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

MATERIALS PROCEDURE

PREPARING MATERIALS PROCEDURES

1. PURPOSE

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

1.1.1 To establish a numbering system for MPs.

1.1.2 To establish a styles guideline for MPs.

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

1.2.1 To set up a reconfirmation schedule for existing MPs.

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

2. REFERENCED DOCUMENTS

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

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

2.3 WVDOH Design Directives DD-105[3]

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

3. NUMBERING GUIDELINES

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

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

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

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

1. .00 - .09 Field Sampling
2. .10 - .19 Pre-sampling (Source or Intermediate Points)
3. .20 - .29 Testing
4. .30 - .39 (For future designation)
5. .40 - .49 Inspection
6. .50 - .59 Quality Assurance System
7. .60 - .69 Reporting (laboratory)

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

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

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

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

4. COMMON DEFINITIONS

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

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

4.3 Specific Terms:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5. UNITS

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

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

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

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

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

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

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

5.3 An example of the unit syntax is as follows:

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

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

6. FORMAT GUIDELINES

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

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

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

6.1.3 The first section shall be titled "purpose/scope", whichever is more fitting for the context, and provide a description of the purpose of the MP and what it applies to. Both a "purpose" and "scope" section may be used when deemed appropriate. The following sections listed, if they are present or necessary in the MP, should be immediately after the "purpose/scope" section(s) and in the order listed:

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

1. General
2. References
3. Definitions

The following sections shall contain the necessary information and procedures for the MP.

~~6.1.3~~6.1.4 Links shall be blue and clickable[5]. The link path shall also be included as a footnote. An example of this is demonstrated by the "blue and clickable" text and link above and the footer at the bottom of this page.

~~6.1.3.1~~6.1.4.1 Any instances of an email address shall also be clickable and adhere the guidelines for a link.

~~6.1.4~~6.1.5 Figure labels shall follow the guidelines of "Section 2.1.4" of AASHTO Publications Style Manual and Process Guide Typography in Design. This section states: "The title should be succinct noun or noun phrase that describes the figure, but does not provide unnecessary background information, nor repeat information found in the text." Do not abbreviate "Figure" and capitalize key words such; an example of this is as follows: "Conditions Determined to Be Pre-Existing."

~~6.1.4.1~~6.1.5.1 Formatting for labels shall be the same as normal body text, except that "Figure X." shall be bold. All figure text shall be centered and located below the figure.

7. HEADER GUIDELINES

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

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

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

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

Figure 1 – MP Header with Approval Date and Reconfirmation Date

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

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

MP 700.00.00
JULY 6, 2022
PAGE 1 OF 2

Figure 2 – MP Header With Approval Date

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

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

Figure 3 – MP Attachment Header

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

8. MP APPROVAL PROCESS

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

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

8.2.1 In the instance where a document has no content changes (editorial changes only), the MP committee may choose to vote to approve the document after one meeting. In this

case, any voting member of the MP committee or the FHWA representative may veto this decision.

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

9. RECONFIRMATION PROCESS

9.1 Each MP shall be periodically reviewed for both relevancy and accuracy. At a minimum frequency, each MP shall be reviewed every 4 years by the applicable MCS&T Section Supervisor (Reconfirmation Champion). In the instances where there is no obvious Section Supervisor, the delegation of the review shall be the responsibility of the chair in liaison with the Director of MCS&T.

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

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

10. POSTING AND DISTRIBUTION OF MPS

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

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

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

Figure 4 – MP Committee Webpage Example

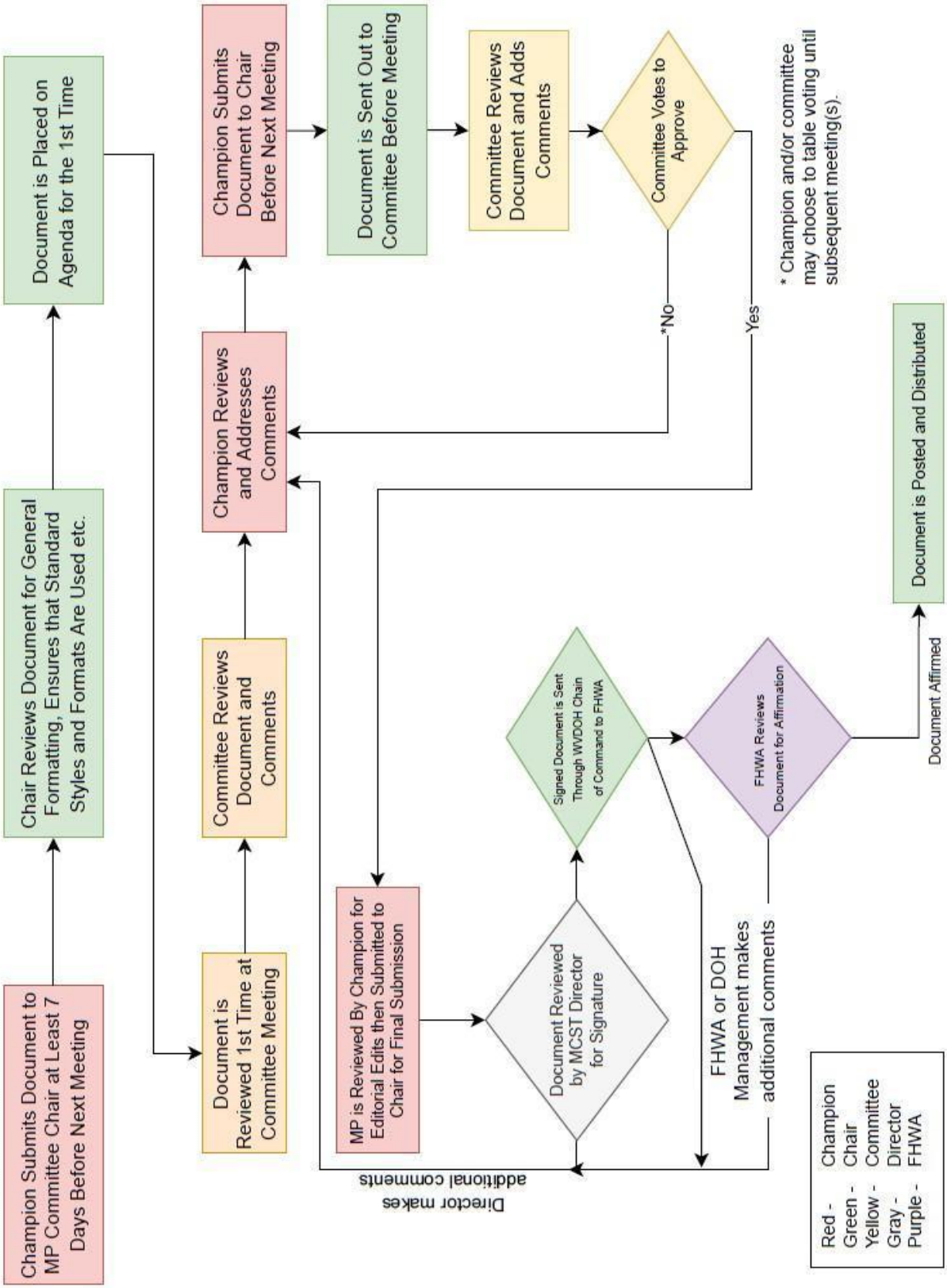
10.2 When a document is affirmed by FHWA, the documents will be distributed to applicable Division Directors, District Engineer/Managers and District Material Supervisors.

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

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

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

MP 100.00.00 Steward – Materials Control Section
MM:Bb
ATTACHMENT



ATTACHMENT 1 – MP Committee Meeting Flowchart

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.

2.2. **Hands-On-Training** is the practical "hands-on" phase of professional development. It is the bridge between classroom theory (knowing how a tool works) and field competency (using that tool to identify a defect on a live project). It is performing the tests outlined in this MP for the certification the technician is seeking. These tests may be performed on a state project, private project, or any place the company has available.

~~2.1.~~2.3. **A Qualified Person** is an individual, such as a Project Engineer, Quality Control Manager, Supervisor, or other personnel, who is familiar with the testing procedures set by the WVDOH, but is not necessarily "certified" in West Virginia. The determination of who meets the requirements of a Qualified Person shall be made by the WVDOH QA Program Administrator and the WVDOH individual who oversees the applicable technical certification program.

3. REFERENCED DOCUMENTS

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

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 State Highway Engineer. They will be advised by a Board composed of the following members:

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

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

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 an 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 State Highway 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 Technician and Inspector Certification Program (TICP) ~~offers~~offer certification classes in the following disciplines:

1. Aggregate Sampling Inspector, refer to Section 8
2. Aggregate Technician, refer to Section 9
3. Asphalt Field & Compaction Technician, refer to Section 10
4. Asphalt Plant Technician, refer to Section 11
5. Asphalt Preservation Technician, refer to Section 12
6. Inertial Profiler Operator, refer to Section 13

7. Portland Cement Concrete Inspector, refer to Section 14
8. Portland Cement Concrete Technician, refer to Section 15
9. Radiation Safety, refer to Section 16
10. Soils & Aggregate Compaction Technician, refer to Section 17

Refer to section 19 for Certification Process Requirements

8. AGGREGATE SAMPLING INSPECTOR

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

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

8.2. 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. AASHTO T 27 Sieve Analysis of Fine and Coarse Aggregates
5. AASHTO T 11 Materials Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing

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

8.3. No practical examination nor ~~apprenticeship~~Hands-On-Training is required for this certification.

9. AGGREGATE TECHNICIAN

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

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

9.2. 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

9.2.1. The applicant must complete an ~~apprentice~~ HANDS-ON-TRAINING cycle, please refer to section 19.2. After successful completion of the written examination, the

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

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

applicant will be required to pass the practical examination. The technician must be able to perform the routine tests associated with aggregate quality assurance.

9.3. American Concrete Institute (ACI) Aggregate Testing Technician - Grade I certification will be accepted as a portion of the West Virginia Aggregate Technician training. However, the applicant must pass the online West Virginia Aggregate Technician written certification ~~test~~test and complete a minimum of 40 hours of HANDS-ON-TRAINING before a certification is issued. Refer to MP 106.03.51. ~~Documented 40 hours of work experience shall be submitted for certification, but a practical exam is not required.~~

9.4. ~~APPRENTICESHIP~~HANDS-ON-TRAINING REQUIREMENTS

9.4.1. Before scheduling the Practical Exam, each participant shall complete a ~~minimum~~minimum of 40 hours of hands-on training under the supervision of a ~~WVDOH Certified Aggregate Technician~~Qualified Person in the eight different aggregate tests on which the participant will be tested. The tests to be trained in are:

1. AASHTO T 11 Materials Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
2. AASHTO T 19 Bulk Density ("Unit Weight") and Voids in Aggregate
3. AASHTO T 27 Sieve Analysis of Fine and Coarse Aggregates
4. AASHTO T 84 Specific Gravity and Absorption of Fine Aggregate
5. AASHTO T 85 Specific Gravity and Absorption of Coarse Aggregate
6. AASHTO T 89 Determining the Liquid Limit of Soils
7. AASHTO T 90 Determining the Plastic Limit and Plasticity Index of Soils
8. MP 703.00.21 Standard Method of Test for Percent Crushed Particles

Once the p~~P~~articipant has completed the minimum 40 hours of training, The ~~WVDOH Certified Aggregate Technician~~Qualified Person who performed the training will complete the ~~Apprenticeship Log Sheet~~HANDS-ON-TRAINING Report and include their ~~written name,~~ signature~~,~~ ~~and~~job title and ~~certification number with~~ the date of completion. The ~~Log Sheet~~Report shall then be submitted to the QA Program Administrator electronically.

9.4.2. Once the ~~Training Log~~HANDS-ON-TRAINING Report has been received and verified by the QA Program Administrator, the participant will be contacted by the MCS&T Aggregate Section to schedule the practical exam (All Practical Examinations must be completed within 90 business days from the date of the original written test date.) If the participant fails, they will be denied the Certification. The practical exam dates are set at the discretion of the Aggregate Section Supervisor and are based on the availability of the Aggregate Lab.

10. ASPHALT FIELD AND COMPACTION TECHNICIAN

10.1. 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.

10.1.1. 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. Surface Preparation
3. Mix Delivery and Placement
4. Joint Construction
5. Percent Within Limitations (PWL)
6. Troubleshooting
7. Compaction Test Procedures
8. Radiation Safety and Nuclear Gauge
9. Test Procedure Problems
10. Testing Forms

10.2.1. This certification has two options: with or without gauge endorsement. Only the applicant for the option with gauge must complete an ~~apprentice~~ HANDS-ON-TRAINING cycle, please refer to section 19.2. For the option without the gauge, participants will take a written exam. For the option with the gauge, after successful completion of the written examination, the applicant will be required to pass the practical examination. The technician must be able to perform the routine tests associated with asphalt compaction quality assurance.

10.3. ~~APPRENTICESHIP~~ HANDS-ON-TRAINING REQUIRMENTS

10.3.1. Each p~~P~~articipant shall complete a ~~minimum~~minimum of 40 hours of hands-on training ~~for the following tests~~ under the supervision of a ~~WVDOH certified~~Qualified Person in the two Asphalt Field and Compaction Technician tests on which the participant will be tested. The tests to be trained in are:

1. AASHTO T 355 Standard Method of Test for In-Place Density of Asphalt Mixtures by Nuclear Methods
2. Specification 401 Gauge Comparison

Once the p~~P~~articipant has completed the minimum 40 hours of training, the Qualified Person ~~WVDOH certified Asphalt and Field Compaction Technician~~ who performed the training will complete the ~~Apprenticeship Log Sheet~~HANDS-ON-TRAINING Report and include their ~~written name,~~ signature, job title and ~~certification number with~~ the date of completion. The ~~Log Sheet~~Report shall then be submitted to the QA Program Administrator electronically.

10.3.2. The participant will be contacted by the MCS&T Pavement Analysis and Evaluation Section to schedule the practical exam. The practical exam may be attempted prior to the completion of the ~~apprenticeship~~ HANDS-ON-TRAINING cycle (All Practical

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

Examinations must be completed within 90 business days from the date of the original written test date.) If the participant fails, they will be denied the Certification.

10.4. A technician that does not demonstrate proper radiation safety training shall not be allowed to continue testing on a WVDOH Project. They must be replaced by another qualified technician. Anyone who does not meet the applicable safety standards must provide proof of additional WVDOH approved radiation safety training before another evaluation will be conducted.

11. ASPHALT PLANT TECHNICIAN

11.1. 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.

11.1.1. 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. Fundamentals
3. Sampling and Testing
4. Control and Inspection
5. Mix Proportioning and Adjustment

11.2.1. The applicant must complete an ~~apprentice~~ HANDS-ON-TRAINING cycle, please refer to section 19.2. After successful completion of the written examination, the applicant will be required to pass the practical examination. The technician must be able to perform the routine tests associated with asphalt plant quality assurance.

11.3. ~~APPRENTICESHIP~~ HANDS-ON-TRAINING REQUIREMENTS

11.3.1. Each participant shall complete a minimum 40 hours of hands-on training under the supervision of a ~~WVDOH Certified Asphalt Plant Technician~~ Qualified Person in the nine tests on which the participant will be tested. The tests to be trained in are:

[4] https://transportation.wv.gov/highways/mcst/Pages/~~hot~~Hands-On-Training~~mixasp~~.aspx

1. ASTM D6926 - Preparation of Asphalt Mixtures by Means of the Marshall Apparatus
2. AASHTO T 312 - Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor
3. AASHTO T 166 - Bulk Specific Gravity (GMB) of Compacted ~~Hot~~Hands-On-Training Mix Asphalt (HMA) Using Saturated Surface-Dry Specimens
4. AASHTO T 331 - Bulk Specific Gravity (GMB) and Density of Compacted ~~Hot~~Hands-On-Training Mix Asphalt (HMA) Using Automatic Vacuum Sealing Method
5. AASHTO T 209 – Theoretical Maximum Specific Gravity (GMM) and Density of ~~Hot~~Hands-On-Training Mix Asphalt (HMA)
6. ASTM D6927 – Resistance to Plastic Flow of Asphalt Mixtures Using Marshall Apparatus
7. AASHTO T 308 – Determining the Asphalt Binder Content of ~~Hot~~Hands-On-Training-Mix Asphalt (HMA) By the Ignition Method, (Method A)
8. AASHTO T 30 – Mechanical Analysis of Extracted Aggregate
9. AASHTO T 269 Standard Method of Test for Percent Air Voids in Compacted Dense and Open Asphalt Mixtures

Once the p~~P~~articipant has completed the minimum 40 hours of training, the ~~WVDOH Certified Asphalt Plant Technician~~ Qualified Person who performed the training will complete the ~~Apprenticeship Log Sheet~~ HANDS-ON-TRAINING Report and include their ~~written name~~, signature, job title and ~~certification number with the~~ date of completion. The ~~Log Sheet~~ Report shall then be submitted to the QA Program Administrator electronically.

11.3.2. The participant will be contacted by the MCS&T Asphalt Section to schedule the practical exam. The practical exam may be attempted prior to the completion of the ~~apprenticeship~~ HANDS-ON-TRAINING cycle (All Practical Examinations must be completed within 90 business days from the date of the original written test date.) If the participant fails, they will be denied the Certification. The practical exam dates are set at the discretion of the Asphalt Section Supervisor and are based on the availability of the Asphalt Lab.

12. ASPHALT PRESERVATION TECHNICIAN

12.1.1. 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.

12.1.2. Details of this certification are available on the MCS&T Webpage[5]

12.2. This exam is based on web-based training found in the ~~AASHTO Technical Training Solutions~~ courses ~~https://store.transportation.org/Trainings?/C_PP~~AASHTO Technical Training Solutions courses.

[5] https://transportation.wv.gov/highways/mcst/Pages/Asphalt-Preservation-Technician.aspx

12.2.1. The required courses are as follows:

1. Flexible Pavement Preservation Treatment Introduction (1 PDH)
2. Flexible Pavement Preservation Treatment Selecting the Right Treatment (0.5 PDH)
3. Flexible Pavement Preservation Treatment Materials (2 PDH)
4. Flexible Pavement Preservation Treatment Localized Pavement Repairs (1.5 PDH)
5. Flexible Pavement Preservation Treatment Crack Sealing and Fillings (1.5 PDH)
6. Flexible Pavement Preservation Treatment Fog Seals (1 PDH)
7. Flexible Pavement Preservation Treatment Chip Seals (1.5 PDH)
8. Flexible Pavement Preservation Treatment Slurry Seals (1.5 PDH)
9. Flexible Pavement Preservation Treatment Micro-Surfacing (1.5 PDH)
10. Flexible Pavement Preservation Treatment Thin Functional HMA Overlay (2 PDH)

12.2.2. A printed copy of the Certificates of Training from these courses is required to be presented for registration on the day of the exam.

12.3. The written examination for an Asphalt Preservation Technician consists of the following areas regarding 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

12.3.1. No practical examination nor ~~apprenticeship~~ HANDS-ON-TRAINING is required for this certification.

13. INERTIAL PROFILER OPERATOR

13.1. This certification allows a technician to operate a lightweight/low-speed and high-speed inertial profiler.

13.2. 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

13.3. 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.

13.3.1. No practical examination nor ~~apprenticeship~~ HANDS-ON-TRAINING is required for this certification.

14. PORTLAND CEMENT CONCRETE INSPECTOR

14.1. Certification as a Concrete Inspector qualifies the technician to perform sampling and/or testing of concrete for Quality Control and/or Quality Acceptance.

14.1.1. Details of this class are available on the MCS&T Webpage[6]

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

1. Fundamentals
2. Sampling and Testing
3. Control and Inspection
4. Specifications

14.2.1. The applicant must complete an ~~apprentice~~ HANDS-ON-TRAINING cycle, please refer to section 19. After successful completion of the written examination, the applicant will be required to pass the practical examination. The technician must be able to perform the routine tests associated with Portland Cement Concrete quality assurance.

14.3. 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 and complete a minimum of 40 hours of HANDS-ON-TRAINING before a certification is issued. Refer to MP 106.03.51. ~~Documented 40 hours of work experience shall be submitted for certification, but a~~ No practical examination ~~nor apprenticeship~~ is required for this option~~practical exam is not required~~.

14.4. ~~APPRENTICESHIP~~ HANDS-ON-TRAINING REQUIREMENTS

14.4.1. Each participant shall complete a ~~minimum~~minimum of 40 hours of hands-on training under the supervision of a ~~WVDOH Certified PCC Inspector~~ Qualified Person in the seven tests on which the participant will be tested. The tests to be trained in are:

1. AASHTO R60 Standard Practice for Sampling Freshly Mixed Concrete
2. ASTM C1064 Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
3. AASHTO T119 Standard Method of Test for Slump of Hydraulic Cement Concrete
4. AASHTO T196 Standard Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method
5. AASHTO T152 Standard Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method
6. AASHTO T121 Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
7. AASHTO R100 Standard Method of Making and Curing Concrete Test Specimens in the Field
8. ~~AASHTO T22 Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens~~

Once the p~~P~~articipant has completed the minimum 40 hours of training, the ~~WVDOH Certified PCC Inspector~~ Qualified Person who performed the training will complete the ~~Apprenticeship Log Sheet~~ HANDS-ON-TRAINING Report and include their ~~written name,~~ signature, job title and ~~certification number with~~ the date of completion.

[6] https://transportation.wv.gov/highways/mcst/Pages/concreteinspector.aspx

The ~~Log Sheet~~ Report shall then be submitted to the QA Program Administrator electronically.

14.4.2. The participant will be contacted by the MCS&T Concrete Section to schedule the practical exam. The practical exam may be attempted prior to the completion of the ~~apprenticeship~~ HANDS-ON-TRAINING cycle. (All Practical Examinations must be completed within 90 business days from the date of the original written test date.) If the participant fails, they will be denied the Certification. The practical exam dates are set at the discretion of the Concrete Section Supervisor and based on the availability of the Concrete Lab.

15. PORTLAND CEMENT CONCRETE TECHNICIAN

15.1. Certification of the Concrete Technician qualifies the technician to make plant and mix adjustments, proportioning, and other concrete related duties.

15.1.1. Details of this class are available on the MCS&T Webpage[7]

15.2. 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

15.2.1. The Concrete Technician requires only the successful completion of the written examination; no practical examination test is required.

15.3. 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.

15.4. ~~APPRENTICESHIP~~ HANDS-ON-TRAINING REQUIREMENTS

15.4.1. PCC Inspector certification is a required prerequisite for the PCC Technician certification, and the NRMCA reciprocal certification. However, a participant may take the PCC Technician class, and exam prior to completing the required 40 hours of training, and or the PCC Inspector practical if they have passed the PCC Inspector written exam, but the PCC Technician Certification will not be granted until the participant has obtained the PCC Inspector Certification.

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/concretetech.aspx

instruction and has a 25-50 question closed book exam. A minimum score of 70 percent is required to pass the course. The course and exam will cover the following areas:

1. Proper storage and security of portable nuclear gauges
2. Transportation of portable nuclear gauges
3. Personal safety while operating a portable nuclear gauge.

16.2. No practical examination nor ~~apprenticeship~~ HANDS-ON-TRAINING is required for this certification.

16.3. This certification expires three years from the date of certification. This is regulated by the NRC.

17. SOILS AND AGGREGATE COMPACTION TECHNICIAN

17.1. 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.

17.1.1. Details of this class are available on the MCS&T Webpage[8]

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

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

17.2.1. The applicant must complete an ~~apprentice~~ HANDS-ON-TRAINING cycle, please refer to section 19.2. After successful completion of the written examination, the applicant will be required to pass the practical examination. The technician must be able to perform the routine tests associated with soil and aggregate compaction quality assurance.

17.3. ~~APPRENTICESHIP~~ HANDS-ON-TRAINING REQUIRMENTS

17.3.1. Before scheduling for the Practical Exam, each Participant shall complete a ~~minimum~~minimum of 40 hours of hands-on training ~~for the following tests~~ under the supervision of a ~~WVDOH certified Soil and Aggregate Compaction technician~~ Qualified Person in the three different tests on which the participant will be tested. The tests to be trained in are:~~.~~

1. MP 700.00.24 Nuclear Density Test by Roller Pass Method
2. MP 712.21.26 Procedure for Determining Random Location of Compaction Lots
3. MP 207.07.20 Nuclear Field Density/Moisture Test for Random Material Having Less than 40% + 3/4-inch Material

Once the Participant has completed the minimum 40 hours of training, the ~~WVDOH certified Technician~~ Qualified Person who performed the training will complete the

[8] https://transportation.wv.gov/highways/mcst/Pages/compactioninspector.aspx

~~Apprenticeship Log Sheet~~ HANDS-ON-TRAINING Report and include their ~~written name,~~ signature, job title and ~~certification number with~~ the date of completion. The ~~Log Sheet~~ Report shall then be submitted to the QA Program Administrator electronically.

17.3.2. Once the ~~Training Log~~ HANDS-ON-TRAINING Report has been received and verified by the QA Program Administrator, the participant will be contacted by the MCS&T Soil and Aggregate Compaction Section to schedule the practical exam. (All Practical Examinations must be completed within 90 business days from the date of the original written test date.) If the participant fails, they will be denied the Certification. A technician that does not demonstrate proper radiation safety shall not be allowed to continue testing on a WVDOH Project. They must be replaced by another qualified technician. Anyone who does not meet the applicable safety standards must provide proof of additional WVDOH approved radiation safety training before another evaluation will be conducted. The practical exam dates are set at the discretion of the Soil and Aggregate Compaction Section Supervisor and based on the availability of the Labs.

18. TESTING PROTOCOL

18.1. 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. P~~hot~~Hands-On-Trainingo 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~~Handheld calculator (No other electronic devices ~~other than a Hand held calculators~~ are allowed to be used during testing.)
5. Highlighters
6. Sticky Notes
7. Ruler / Straight edge

18.3. SPECIAL NEEDS AND REQUESTS

18.3.1. Applicants with special needs should notify the QA Program Administrator prior to the class to ensure that the training location is prepared to accommodate their needs.

[9] https://transportation.wv.gov/highways/contractadmin/specifications/Pages/default.aspx

19. CERTIFICATION, ~~APPRENTICESHIP~~ HANDS-ON-TRAINING, AND RE-CERTIFICATION

19.1. CERTIFICATION

19.1.1. An individual must pass the written 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 written exam, they will be given another attempt at a later date to score 70%. This second attempt shall be a subsequent, scheduled make-up written exam. Failure to attend any scheduled written examination counts as a failed exam.

19.1.2.1. If the applicant fails the second written exam, they may not attempt the written examination again until they retake the class or wait one calendar year.

19.1.3. If required by the certification, a practical exam must be successfully completed. Specific requirements for the practical exam are included in the respective sections. If a participant fails the practical exam, they may not retake the practical exam until they have attended the respective class and successfully passed the written examination again. An exception may be made at the discretion of the section head and the QA Program Administrator.

19.1.4. Upon successfully completing the requirements for certification, applicants may print their certification card from the Divisions Webpage. ~~http://dotftp.wv.gov/materialsdir/~~ Materials Certification Directory

19.1.5. This certification is not transferable. A certification is valid for 5 years and expires December 31, of the 5th year of certification. For example, if a technician is certified in January of 2026, it will expire on December 31, 2031. Radiation Safety must be renewed every 3 years from the certification date. For example, if a technician is certified on January 15, 2026, it will expire on January 15, 2029.

19.1.6. Anyone who teaches during the certification classes shall have their certification extended 1 year per calendar year per certification taught. This does not apply to Radiation Safety.

19.2. ~~APPRENTICESHIP~~HANDS-ON-TRAINING

19.2.1. For the initial certification of an applicant technician, ~~an apprenticeship~~ HANDS-ON-TRAINING is required which consists of three tasks; pass a written exam, hands-on experience, and pass a hands-on practical exam. The Technician shall ~~work as an apprentice~~ complete the tests outlined in each certification under the supervision of a ~~certified technician~~ Qualified Person for the ~~Apprenticeship~~ HANDS-ON-TRAINING Cycle. This must be completed up to one year before and ninety business days after the written exam. This requirement shall not apply to a technician who has let their certification expire with proof of previous certification.

An applicant who seeks certification via reciprocity must provide a minimum of 40 hours of experience documented by a Qualified Person ~~the company's QC Manager or~~

~~applicant's Supervisor~~ on the ~~Apprenticeship Log Sheet~~ HANDS-ON-TRAINING Report. The ~~apprentice~~ technician shall keep ~~a~~a ~~work log~~ HANDS-ON-TRAINING Report that is signed by the ~~supervising technician~~ Qualified Person. (~~an example is on T~~the HANDS-ON-TRAINING Report can be downloaded from the WVDOH MCST Webpage Toolbox[10]). The ~~work log~~ Report shall record the number of hours performing the specified testing as outlined in the respective section. Hours spent shadowing or observing others does not count. The ~~work log shall~~HANDS-ON-TRAINING Report shall be submitted to the QA Program Administrator at qaschoolscoordinator@wv.gov ~~and must be reviewed and approved by the appropriate MCS&T Section.~~

19.2.2. ~~Apprenticeship~~ HANDS-ON-TRAINING requirements vary between certifications. See the respective section for details of the ~~apprenticeship~~ HANDS-ON-TRAINING requirements.

19.3. ~~APPRENTICE~~ HANDS-ON-TRAINING CYLE

19.3.1. The ~~Apprentice~~ HANDS-ON-TRAINING Cycle is ~~the number of~~ 40 hours for specific tests which must be performed by the applicant and documented by a ~~certified technician~~ Qualified Person~~.~~ ~~For~~for each of the certification schools, ~~the hours of testing are listed in the respective section~~.

19.4. RE-CERTIFICATION

19.4.1. The responsibility for obtaining re-certification shall lie with the certified individual.

19.4.2. Certification holders are responsible for ensuring that their certifications stay current. The WVDOH will no longer mail reminder letters to certification holders.

19.4.3. The renewal of all certifications shall require a written exam and a hands-on practical exam, where applicable.

19.4.4. Independent Assurance (IA) test scores of 3 or better can be used in place of the hands-on practical for the following re-~~certifications;~~certifications,

1. PCC Inspector – Air and Slump tests
2. Soil and Aggregate Compaction – Moisture/Density Test, and pass the 1-point proctor

19.4.5. Applicants will be given two scheduled attempts to pass the written 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.

19.4.6. 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.

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

19.4.7. The certification holder is responsible for updating their personal information on the online learning website[11].

19.4.8. If an applicant seeking recertification disagrees with a recertification decision, they may file a written appeal with the Certification Board.

19.4.9. 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.

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.

21.3. CODE OF CONDUCT

21.3.1. The purpose of this Code of Conduct establishes expectations for behavior throughout the training course and during the end-of-course written exam. Its goal is to create a respectful productive, and fair learning environment for all participants.

21.3.2. Professional behavior is always expected. Participants are expected to treat instructors and fellow learners with courtesy and respect. Disruptive behavior, harassment, or discrimination of any kind will not be tolerated. Active participation is encouraged, but learners should allow others the opportunity to contribute.

21.3.3. Attendance and engagement are important to successful completion of the course. Arrive on time for all sessions and return promptly from breaks. Stay engaged during instruction, group work and activities. If you anticipate an absence, notify the instructor when possible.

21.3.4. Use of technology during training is encouraged. Laptops, tablets, and phones may be used for documentation, note taking, taking pictures, and searching documents. Please keep devices on silent ring during class, and if you must take a call, please excuse yourself from class to complete the conversation.

[11] http://www.onlinelearning.wv.gov/student/home.html

21.3.5. Academic integrity during exams is taken seriously. Cell phones, spreadsheets, and AI tools are prohibited during the written exam. Only approved materials may be used during the exam. These materials include notes taken during class, course manuals, MPs, current Specification book, and the WVDOH Website. Talking, sharing answers, or attempting to access unauthorized resources will result in disciplinary action, which may include exam failure or removal from the course.

21.3.6. Confidentiality must be observed. Course materials, discussions, and assessments may contain sensitive or proprietary information. Participants must not share or distribute course content without permission.

21.3.7. Safety must always be observed. Follow all safety guidelines provided by the instructor of facility. Report any unsafe conditions or concerns immediately.

21.3.8. Failure to follow this Code of Conduct may result in the following disciplinary actions, verbal warning, removal from the classroom, disqualification from the exam, and dismissal from the course. Consequences will be applied at the instructor's discretion based on the severity of the violation.

~~21.2.~~

22. REVOCATION OF CERTIFICATION

22.1. 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 State Highway Engineer upon recommendation of the Certification Board.

22.2. 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.

22.3. 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 Certification Board will notify the individual in writing of intent to revoke certification(s).

23. APPEALING A DECISION

23.1. 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

23.2. If the individual fails to respond within 10 days of receipt of the original notification of revocation letter, the revocation becomes final.

23.3. 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 State Highway Engineer for review. All information including any letter(s) of explanation from the appellant will accompany the documents submitted to the State Highway Engineer. The board will mail the decision of the State Highway Engineer to the appellant. The decision by the State Highway Engineer is final.

24. THE LENGTH OF REVOCATION:

24.1. First Offense

24.1.1. 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.

24.2. Second Offense

24.2.1. 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.

24.3. Third Offense

24.3.1. This may include revocation of all certifications for life. There is also the possibility of disciplinary actions for WVDOH employees.

24.4. In the event of a serious violation as determined by the Division, the case may be referred to the Department of Justice.

25. CONTACT INFORMATION

25.1. 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
Director
Materials Control, Soils & Testing Division

MP 106.03.50 Steward – Technician Certification Section
MAM:Bh

WEST VIRGINIA TICP HANDS-ON TRAINING (HOT) REPORT

NAME:		TICP NUMBER:		
ADDRESS:		PHONE NUMBER:		
EMPLOYER/DISTRICT:		TRAINEE:	YES:	NO:

AGGREGATE TECH	ASPHALT FIELD COMPACTION	ASPHALT PLANT TECHNICIAN	PCC INSPECTOR	SOIL & AGG. COMPACTION
30-TDH **Written Exam Date:**	**15-TDH** **Written Exam Date:**	**30-TDH** **Written Exam Date:**	**30-TDH** **Written Exam Date:**	**30-TDH** **Written Exam Date:**
• 40 hours of HOT are required to attempt the Aggregate technician practical for Certification. **PREREQUISITE:** • **40 hours of HOT**	• 40 hours of HOT are required to complete Asphalt Field and Compaction Certification.	• 40 hours of HOT are required to complet the Asphalt Plant Certification.	• 40 hours of HOT. are required to complete PCC Inspector Certification.	• 40 hours of HOT. are required to attempt the Soil & Aggregate Compaction practical for Certification. **PREREQUISITE:** • **40 hours of HOT**
Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________
Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________
Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________
Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________
Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________	Total Hours: ___________ Week Ending: ___________
I am a qualified person familiar with WVDOH DOT procedures, and I hereby authorize and verify that the above HOT Hours are true and correct. ____________________ **Name / Job Title / Date**	**I am a qualified person familiar with WVDOH DOT procedures, and I hereby authorize and verify that the above HOT Hours are true and correct.** ____________________ **Name / Job Title / Date**	**I am a qualified person familiar with WVDOH DOT procedures, and I hereby authorize and verify that the above HOT Hours are true and correct.** ____________________ **Name / Job Title / Date**	**I am a qualified person familiar with WVDOH DOT procedures, and I hereby authorize and verify that the above HOT Hours are true and correct.** ____________________ **Name / Job Title / Date**	**I am a qualified person familiar with WVDOH DOT procedures, and I hereby authorize and verify that the above HOT Hours are true and correct.** ____________________ **Name / Job Title / Date**
Aggregate Certification Date: ______________	Asphalt Field Compaction Certification Date: ______________	Asphalt Plant Tech. Certification Date: ______________	PCC Inspector Certification Date: ______________	Soil & Aggregate Comp. Certification Date: ______________

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.

~~2.10 MP 106.10.52 – WVDOH Buy America De Minimis Exceptions~~

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 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

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.

5.2 Definition

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

[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

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

~~5.2.1~~5.2.1.1 Components and/or products with the intent of being assembled or installed into one product at the work site to perform a unified function are defined as a kit. The components shall be acquired from a single manufacturer or supplier and assembled at the work site. The kit if classified as a manufactured product through 23 CFR 635.410 shall be classified as a singular manufactured product. The individual components should not be classified as separate manufactured products, even if they are brought to the work site separately.

5.2.1.2 An example of kits are discrete products with a unified function (e.g. elevator). A non-example of kits are interconnected items that contribute to achieve a broad function (e.g. HVAC system).

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.

~~5.3.1~~5.3.2 For a kit to comply with the final assembly requirement, the place at which the manufacturer of the kit brings together the kit's components must be in the United States.

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

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]

~~5.4.1~~5.4.1.1 Kits shall also fully comply with the 55 Percent Standard.

~~5.4.1.1~~5.4.1.2 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).

~~1.~~a. Note that when calculating the transportation costs of a kit, the place of incorporation should be considered the place at which the manufacturer of the

[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.

kit brings together the kit's components. It should not be read to refer to the transportation cost of the kit's components to the work site.

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.

5.4.1.3 For Precast Concrete Products that are classified as manufactured products, components that consist "predominantly of iron or steel or a combination of both" also must meet the steel and iron products Buy America requirements in Section 4.

5.4.1.4 For ITS products, the cabinets or other enclosures that are classified as manufactured products, components that consist "predominantly of iron or steel or a combination of both" also must meet the steel and iron products Buy America requirements in Section 4.

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. "All manufacturing processes" is defined in 2 CFR 184.6.

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 In the event of a change order which includes the addition of new materials, a new Certificate of Compliance shall be furnished to include the new materials.

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

8.1.3.1 Title: Buy America Certification of Compliance.

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

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

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

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

8.1.3.6 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.

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

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

8.1.3.9 Signature of the Contractor and date.

8.1.3.10 A list of materials on the project that “Buy America” applies but are not Buy America compliant.

8.1.3.11 If the notarization occurs in the state of West Virginia, the document must be notarized as per the “West Virginia Notary Handbook.”

8.1.3.11.1 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. CERTIFICATE OF COMPLIANCE TOOL

9.1 The WVDOH has created an online tool to generate a Certificate of Compliance. This tool is available on the MCST AWP Webpage. The Contractor will select their

contract, then generate the report. This report will then be signed and notarized as specified in this document, then submitted to the Project.

9.1.1 In the event of a change order which adds materials, a new Certificate of Compliance must be submitted to include any new material.

10. BUY AMERICA WAIVERS

10.1 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)".

11. BUY AMERICA MATERIALS

11.1 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:

Temporary Material: Material is not permanently incorporated into the project.

11.1.1 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.

11.1.2 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.

12. DOCUMENTATION OF BUY AMERICA CERTIFICATION OF COMPLIANCE

12.1 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
MM:Bb
ATTACHMENTS

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

Buy America Certification of Compliance

Acme Construction Company
123 Main Street
Charleston, WV 25302

Ship Date: 10/31/2024

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

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

~~3.5.~~3.6. ASTM D4788: Standard Practice for Measuring Delamination in Concrete Bridge Decks Using Infrared Thermography

~~3.6.~~3.7. ASTM D6432: Standard Guide for Using the Surface Ground Penetrating Radar Method for Subsurface Investigation

~~3.7.~~3.8. ASTM E11: Standard Specifications for Woven Wire Test Sieve Cloth and Test Sieves

~~3.8.~~3.9. 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.

4.2.3. Handheld rebar detector capable of locating rebar embedded in concrete at a minimum depth of 7 inches.

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. Any detected delaminated areas shall be outlined using chalk.

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 any exposed rebar on the bridge, ~~or a metal expansion dam,~~ 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 ~~either~~ an exposed rebar that is tied into the rebar mat of the bridge deck. ~~or a metal expansion dam on the bridge.~~ When an access shaft is needed to expose the embedded steel; a rebar detector shall be used to locate rebar; and a minimum 4'' core shall be drilled to the depth of the reinforcement without cutting the rebar. ~~A minimum 1 in. area of the epoxy coating on the epoxy coated rebar will need to be removed 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. Locations of cores shall be mapped per Attachment 5.

5.4.1.3. MCS&T shall coordinate with the District to have any core holes repaired.

5.4.1.4. 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 Content

5.4.2.1. At least 1 location per lane shall be selected to obtain cores for chloride testing. 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. Each core shall be labeled with its core number, bridge name, route, lane type, and direction of traffic. Locations of cores shall be mapped per Attachment 5.

5.4.2.2. MCS&T shall coordinate with the District to have any core holes repaired.

5.4.2.3. Cores obtained in the field in 5.4.2.1 will be cut into one (1) in. thick disc specimens maintaining their four (4) in. diameters once received in the laboratory. Successive (1) in. sections will be cut from the core starting with the section that represents the top surface of the bridge deck to the bottom approximately at a depth of 8.0 inches. Each section will be labeled with the core number and depth.

5.4.2.4. 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 labeled with the core number and the depth it represents.

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

5.4.2.6. Record the test results in the format of the table in Attachment 8.

5.5. Crack Mapping

5.5.1.1. Walk the entire area of the bridge deck looking for any cracks, longitudinally and transversely.

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~~Subsurface Investigation Requests

5.6.1. A Subsurface Investigation may be requested as part of the bridge deck assessment.

~~5.6.1.~~5.6.1.1. ~~A~~ Ground Penetrating Radar ~~investigation~~ may be ~~requested~~ used in accordance with ASTM D6432, or Infrared Thermography may be used in accordance with ASTM D4788 ~~on a bridge deck~~ to perform the subsurface investigation. ~~; it shall be run according to ASTM C6432.~~

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) by an official Memorandum. An example Memorandum and MIR can be found in Attachments 1 and 2.

7.2. The MIR shall include the following sections: Introduction, Accounting Data, Purpose of Report, Results of Bridge Deck Condition Survey, Conclusion, and Recommendations. In additions Attachments 5-9 shall be completed and provided as attachments with the MIR.

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

MP 601.00.49 Steward – Cement and Concrete Section
MAM:Tk
ATTACHMENT

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, XXXX

M E M O R A N D U M

TO: **NAME**
DISTRICT 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: (District Bridge Engineer, Regional Construction Engineer)

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.

4.3 Delamination Survey (ASTM D-4580)

4.3.1 The chain drag test was used to locate subsurface delamination in the bridge deck. Bridge number _____ was found to have delamination affecting ___% of the

entire bridge deck. Bridge number _____was found to have delamination affecting _____% of the entire bridge deck.

4.3.2 See Attachment No. 6 for the plotted delamination of the bridge decks.

4.4 Bridge Deck Surface Cracking

4.4.1 The transverse and longitudinal cracks were measured and mapped. Bridge number _____ was found to have cracking on _____% of the bridge deck. Bridge number _____ was found to have surfacing cracking on ____% of the bridge deck. The transverse and longitudinal crack widths ranged from ____ to ____ throughout the top surface of the deck.

4.4.2 See Attachment No.6 for the plotted locations of the concrete cracks on the bridge deck.

4.5 Compressive Strength Cores (ASTM C39).

4.5.1 _____ compressive cores were taken in total. _____bridge cores were used to determine the compressive strength of the deck.

4.5.2 Results from northbound and southbound lanes:

Core	NB-F-2	NB-S-4	SB-SL-C1	SB-FL-C4
Length (in.)	5.428			
Diameter 1 (in.)	3.982			
Diameter 2 (in.)	3.997			
Correction Factor	0			
Load (lbs.)	95240			
Force (psi)	7579			
Break Type	D,E etc…..			

Average Force (psi)	psi

4.5.3 The depth of the overlay, from each of the ___ cores, was measured using visual indications of the different concrete layers:

NB-F-1	NB-F-2	NB-S-3	NB-S-4	SB-SL-1	SB-SL-2	SB-FL-3	SB-FL-4
2.5in.							

4.5.4 See Attachment No. 3 for the visual locations and a photograph of each core.

4.6 Chloride Content of Bridge Deck Concrete (AASHTO T-260)

4.6.1 ____, one-inch layers where cut from the cored cylinders to determine the Chloride Content of the Bridge Deck. The one-inch layers were cut from four of the ____, compressive strength cylinders. _____of the one-inch layers in the northbound cores were unable to be chloride tested because the presence of rebar compromised their ability to hold during the slicing process.

4.6.2 Results from northbound and southbound lanes:

Core Number	Location of Sample on Core	Lbs./yd^3
NB-F-1 (Lab No.)	0.5 – 1.5 inches from bottom	0.8
	1.5 – 2.5 inches from bottom	
	2.5 – 3.5 inches from bottom	
	3.5 – 4.5 inches from bottom	
	4.5 – 5.5 inches from bottom	
	5.5 – 6.5 inches from bottom	
	6.5 – 7.5 inches from bottom	
	Average for Cylinder	1.25
NB-S-3 (Lab No.)	0.5 – 1.5 inches from bottom	
	1.5 – 2.5 inches from bottom	
	2.5 – 3.5 inches from bottom	
	3.5 – 4.5 inches from bottom	
	4.5 – 5.5 inches from bottom	
	5.5 – 6.5 inches from bottom	
	6.5 – 7.5 inches from bottom	
	Average for Cylinder	
SB-Sl-C2	0.5 – 1.5 inches from bottom	
	1.5 – 2.5 inches from bottom	
	2.5 – 3.5 inches from bottom	
	3.5 – 4.5 inches from bottom	

(Lab No.)	4.5 – 5.5 inches from bottom	
	5.5 – 6.5 inches from bottom	
	6.5 – 7.5 inches from bottom	
	Average for Cylinder	
SB-FL-C3 (Lab No.)	0.5 – 1.5 inches from bottom	
	1.5 – 2.5 inches from bottom	
	2.5 – 3.5 inches from bottom	
	3.5 – 4.5 inches from bottom	
	4.5 – 5.5 inches from bottom	
	5.5 – 6.5 inches from bottom	
	6.5 – 7.5 inches from bottom	
	Average for Cylinder	

4.6.3 The average chloride content for each layer across these four cylinders are:

Location of Sample on Core	Lbs./yd^3
6.5 – 7.5 inches from bottom	0.8
5.5 – 6.5 inches from bottom	1.2
4.5 – 5.5 inches from bottom	1.2
3.5 – 4.5 inches from bottom	1.4
2.5 – 3.5 inches from bottom	2.0
1.5 – 2.5 inches from bottom	0.8
0.5 – 1.5 inches from bottom	0.8

4.6.4 As expected, the middle layers have the highest chloride content because these layers were exposed on the surface before it was overlayed. However, the data in the overlay layers suggest a higher chloride content than when the concrete was originally placed. With data missing from the higher layers due to the rebar

interference, it is predicted that the overlayed surface layer should have a more consistent chloride content with the surrounding layer

4.7 Corrosion Potential of Uncoated Reinforcing Steel in Bridge Deck (ASTM C876)

4.7.1 The corrosion potential was determined by measuring the potential difference between a reference electrode and embedded steel. In this case, the meter was connected to the steel beam beneath the concrete bridge. The corrosion potentials are documented every 3 feet longitudinally and laterally.

4.7.2 Potentials less negative than -0.20V generally indicate a 90% or higher probability of no corrosion taking place at the time of measurement. Potentials in the range of -0.20V to -0.35V are inconclusive. Potentials greater than -0.35V generally indicate a 90% or higher probability of active corrosion in the area at the time of testing.

4.7.3 Bridge number (NB) was found to have a ___% or higher probability of corrosion on ____% of the bridge deck. Bridge number _____ (SB) was found to have a ___% or higher probability of corrosion on ___% of the bridge deck.

4.7.4 See Attachment No. 9 for the plotted corrosion potentials found on the bridge decks.

5. CONCLUSION

5.1 The bridge deck condition survey revealed delamination in the bridge deck concrete to the depth of the top line of reinforcing steel in the bridge deck. The bridge deck concrete did exhibit transverse and longitudinal cracking. The bridge deck concrete did exhibit the probability of steel corrosion. The bridge deck concrete did exhibit an increase in chloride content closer to the surface.

6. RECOMMENDATIONS

6.1 Due to the severity and extent of damage found during the bridge deck condition survey, replacement of the deck overlay is recommended.

Signature

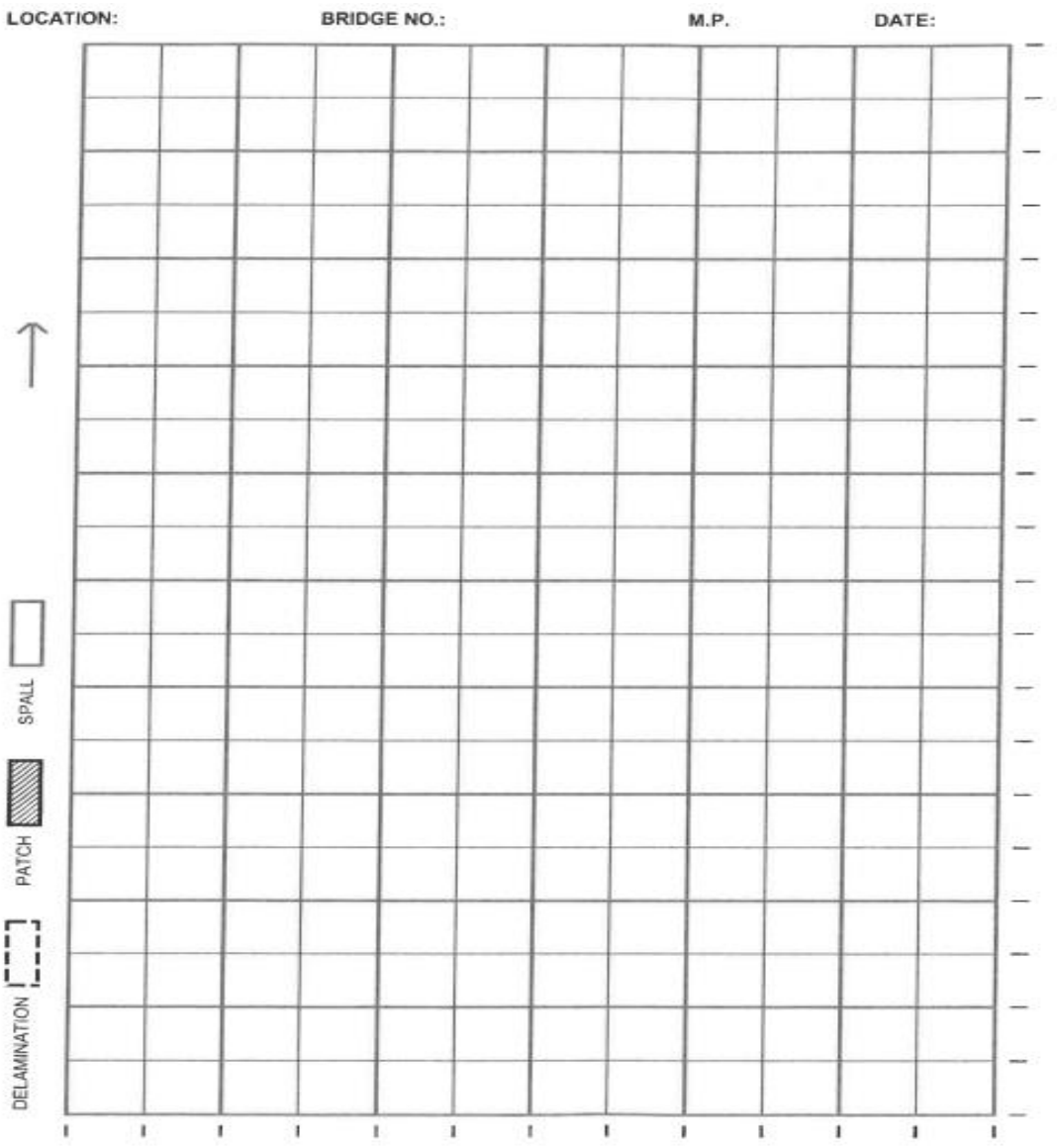
Cement and Concrete Section

_____

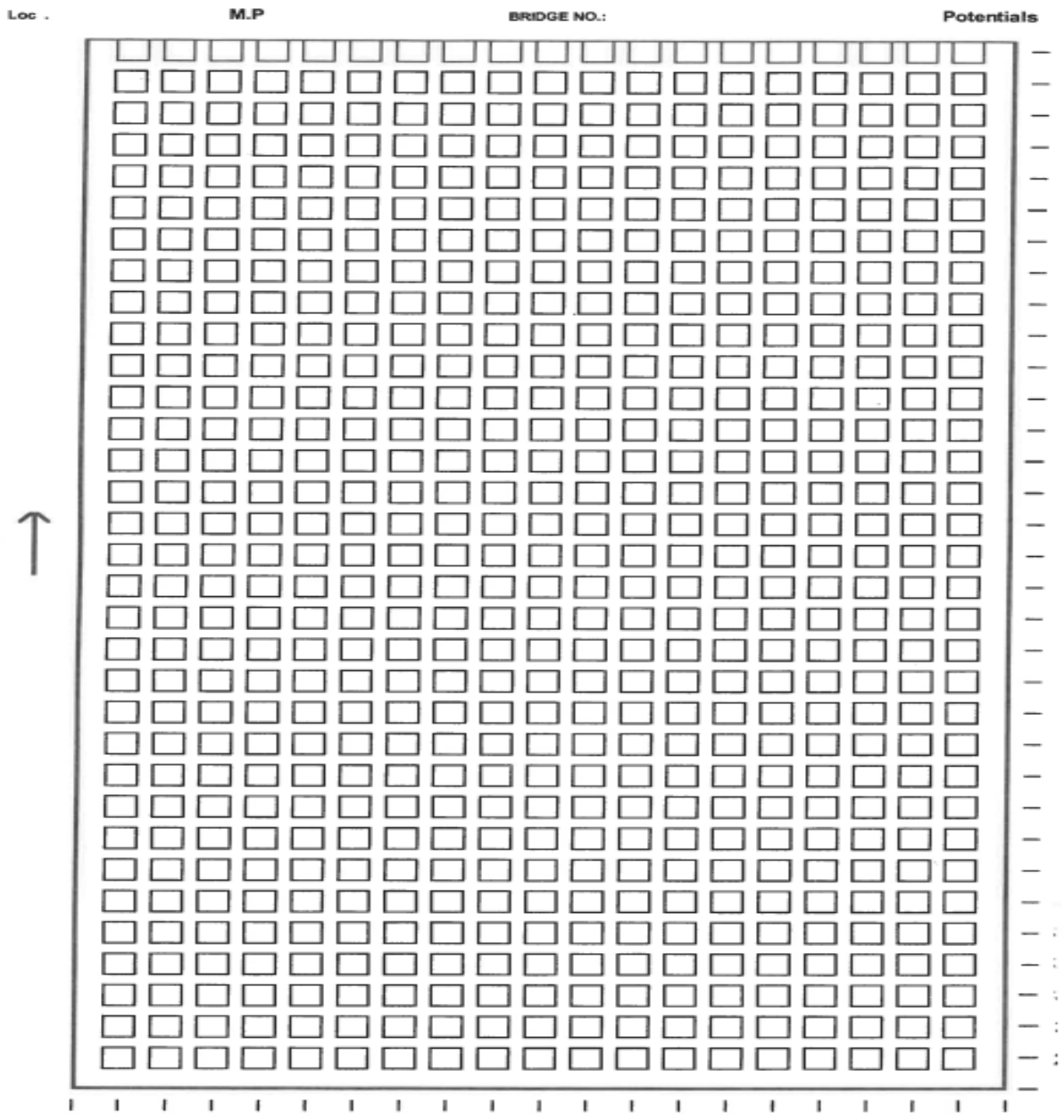
Signature

Cement and Concrete Section Supervisor

Field Defect Map

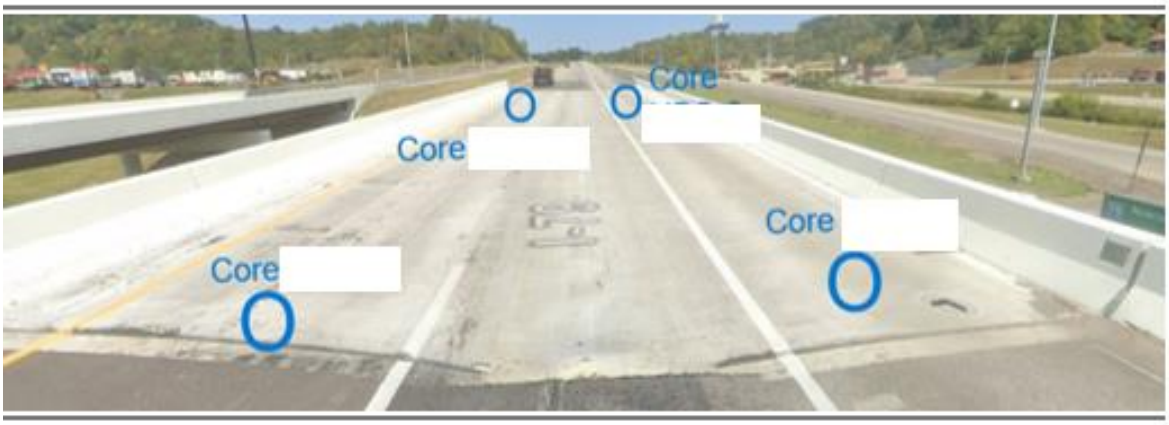


Field Corrosion Potential Map

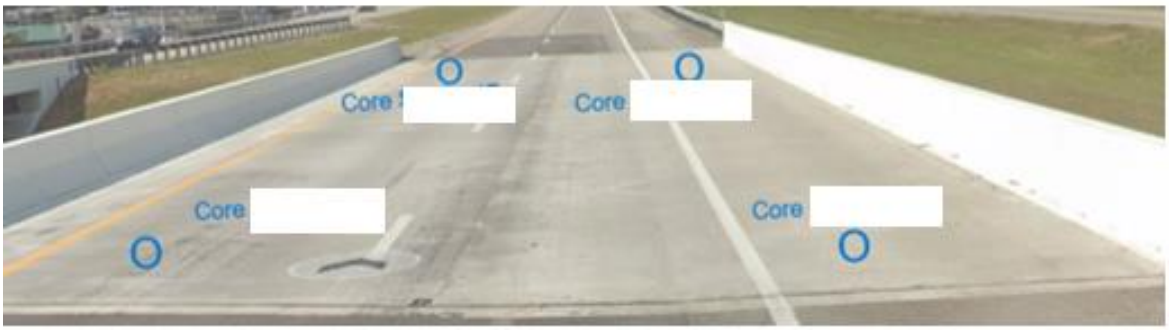


Core Loaction Maps

Northbound Core Locations

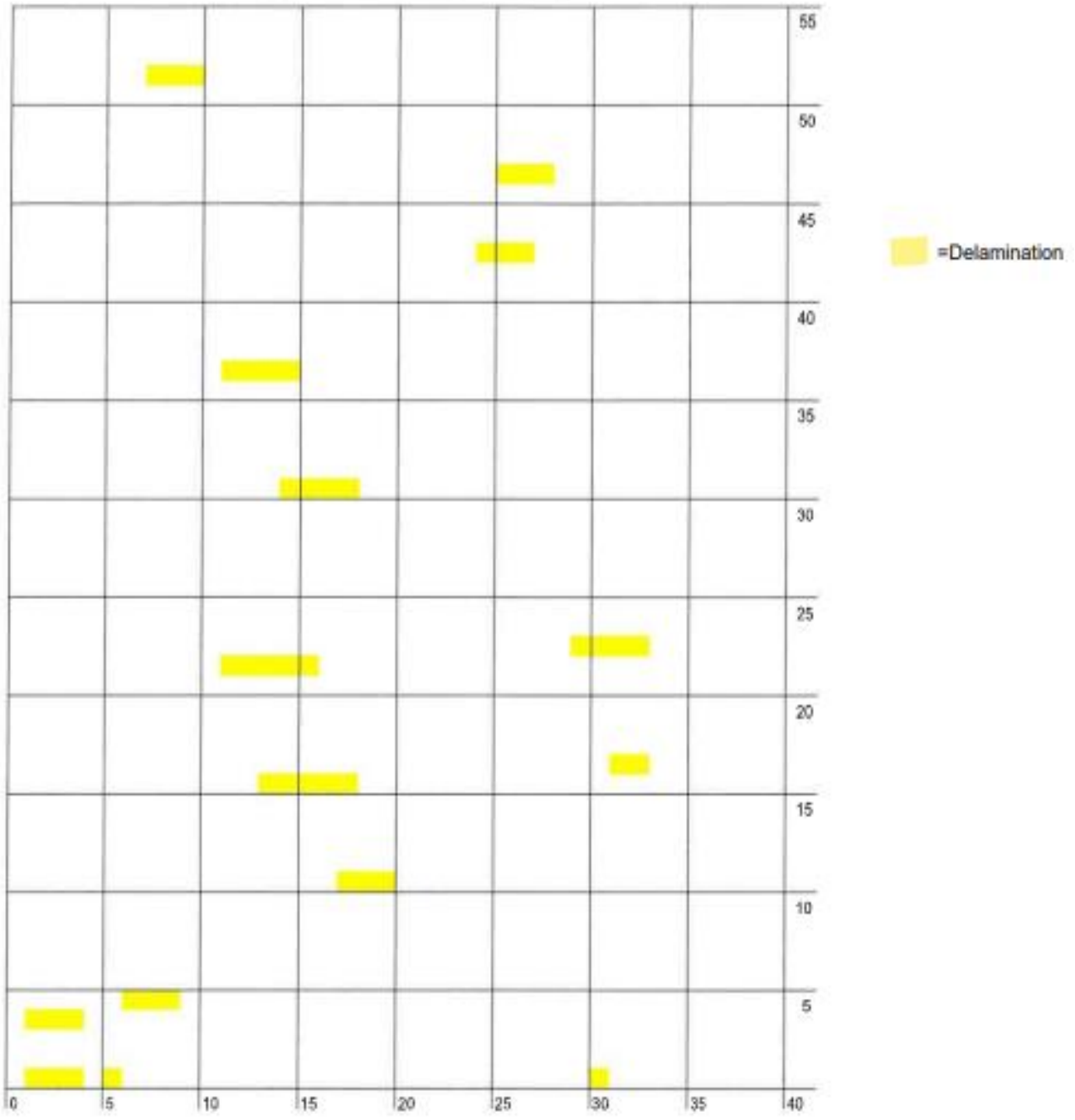


Southbound Core Locations

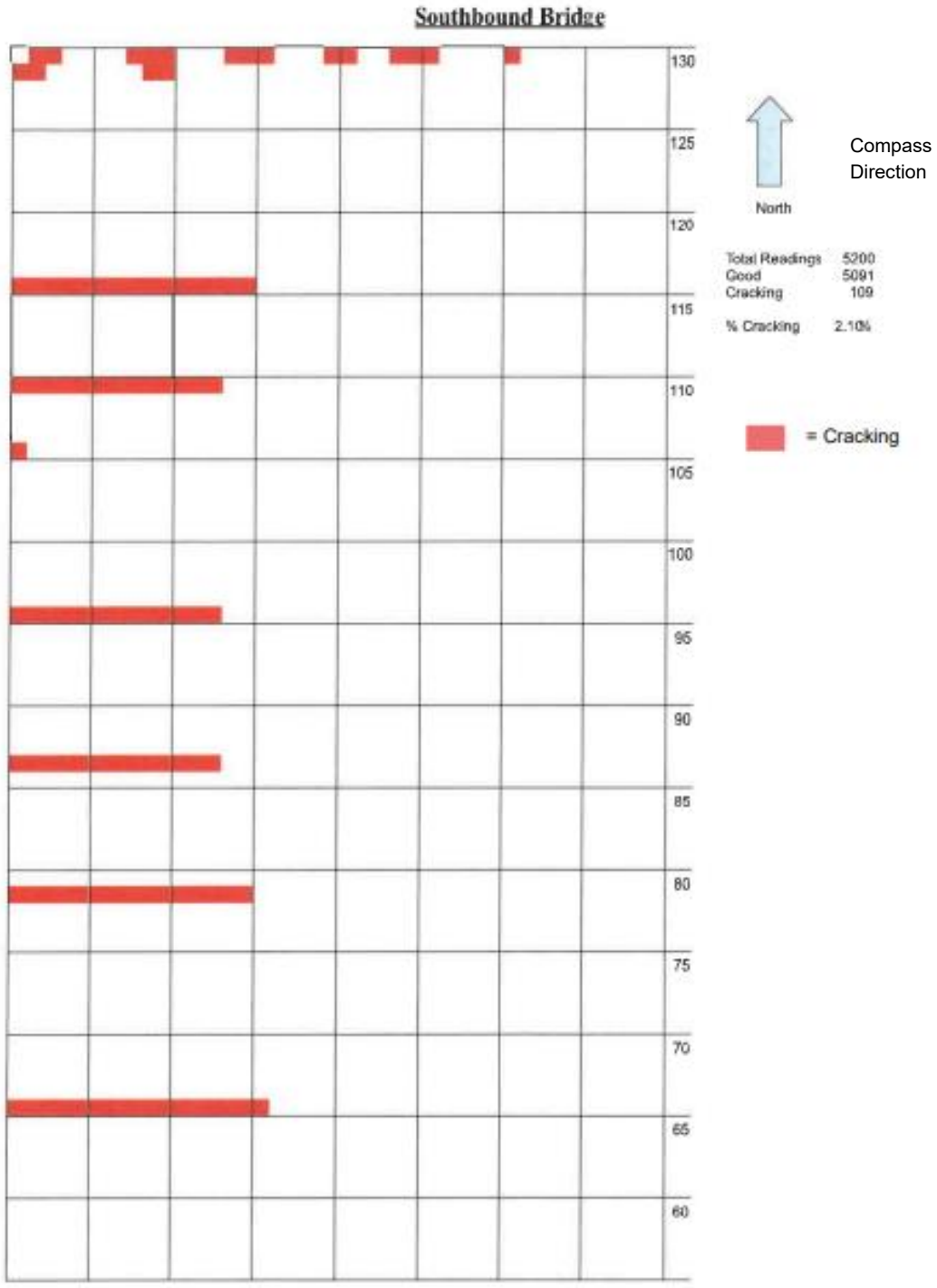


Delamination Plotting

Southbound Bridge Continue



Crack Mapping

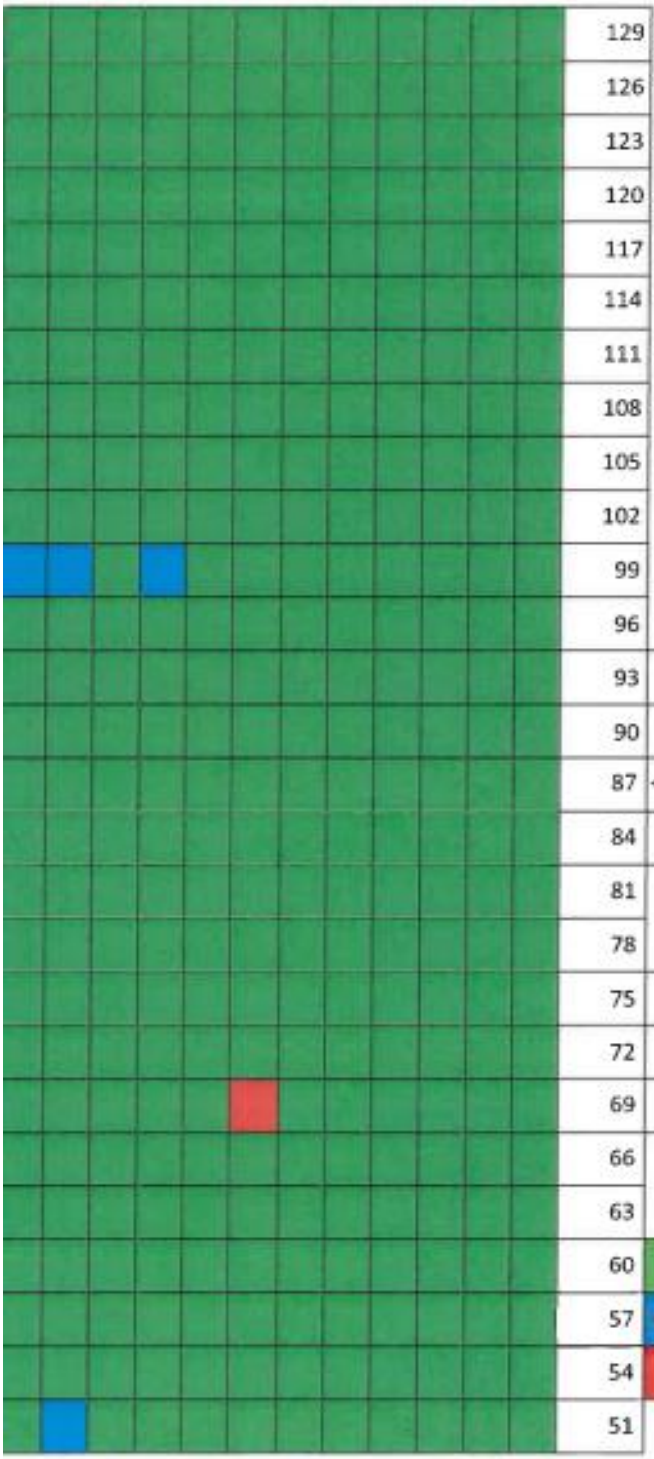


Chloride Content Results Table

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 Map

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

TEST METHOD FOR THE DETERMINATION OF BOND STRENGTH BETWEEN PRESTRESSING STEEL STRAND AND SELF-CONSOLIDATING CONCRETE (SCC)

1. PURPOSE

1.1 To establish a test method for the determination of the bond strength between prestressing steel strand and self-consolidating concrete (SCC).

2. SCOPE

2.1 The test method set forth in this MP shall be used as part of the mix design qualification and approval process for SCC mixes used in the fabrication of prestressed concrete bridge members fabricated for the WVDOH.

3. PETERMAN BEAM TEST

3.1 The Peterman Beam Test shall be used to determine the bond capacity of AASHTO M203 Grade 270 0.520-inch (½-inch "oversize") diameter 7-wire steel strand (area of steel = 0.167 in^2) and AASHTO M203 Grade 270 0.600-inch diameter 7-wire steel strand (area of steel = 0.217 in^2) when used in conjunction with SCC. Each size of strand which will be used during the fabrication of prestressed concrete bridge members for the WVDOH must be tested.

3.2 An 8-inches wide x 6-inches tall x 11-ft 6-inches long concrete test beam, containing a single prestressing strand of the size being qualified, shall be constructed as shown in Figures 1, 2, & 3. The SCC mix being qualified and the Fabricator's standard batching, placement, curing, and de-tensioning methods shall be used to fabricate this test beam. The single prestressing strand shall be embedded along the centerline of the beam at a depth of 4.5-inches from the top.

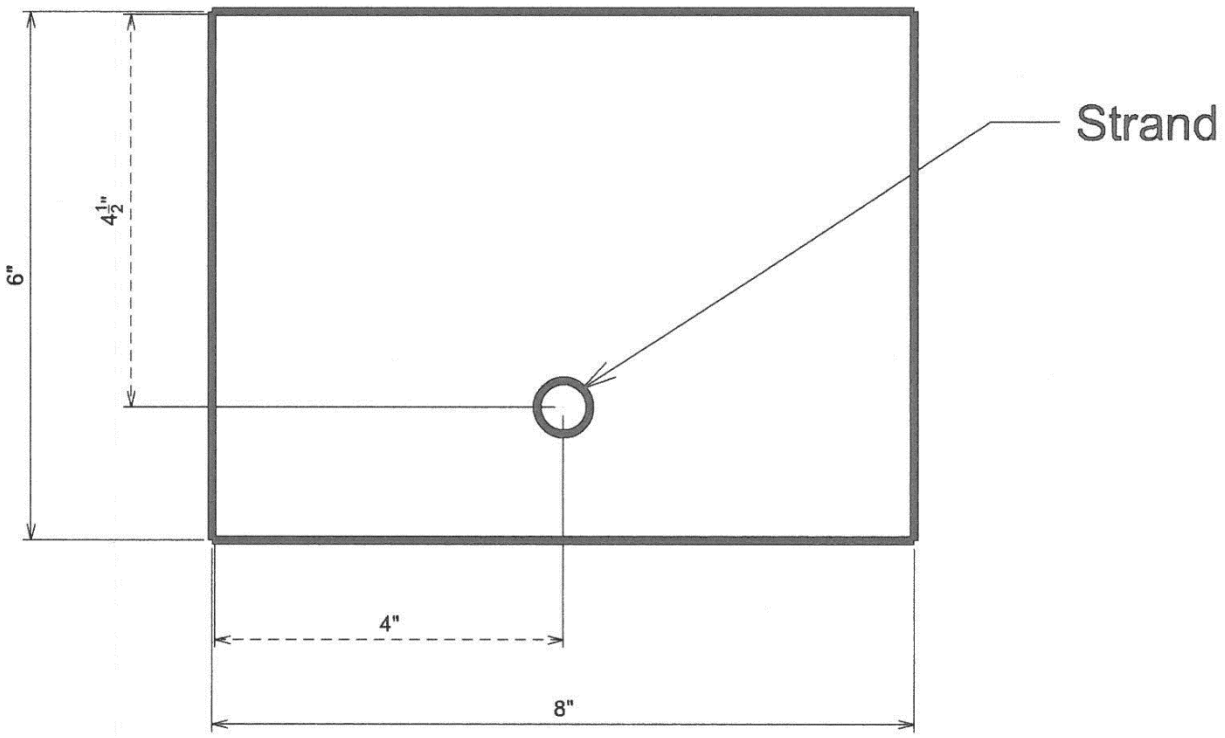


Figure 1. This drawing shows a cross section of the quality assurance test beam. (1 in = 25.4 mm) Dimensional tolerance: +/- 1/8 inch

3.3 After de-tensioning, the ends of the strand shall be ground flush with the concrete at the ends of the test beam. Figure 1 shows the cross section at the end of beam.

3.4 Once 28-day design strength has been achieved, ~~G~~gradually load the test beam to $P_{85\%}$, which is the load necessary to produce 85% of the calculated nominal moment capacity of the section as shown in Figure 2. This can be accomplished by slowly lowering concrete dead-weight blocks using a forklift or other lifting device. The use of nylon slings to suspend the blocks facilitates the gradual loading process as the nylon stretches during the loading process. Alternatively, several smaller weights may be sequentially loaded onto the beam.

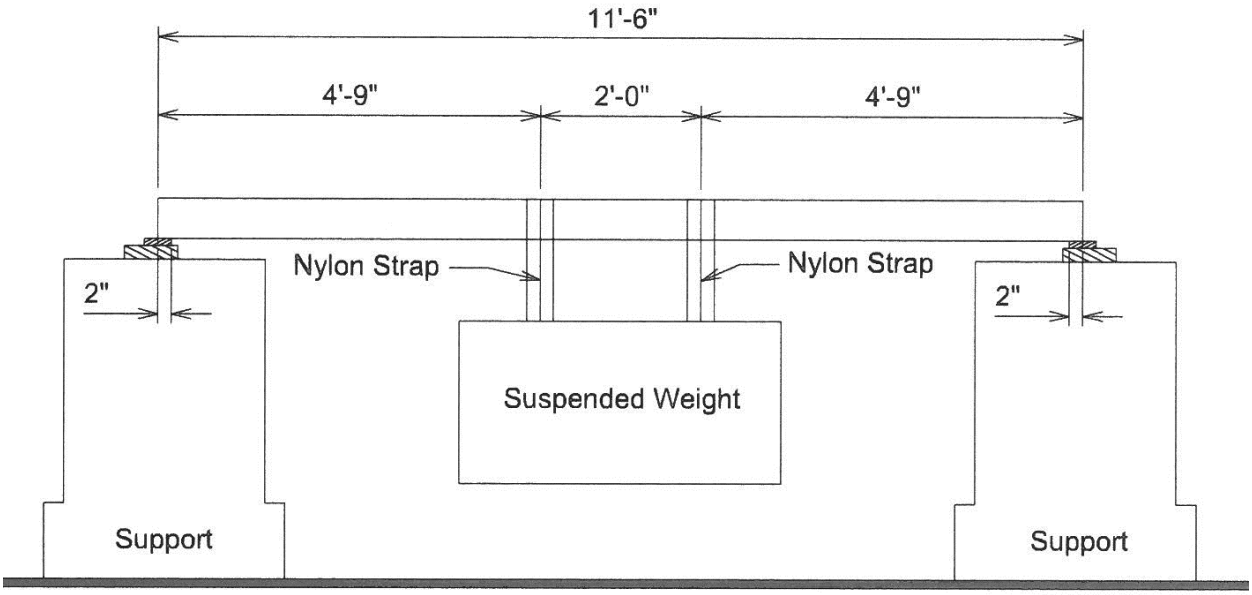


Figure 2. Test Setup

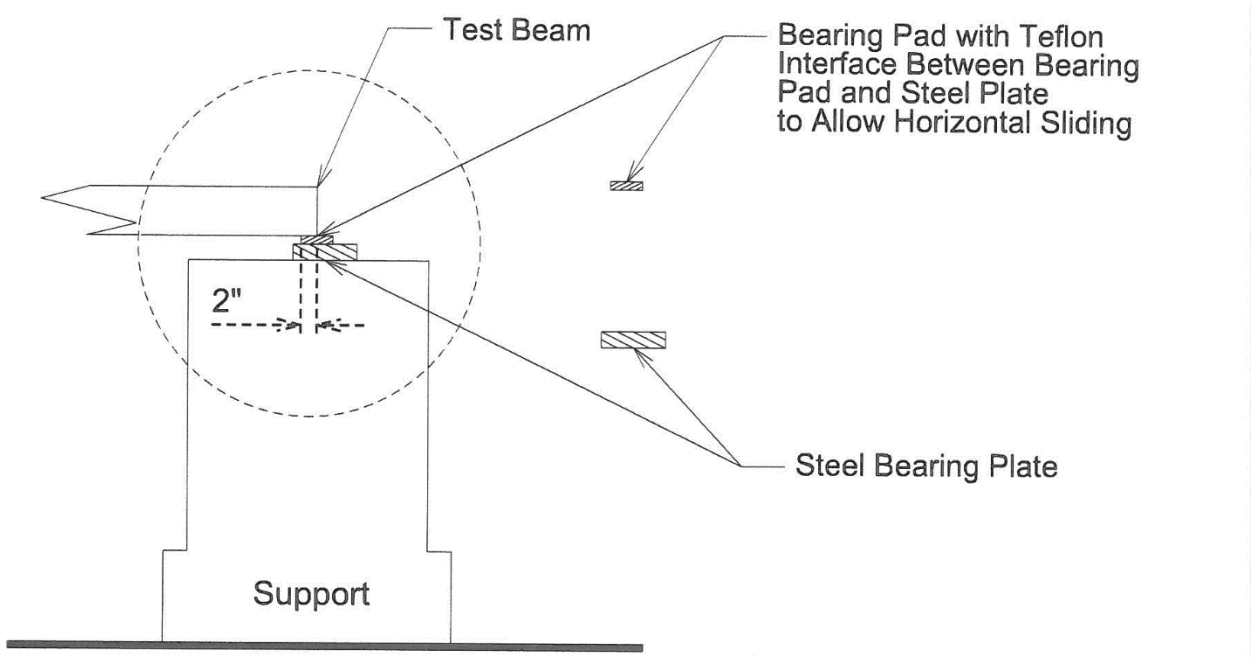


Figure 3. The test setup can be with neoprene bearing pads and bearing plates at each end, or one end of the test setup can have a slide bearing or roller (3 inches diameter minimum), while the other end has a standard neoprene bearing pad. The bearing pad (1 inch thickness minimum) has a Teflon interface on top of a stainless-steel bearing plate (1/2 inch thickness minimum). When this test is carried out at an actual facility, a protective fence and other safety measures should be used. (1 in = 25.4 mm. 1 ft = 0.305m). Dimensional Tolerance: +/- ¼ inch

3.5 Inspect the beam and document cracks and strand end-slip if present. With the ends of the strand ground initially flush with the end of the beam end, additional strand slip can be visually detected by noting any draw-in at the ends.

3.6 Sustain the load for a minimum of 24 hours to see if there are increasing signs of distress, such as increased strand slippage at the ends, increased cracking, concrete crushing, and the like.

3.7 Load the beam with the additional 15% of the load ($P_{15\%}$) which will give the total load ($P_{100\%}$) required to give a full nominal moment (M_n) of the section and hold that load for at least 10 minutes. If the beam has not collapsed, it has successfully passed the test, and the SCC mix being qualified shall be considered to have acceptable bonding characteristics to the size of strand being tested.

3.8 Tables 1 and 2 are the prescribed loads for specified compressive strengths of concrete for Areas of Steel Reinforcement of 0.167 inch^2 and 0.217 inch^2 respectively. Note the specified minimum compressive strength of concrete at the time of initial prestress is 4000 psi.

Table 1. Prescribed Loadings for Reinforcement Area of 0.167 inch^2 per specified compressive strength.

$f_{c`}$ (psi)	$P_{85\%}$ (lbs)	$P_{15\%}$ (lbs)	$P_{100\%}$ (lbs)
5000	4440	840	5280
6000	4560	860	5420
7000	4650	880	5530
8000	4720	890	5570
9000	4770	900	5670
10000	4820	910	5730

Table 2. Prescribed Loadings for Reinforcement Area of 0.217 inch^2 per specified compressive strength.

$f_{c`}$ (psi)	$P_{85\%}$ (lbs)	$P_{15\%}$ (lbs)	$P_{100\%}$ (lbs)
5000	5580	990	6570
6000	5780	1020	6800
7000	5920	1040	6960
8000	6020	1060	7080
9000	6100	1080	7180
10000	6170	1090	7260

~~Ronald L. Stanevich~~Michael A. Mance, P.E.
Director
Materials Control, Soils and Testing Division

MP 603.06.20 Steward – Cement and Concrete Section
MAM:Tr~~RLS:Tt~~

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

MATERIALS PROCEDURE

INSPECTION AND ACCEPTANCE PROCEDURES FOR PRECAST CONCRETE PRODUCTS

1. PURPOSE

1.1. To set forth procedures for the inspection and acceptance of precast concrete products, including inlets, manholes, box culverts, 3-sided bridge units, retaining wall panels, headwalls, wingwalls, lagging, junction boxes, and any other precast products, and the approval of the plants at which they are fabricated.

2. SCOPE

2.1. This procedure will apply to all precast concrete products supplied for use on West Virginia Division of Highways projects and to all precast concrete product fabricators that supply material for use on West Virginia Division of Highways projects.

2.2. For prestressed concrete members refer to MP 603.10.40 “Inspection and Acceptance Procedure for Prestressed Concrete Bridge Beams.”

3. FABRICATOR APPROVAL

3.1. All precast concrete product fabricators (hereafter referred to as the Fabricator) shall be approved by Materials Control Soils and Testing MCS&T Division prior to the start of any work for the WVDOH. If not listed on the WVDOH Approved List of Precast Concrete Fabricators, a Fabricator shall contact MCS&T Division a minimum of six weeks prior to the planned date on which fabrication is to begin to initiate the approval process.

3.2. In order for a Fabricator to be approved and listed on the WVDOH Approved List of Precast Concrete Fabricators, they must be NPCA (National Precast Concrete Association) certified, QCAST (American Concrete Pipe Association) Certified, or have an equivalent type of certification.

3.2.1. All fabricators must set up their invoicing as an E-Ticket that meets the requirements of Section 109.20.1 of the Standard Specification prior to approval.

3.3. The process for approving a Fabricator shall include, but not be limited to, an on-site visit to the fabrication plant by a WVDOH representative from MCS&T Division. During this visit, the WVDOH Quality Assurance (QA) personnel shall inspect the fabrication facility, the Quality Control (QC) lab, and meet with QC and other key personnel from the Fabricator. Component materials which will be used in the fabrication of precast items shall be sampled for testing. Batch scales shall be calibrated in accordance with MP 700.00.30 at a minimum once per year.

3.3.1. Sampling and testing of component materials shall be done in accordance with MP 603.02.10. Copies of recent component delivery tickets should be presented on the day of sampling. All component materials must be approved prior to the start of fabrication.

3.3.1.1. At the discretion of the MCS&T Director, any Fabricator which does not produce for the WVDOH or Project utilizing WVDOH Specifications for a period of 2 years shall be removed from the Approved Fabricator list. After removal from the approved list, before a Fabricator can again produce for the WVDOH, they must repeat the approval process. Sampling of component materials will not continue when the plant is not listed on the Approved Fabricator list.

3.3.2. Personnel from the Fabricator required to be present during the initial on-site visit and meeting between WVDOH and Fabricator shall include representatives from Production and Quality Control. Any questions and concerns regarding WVDOH requirements, including applicable Specifications, Materials Procedure (MP's), Standard Details, and QC/QA Inspections shall be addressed at this meeting.

3.3.3. The Fabricator must submit the Quality Control Manual/Plan for review at this meeting.

3.4. All Concrete Mix Designs which will be used on products fabricated for the WVDOH must be submitted for review & approval, prior to the start of fabrication. Any design mix with an aggregate(s) that has a reactivity class~~es~~ R1, R2, or R3, as shown as in Approved Aggregates Source List, shall be developed in accordance with WVDOH specifications, subsection 601.3.1.1. If an aggregate Source is not listed on the Approved Aggregates Source List, the Division will test the fine and coarse aggregate from the Source, in accordance with AASHTO T 303, to determine the reactivity class of the aggregate prior to its use on any WVDOH project. The Division will inform the Fabricator of the reactivity class of aggregates that they are proposing to use. If a cement Source and/or a SCM Source are not listed on the Approved Source List, the Division will test cement and/or SCM from that Source prior to its use on any WVDOH project.

3.5. The Fabrication Plant QC Personnel, as a minimum, shall be a certified ACI Grade I Concrete Field Testing Technician~~ and/or a WVDOH PCC Inspector~~ and meet the requirements of Section 14 of MP 106.03.50 or hold current WVDOH PCC Inspector Certification.~~.~~ In addition, if Self-Consolidating Concrete (SCC) is used, Fabrication Plant QC Personnel shall be a certified ACI SCC Testing Technician.

3.6. All Precast Concrete items shall be accepted by Direct or Master Coverage except when a Fabricator is certified as an Approved Source of concrete lagging as defined in Section 7.

4. FABRICATION & INSPECTION OF PRODUCTS FOR DIRECT & MASTER COVERAGE

4.1. Prior to beginning fabrication of any precast concrete products, the Fabricator shall provide written or email notification to MCS&T Division at least one calendar week in advance of the date on which fabrication is to begin.

4.1.1. Depending upon the precast items being fabricated, MCS&T Division may choose to monitor fabrication. Fabrication of structurally significant products such as box

culverts and 3-sided bridge units shall be monitored. Other items may be monitored at the discretion of MCS&T.

4.1.2. After fabrication has begun, the Fabricator shall keep MCS&T Division and the Inspector (whether a WVDOH employee or a contract employee representing the WVDOH) informed in advance of the days on which fabrication will take place.

4.2. Shop Drawings must be approved by the West Virginia Division of Highways prior to the start of any work by the Fabricator. The Inspector must have a copy of these approved shop drawings prior to start of any work by the Fabricator.

4.3. Concrete cylinders shall be made for compressive strength testing with 4-inch by 8-inch molds. The cylinders are to be cured in the same area as the products for which they represent (Field Cured as outlined in AASHTO R100) until tested to create a curing environment similar to the product that they represent. A compressive strength test shall consist of the average result of a set of cylinders, which is at least two cylinders. Form removal for wet cast concrete is not permitted until concrete has reached 50% of the design strength, unless otherwise specified. If forms are stripped from box culverts at 50% of the design strength, another curing method from section 601.12, or ASTM C1577 must be used until 70% of the design strength is obtained. Form removal limitations do not apply to elements fabricated with dry cast concrete. Dry cast concrete is defined as concrete with a slump less than 1-inch.

4.3.1. For both conventional wet cast concrete and SCC mixes, a minimum of one set of compressive strength cylinders shall be fabricated from every 7 cubic yards of concrete, or fraction thereof, with a minimum of one set per day per mix design. Both the form removal strength and the 28-day strength must be confirmed by a set of cylinders. Cylinders shall be the same size as those used in the initial approved mix design. For conventional concrete, slump, temperature, and air content tests shall be conducted on the first batch of concrete each day and every time that cylinders are fabricated. For SCC mixes, spread, temperature, and air content tests shall be conducted on every batch. For all types of concrete, unit weight and yield tests shall be conducted on the first batch of concrete each day and thereafter as deemed necessary by Quality Control and Quality Assurance Personnel.

4.3.2. For dry cast mixes, the 28-day strength shall be confirmed by a set of compressive strength cylinders. Compressive strength testing for form removal is not required for dry cast mixes. A minimum of one set of 28-day compressive strength cylinders shall be fabricated from every 20 cubic yards of concrete, or fraction thereof, with a minimum of one set per day per mix design. The cylinders are to be fabricated in the molds on the vibration table in accordance with ASTM C497. For dry cast mixes, slump testing is not required, and concrete temperature testing shall be performed on the first batch of concrete each day and every time that cylinders are fabricated.

4.4. For precast manholes fabricated with wet cast and SCC mixes, absorption tests are to be conducted in accordance with ASTM C642. Tests should be conducted on a weekly basis for each mix design used, at a minimum, unless otherwise specified.

4.5. For precast products fabricated with dry cast mixes, absorption tests are to be conducted in accordance with ASTM C642, and tests should be conducted on a weekly basis for each mix design used. The maximum allowable absorption shall be 9%.

4.6. Unless otherwise specified, for conventional wet cast and SCC mixes, plastic concrete shall have an air content measured at 7.0 ± 2.0%. For dry cast concrete, the air content test requirement is waived.

4.6.1. Prior to the use of Self-Consolidating Concrete in precast items, all mix designs must be submitted to MCS&T for approval and meet the requirements of the following table. Test results from trial batches produced by the laboratory which designed it shall be included in the submittal. The compressive strength of the design mix shall be at least 15% above the specified design strength.

Table 4.6.1 - SCC Mix Design Acceptance

Fresh Property	**Mix Design Batch Acceptance Criteria**
Air Content	7.0± 1.5%
Spread (ASTM C1611)	Target ± 1.5 inches 2 seconds ≤ T_{50}≤ 7 seconds Visual Stability Index ≤1.0
Passing Ability (ASTM C1621)	J-Ring Value ≤1 inch
Segregation Resistance (ASTM C1610)	Segregation ≤ 12%
Unit Weight and Yield	±2% of Theoretical

4.6.2. The following table lists the criteria for SCC production.

Table 4.6.2 - SCC Production Acceptance

Fresh Property	**Production Acceptance Criteria**
Air Content	7.0± 2.0%
Spread (ASTM C1611)	Target ± 2 inches 2 seconds ≤ T≤ 7 seconds Visual Stability Index ≤1.0
Concrete Temperature	<90°F
Unit Weight and Yield	±2% of Theoretical

4.6.3. SCC should only be given minimal vibration; and shall not be dropped from a distance greater than 4 feet relative to the top of the form.

4.6.4. Precast products fabricated with dry cast concrete shall be limited to a maximum wall thickness of 12 inches when single sided vibration is used and 18 inches when double sided vibration is used.

5. FINAL INSPECTION

5.1. After fabrication is completed and prior to shipment, the precast items will be stored on dunnage. The Fabricator shall provide MCS&T Division with a written or email request for final inspection a minimum of 5 business days prior to the desired date of inspection. Effective communication from the Fabricator to MCS&T Division and

Consultant Inspection Agency is the key to avoiding any scheduling conflicts regarding final inspection.

5.2. At the final inspection, the fabricator shall provide the inspector with documentation of required data pertinent to the product(s) being produced. Attached to this document is a sample inspection sheet to be used as a guide for presenting this information. This documentation is also available on the MCS&T Division Website[1].

5.2.1. For the final inspection, the Inspector may witness compressive strength tests if required, inspect repairs as needed, and conduct a thorough visual examination of each member. A copy of the Inspector's daily reports, a copy of the final inspection report, and all other pertinent information provided to the Inspector by the Fabricator shall be kept on file by MCS&T Division.

5.2.2. For box culverts, trial fitting of adjacent pieces, prior to shipping, will be required as part of the final inspection process. Each adjacent box culvert will be trial fitted in pairs horizontally or vertically; the gaps between each pair will be measured. Dunnage will be placed on a smooth level surface below the bottom of the culvert to prevent damage. The maximum gap between the adjacent pieces shall not exceed ½ inch (13 mm), unless otherwise stated in the construction plans.

6. ACCEPTANCE & REJECTION

6.1. Upon completion of final inspection, if a precast product meets all specification requirements and does not contain any defects, the Inspector will stamp the precast product as accepted by MCS&T Division and provide a 7-digit Laboratory Reference Number for shipment.

6.1.1. Shipping invoices shall document the assigned Laboratory Reference Number, type of material, number of pieces, size, and cast dates. All Division invoicing must be submitted as an E-Ticket to the project that meets the requirements of Section 109.20.1 of the Specifications.

6.2. If, however, the precast product does not meet all specification requirements due to damage, defect, or dimensional tolerance, the product must be further evaluated before potential acceptance by the MCS&T Division as described in the following subsections.

6.2.1. Minor defects may be repaired in accordance with the pre-approved repair procedures which should be incorporated within the Fabricator QC Plan. Cracks 4 mils or less shall be sealed by silane; and cracks between 4 mils and 16 mils shall be repaired by epoxy injection in accordance with Section 603.10.2. Any crack exceeding 16 mils shall be considered a major defect and the item shall be rejected by MCS&T. If repairs have been approved, and appear satisfactory and all other specifications are met, the Inspector shall stamp the product as approved for shipment and issue a 7-digit Laboratory Reference Number for acceptance.

6.2.2. Major defects shall include dimensions that exceed tolerances, failure to reach required compressive strength, cracks greater than 16 mils, and any defect that could be considered structural. Lagging dimensions shall be within ± ¼'' from the specified

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

dimension, and all other items must meet relevant tolerances in AASHTO and ASTM Standards. Items with major defects shall be rejected by MCS&T Division, and a 7-digit Laboratory Reference Number will be assigned documenting MCS&T Division's rejection. When items are load bearing, they shall be evaluated by the Designer for structural adequacy and then may be accepted by DMIR, pending concurrence by the District, and or the Engineer of Record. If a product is approved for repair, and if repairs appear satisfactory, the Inspector shall proceed with a final shipping inspection of the piece. Any items found to be not acceptable by the Engineer of Record, Designer, or the District/Division; shall be rejected by the Division.

6.2.3. When an item does not achieve the specified 28-day compressive strength prior to shipment, and if it is accepted by a DMIR, the following formula for the price adjustment shall be used in the DMIR, plus any administrative fee.

f'_c – 28 Day Compressive Strength (psi)
$\bar{X}$ – Average 28 – day Compressive Strength (psi)
IC - The invoiced cost of the precast item only.

Formula 1 (Constructed by Contractor)

$$\text{Price Reduction} = \left[\frac{f'_c - \mathbf{X}}{.5\, f'_c}\right] x\ 40\%\ \text{Unit Bid Price}$$

Formula 2 (Constructed by Division)

$$\text{Price Reduction} = \left[\frac{f'_c - \bar{X}}{.5\, f'_c}\right] x\ \text{IC}$$

7. PROCEDURE FOR APPROVED SOURCE OF PRECAST CONCRETE LAGGING

7.1. Precast concrete Fabricators may be classified as an Approved Source of precast concrete lagging if they have met the requirements of Section 3 and are producing lagging which is made in accordance with the relevant WVDOH Standard Details. Once classified as an Approved Source of precast concrete lagging, an Approved Source Lab Number will be assigned to the Fabricator for material tracking.

7.2. MCS&T Division may perform regular quality assurance inspections prior to shipment and/or, monitor fabrication of lagging from a Fabricator that is an Approved Source. The Approved Source Lab Number shall be noted on all shipping documents from the fabricator, and material coverage will be requested under the assigned Approved Source Lab Number. All relevant concrete test data, component material information, QC inspection data, and shipping information shall be kept on file at the Fabricator for the last three years of fabrication and shall be available upon request by the Division. Failure to produce requested documentation may result in revocation of the Fabricator's Approved Source certification status.

7.3. Approved Sources will be evaluated by the Division by random audits~~.~~ on at least a yearly basis. For Approved Sources that have not previously produced lagging for WVDOH projects there will be an initial acceptance audit upon approval. –Audits will

be conducted on the material that is available to the Inspector at the time of the audit. All documentation and records for the pieces must be made available to the Inspector on the day of the audit and must be complete, current, and accurate. Failure to produce records shall be a cause for decertification. A sample audit check sheet is attached to this document.

7.3.1. All shipping documentation, concrete test data, and component material certifications shall be made available to the Inspector for review. These documents shall include all documents from material that has been shipped to state projects since the last audit. If data indicates that any material did not conform to this MP, the applicable Specifications, or Standard Detail; and was used in a state project, then the Fabricator will be de-certified as an Approved Source of precast concrete lagging.

7.3.2. In addition to documentation, the audit will consist of fabrication monitoring, test observance, and a visual inspection of material that is stocked for shipping on the day of the audit.

7.3.2.1. Each material test monitored during the audit must be performed in accordance with the applicable Standards and Specifications. Visual inspection of stocked material will include quality checks of surface finish for cracks, spalls, and other surface blemishes after all repairs have been performed and dimensional checks. The material shall be properly stored to avoid handling damage and be accessible to the Inspector. Audits shall be graded on a point system deducted from 100 and weighted based on the Non-Conformance Points found per Table 7.3. A minimum score of 75 shall be considered passing.

TABLE 7.3

Audit Category	**Non-Conformance Points**
Material Test Data Review	10 (per error)
Component Material Certification Review	10 (per error)
Shipping Documentation	10 (per error)
Stocked Material Visual Inspection	15 (per defect)
Dimension Check	20 (per error)
Test Performance Check	15 (per Test)

7.4. When a Fabricator, which is an Approved Source, fails an audit, the Fabricator must submit a written corrective action plan to bring their QC program back into compliance with this MP and corresponding Specifications during a probationary period of one month during which time the fabricator must prove they have fulfilled the corrective actions they submitted before supplying the material again. If the Fabricator fails to bring their material back into compliance within the probationary period, the Approved Source status will be revoked for a minimum of one year from the date of the end of the probationary period, or until the Fabricator has corrected the nonconformances listed during the failed audit. Two failing audits in a year shall result in revocation of the Fabricator's Approved Source status for one year from the date of the last failed audit. Any evidence of document falsification shall result in immediate loss of Approved Source status, and removal from the Approved List of Concrete Fabricators for a minimum 2 years. Depending on the severity and the legality of the falsified documents the removal may be permanent. If severity warrants, the case may be referred to the Department of Justice.

7.5. Non-Conforming material received by WVDOH projects and reported to MCS&T shall result in an immediate failing audit and will require the Fabricator to submit corrective actions. If the Fabricator fails the subsequent audit, it will result in the loss of their Approved Source status.

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

MP 604.02.40 Steward – Cement and Concrete Section
MM:T
ATTACHMENT

PRECAST CONCRETE PRODUCTS
WVDOT DIVISION OF HIGHWAYS MCS&T DIVISION

SAMPLE FABRICATION CHECKLIST

Preliminary Verifications

NPCA (National Precast Concrete Association) Certification _____

CONCRETE COMPONENTS

Mix Design Lab # (if applicable): _____

Cement Source: _____ **Fly Ash Source:** _____

Coarse Aggregate Source 1: _____ **Coarse Aggregate Source 2:** _____

Cement Type: _____ **Approved/Tested:** _____

Fly Ash Type: _____ **Approved/Tested:** _____

Coarse Aggregate 1: _____ **Approved/Tested:** _____

Coarse Aggregate 2: _____ **Approved/Tested:** _____

Fine Aggregate 1: _____ **Approved/Tested:** _____

Fine Aggregate 2: _____ **Approved/Tested:** _____

Batch Water Source: _____ **Approved/Tested:** _____

Admixtures: _____

STEEL COMPONENTS

Reinforcement: Supplier(s): _____

Description: _____ **Lab Number:** _____

Description: _____ **Lab Number:** _____

Description: _____ **Lab Number:** _____

Inserts: Supplier(s): _____

Description: _____ **Lab Number:** _____

_____

_____

SHIPLOOSE MATERIAL

Grates: Fabricator: _____

Mill Certs.: _____ **Galvanize Cert.:** _____ **Lab Number:** _____

Mastic: Fabricator: _____

Inspected at: _____ **Lab Number:** _____

SHOP DRAWING REVIEW

Approval Date: _____ **Approved By:** _____

PRECAST CONCRETE PRODUCTS
WVDOT DIVISION OF HIGHWAYS MCS&T DIVISION
SAMPLE FABRICATION CHECKLIST

Preliminary Verifications

POST POUR WORK

Repairs: **Approved Repair Procedures:** ____

Approved by: _____ **Approval Date:** _____

Repair Witnessed: _____

Comments: _____

Sample Form Inspection (Pre-Placement of Concrete)

Product Type (s)				
Criteria	**Design Dimension**	**Tolerance (±)**	**Actual Measurement**	**Within Tolerance**
Fill in Form Information (if applicable)				
Height of Product (ft-inch)				
Depth of form (ft-inch)				
Inside Width of form (inch)				
Outside Width of form (inch)				
Inside Length of form (inch)				
Outside Length of form (inch)				
Wall Thickness (inch)				
Forms Square and Level (√)				
Skew dimensions [if applicable (ft-inch)]				
Locations of inserts, sleeves, block outs, etc. (√)				

Product Type(s)		**Form Properly sealed at joints & edges (√)**	
Framework Constructed of metal on concrete foundation (√)		**Form Clean & Free of debris (√)**	
Form dimensionally correct (√)		**Release Agent applied (√)**	
Other Information:			

Reinforcing Steel	
Reinforcing Steel (Condition)	
Fill in steel information (if applicable)	
Size & Grade	
Location & Lapping Length (√)	
Spacing and Clearances (√)	
Chairs, Spacers properly used	

Sample Concrete Placement & Curing

Quality Control Concrete Testing			
Concrete Truck Arrival Time		**Concrete Truck Departure Time**	
Concrete Temp		**Ambient Temp, Weather Conditions**	
Slump/Spread (inch)		**Air Content (%)**	
QC Tests performed per Specifications & Passing		**Number & diameter (inch) of Cylinders**	
Comments:			

Placement of Concrete			
Lift	**Start Time**	**Completion Time**	**Vibrated (External/Internal/Both)**
1st			
2nd			
3rd			
4th			
Placement of Concrete Completion Time			
Comments:			

Curing/Finishing of Concrete	
Top Surface Finished Per Specification	
Lifting loops/inserts accessible	
Product Curing Location (Inside/Outside)	
Product Covered & Heat Applied (Time Start & Time Finished)	
Heat Sensors Installed (√)	
Compressive Strength Cylinders Stored with Product under Curing/Normal Environment (√)	
Compressive Strength Test Conducted when curing was discontinued (√)	
Comments:	

Sample Concrete Post Pour Product Inspection

Product	
Visual Inspection for Damage (√)	
Notes (Size & Location of cracks, spalls, honeycomb, etc.)	
Products in Need of Repair (√)	
Repair Method Approved (√)	
Comments:	

Product Type (s)				
Criteria	**Design Dimension**	**Tolerance (±)**	**Actual Measurement**	**Within Tolerance**
Fill in Form Information (if applicable)				
Height of Product (ft-inch)				
Inside Width of product (inch)				
Outside Width of product (inch)				
Inside Length of product (inch)				
Outside Length of product (inch)				
Wall Thickness (inch)				
Product Square and Level (√)				
Skew dimensions [if applicable (ft-inch)]				
Locations of inserts, sleeves, block outs, etc. (√)				

Product	
Dimensional Tolerances Met? (yes or no)	
Heights (yes or no)	
Widths (yes or no)	
Depths (yes or no)	
Wall Thickness(es) (yes or no)	
Inserts, sleeves, lifting points, etc. (yes or no)	
All Concrete Finishes per specification (yes or no)	
Product properly transported (yes or no)	
Product stored on proper dunnage (yes or no)	
Design Shipping Strength met (yes or no)	

Repairs Satisfactory (yes or no)	
Product Stamped for Final Inspection (yes or no)	
Comments:	

Sample Inspection Sheet

Inspection Date_____ QC Personnel_____ QC Signature_____

Fabricator_____ Location_____

Project Name_____ WV State Project #_____ Federal Project #_____

Authorization # _____ Inspection done by_____

Steel Reinforcement

Reinforcement Supplier _____

Description_____ Approved Lab #_____

Description_____ Approved Lab #_____

Description_____ Approved Lab #_____

Product Description	Quantity	Date Cast	Slump/ Spread (inch)	Air Content (%)	Design Strength (psi)	Cylinder Breaks (psi)	Date Of Break	Absorption (%)
Type "D" inlet								
Type "G" inlet								
36-inch Manhole (base, riser, top)								
48-inch Manhole (base, riser, top)								
10'0"x 12'0" Box Culvert								NA
Lagging 8"x24"x54"								NA
Type A Reinforced Panel								NA
6'0" Coping								NA
24-inch Wing wall								

Approved Lagging Source Audit Sheet

Facility Name: _____ Facility Code: _____

Approved Lagging Lab Number: _____

Date of Audit: _____ Audit Score: _____/100 (Minimum of 75)

Date of Last Audit: _____ Previous Score: _____/100

Inspector: _____ Report Lab#: _____

Materials Used in Lagging				
Type of Material	Supplier of Material	Lab#/APL	Cert	Buy America
Cement				
Fine Aggregate				
Coarse Aggregate				
Coarse Aggregate				
Admixture				
Admixture				
Admixture				
Reinforcement				
Lifting Fixture				
Tie Wire				
Rebar Chairs				
Hold Downs				

Document Control	✓
Lab Number on shipments since last audit? (BOL/Invoice)	
Concrete Test data?	
QC Pre and Post Pour Inspections	
Monitored Fabrication Size:	
Visual Inspection of Stock Lagging Size:	
Dimensional Check of Stock Lagging Size:	

Audit Category	**Number of Errors**	**Non-Conformance Points**
Material Test Data Review		10 (per error)
Component Material Certification Review		10 (per error)
Shipping Documentation		10 (per error)
Stocked Material Visual Inspection		15 (per defect)
Dimension Check		20 (per error)
Test Performance Check		15 (per Test)

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

MATERIALS PROCEDURE

GUIDE FOR CONTRACTOR'S AND FABRICATOR'S QUALITY CONTROL PLAN FOR PAINTING

1. SCOPE

1.1. This materials procedure shall serve as a guide for the design of the Prime Contractor's or Fabricator's Quality Control (QC) Plan for surface preparation, application of coatings, and inspection procedures.

1.1.1. This procedure shall be applicable to all structures that include, but are not limited to those being fabricated, erected, fully repainted, and/or zone painted.

2. REFERENCED DOCUMENTS

2.1. ~~West Virginia Department of Transportation, Division of Highways Standard Specifications Road and Bridges and the West Virginia Department of Transportation, Division of Highways Supplemental Specifications intended to supplement the latest version of the Standard Specifications~~ WVDOH Specifications:

a. 107-Legal Relations and Responsibility to Public
b. 601-Structural Concrete
c. 685-Bridge Cleaning
d. 688-Field Painting of Metal Structures

2.2. Society for Protective Coatings (SSPC):

a. Monitoring and Controlling Ambient Conditions during Coating Operations.
b. PA 1-Shop, Field and Maintenance Coating of Metals
c. PA-2Procedure for Determining Conformance to Dry Coating Thickness Requirements
d. PA 17-Procedure for Determining Conformance to Steel Profile/Surface Roughness/Peak Count Requirements.
e. SP 13-Surface Preparation of Concrete
f. SP 14-Industrial Blast Cleaning
g. The Fundamentals of Cleaning and Coating Concrete 2001
h. Technology Guide 6: Guide for Containing Debris Generated During Paint Removal Operations.
i. Technology Guide 7: Guide to the Disposal of Lead-Contaminated Surface Preparation Debris
j. Technology Guide 16: Guide to Specifying and Selecting Dust Collectors

2.3. International Organization for Standardization:

a. 8501- Preparation of Steel Substrates before Application of Paints and Related Products - Visual Assessment of Surface Cleanliness.

2.4. Other *SSPC, ASTM, ISO*, or *WVDOH* Documents that may be applicable to the application, surface preparation or inspection of applied coatings on any substrate, concrete or steel, not mentioned above.

3. REQUIREMENTS AND GUIDELINES

3.1. General Requirements:

3.1.1. The Contractor or Fabricator shall provide and maintain a Quality Control System that will give reasonable assurance that the paints have been applied in accordance with the specification requirements.

3.1.2. The Contractor or Fabricator shall conduct or have conducted inspections and tests required to substantiate that the paints have been applied in accordance with the specification requirements.

3.1.3. The Contractor's or Fabricator's Quality Control inspections and testing shall be documented daily and provided to the Engineer for review at the end of the work-day. These documents shall be maintained for the life of the contract.

3.2. Quality Control Plan:

3.2.1. The QC Plan shall follow Specification 688, Section 688.2.5-Submittals, and 601.13.3.7.1-Quality Control Plan for Painting.

4. PROCEDURE APPROVAL

4.1. Approved Coating Product Quality Control Document requirements:

4.1.1. If the coating contractor's paint system is already on the Coating approved product list, the following documents shall be required with the Quality Control (QC) Paint Plan Form:

1) Paint System Technical Data Sheets
2) Contractor's Quality Control Manual
~~a.~~3) Coater's AMPP QP1 and QP2 Certifications

~~4.~~5. FORMAT

~~4.1.~~5.1. The Contractor/Fabricator shall complete the form: "688.03.20 - WVDOH QC Plan for Environmental Monitoring." A sample of this document is provided with this MP in the Attachment, however the live document is available on the WVDOH MCS&T Webpage under the "Tool Box[1]."

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

~~4.1.1.~~5.1.1. This form is a fillable PDF form and shall be submitted electronically. The plan will be submitted to DOHQCPaintEnvMonPlan@wv.gov[2]. All form fields in RED shall be completed at a minimum. Once completed the submit button may be activated and an e-mail will generate with the form attached and the e-mail address populated. At this time the supporting documentation shall be added and submitted with the plan.

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Director
Materials Control, Soils & Testing Division

MP 688.03.20 Steward – Environmental and Coatings Section
MM:Br
ATTACHMENT

[2] DOHQCPaintEnvMonPlan@wv.gov

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

MATERIALS PROCEDURE

GUIDE FOR DEVELOPMENT OF THE CONTRACTOR'S ENVIRONMENTAL CONTROL PLAN FOR SPENT MATERIAL PRIOR TO PAINTING EXISTING STRUCTURES

1. SCOPE

1.1 This materials procedure shall be used as guidance for the development of the Contractor's Environmental Control Plan for "Spent Material" prior to painting existing structures. This procedure is applicable for all structures having a coating system removed prior to field painting.

1.2 Spent Material: This shall include material generated by surface preparation operations and shall be sampled and tested in accordance with the current revision of SSPC Guide 7, Guide to the Disposal of Lead-Contaminated Surface Preparation Debris, available at the SSPC.org Webpage[1]. The Contractor shall, at the Contractor's expense, select a laboratory that will sample and analyze the Spent Materials. The laboratory must be certified by the WVDEP, EPA, or by another state's DEP-equivalent. Certification will be provided to the Engineer prior to the beginning of work. The waste transporter for both hazardous and non-hazardous waste will be listed on the Contractor's Environmental Control Plan.

1.2.1 The hazardous waste transporter named within the plan shall have a US EPA Identification Number.

2. REFERENCED DOCUMENTS

2.1 Reference to standard specifications and other standard procedures shall be the latest edition of the published document.

2.1.1 West Virginia Department of Transportation, Division of Highways Standard Specifications Road and Bridges:

a. 107-Legal Relations and Responsibility to Public
b. 601-Structural Concrete
c. 685-Bridge Cleaning
d. 688-Field Painting of Metal Structures

[1] http://www.sspc.org/

2.1.2 Society for Protective Coatings (SSPC) Technology Guides:

a. Technology Guide 6: Guide for Containing Debris Generated During Paint Removal Operations.
b. SSPC Technology Guide 7: Guide to the Disposal of Lead-Contaminated Surface Preparation Debris
c. SSPC Technology Guide 16: Guide to Specifying and Selecting Dust Collectors

2.2 Any *SSPC, ASTM, ISO, AASHTO* or *WVDOH* documents that may be applicable, not previously mentioned.

3. ENVIRONMENTAL CONTROL PLAN

3.1 As stated in Specification 688, Section 688.2.5-Submittals and 601.13.3.7.1-Quality Control Plan for Painting, a Quality Control Plan shall be designed by the Contractor and submitted for acceptance/approval by the Engineer prior to commencement of the subject work. The plan shall clearly describe the methods by which the Contractor's Environmental Control Plan will be implemented. An acceptable plan should include the following:

3.2 Procedure Approval

3.3 Field Painting:

3.4 Approved Environmental Monitoring Plan Quality Control document requirements

3.4.1 The coating contractor is required to submit Quality Control Environmental Monitoring Plan form for coating containment blast removal and spray coating applications. The following supporting documents shall be required:

1) Quality Control Plan set that includes the containment design drawings and plan notes
2) Containment calculations that include load design requirements that support the workers and scaffolding
3) Contractor's Environmental Protection and Work Plan

3.5 Shop Painting:

3.5.1 No supporting containment documentations are required

4. FORMAT

4.1 The Contractor/Fabricator shall complete the form: "688.03.20 - WVDOH QC Plan for Environmental Monitoring." A sample of this document is provided with this MP, however the live document is available on the WVDOH MCS&T Webpage under the "Tool Box"[2].

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

4.1.1 This form is a fillable PDF form and shall be submitted electronically. The plan will be submitted to the Paint QC E-mail Address[3]. All form fields in RED shall be completed at a minimum. Once completed the submit button may be activated and an e-mail will generate with the form attached and the e-mail address populated. Additional information shall be provided as separate documents attached to the Environmental Control Plan.

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

MP 688.03.20 Steward – Environmental and Coatings Section
MM:Br

[3] DOHQCPaintEnvMonPlan@wv.gov

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

MATERIALS PROCEDURE

MAINTAINING SPECIFIED LEVEL OF STRENGTH IN PORTLAND CEMENT CONCRETE

1. PURPOSE

1.1 The purpose of this procedure is to set forth a method of adjusting the cement content of Portland cement concrete so that a reasonable conformance with the specified level of strength may be assured.

2. SCOPE

2.1 The procedure shall apply to all classes of concrete.

3. PROCEDURE

3.1 Initial Cement Requirement

3.1.1 "Initial Cement Requirement" is the cement requirement determined by the formal laboratory design method outlined in MP 711.03.23.

3.2 Reevaluating Cement Requirement

3.2.1 A concrete mix design referred to herein means a combination of particular source and type of materials and a cement factor which satisfies the requirement of the governing specification, said combination of materials and cement factor being formulated for the express purpose satisfying the requirement of a particular class of concrete specified for the work. The cement factor in a particular mix design may be changed without invalidating the design. If source or type of materials in a mix design are changed, then the mix design is considered changed, and two or more mix designs would result from such change(s).

Strength data which represents two cement factors in one mix design may be processed collectively in the derivation of statistical parameters, average and standard deviation, for example, if it is felt that such a treatment does not significantly affect the statistics.

3.2.2 For the various classes of concrete which are designed in conformance with MP 711.03.23, the first reevaluation of cement requirement shall be made after at least ten pieces of strength data are available to evaluate the adequacy of the mix design. Thereafter, a reevaluation of cement requirement shall be made at monthly intervals at which time, the evaluation shall be based on the strength data developed during the preceding two months or on the last ten pieces of data developed, whichever is greater.

3.3 Method of Evaluating Cement Requirement

3.3.1 The cement requirement for all classes of concrete governed by this procedure shall be the quantity necessary to maintain the average strength of the concrete within the range of the Design Strength (f'_c) plus K_1 standard deviations and the Design Strength (f'_c) plus K_2 standard deviations $\{(f'_c + K_1\sigma) < \bar{X} < (f'_c + K_2\sigma)\}$.The average strength ($\bar{X}$) and the standard deviation (σ) shall be calculated using the strength data ~~developed during the previous two months or the last ten pieces of strength data, whichever is greater~~ from the previous 3-month period if there is at least 10 samples. If there are less than 10 samples during the previous 3-month period, then the strength data from the previous 12-month period shall be used. If there is not a minimum of 10 samples in the previous 12-month period, then the previous 24-month period shall be used.

3.3.2 If the average strength of concrete can be maintained at a level which is equal to or greater than the Design Strength plus K_2 standard deviations $\bar{X} > (f'_c + K_2\sigma)$, then the cement factor which causes this level of average strength to be developed may be reduced as indicated in Article 3.3.4.3 except that in no instance shall the cement factor be reduced below a level of the target specified cement factor minus 47 lbs. of cement per cubic yard.

3.3.3 If the average strength of the concrete is maintained below the level of the Design Strength plus K_1 standard deviations, $\bar{X} < (f'_c + K_1\sigma)$, then the cement factor which causes this level of average strength to be developed shall be increased as indicated in Article 3.3.4.2.

3.3.4 The relationship between the level of concrete strength (considered to be the average of all data developed during the preceding two months or the average of the last ten pieces of strength data, whichever is greater, and represented by $\bar{X}$), and the action which must be taken regarding the cement factor is as follows:

3.3.4.1 If the average strength is maintained at a level between the Design Strength plus K_1 standard deviations and the Design Strength plus K_2 standard deviations $\{(f'_c+K_1\sigma) < \bar{X} < (f'_c+K_2\sigma)\}$ the cement factor shall be maintained without change.

3.3.4.2 If the average strength falls below the Design Strength, plus K_1 standard deviations $\{\bar{X} < (f'_c+K_1\sigma)\}$ the cement factor shall be increased in accordance with the following formula:

$$C_i = \frac{(f'_c + K_1\sigma) - \bar{X}}{200}$$

Where C_i = Number of 23.5 lb. increments of cement increase per cubic yard, rounded up to a whole number.
f'_c = Design Strength
K_1 = Factor from Table 1
σ = Standard Deviation
$\bar{X}$ = Average Strength

3.3.4.2.1 When the cement factor for a certain mix design, which contains a Supplementary Cementitious Material (SCM), is required to be increased, the Concrete Producer

has two options to meet the cement factor increase requirement.

Option 1: Make the cement factor increase entirely with cement.

Option 2: Make the cement factor increase with the same cement/SCM ratio that is used in the subject mix design. For example, if 20% of the cementitious material in the subject mix design is fly ash and 80% of the cementitious material in the subject mix design is cement, and the cement factor was required to be increased by 23.5 pounds, the cement factor increase would consist of an additional 5 lbs. of fly ash and an additional 19 pounds of cement. Fractions of a pound that are 0.5 and above shall be rounded up, and fractions of a pound that are below 0.5 shall be rounded down.

3.3.4.3 If the average strength falls above the Design Strength plus K_2 standard deviations $\{\bar{X} > (f'_c+K_2\sigma)\}$ the cement factor may be decreased in accordance with the following formula:

$$Cd = \bar{X} - \frac{(f'_c + K_2\sigma)}{200}$$

Where C_d = Number of 23.5 lb. increments of cement to be decreased per cubic yard, rounded to the nearest whole number.

K_2 = Factor from Table 1

3.3.4.3.1 When the cement factor for a certain mix design, which contains a SCM, is permitted to be decreased, and if the Concrete Producer elects to decrease that cement factor, the cement factor shall be decreased with the same cement/SCM ratio that is used in the subject mix design. For example, if 20% of the cementitious material in the subject mix design is fly ash and 80% of the cementitious material in the subject mix design is cement, and the cement factor was permitted to be decreased by 23.5 pounds, the cement factor decrease would consist of a reduction of 5 lbs. of fly ash and a reduction of 19 pounds of cement. Fractions of a pound that are 0.5 and above shall be rounded up, and fractions of a pound that are below 0.5 shall be rounded down.

3.4 Reporting

Once each month, the Materials Control, Soils and Testing Division will publish a list of concrete producers (Commercial Suppliers and/or Contractors), with all concrete mix designs for each concrete producer, and their corresponding cement factor, determined in conformance with this MP.

3.5 Reevaluating Concrete Mix Design

A concrete mix design which is approved for a particular project will remain valid to the extent that it satisfies the requirement for that particular project for its duration.

A concrete mix design which is developed in accordance with MP 711.03.23 and maintained for a period of three years shall be re-approved in accordance with Section 6 of MP 711.03.23. It is the Contractor's responsibility to make adjustments to the design mix as necessary to maintain in the concrete proper placement properties, workability, finishability, yield, consistency, air content, and other requirements of the governing specification. The Contractor should be especially aware of this responsibility when the cement factor is changed in conformance with this procedure.

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

MAM:T
ATTACHMENT

TABLE 1
VALUES OF "K" FACTORS

NUMBER OF PIECES OF DATA	K1	K2
10	1.604	3.615
11	1.588	3.510
12	1.576	3.429
13	1.565	3.365
14	1.557	3.313
15	1.549	3.270
16	1.543	3.233
17	1.538	3.202
18	1.533	3.175
19	1.528	3.151
20	1.525	3.130
21	1.521	3.112
22	1.518	3.096
23	1.515	3.081
24	1.513	3.067
25	1.511	3.055
26	1.508	3.044
27	1.507	3.034
28	1.505	3.024
29	1.503	3.016
30	1.501	3.008
Above 30	1.500	3.000