures to perform the ground penetrating radar

6. CALCULATIONS

6.1. Chain Drag Test

6.1.1. The total area of delamination, spalls, and patched shall be calculated against the total area of the bridge deck. Refer to Attachment 5 for example.

6.2. Potential Corrosion Test

6.2.1. The total area of potential readings greater than -0.20V shall be calculated against the total area of the bridge.

6.2.2. The total area of the potential readings in the range of -0.20V to -0.35V shall be calculated against the total area of the bridge.

6.2.3. The total area of potential readings less than -0.35V shall be calculated against the total area of the bridge.

6.2.4. Potentials greater than -0.20V indicate a 90% or higher probability of no corrosion taking place at the time of measurement.

6.2.5. Potentials in the range of -0.20V to -0.35V are inconclusive.

6.2.6. Potentials less than -0.35V generally indicate a 90% or higher probability of active corrosion taking place at the time of measurement. Refer to Attachment 8 for example.

6.3. Compressive Strength Cores

6.3.1. The compressive strength of the cores shall be calculated according to ASTM C39

6.4. Crack Mapping

6.4.1. The total area of cracks shall be calculated against the total area of the bridge. Refer to Attachment 6 for example.

7. REPORTING

7.1 The results will be presented through a Materials Inspection Report (MIR). The MIR shall include the following sections: Introduction, Accounting Data, Purpose of Report, Results of Bridge Deck Condition Survey, Conclusion, and Recommendations. Attachments 1 and 2 includes an example Memorandum and MIR.

Example

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

Division of Highways

1900 Kanawha Boulevard East • Building Five • Room 110
Charleston, West Virginia 25305-0430 • (304) 558-3505

Deputy Secretary of Transportation
Deputy Commissioner of Highways

Secretary of Transportation
Commissioner of Highways

MONTH DAY, 20XX

M E M O R A N D U M

TO: **NAME**
REGIONAL CONSTRUCTION ENGINEER
DISTRICT NUMBER

FROM: **NAME**
DIRECTOR
MATERIALS CONTROL, SOILS AND TESTING DIVISION

THRU: **HF**

SUBJECT: **BRIDGE DECK CONDITION SURVEY**
BRIDGE NUMBERS:
BARS NUMBERS:
BRIDGE NAME, COUNTY, DISTRICT NUMBER

Attached for your review and further handling is a copy of Materials Inspection Report (MIR) Number XXXXXXX. This MIR documents our findings regarding the subject bridge and will serve as a bridge deck condition survey.

Should you have any questions, please feel free to contact NAME at XXX-XXX-XXXX.

MAM:Td

Attachment

CC:

Example

Materials Inspection Report:	XXXXXXX
Authorization Number:	XXXXXXX
Subject:	Bridge Deck Condition Survey
BARS Number:	
County:	
District:	
Date of Report:	Month Day, Year

1. **ACCOUNTING DATA**

1.1 Project Name:

State Project No.: Contract ID: XXXXXXXXXX

Federal Project No.: Authorization No.:

ORG No.:

2. **INTRODUCTION**

2.1 As requested in MONTH of YEAR by the District NUMBER Regional Construction Engineer, a bridge deck condition survey was performed beginning on MONTH DAY, YEAR, and was concluded on MONTH DAY, YEAR. The tests that were performed were as follows: chain drag test, crack mapping, compressive strength cores, chloride core content and corrosion potential.

3. **PURPOSE OF REPORT**

3.1 This report provides the data developed regarding the bridge deck condition.

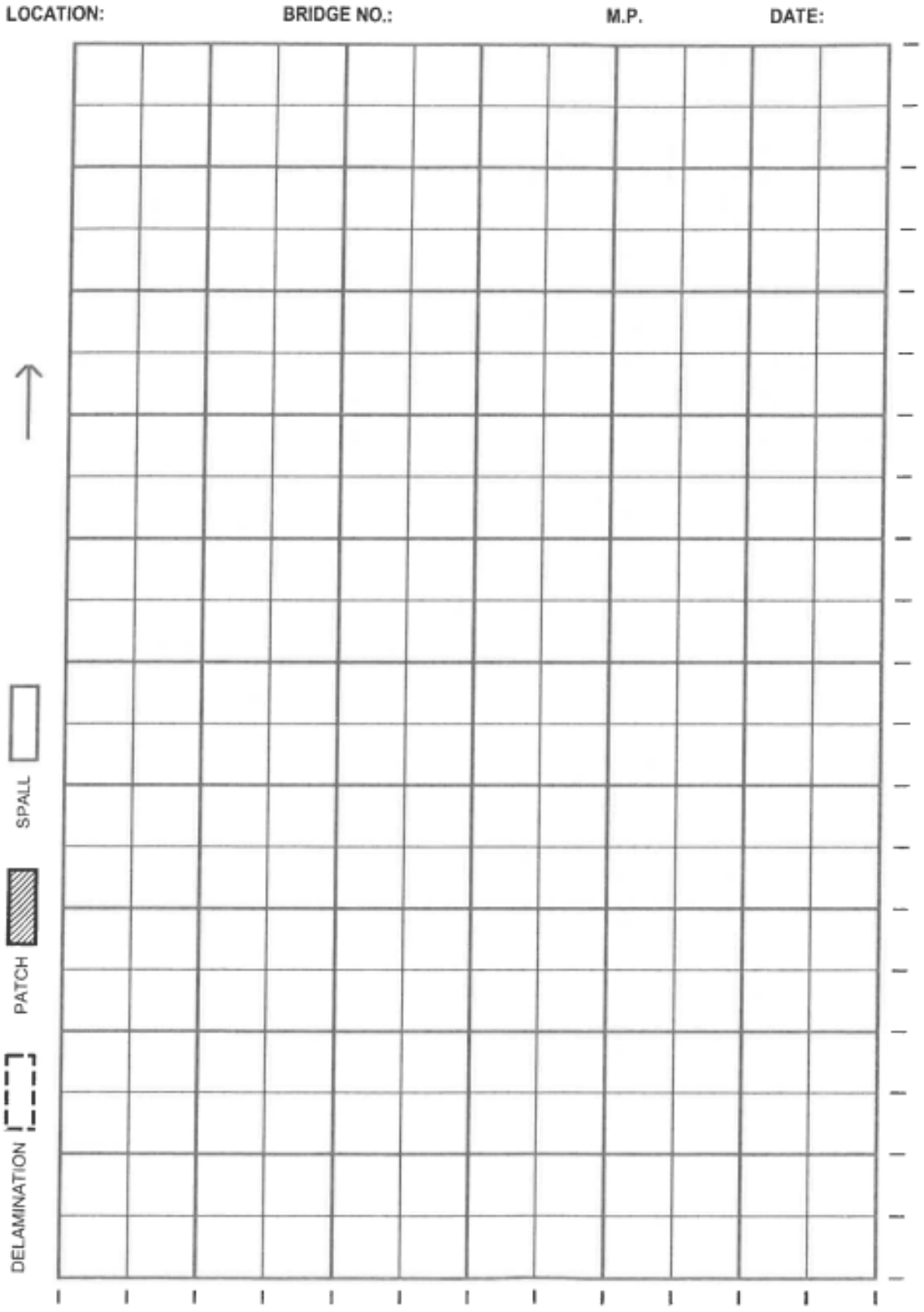
4. **RESULTS OF BRIDGE DECK CONDITION SURVEY**

4.1 Surface Condition

4.1.1 The bridge deck surfaces exhibited spalling and delamination.

4.2 Subsurface Condition

4.2.1 The bridge deck subsurface condition survey was not performed because it was not requested.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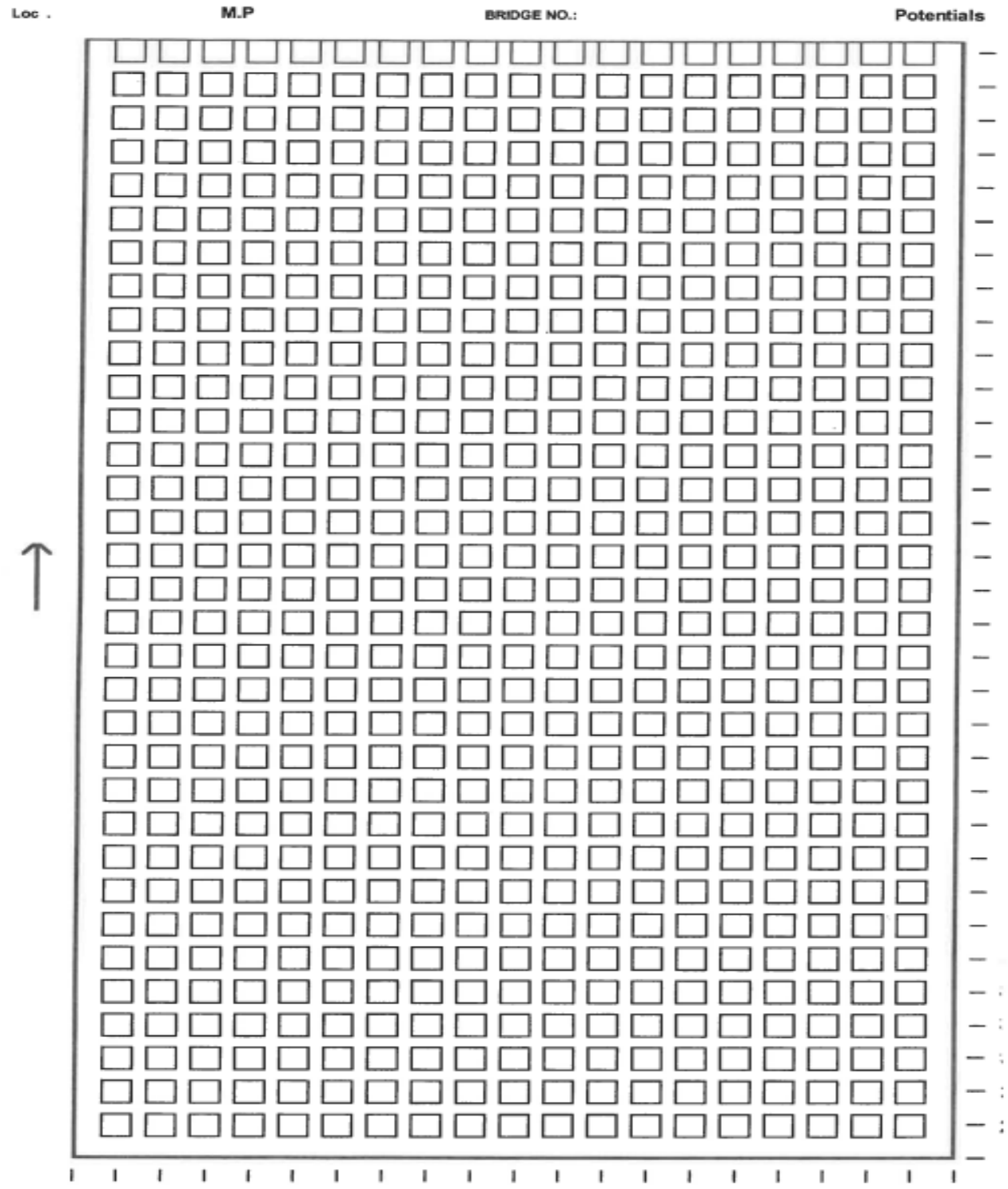
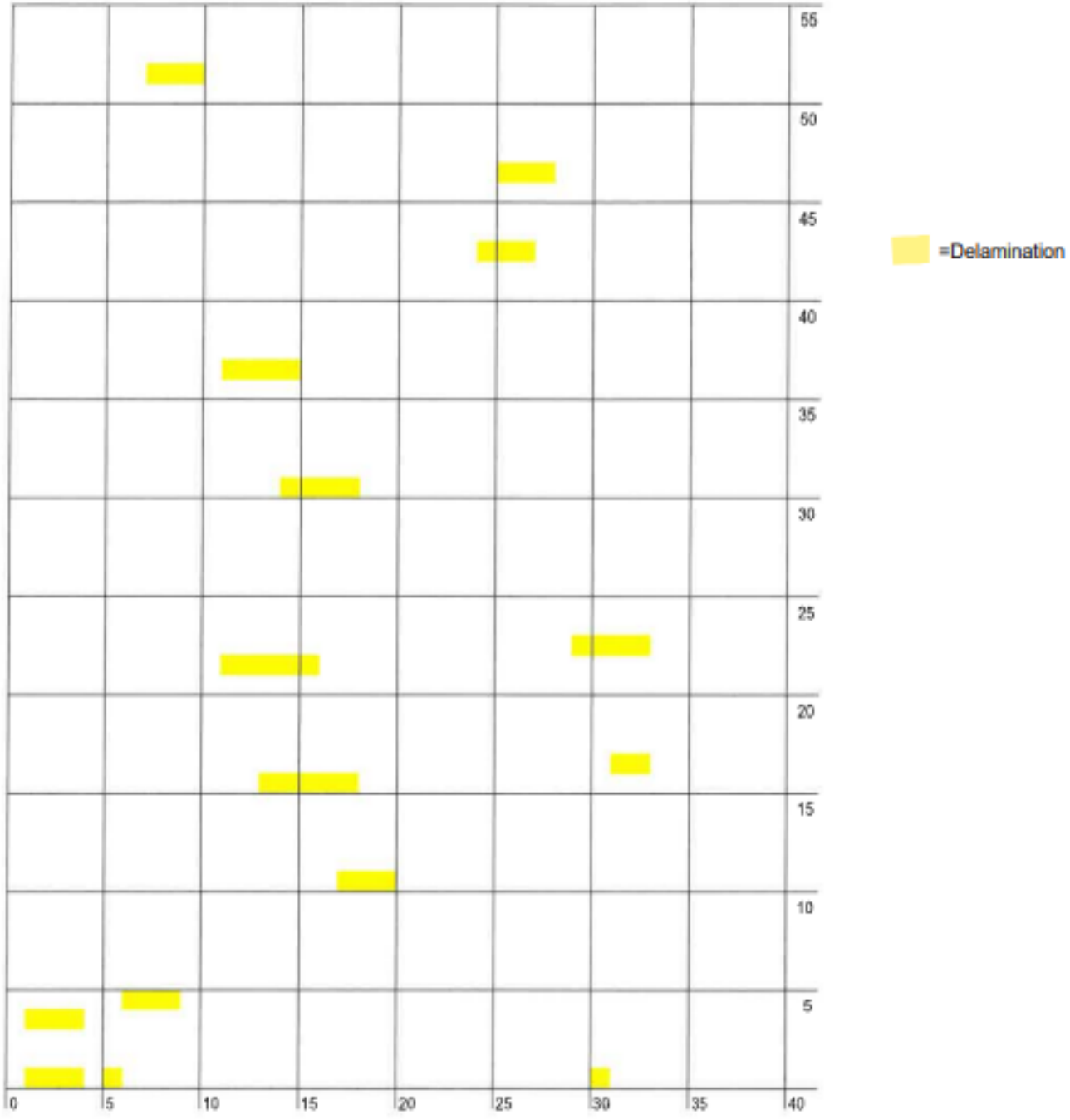
BRIDGE NO.:
M.P.
DATE:
SPALL
PATCH
DELAMINATION

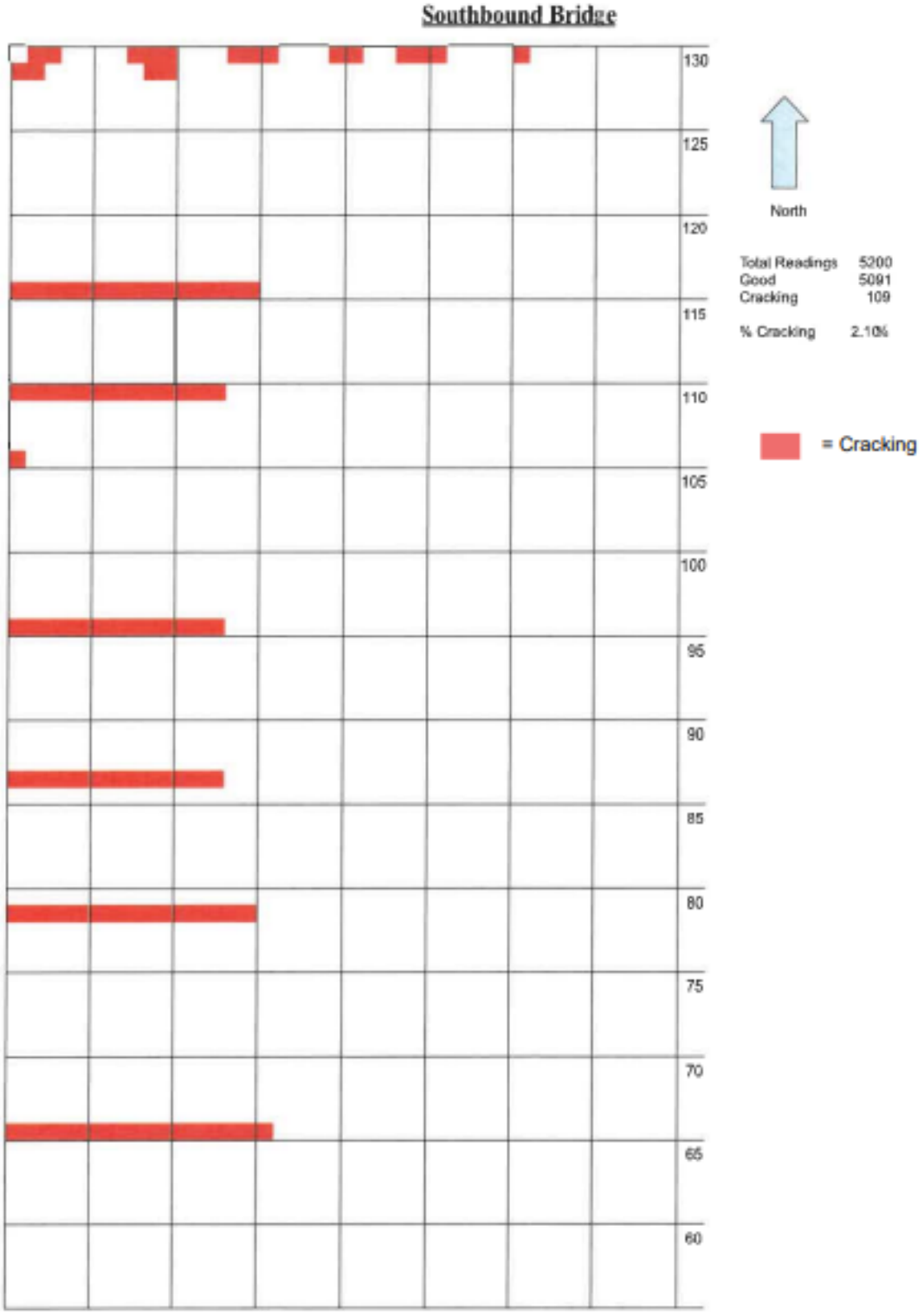

Loc .
M.P
BRIDGE NO.:
Potentials

Delamination Plotting

Southbound Bridge Continue



Crack Mapping

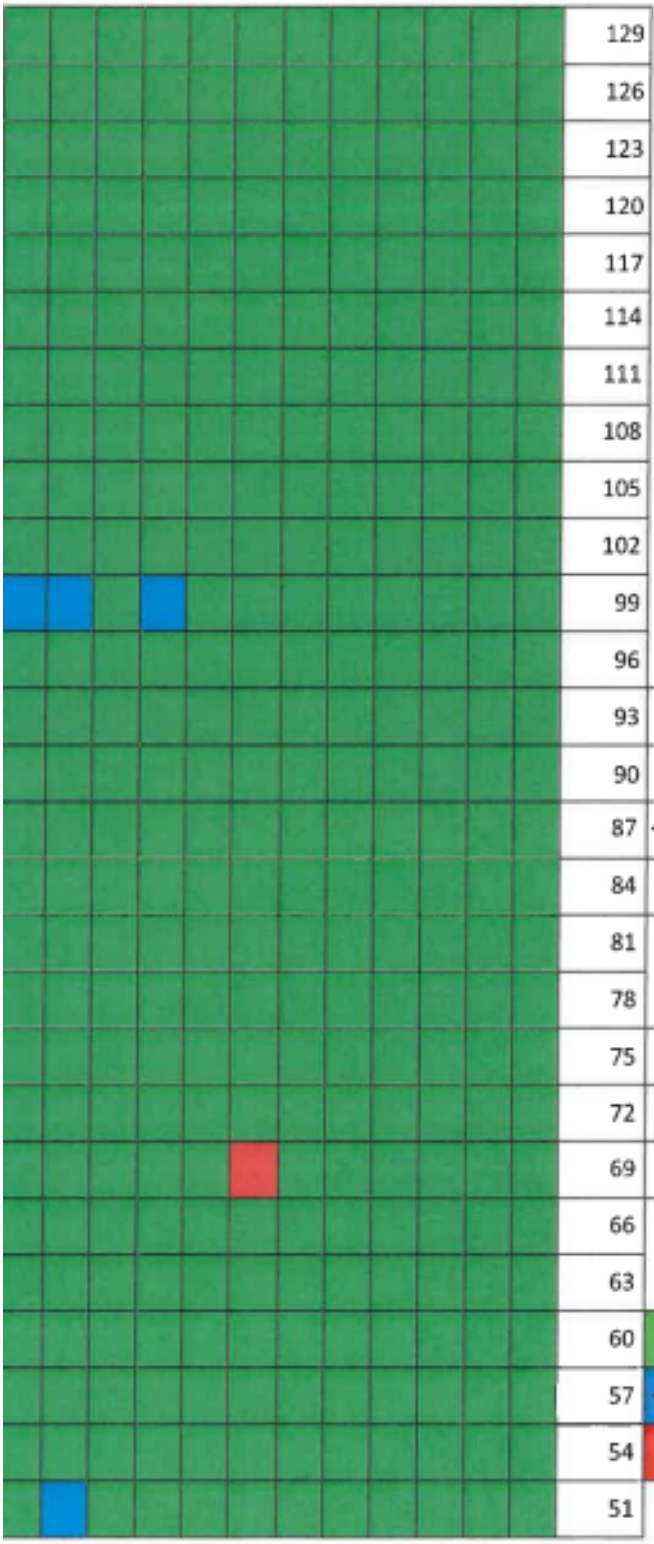


Chloride Potential Results Table

Core #	Depth in inches	lbs. of Chloride per CY of Concrete
C1	0.5 to 1.5	3
C1	1.5 to 2.5	1
C1	2.5 to 3.5	0
C1	3.5 to 4.5	0
C1	4.5 to 5.5	0
C1	5.5 to 6.5	0
C2	0.5 to 1.5	0
C2	1.5 to 2.5	0
C2	2.5 to 3.5	0
C2	3.5 to 4.5	0
C2	4.5 to 5.5	0
C2	5.5 to 6.5	0
C2	6.5 to 7.5	2
C3	0.5 to 1.5	2
C3	1.5 to 2.5	1
C3	2.5 to 3.5	1
C3	3.5 to 4.5	0
C3	4.5 to 5.5	1
C3	5.5 to 6.5	0
C4	0.5 to 1.5	2
C4	1.5 to 2.5	1
C4	2.5 to 3.5	1
C4	3.5 to 4.5	0
C4	4.5 to 5.5	0
C4	5.5 to 6.5	0
C4	6.5 to 7.5	0

Corrosion Potential

Northbound Bridge



Measured Potential	Amount
> (-0.20 V)	508
< (-0.35 V)	1
< (-0.20 V) and > (-0.35 V)	7
Total Readings	516

Probability of Steel Corrosion	Measured Potential
Less than 10%	> (-0.20 V)
Uncertain	< (-0.20 V) and > (-0.35 V)
More than 90%	< (-0.35 V)

Measured Potential	% Found in Bridge
> (-0.20 V)	**98%**
< (-0.20 V) and > (-0.35 V)	**1%**
< (-0.35 V)	**0.2%**

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

MATERIALS PROCEDURE

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

1. PURPOSE

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

2. DEFINITIONS

2.1. System: The Division Approved Materials Tracking System.

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

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

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

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

2.5.1. Project Approach: A verification Data Set must contain all of the following:

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

2.5.2. System Approach: A verification Data Set must contain all of the following:

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

2.6. Data Set: The series QC and linked QA test result data that is statistically compared for verification. This data set includes all linked test data that follows the inclusion specified in Sections 2.5.1 and 2.5.2.

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

3. SCOPE

3.1. The following materials, tests and their respective test(s) and test result(s) are evaluated by the specified approach.

3.1.1. Aggregate Gradations – Project Approach

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

3.1.2. Marshall Asphalt Mixture – System Approach

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

3.1.3. SuperPave Asphalt Mixture – System Approach

1. Asphalt Content
2. Air Voids
~~3. VFA~~
4.3. VMA
5.4. Gradation (each Specification Sieve and Pan if applicable)

3.1.4. Portland Cement Concrete – Project Approach

1. Air Content
2. Consistency
3. Strength

4. PROCEDURE

4.1. After completion of the QA sample, the test data shall be entered into the System. The QA sample shall be linked to the appropriate QC sample(s) as specified in Section 4.2. Note that all samples being linked must contain all respective test results for the material shown in Section 3 and meet the criteria stated in Sections 2.5.1 and 2.5.2.

4.1.1. If tests results are missing, the District shall explain their omission.

4.2. The samples shall be linked based on the total number of QC samples. This will allow the System to create a data set and perform an evaluation (if applicable).

4.2.1. 1-4 QC Sample(s)

If there are less than five QC samples, they shall be linked, but no calculation shall be performed; The evaluation will be conducted as specified in Section 5.1

4.2.2. 5-10 QC Samples

If there are five to ten QC samples, they shall be linked; the data set shall consist of all of the available tests. The evaluation shall be conducted as specified in Section 5.2

4.2.3. 11 + Quality Control Samples

If there are eleven or more QC samples available, they shall be organized sequentially by date/time; only the first ten shall be linked. The data set shall consist of these ten samples. The evaluation shall be conducted as specified in Section 5.2.

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

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

5. EVALUATION

5.1. If the data set contains less than 5 linked QC samples, no calculation shall be made. The test data shall be visually evaluated for significant deviance. If a significant deviance is noted, appropriate action shall be taken by the District as specified in Section 5.3.2.1. If there is no significant deviance, the report shall indicate: "This sample, <sample number recorded here> has been reviewed in accordance with MP 700.00.54."

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

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

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

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

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

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

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

6. REPORTING AND SAMPLE SUBMISSION

6.1. Once the evaluation is completed, the result shall be noted on the QA sample. The sample shall then be submitted to the respective Materials Regional Coordinator for final evaluation and approval.

6.2. If applicable, the sample shall also be marked as “Pass” or “Fail” along with whether the data is “Similar” or “Non-Similar” as defined in Section 6.2.1 and 6.2.2.

6.2.1. If the data set is found to be “Similar”, the QA Sample shall be marked “Similar” in the System.

6.2.2. If the data set is found to be “Non-Similar” the QA sample shall be marked “Non-Similar” in the System.

6.2.2.1. If the Sample is marked “Non-Similar”, the documentation from Section 5.3.2.1 shall be submitted with the sample.

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

6.3. A sample report is shown in Attachment 2.

_____

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

MP 700.00.54 Steward – Materials Control Section
MM:B

Attachment 1: Sample Calculations

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

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

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

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

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

West Virginia
Department of Transportation

Marshall Verification Sample Evaluation Computation Sheet

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

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

Sample Record Name	% Asphalt	% Air Voids	%VMA	Stability	Flow	Lab Reference Number	Open Sample Record
TKraf20241018080012	5.0	4.5	14.1	11,648	15.0	C7B2440	Click Here
TKraf20241022120955	5.1	2.2	12.3	12,642	15.3	C7B2441	Click Here
TKraf20241022121156	4.8	3.2	12.5	11,529	14.3	C7B2442	Click Here
TKraf20241022121345	5.0	2.0	12.0	11,633	15.5	C7B2444	Click Here
TKraf20241022121524	4.9	2.9	12.5	12,417	14.8	C7B2445	Click Here
TKraf20241108123059	5.3	2.0	12.5	12,337	15.7	C7B2448	Click Here
Average:	5.02	2.8	12.65	12034.33	15.1		**Records:** 6
Range:	0.5	2.5	2.1	1113	1.4		
Upper Limit Interval:	5.69	6.13	15.44	13514.62	16.96		
Lower Limit Interval:	4.36	0	9.86	100	13.24		

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

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

GENERAL INFORMATION GUIDE FOR TECHNICIAN AND INSPECTOR CERTIFICATION PROGRAM (TICP)

1. PURPOSE

1.1. The purpose of the West Virginia Division of Highways (WVDOH) Technician and Inspector Certification Program is to improve the quality assurance of various materials by the certification of industry and WVDOH. This procedure is to establish guidelines for this purpose.

2. GENERAL

2.1. It is the WVDOH's intent to conduct a cooperative program of training, study, and examination so that personnel of the producer, contractor, and the WVDOH will be able to better assure, by their increased technical knowledge, the level of quality required by the governing Specifications.

3. REFERECED DOCUMENTS

3.1. MP 720.10.01 - Guide for Using a High-Speed Inertial Profiler to Measure the Longitudinal Profile of Pavement.

~~3.1.~~3.2. MP 106.03.51 - Policy for Materials Certification Reciprocity with PCC Inspector, PCC Technician, and Aggregate Technician

4. SCOPE

4.1. This procedure is applicable to all requirements, guidelines, and other support documents of the WVDOH that reference conditions, methods, and levels of qualification specific to the WVDOH Training and Certification Program.

5. POLICIES AND ADMINISTRATION

5.1. Certification Board - The Certification Program will be carried out in accordance with general policy guidelines established or approved by the Chief Engineer. They will be advised by a Board composed of the following members:

1. Chief Engineer
2. Deputy General Counsel
3. Director of MCS&T - hereafter referred to as “Director”
4. Quality Assurance Training Program Administrator
5. Applicable MCS&T Supervisor(s)

5.1.1. The Certification Board will meet when called by the Director.

Commented [DB1]: Add reference to Reciprocity and consider adding reciprocity to this document

Commented [DB2]: If we do combine, update the title

Commented [DB3]: Comment - Steve Williamson -

Will the state consider making our program so we can make our technician school become/meet the criteria for an AASHTO acceptance.

Recent AASHTO inspection, re-certify, but we don’t take the practical for all the procedures, just select random ones. If we did all the procedures? Wouldn’t take that much additional effort.

AASHTO Accreditation more common.

Mike Mance - Our process should already qualify.

SW - wouldn’t accept WVDOH because we don’t do all the recertifications, not all the tests, just 2 or 3. Can get that information to us.

If we did all of them that we do in the practical, would be good for AASHTO.

Have to scramble and send people to the ACI classes, in the last couple of months.

MM - They looked at the recertification process.

SW - Initial, was ok, but the recertification was not. In ACI Recertification, every 5 years you need to go through every one of the procedures every year. Missing cylinders.

Further discussion once we get the report.

5.1.2. Administration - The program will be administered by the Director.

5.1.3. The Program Administrator shall be appointed by the Director. The Program Administrator will be assigned to assist the Director in administering the program and to handle planning, administration, and coordinating functions as may be delegated within the scope of appropriate WVDOH directives.

6. REQUIREMENTS

6.1. Where applicable, quality control representatives of the contractor and/or producer will be certified in the applicable certifications listed below, depending on the individual's duties or responsibilities. Responsibilities and qualification requirements are listed in appropriate support documents such as Specifications, Materials Procedures and/or Quality Control Plans.

6.2. For purposes of the WVDOH Quality Assurance Program, a non-WVDOH employee who is a certified Technician/Inspector represents the company of which they are a full-time employee on the project, owner, or partner (as defined by the Federal Wage and Hour Legislation). If said company has subsidiary or affiliated organizations, each organization will be required to have its own certified Technicians/Inspectors where applicable unless the Chief Engineer makes an exception. Exceptions will be granted only when it can be proven that the certified Technician/Inspector performs the duties of the Technician/Inspector for all the subsidiary or affiliated organizations.

7. CERTIFICATION CLASSES

7.1. The TICP offers certification classes in the following disciplines:

1. Aggregate Technician
2. Aggregate Sampling Inspector
3. Soils & Aggregate Compaction Technician
4. Asphalt Field & Compaction Technician
5. Portland Cement Concrete Technician
6. Portland Cement Concrete Inspector
7. Asphalt Plant Technician
8. Asphalt Preservation Technician
9. Radiation Safety
10. Inertial Profiler Operator

Commented [DH4]: No class for this certification

Commented [DH5]: No class for this certification

7.2. Except as noted, all certifications are valid for a ~~three~~five-year period

7.3. All certifications require written examinations. ~~—~~Some also require a practical examination after successful completion of the written examination.

7.4. It is the responsibility of the applicant to determine which certification is applicable to their assignment. Following is a description of the certifications listing relevant information about each.

8. AGGREGATE TECHNICIAN

8.1. Details of this class are available on the MCS&T Webpage[1]

8.2. The written examination for an Aggregate Inspector consists of the following areas:

1. Aggregate Specifications and Procedures
2. Aggregate Fundamentals
3. Sampling, Control, and Inspection of Aggregates
4. Aggregate Testing

8.3. After successful completion of the written examination, the applicant will be required to pass a practical examination. The technician must demonstrate the testing common to normal aggregate quality requirements.

8.4. Certification as an Aggregate Inspector qualifies the technician to perform sampling and/or testing of aggregates for both Quality Control and Quality Assurance.

9. AGGREGATE SAMPLING INSPECTOR

9.1. Details of this class are available on the MCS&T Webpage[2]

Commented [DH6]: Class or certification?

9.2. The web-based examination for an Aggregate Sampling Inspector consists of the following areas:

1. Specifications
2. Sampling Fundamentals
3. Sampling Methods and Equipment
4. Gradations
5. T11 Wash Test

9.3. The Aggregate Sampling Inspector requires the successful completion of an online examination.

9.4. Certification as an Aggregate Sampling Inspector qualifies the technician to perform sampling of aggregates for both Quality Control and Quality Assurance.

10. SOILS AND AGGREGATE COMPACTION TECHNICIAN

10.1. Details of this class are available on the MCS&T Webpage[3]

10.2. The written examination for this class consists of the following areas:

1. Specifications
2. Soil Compaction Test Procedures
3. Radiation Safety and Nuclear Gauge
4. Test Procedure Problems

[1] https://transportation.wv.gov/highways/mcst/Pages/Agg-Technician.aspx

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

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

10.3. After successful completion of the written examination, the applicant will be required to pass a practical examination demonstrating their proficiency in using the testing equipment.

10.4. Certification of the Soils and Aggregate Compaction Technician qualifies the technician to conduct tests on all Soil and Aggregate construction materials that require compaction testing.

11. ASPHALT FIELD AND COMPACTION TECHNICIAN

11.1. Details of this class are available on the MCS&T Webpage[4]

11.2. The written examination for this class consists of the following areas:

1. Specifications
2. Surface Preparation
3. Mix Delivery and Placement
4. Joint Construction
5. PWL
6. Troubleshooting
7. Compaction Test Procedures
8. Radiation Safety and Nuclear Gauge
9. Test Procedure Problems
10. Testing Forms

11.3. Successful completion of the written examination and a practical examination test is required.

11.4. Certification as an Asphalt Field and Compaction Technician qualifies the technician to oversee or inspect asphalt pavement construction. In addition, the class hand-out material is a valuable reference tool for each stage of the construction process. The required radiation safety training is included in this class and will certify attendees with a passing score to perform nuclear density testing on asphalt pavements.

11.5. Asphalt Field and Compaction Technicians must also be evaluated by qualified District personnel on the first WVDOH paving project in which they perform this testing.

11.5.1. The District personnel will make the decision as to whether or not the technician is correctly conducting the nuclear density tests in accordance with the Specifications.

11.5.2. The District will also complete an evaluation form and send it to the MCS&T for processing.

11.5.3. A technician that does not demonstrate proper nuclear density testing techniques shall not be allowed to continue testing on the WVDOH project. They must be replaced by another qualified technician. Anyone who does not meet the evaluation standards must provide proof of additional WVDOH approved radiation safety training before another evaluation will be conducted.

Commented [DB7]: VA to review

[4] https://transportation.wv.gov/highways/mcst/Pages/AsphaltFieldTech.aspx

12. PORTLAND CEMENT CONCRETE TECHNICIAN

12.1. Details of this class are available on the MCS&T Webpage[5]

12.2. The written examination for this class consists of the following areas:

1. Specifications
2. Fundamentals
3. Sampling and Testing
4. Control and Inspection
5. Mix Proportioning and Adjustment

12.3. The Concrete Technician requires only the successful completion of the written examination; no practical examination test is required.

12.4. Certification of the Concrete Technician qualifies the technician to make plant and mix adjustments, proportioning, and other concrete related duties.

12.4.1. National Ready Mixed Concrete Association (NRMCA) Concrete Technologist Certification Course, "Short Course," will be accepted as a portion of the West Virginia PCC Technician training. However, the applicant must pass the online West Virginia PCC Technician written certification test before a certification will be issued. Refer to MP 106.03.51

13. PORTLAND CEMENT CONCRETE INSPECTOR

13.1. Details of this class are available on the MCS&T Webpage[6]

13.2. The written examination for this class consists of the following areas:

1. Fundamentals
2. Sampling and Testing
3. Control and Inspection
4. Specifications

13.3. After successful completion of the written examination, the applicant will be required to pass a practical examination demonstrating their proficiency in conducting tests common to concrete quality control.

13.4. Certification as a Concrete Inspector qualifies the technician to perform sampling and/or testing of concrete for Quality Control and/or Quality Acceptance.

13.4.1. American Concrete Institute (ACI) Field Testing Grade I certification will be accepted as a portion of the West Virginia PCC Inspector training. However, the applicant must pass the online West Virginia PCC Inspector written certification test before a certification will be issued. Refer to MP 106.03.51

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

[6] https://transportation.wv.gov/highways/mcst/Pages/concreteinspector.aspx

14. ASPHALT PLANT TECHNICIAN

14.1. Details of this class are available on the MCS&T Webpage[7]

14.2. The written examination for this class consists of the following areas:

1. Specifications
2. Fundamentals
3. Sampling and Testing
4. Control and Inspection
5. Mix Proportioning and Adjustment

14.2.1. After successful completion of the written examination, the applicant will be required to pass a practical examination demonstrating their proficiency in conducting tests common to Asphalt quality control.

14.2.2. Certification of the Asphalt Technician qualifies the employee technician to take asphalt mixture samples, perform quality control or quality assurance testing on plant produced asphalt mixtures, make plant and mix adjustments, aggregate proportioning, and other duties.

15. ASPHALT PRESERVATION TECHNICIAN

15.1. Details of this class are available on the MCS&T Webpage[8]

Commented [DH8]: Class or Certification?

15.2. This exam is based on web-based training found in the TC3 Course "Flexible Pavement Preservation Treatment Series."

15.3. A printed copy of the Certificate of Training from this course is required to be presented for registration on the day of the exam.

15.4. The written examination for an Asphalt Preservation Technician consists of the following areas in regards to chip seals, micro surfacing, thin overlays, and crack sealing

1. Fundamentals of Preservation
2. Pavement Conditions and Treatment Selection
3. Performance Characteristics
4. Inspection and Best Practices

15.4.1. Certification of the Asphalt Preservation Technician is currently optional. This certification is for technicians who want to be more prepared for asphalt preservation style projects.

16. RADIATION SAFETY

16.1. This certification is required by the Nuclear Regulatory Commission (NRC) before operating a portable nuclear gauge. The training consists of 3 - 4 hours classroom

[7] https://transportation.wv.gov/highways/mcst/Pages/hotmixasp.aspx

[8] https://transportation.wv.gov/highways/mcst/Pages/Asphalt-Preservation-Technician.aspx

instruction and has a 25-50 question closed book exam. A minimum score of 70 percent is required for passing the course. The course and exam will cover the following areas:

5. Proper storage and security of portable nuclear gauges
6. Transportation of portable nuclear gauges
7. Personal safety while operating a portable nuclear gauge.

17. INERTIAL PROFILER OPERATOR

Commented [DB9]: Ask Vince - separate class?

17.1. This certification does not have class, nor does the test need to be proctored by the WVDOH. The exam is provided upon request. Details of this certification are in MP 720.10.01 - Guide for Using a High-Speed Inertial Profiler to Measure the Longitudinal Profile of Pavement

17.2. The written examination for the inertial profiler operator covers of the following areas:

1. WVDOH Specifications
2. AASHTO and ASTM Specifications
3. Knowledge of operation and analysis of collected data.

17.3. This certification allows a technician to operate a lightweight/low-speed and high-speed inertial profiler.

18. TESTING PROTOCL

18.1. TESTING PROTOCOL

18.1.1. The TICP has a testing protocol that must be followed. The protocol includes testing environment, time limits, proctoring exams, etc. The entire protocol will be covered with attendees prior to testing.

18.2. CLASS SUPPLY LIST

18.2.1. We recommend that participants bring the following items with them to the certification classes:

1. Laptop Computer or Tablet (Mandatory)
2. Photo ID
3. Current WV Specification book and the latest Supplemental to the Specification book. You will need this during the test. These are also available in printable PDF format on the WVDOH Webpage.[9]
4. Hand held calculator (No electronic devices other than a Hand held calculators are allowed to be used during testing.)
5. Highlighters
6. Sticky Notes
7. Ruler / Straight edge

[9] https://transportation.wv.gov/highways/contractadmin/specifications/Pages/default.aspx

18.3. SPECIAL NEEDS AND REQUESTS:

18.3.1. Applicants with special needs should notify the Quality Assurance Training Program Administrator prior to the class to ensure that the training location is prepared to accommodate their needs.

Commented [DB10]: Fix header to be consistent.

19. CERTIFICATION, APPRENTICESHIP, AND RE-CERTIFICATION

19.1. Certification

19.1.1. An individual must pass the examination in each level for which they are requesting certification. Unless otherwise noted, to pass the written examinations, the applicant must obtain a minimum score of 70 percent.

19.1.2. If an applicant fails to receive a minimum score of 70% on the first exam, they will be given another attempt at a later date to score a 70%. This second attempt shall be a subsequent, scheduled make-up exam. Failure to attend any examination counts as a failed exam.

19.1.3. Upon successfully completing the requirements for certification, applicants may print their certification card from the divisions Webpage. http://dotftp.wv.gov/materialsdir/

19.1.4. This certification is not transferable. A certification is valid for up to ~~Three~~ five years and expires December 31, of the 5th~~3rd~~ year of certification. Radiation Safety must be renewed every 3 years from the certification date.

19.2 Apprenticeship

19.2.1 Upon successful completion of the written exam, the Technician shall work as an apprentice under the supervision of a certified technician for a period of 6 months before becoming a fully certified technician.

19.2.2 The apprenticeship shall be completed before attempting the practical portion of the certification process.

19.2.3 The apprentice shall keep a daily work log that is signed at the end of each workday by the supervising technician. The work log shall be submitted to the Quality Assurance Program Administrator prior to taking their practical exam. If the certification does not require a practical, this work log shall be submitted at the end of 6 months to obtain their certification.

19.3. Re-Certification

19.3.1. The responsibility for obtaining re-certification shall lie with the certified individual.

19.3.1.1. Certification holders are responsible to ensure that their certifications stay current. The West Virginia Division of Highways will no longer mail reminder letters to certification holders.

19.3.2. The renewal of all certifications shall require a written exam and a hands-on practical exam, where applicable.

19.3.3. Applicants will be given two scheduled attempts to pass the recertification exam and one attempt to pass the practical exam (each, respectively). Any applicant that fails to

acquire a minimum score of 70% on a recertification exam or who fails the subsequent practical exam will not have their certification renewed. The applicant will be required to take the respective certification classes at the next available time given by MCS&T.

19.3.4. Any failed recertification examination taken prior to the expiration date of the current certification, either practical or written will not result in termination of any current certification prior to the expiration date of that certification.

19.3.5. The certification holder is responsible updating their personal information on the online learning website[10].

19.3.6. If an applicant seeking recertification disagrees with a recertification decision, they may file a written appeal with the board.

19.3. If certification is not renewed by December 31, the Technician should take the class and shall take the full exam and practical at the next available offering.

Commented [DH11]: Should be 19.3.7

19.4 Instructor's Extended Certification

19.4.1 Anyone who teaches during the certification classes shall have their certification extended 1 year per calendar year per certification taught.

~~19.4.~~

20. RECIPROCAL CERTIFICATIONS

20.1. Acceptance of WVDOH Certifications by other state agencies is at the sole discretion of the other agency. Refer to MP 106.03.51

21. TRAINING

21.1. Training - The Division of Highways, contractors, and producers may sponsor courses of instruction consisting of schools and seminars to help prepare personnel for certification under one or more of these certification programs. To the extent possible, these courses of instruction will be joint efforts of the industry and WVDOH. Nothing in this document shall be interpreted to prohibit any party from conducting courses of instruction for their personnel to assist in preparation for these exams.

21.2. The purpose of the schools is to provide helpful information and instruction for people preparing to take the WVDOH Technician/Inspector examinations. These courses are designed to provide instruction for people with a basic foundation in the subject matter. Work experience in the subject matter is encouraged before attending classes.

22. EXAMINATIONS

22.1. Renewal and Certification – Certifications shall be renewed as required in this document. General guidance and information for renewal will be recommended by the Board as required by the Chief Engineer. All certifications, except Radiation Safety,

[10] http://www.onlinelearning.wv.gov/student/home.html

shall terminate on December 31st of the year of expiration. There may be written, and practical examination required for recertification where applicable.

22.1.1. Upon obtaining renewal of certification, a renewal card may be printed from the MCS&T Webpage.

22.2. For further information on classes, recertification, schedules, class calendars and other helpful information please visit the MCS&T's Webpage.

23. FUNCTIONS AND RESPONSIBILITIES

23.1. Contractor or Producer - The producer and contractor will be responsible for product control of all materials during the handling, blending, and mixing operations. The contractor and producer also will be responsible for the formulation of a design mix that will be submitted to the Division for approval.

23.1.1. Technician/Inspector - A Quality Control representative of a contractor or producer should be a certified Technician/Inspector as outlined in Section 5. and whose responsibilities may include such duties as proportioning and adjusting the mix, sampling and testing the product, and preparing control charts.

23.2. The WVDOH - The WVDOH is responsible for all acceptance decisions.

23.2.1. District Materials Supervisor - District Materials activities are the responsibility of the District Materials Supervisor.

23.2.2. Division Technicians and Inspectors – The WVDOH Technicians and Inspectors will be assigned as necessary to carry out the required acceptance decision activities. The WVDOH representatives will not issue instructions to the contractor or producer regarding process control activities. However, the WVDOH representatives have the responsibility to question, and where necessary to reject, any operation or sequence of operations, which are not performed in accordance with the contract documents.

24. REVOCATION OF CERTIFICATION

24.1. If at any time a WVDOH, contractor's, producer's, or supplier's Technician or Inspector is found to have altered or falsified test reports or is found to have improperly performed tests or reported their results, the individual's certification may be rendered invalid by the Chief Engineer upon recommendation of the Board.

24.2. Generally, certifications may be revoked if in the opinion of the certifying authority, an individual has knowingly committed acts detrimental to the integrity of the Certification Program or transportation industry. Examples of situations that warrant revocation include, but are not limited to:

1. Deliberate falsification of field or quality control test results or records.
2. Deliberate falsification of calculations, test results or materials
3. Cheating on certification/re-certification exams.
4. Submittal of false information on certification applications.

5. Submitting trial mix mixture and/or calculations completed by someone other than the signatory, or knowingly supplying trial mix mixture and/or calculations for another individual's certification.

Commented [DB12]: SJ - What does this mean? What are they referring?

24.3. The Quality Assurance Training Program Administrator will take the lead in gathering facts and investigating any allegations which may require revocation of a certification. The review board will notify the individual in writing of intent to revoke certification(s).

25. APPEALING A DECISION

25.1. Any individual who disagrees with a decision by the Certification Board has 10 business days from the date of receipt of the notification to respond in writing to the board and present documentation to support their continued certification and/or request an opportunity for a meeting to present their case.

Appeals should be mailed to:
Certification Board
ATTN: Quality Assurance Program Administrator
West Virginia Division of Highways
190 Dry Branch Dr.
Charleston, WV 25306

25.2. If the individual fails to respond within 10 days of receipt of the original notification of revocation letter, the revocation becomes final.

25.3. Not later than 20 business days after receiving a request for a meeting from the individual, the Certification Board will schedule a meeting in which the appellant can present their case. If the Certification Board was not persuaded by the documentation provided by the appellant and believes that revocation of the certification is warranted, the appellant may file a written appeal to the Chief Engineer for review. All information including any letter(s) of explanation from the appellant will accompany the documents submitted to the Chief Engineer. The board will mail the decision of the Chief Engineer to the appellant. The decision by the Chief Engineer is final.

26. THE LENGTH OF REVOCATION:

26.1. First Offense

26.1.1. This may include revocation of all certifications for up to one year. After the revocation period the individual may obtain recertification by passing respective certification exam and a practical (if applicable). If either exam is failed, the individual will be required to take the certification class before being permitted to test again. The individual will be required to retake and pass the written exam regardless of whether it was previously passed.

26.2. Second Offense

26.2.1. This may include revocation of all certifications for up to five years. There is also the possibility of demotion and reduced pay for WVDOH employees. After the revocation

period the individual may obtain recertification by passing the respective certification exam and a practical (if applicable) at the discretion of the board. If either exam is failed, the individual will be required to take the certification class before being permitted to test again. The individual will be required to retake and pass the written exam regardless of whether it was previously passed.

26.3. Third Offense

26.3.1. This may include revocation of all certifications for life. There is also the possibility of termination, demotion and reduced pay for WVDOH employees.

27. CONTACT INFORMATION

27.1. If an applicant/technician/appellant has any questions about the DOH program or needs more information. Please contact: Qaschoolscoordinator@wv.gov

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

MP 106.03.50 Steward – Personnel, Payroll Section
MM:h

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

MATERIALS PROCEDURE

METHOD FOR ACCEPTANCE OF COMPACTION TESTING

1. PURPOSE

1.1 To provide a procedure for the acceptance of compaction testing.

2. SCOPE

2.1 This procedure is applicable to all materials that require evaluation of compaction tests.

3. TESTING

3.1 The minimum frequency for acceptance testing shall be 10% of the contractor's individual tests. Five tests shall be performed in a lot for acceptance testing.

3.2 Acceptance testing shall be distributed throughout the placement of material.

3.3 The material should be categorized according to the base, subgrade, pipe backfill, embankment, etc.

4. EVALUATION

4.1 Calculations shall be rounded to the following significant digits according to ASTM Method E29.

Average (X)	0.1%
Standard Deviation	0.01
Range	1%

4.2 Determine the number of lots tested by the contractor for a particular material since the last monitoring including the lot just tested. Record the percent relative densities on the attached form.

4.3 Calculate the standard deviation (S) for the percent relative densities.

4.4 Calculate the range (R) for plus and minus 1.65 standard deviations (S) from the average (X) for the contractor's tests ($R = X \pm 1.65\ S$).

4.5 Compare the acceptance tests to the calculated range.

4.5.1 If all the acceptance tests are within the range, the testing is similar. When the testing is similar, the degree of compaction for the lots of material represented by the acceptance evaluation may be accepted.

4.5.2 If any of the 5 acceptance tests are outside the range, calculate 3 standard deviations for the contractor's tests ($R = X \pm 3S$).

4.5.3 If all acceptance tests are within the range, the testing is considered similar, however, the quality control practices by the contractor should be reviewed for possible problems.

4.5.4 Any test outside the standard 3 deviation range indicates that there may be problems with the quality control system and no additional material shall be placed until the problem is resolved. The investigation would include checking such areas as equipment, test procedures, location of tests, variability of materials, compaction techniques, etc. The results of the investigation shall be documented in the project files.

MP 700.00.50 Steward – Laboratory Support Section
MM:W
ATTACHMENT

PROJECT NUMBER: _____

ITEM NUMBER (S): _____

TYPE OF MATERIAL: _____ DATE: _____

QUALITY CONTROL
TESTS

LOT NUMBER				
	1 2 3 4 5			
	AVERAGE (X)		STANDARD DEVIATION	
ACCEPTANCE TESTS				
TEST NUMBER	1 2 3 4 5	X + 1.65 (S) = X - 1.65 (S)= WITHIN LIMITS	YES NO	= UPPER LIMIT = LOWER LIMIT (SIMILAR) (DISSIMILAR)
		X + 3(S) = X - 3(S) = WITHIN LIMITS	YES NO	= UPPER LIMIT = LOWER LIMIT (SIMILAR) (DISSIMILAR)

EVALUATED BY: _____ CHECKED BY: _____