

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

MATERIALS PROCEDURE

GUIDE FOR QUALITY CONTROL AND ACCEPTANCE REQUIREMENTS FOR
PORTLAND CEMENT CONCRETE

1. PURPOSE

- 1.1 To establish minimum requirements for Contractor's Quality Control (QC) system and the Division's Acceptance Plan. It is intended that these minimum requirements be followed in detailing the inspection, sampling, and testing deemed necessary to maintain compliance with all Specification requirements.
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2. SCOPE

- 2.1 This Materials Procedure (MP) is applicable to all Portland Cement Concrete (PCC) items, and it outlines the quality control procedures for both plant and field operations and includes procedures for approving and using Master and/or Project Specific QC Plans. This procedure also aids in documentation and retention of QC Plans in ProjectWise.
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3. REFERENCED DOCUMENTS

- 3.1 AASHTO M 201 - Standard Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes.
- 3.2 AASHTO T 22 - Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens.
- 3.3 AASHTO T 231 - Standard Method of Test for Capping Cylindrical Concrete Specimens.
- 3.4 ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
- 3.5 ASTM C1231 - Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Cylindrical Concrete Specimens.
- 3.6 ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- 3.7 ASTM C511 - Standard Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes.
- 3.8 ASTM C617 - Standard Practice for Capping Cylindrical Concrete Specimens.

- 3.9 MP 109.00.21 - Basis for Charges for Non-Submittal of Sampling & Testing Documentation by the Established Deadline.
- 3.10 MP 300.00.51 - Procedural Guidelines for Maintaining Control Charts for Aggregate Gradation.
- 3.11 MP 601.03.52 – Procedural Guidelines for Maintaining Control Charts for Portland Cement Concrete.
- 3.12 MP 601.04.20 - Curing Concrete Test Specimens in The Field.
- 3.13 MP 601.05.50 - Quality Assurance Procedures for Portland Cement Concrete.
- 3.14 MP 700.00.54 - Procedure for Evaluating Quality Control Sample Test Results with Verification Sample Test Results.

4. GENERAL REQUIREMENTS

- 4.1 The Contractor shall provide and maintain a quality control system that will provide reasonable assurance that all materials and products submitted to the Division for acceptance will conform to the contract requirements whether manufactured or processed by the Contractor or procured from suppliers, subcontractors, or vendors. The Contractor shall perform or have performed the inspections and tests required to substantiate product conformance to contract document requirements and shall also perform or have performed all inspections and tests otherwise required by the contract. The Contractor's quality control inspections and tests shall be documented and shall be available for review by the Engineer throughout the life of the contract. The Contractor shall maintain standard equipment and qualified personnel as required by the Specifications to assure conformance to contract requirements. Procedures will be subject to the review of the Division before the work is started.

5. QUALITY CONTROL PLAN

- 5.1 The Contractor shall prepare a QC Plan detailing the type and frequency of inspection, sampling, and testing deemed necessary to measure and control the various properties of materials and construction governed by the Specifications. As a minimum, the sampling and testing plan should detail sampling location, sampling techniques, and test frequency to be utilized. Quality control sampling and testing performed by the Contractor may be utilized by the Division for acceptance.
 - 5.1.1 A QC Plan must be developed by the Contractor and submitted to the Engineer prior to the start of construction on every project. Acceptance of the QC Plan by the Engineer will be contingent upon its concurrence with these guidelines.
 - 5.1.2 As work progresses, an addendum(s) may be required to a QC Plan to keep the QC program current. Personnel may be required to show proof of certification for testing.
- 5.2 Quality Control Plan Guidelines

- 5.2.1 The Plan shall identify the personnel responsible for the Contractor's quality control. This should include the company official who will act as the liaison with Division personnel, as well as the Certified Portland Cement Concrete Technician who will direct the inspection program at the plant or in the field depending if it is a plant or field QC Plan. Their phone number and email address must also be included as a means for contact by the Division personnel.
- 5.2.2 All classes of concrete and corresponding mix design numbers, which may be used, shall be listed on the Plant QC Plan. All classes of concrete, which may be used, shall be listed on the Field QC Plan.
- 5.2.3 Process control sampling, testing, and inspection should be an integral part of the contractor's quality control system. In addition to the above requirements, the Contractor's QC Plan should document the process control requirements shown in Table 1 of Attachment 1. The process control activities shown in Table 1 are considered to be normal activities necessary to control the production and placement of a given product or material at an acceptable quality level. To facilitate the Division's activities, the Contractor, as per ML-25, shall retain all completed gradation samples until further disposition is designated by the Division.
- 5.2.4 All concrete producers shall provide an E-Ticket that meets the requirements of Section 109.20.1 of the Specifications.
- 5.2.5 All sampling and testing shall be in accordance with the methods and procedures required by the Specifications. Measuring and testing equipment shall be standard and properly calibrated as per the specified test procedures. If alternative sampling methods, procedures, and inspection equipment are to be used, they shall be detailed in the QC Plan. Any QC testing that is not performed in accordance with the methods and procedures required by the Specifications shall be considered an invalid test, and the applicable penalty for the cost associated with that test, in accordance with MP 109.00.20, will be assessed to the contractor, along with the applicable price adjustment in Section 105.3. The test specimen(s) represented by an invalid test shall be considered as not meeting Specifications and documented accordingly. The Division may, however, use the results of an invalid test to determine if material may be accepted and allowed to remain in place and if payment may be made for the material represented by the invalid test.
- 5.2.5.1 Any individual who samples or tests plastic concrete for quality control purposes shall be certified as a WVDOH PCC Inspector.
- 5.2.5.2 Any Laboratory which tests the hardened concrete cylinders for the Contractor, for quality control purposes, shall be listed in the Contractor's QC Plan for field operations. This Laboratory shall provide evidence that it meets the applicable requirements in ASTM C1077, pertaining to testing hardened concrete cylinders, for a concrete testing laboratory, including curing facilities, testing equipment, technician proficiency, participation in the Cement and Concrete Reference Laboratory (CCRL) Concrete

Proficiency Sample Program (PSP), Quality Management System documentation, and recordkeeping. The only test required for these laboratories, in the CCRL Concrete PSP, is ASTM C39 (AASHTO T22), but it is recommended that the laboratory perform all the field test portions of these Proficiency Samples and maintain the results of these tests, in order to evaluate any root cause issues pertaining to compressive strength. Each Laboratory shall be inspected and evaluated initially, and at least once every regular inspection tour cycle (approximately 30 months) by the CCRL. The ASTM standards pertaining to testing concrete cylinders, with which the subject laboratory must comply, include ASTM C39 (AASHTO T22), ASTM C617 (AASHTO T231) or ASTM C1231, and ASTM C511 (AASHTO M201). The Personnel Qualification requirements in Section 6 of ASTM C1077 regarding PE direction, Laboratory Supervisors, and concrete laboratory personnel testing certifications also apply, except that a Laboratory Supervisor with at least five years' experience in construction materials testing shall be a permissible substitution for the licensed professional engineer. Subsequent documentation shall be provided to the Division showing that the subject Laboratory and personnel meet the applicable requirements of ASTM C1077, pertaining to testing concrete cylinders, for a concrete laboratory. In addition any laboratory conducting concrete surface resistivity testing must be evaluated by CCRL for AASHTO T358. Any Laboratory which desires to test Contractor hardened concrete QC specimens on WVDOH projects shall submit the evidence/documentation, required in Section 4.2.4.2, confirming compliance with ASTM C1077, with regards to testing concrete cylinders, to MCS&T Division at the following e-mail address: DOHMCSnTconcretelab@wv.gov. MCS&T Division will review this submittal. In this submittal, the subject Laboratory shall also explain how all deficiencies noted in the CCRL Laboratory Inspection Report have been addressed. All deficiencies noted in the CCRL Laboratory Inspection Report shall be resolved to the satisfaction of the Division within 90 days from the date of the CCRL Laboratory Inspection Report. Once MCS&T Division determines that the subject Laboratory is in compliance with the applicable requirements of ASTM C1077, and all deficiencies have been adequately resolved, that Laboratory will be placed on the Division's Approved List of Concrete Cylinder Testing Labs. All laboratories which test contractor hardened concrete QC specimens on WVDOH projects must be listed on the Division's Approved List of Concrete Cylinder Testing Labs. Laboratories that are certified to run AASHTO T358 will be indicated by an asterisk associated to the applicable footnote on the APL. A listing of these laboratories is available on the WVDOH MCS&T [Webpage](#)¹. All Division Approved Laboratories shall provide the Division with the CCRL Lab Number for their laboratory and agree to allow DOH, CCRL, and AASHTO re:source to freely share information about assessment reports, proficiency samples, corrective actions, quality management system, and personnel competency and certification records.

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

- 5.2.6 When calculating the compressive strength of concrete cylinders in accordance with AASHTO T22, the following procedure shall be used:

$$CS = \frac{ML}{0.25 \times \pi \times D^2}$$

Where:

- CS = Compressive Strength of the specimen
ML = Maximum load carried by the specimen during the test
 π = Mathematical constant PI
D = Diameter of the cylinder being tested (in accordance with AASHTO T 22)

Note: The calculation for CS shall be performed in one continuous step (without any rounding), either by the testing machine, or by calculating device, and only the final value (CS) is permitted to be rounded (to the accuracy specified in AASHTO T 22). The value for π shall be the manufacturer's pre-programmed value in a calculating device or the testing machine.

5.2.7 Miscellaneous Concrete:

The contractor is not required to perform the process control testing required by Part C of Table 1 of the Attachment on miscellaneous concrete (as defined in section 4.2.6.1), provided that the concrete in question is being supplied by an A1 or A2 plant (as defined in MP 601.05.50, formerly numbered as IM-18), and provided that the requirements of section 4.2.6.2 are met for each project on which the reduced testing of miscellaneous concrete is applied.

- 5.2.7.1 Miscellaneous concrete shall be defined as relatively small quantities, not exceeding 25 yd³ per day, incorporated into items that will not adversely affect the traffic carrying capacity of a completed facility. Such items would not include any concrete intended for major structures, permanent mainline or ramp pavements, or any other structurally critical items part of, or adjacent to the roadway.

The following items are suggested as a guideline in establishing items that may be categorized as miscellaneous concrete:

Note: Concrete testing for certain items below is waived, in some cases, by the referenced section of the specifications.

- 1 Sidewalks
2. Curb and Gutter
3. Slope walls for under drain outlet pipes
4. Temporary pavements and pipe crossings
5. Building floors
6. Slope paving and headers
7. Paved ditch or gutter

8. Small (less than 36" diameter) culvert headwalls
9. Catch basins, manhole bases, inlets, and junction boxes (and adjustments of such items) not located in the roadway
10. Foundations for breakaway supports
11. Utility trench fills
12. Cast-in-place survey markers

5.2.7.2 One sample per two days of production (for the same project) shall be tested (beginning on the first day of production) for compressive strength, air content, and consistency. On a minimum of ten percent of the samples outlined above, the Division will observe the batching operation at the plant (that is producing the concrete to be sampled) and check the operational control.

5.2.7.3 When placing miscellaneous concrete and no testing is required, an Approved Source Sample will be generated in SiteManager. The C##### representing the test from the previous day of production shall be entered in the intended use field. Miscellaneous Concrete will be entered in remarks. Miscellaneous Concrete will be written on all batch tickets for which testing is not required, per the miscellaneous concrete provisions of this MP, prior to scanning and placing in ProjectWise.

5.2.8 Documentation:

The Contractor shall maintain adequate records of all inspections and tests. The records shall indicate the nature and number of observations made, the number and type of deficiencies found, the quantities approved and rejected, and the nature of corrective action taken as appropriate. The Contractor's documentation procedures will be subject to the review and approval of the Division prior to the start of the work and to compliance checks during the progress of the work.

5.2.9 Charts and Forms:

All conforming and non-conforming inspections and test results shall be kept complete and shall be available at all times to the Division during the performance work. Forms shall be on a computer-acceptable medium where required. Batch ticket data shall be documented in accordance with the applicable section of MP 601.03.50, with a copy to be submitted to the District Materials Section within 72 hours of the concrete placement. Gradation data shall be documented on WVDOH form T300 using the material codes listed in the online computer systems user guide. The original gradation data shall be submitted to the District Materials Section within 72 hours of obtaining the gradation sample. Test data for (PCC) shall be charted in accordance with the applicable requirements of MP 601.03.52. Gradation test data shall be plotted in accordance with the applicable requirements of MP 300.00.51. The Contractor may use other types of control charts as deemed appropriate by the Division. It is normally expected that testing and charting will be completed within 48 hours after sampling.

The Contractor shall also ensure that all Material Suppliers prepare and submit the HL-441 form (weekly supplier report) in a timely manner

5.2.9.1 All charts and records documenting the Contractor's quality control inspections and tests shall become property of the Division upon completion of the work.

5.2.10 Batch Tickets

Each batch of Structural Concrete, including miscellaneous concrete (as defined in section 4.2.6.1), delivered at the project shall be accompanied by one batch ticket with all of the items of information listed in Section 4.2.9.1 pre-populated on the ticket. In the case of (PCC) Pavement, each batch of concrete delivered at the project on which a test in accordance with Table 1 of Attachment 1 is to be performed shall be accompanied by a batch ticket. This batch ticket shall have all of the items listed in section 4.2.9.1 pre-populated on the ticket unless non-agitator trucks or truck agitators are used. In this case, the batch ticket shall have all of the items listed in section 4.2.9.2 pre-populated on the ticket.

5.2.10.1 All batch tickets for Structural Concrete and (PCC) Pavement Concrete transported by truck mixers shall have all the following items pre-populated on the ticket:

1. Producer/Supplier Code
2. Producer/Supplier Name
3. Producer/Supplier Location
4. Mix Design Laboratory Reference Number
5. Date
6. Sequence Number
7. Volume (yd³/m³)
8. Time Batched
9. Contract Identification Number (CID #)
10. Federal Project Number (If applicable)
11. State Project Number
12. Material Code/Name
13. Water Allowed (gal/L)
14. Water at Plant (gal/L)
15. Weight of Ice at Plant (lb/kg)
16. Weight of Cement (lb/kg)
17. Supplementary Cementitious Material(s) (SCM) (lb/kg)
18. Weight of Fine Aggregate (lb/kg)
19. Weight of Coarse Aggregate (lb/kg)
20. *Admixture Name(s) and Dose (oz/L)
21. Cylinder I.D.
22. Initial Counter
23. Target Consistency (in/mm)
24. Target Air (%)
25. License Number of Haul Unit.

* If admixtures are added at the jobsite, these shall be entered by the project.

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

1. Contract Item Number
2. Contract Line Number
3. Time Unloaded
4. Water at Job (gal/L)
5. Concrete Temperature (°F/°C)
6. Final Counter
7. Actual Consistency (in/mm)
8. Actual Air (%)

5.2.10.2 All batch tickets for concrete delivered by means of non-agitator trucks or truck agitators shall have all of the following items pre-populated on the ticket:

1. Producer/Supplier Name
2. Mix Design Laboratory Reference Number
3. Date
4. Sequence Number
5. Volume (yd³)
6. Time Batched
7. Contract Identification Number (CID #)
8. Federal Project Number (If applicable)
9. State Project Number
10. Material Code/Name
11. Water Allowed (gal/L)
12. Water at Plant (gal/L)
13. Weight of Ice at Plant (lb/kg)
14. Weight of Cement (lb/kg)
15. Weight of SCM (lb/kg)
16. Weight of Fine Aggregate (lb/kg)
17. Weight of Coarse Aggregate (lb/kg)
18. *Admixture Name(s) and Weight(s) (oz/L)
19. Target Consistency (in/mm)
20. Target Air (%)
21. License Number of Haul Unit.

* If admixtures are added at the jobsite, these shall be entered by the project

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

1. Item Number
2. Line Number
3. Time Unloaded
4. Temperature (°F/°C)
5. Actual Consistency (in/mm)
6. Actual Air (%)

5.2.10.3 The batch ticket in the case of either type of concrete shall be a batch ticket prepared by the plant. This ticket must be computer generated with blank fields provided in which all of the required data shall be recorded. The data items listed above that are completed in the field (such as Time Unloaded, Actual Consistency, etc.) must have a field on the batch ticket for completion. Volume is to be reported to the nearest 0.01 yd³. Consistencies are to be reported to the nearest 0.25 inch. Target and Actual Air are to be reported to the nearest 0.1% (to the nearest 0.25% if the volumetric method is used).

5.2.10.4 As per the requirements of Section 109.20.1 of the Specifications, an E-Ticket shall be provided to meet these requirements.

5.2.11 Corrective Action:

The Contractor shall take prompt action to correct conditions, which have resulted, or could result, in the submission to the Division of materials and products, which do not conform to the requirements of the Contract documents.

5.2.12 Non-Conforming Materials:

4.2.11.1 The Contractor shall establish and maintain an effective and positive system for controlling non-conforming material, including procedures for its identification, isolation and disposition. Reclaiming or reworking of non-conforming materials shall be in accordance with procedures acceptable to the Division. All non-conforming materials and products shall be positively identified to prevent use, shipment, and intermingling with conforming materials and products. Holding areas, mutually agreeable to the Division and the Contractor shall be provided by the Contractor.

5.2.13 Types of QC Plans:

5.2.13.1 QC Plans which are intended for use on more than one project shall be defined as Master QC Plans. Section 4.3 outlines the procedures for Master QC Plan submittal and approval.

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

- 5.2.13.3 A Contractor may submit a Master QC Plan for Plant and/or Field operations instead of a Project Specific QC Plan.
- 5.2.13.4 Once any QC Plan is approved for a project, the key date shall be entered in SiteManager by the appropriate District Materials personnel. The first date entered shall be the date the Project QC Plan letter is received. The second date shall be when the District approves the QC Plan for use on the project.
- 5.3 Master QC Plan
- 5.3.1 The intent of Master QC Plans is to facilitate the approval process in a more uniform manner. Master QC Plans can be submitted to the Division by the Contractor when their workload in a given District is routinely repetitive for the year.
- 5.3.2 The Contractor shall submit a Master Field QC Plan yearly to each District in which they have work (see Attachment 2). If the Contractor does not have work in a given District for the year, then a Master Field QC Plan does not need to be submitted to that District.
- 5.3.3 The Producer/Supplier shall submit a Master Plant QC Plan at the beginning of each year to the District in which their plant is located (see Attachment 3).
- 5.3.4 The District will review the submitted Master QC Plans to see if they meet the applicable requirements of Sections 4.2 thru 4.2.11.1 and assign a Laboratory Reference Number to each QC Plan upon approval, for future referencing. The District will acknowledge approval of each Master QC Plan to the Contractor and/or Producer/Supplier by letter (see Attachment 4), which will include the Laboratory Reference Number and a copy of the approved Master QC Plan. This will then be scanned and placed in ProjectWise under the appropriate District's Org for that Contractor and/or Producer/Supplier.
- 5.3.5 Once a project has been awarded, if a contractor elects to use the approved Master Plant and Master Field QC Plans on that project, the Contractor shall submit a letter requesting to use the Master QC Plans for that project. This letter must be on the Contractor's letterhead, be addressed to the District Engineer/Manager or their designee, and contain the following information: project number, CID#, project description, type of Quality Control Plan and the laboratory reference number for the Master QC Plan. See Attachment 5 for an example of a plant letter and Attachment 6 for an example of a field letter.
- 5.3.5.1 The District shall review the referenced Master QC Plans to ensure they cover all items in that project. If the referenced Master QC Plan is found to be insufficient for some items on that project, the District shall request the Contractor to submit additional information for quality control of those items as an addendum on a project specific basis. When the District is satisfied with the QC Plan for that project, a letter shall be sent to the Contractor acknowledging approval (see Attachment 7), with the following

attached: the contractor's project QC Plan request letter and the Master QC Plan approval letter. This shall then be placed in the project's incoming-mail mailbox in ProjectWise.

- 5.3.5.2 A Master QC Plan that has been approved for project use shall be good for the duration of that project.
- 5.3.5.3 For the use of Division Personnel, the District approval letter for this project must state the ProjectWise link to the referenced Master QC Plan for that Contractor (for example: WV DOT ORGS > District Organization #> Materials > Year > Master QC Plans).
- 5.3.6 The Master Field and Plant QC Plans shall be valid for the duration of one calendar year beginning on January 1st and ending on December 31st. The Master Plant QC Plan will also cover maintenance purchase order concrete for the year.

6. ACCEPTANCE SAMPLING AND TESTING

- 6.1 Acceptance sampling and testing is the responsibility of the Division. Quality control tests by the Contractor may be used for acceptance.
- 6.2 The Division shall sample and test for applicable items completely independent of the contractor at a frequency equal to approximately ten (10) percent of the frequency for testing given in the approved QC Plan. Witnessing the contractor's sampling and testing activities may also be a part of the acceptance procedure, but only to the extent that such tests are considered "in addition to" the ten (10) percent independent tests.
- 6.3 Results from independent tests conducted by the Division for gradation, entrained air, consistency, and strength will be plotted on the Contractor's quality control charts with a red circle but are not to be included in the moving average. When the Contractor's tests are witnessed, the results are circled on the control chart in red and are to be included in the moving average calculations.
- 6.4 Results from both independent tests and witnessed tests will be evaluated in accordance with MP 700.00.54. If a dissimilarity is detected, an investigation shall be immediately initiated to determine the cause of the dissimilarity.

7. ABSENT TESTING OF MATERIAL

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

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

Michael Mance Digitally signed by Michael Mance
Date: 2024.08.23 10:03:05 -04'00'

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

MP 601.03.50 Steward – Cement and Concrete Section
MM:T
ATTACHMENTS

TABLE 1
CONTRACTORS PROCESS CONTROL
REQUIREMENTS
STRUCTURAL CONCRETE AND
PORTLAND CEMENT CONCRETE PAVEMENT

Minimum frequency*

A. PLANT AND TRUCKS

- | | |
|--------------------------------------|----------------------------------|
| 1. Mixer Blades | Prior to Start of Job and Weekly |
| 2. Scales | |
| a. Tared | Daily |
| b. Calibrate | Prior to start of Job |
| c. Check Calibration | Weekly |
| 3. Gauges and Meters-Plant and Truck | |
| a. Calibrate | Yearly |
| b. Check Calibration | Weekly |
| 4. Admixture Dispenser | |
| a. Calibrate | Prior to Start of Job |
| b. Check Operation and Calibration | Daily |

B. AGGREGATES

- | | |
|-------------------|---|
| 1. Fine Aggregate | |
| a. Gradation | Per section 601.3.2.4 of the Specifications |
| b. Moisture | Daily |

2. Coarse Aggregates
 - a. Gradation Per section 601.3.2.4 of the Specifications
 - b. Percent passing No. 75 μ m Daily
 - c. \bar{A} for Combined Coarse Aggregates
Fine Aggregates and Cement Per section 601.3.2.4 of the Specifications
 - d. Moisture Daily
3. Optimized Aggregates
 - a. Gradation Per section 601.3.2.4.1 of the Specifications
 - b. Moisture Daily

C. PLASTIC CONCRETE

1. Entrained Air Content

Pavement Concrete	Two at the beginning of the paving operation, per Section 501.4.2, then one per 500 yd ³ (380 m ³) or fraction thereof, with a minimum of two per day
Structural Concrete (except Bridge Superstructure)	One per 100 yd ³ (75 m ³) or fraction thereof, with a minimum of one per ½ day of operation
Bridge Superstructure	One per batch
2. Consistency**

Pavement Concrete	One per 500 yd ³ (380 m ³) or fraction thereof, with a minimum of two per day
Structural Concrete (except Bridge Superstructure)	One per 100 yd ³ (75 m ³) or fraction thereof, with a minimum of one per ½ day of operation

Bridge Superstructure	One for first batch and one for every fifth batch thereafter
3. Temperature	Per Specification
4. Yield	
Pavement Concrete	Per Section 501.3 of the Specifications and one for each five days of operation after the first five days of operation
Structural Concrete	Per Section 601.3.2.3 of the Specifications and one for each ten sets of cylinders after the first ten
5. Compressive Strength***	
Pavement Concrete	One set of concrete cylinders for each 350 yd ³ (270 m ³) or fraction thereof
Structural Concrete	For each class concrete delivered and placed on a calendar day from a single supplier, one set of concrete cylinders for each 100 yd ³ (75 m ³) or fraction thereof
6. Permeability	
Pavement Concrete	N/A
Structural Concrete	Per Section 601.4.5 of the Specifications
Specialized Concrete Overlays	Per Section 679.2.2 of the Specifications

* Frequency for Process Control will vary with the size and type of aggregate or mixture and the batch-to-batch variability of the item.

** When superplasticizer is added to the concrete in the field, additional consistency testing is required as per Section 601.3.2.1 of the Specifications.

*** All cylinders shall be made, cured, and shipped to the Laboratory in accordance with AASHTO R 100 and MP 601.04.20. They shall be tested in accordance with AASHTO T 22 and the applicable section of the Specifications.

Example
COMPANY LETTERHEAD

Mr./Ms./Mrs. _____
West Virginia Department of Highways
District ___ Engineer/Manager
_____, WV #####

RE: Master PCC Field QC Plan

Dear _____,

We are submitting our PCC Field Quality Control Plan, developed in accordance with Sections 501 and 601 of the (year) WVDOH Standard Specifications, the (year) WVDOH Supplemental Specifications, and MP 601.03.50.

1. The Quality Control program is under the direction of _____, who can be contacted in Field/Office, by telephone number _____, cell# _____, and/or e-mail address _____.
2. Sampling and testing will be performed by qualified personnel as per WVDOH specifications Section 106.
3. Class(es) of Concrete to be controlled are listed as follows:
 - All types Class A - All types Class B - All types Class C
 - All types Class D - All types Class K - All types Class H
 - Etc.
4. All items in this QC Plan will be sampled at a minimum frequency as specified in Table 1 of Attachment 1. We acknowledge that additional sampling may be required by the Division in addition to the minimum frequency stated.
5. All sampling and testing will be in accordance with the methods and procedures required by the Specifications. All measuring and testing equipment shall be standard and properly calibrated as per the specified test procedure. *(If alternative sampling methods, procedures and inspection equipment are to be used please state in detail what they are and how they will be utilized.)*
6. Batch ticket data shall be documented in accordance with the applicable section of MP 601.03.50, with a copy to be submitted to the District Materials Section within 72 hours of the concrete placement.

7. Calculation of the compressive strength of concrete cylinders will be done as shown in Section 5.2.5 of MP 601.03.50.
8. Testing of Miscellaneous Concrete will be as specified in Section 5.2.6 and Sub-Sections 5.2.6.1 thru 5.2.6.3 of MP 601.03.50.
9. We will maintain adequate records of all inspection and tests. The records will indicate the type of test, number of observations made, the amount and type of deficiency's found, the quantities approved and rejected, and the nature of corrective actions taken as appropriate.
Our documentation procedures will be subject to the review and approval of the Division prior to the start of the work and to compliance checks during the progression of the work.
10. Our company will take prompt action to correct conditions, which have resulted or could result, in the submission to the Division/District of materials and products, which do not conform to the requirements of the contract documents.
11. Non-Conforming Materials -- *State how you will establish an effective and positive system for controlling non-conforming material. This shall include the following:*

- procedures for non-conforming material identification

- isolation and disposition of this material

Reclaiming or reworking of non-conforming materials shall be in accordance with procedures acceptable to the Division.

Our company will specify and provide holding areas, which shall be mutually agreeable by the Division and Contractor.

Very Truly Yours,

Company Official, Title

Example
COMPANY LETTERHEAD

Mr./Ms./Mrs. _____
West Virginia Department of Highways
District ___ Engineer/Manager
_____, WV #####

RE: Master PCC Plant QC Plan

Dear _____,

We are submitting our PCC PLANT Quality Control Plan, developed in accordance with Sections 501 and 601 of the (year) WVDOH Standard Specifications, the (year) WVDOH Supplemental Specifications, and MP 601.03.50.

1. The Quality Control program is under the direction of _____, who can be contacted in Field/Office, by telephone number _____, cell# _____, and/or e-mail address _____.
2. Sampling and testing will be performed by qualified personnel as per Specifications Section 106.
3. The PCC Mix Designs and class of concrete to be controlled are listed below:

	Mix Design Number	Class of Concrete
1.	#####	Class B
2.	_____	_____
3.	_____	_____
4.	_____	_____
Etc.		

4. All items in this QC Plan will be sampled at a minimum frequency as specified in Table 1 of Attachment. We acknowledge that additional sampling may be required by the Division in addition to the minimum frequency stated.
5. All sampling and testing will be in accordance with the methods and procedures required by the Specifications. All measuring and testing equipment shall be standard and properly calibrated as per the specified test procedure. *(If alternative sampling methods, procedures and inspection equipment are to be used please state in detail what they are and how they will be utilized.)*

6. Charts and forms

Our Company will make sure all conforming and non-conforming inspections and test results shall be kept complete and shall be available at all times to the Division during the performance work. Forms shall be on a computer-acceptable medium where required. Gradation data shall be documented on WVDOH form T300 using the material codes listed in the online computer systems user guide. The original gradation data shall be submitted to the District Materials Section within 72 hours of obtaining the gradation sample. Test data for Portland cement concrete shall be charted in accordance with the applicable requirements of MP 601.03.52. Gradation test data shall be plotted in accordance with the applicable requirements of MP 300.00.51. We may use other types of control charts as deemed appropriate by Division. It is normally expected that testing and charting will be completed within 48 hours after sampling. Our Company shall also ensure that all Material Suppliers prepare and submit the HL-441 form (weekly supplier report) in a timely manner. All charts and records will be turned over to the Division upon completion of work for a given WVDOH project.

7. *State that batch tickets will conform to requirements of MP 601.03.50 Section 5.3.9 and its applicable subsections.*

8. Our company will take prompt action to correct conditions, which have resulted or could result, in the submission to the Division of materials and products, which do not conform to the requirements of the contract documents.

9. Non-Conforming Materials - *State how you will establish an effective and positive system for controlling non-conforming material. This shall include the following:*

- *procedures for non-conforming material identification*
- *isolation and disposition of this material*

Reclaiming or reworking of non-conforming materials shall be in accordance with procedures acceptable to the Division.

Our company will specify and provide holding areas, which shall be mutually agreeable by the Division and Contractor.

Very Truly Yours,

Company Official, Title

WVDOH District Master QCP Approval Letter
*** EXAMPLE ***
WVDOH LETTERHEAD

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

RE: PCC Plant or PCC Field (*whichever is applicable*)
Master QC Plan
Description: (YEAR)
P/S code: (only if a plant QCP)

Dear Sir,

Your Quality Control Plan (M#-#####) for _____ has been reviewed and found to be acceptable for the following items:

- All WVDOH approved Designs for PCC Classes of Concrete controlled by the referenced QC plan.

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

Very truly yours,

Name, Title

Example

COMPANY LETTERHEAD

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

RE: PCC Quality Control Plan
for Plant ---- Project

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

Dear Mr./Ms./Mrs. _____,

We would like to use our Producer/Supplier's name Master PCC Plant QC Plan, reference number _____ for the project referenced above. All PCC items on the referenced project are covered by the Master PCC Plant QC Plan. *(if needed state the Special Provision and that the addendum is attached for Quality Control of Special Provision Item)*

The Quality Control Plan is under the direction of _____, _____ (title), and will be the company's contact representative to the Division of Highways District Materials and Construction Departments. They can be contacted in person at the plant, by telephone _____ or at e-mail at _____.

Very truly yours,

Company Representative

Example

COMPANY LETTERHEAD

Mr./Ms./Mrs. _____
WV Department of Highways
District ____ Engineer/Manager
_____, WV #####

Re: PCC Quality Control Plan
for Field ---- Project

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

Dear Mr./Ms./Mrs. _____,

We would like to use our approved Master PCC Field QC Plan, reference number _____ for the project referenced above. All PCC items on the referenced project are covered by the Master PCC Field QC Plan. *(if needed state the Special Provision and that the addendum is attached for Quality Control of Special Provision Item)*

The Quality Control Plan is under the direction of _____, _____ (title), and will be the company's contact representative to the Division of Highways District Materials and Construction Departments. They can be contacted in person at the plant, by telephone _____ or at e-mail at _____.

Very truly yours,

Company Representative

WVDOH District Master QCP Approval Letter
*** EXAMPLE ***
WVDOH LETTERHEAD

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

RE: PCC Field or PCC Plant (*whichever is applicable*) QC Plan

Project CID#: #####
Fed/State Project #: NHPP- ## - #####-##
Description: Falling Slide
County: XXXXXXXX
P/S Code: (If a Plant)

Dear Sir,

Your request to use Master Quality Control Plan (M# - #####) for PCC Plant or PCC Field (*whichever is applicable*) on the project referenced above, has been reviewed and found to be acceptable for the following items:

- All WVDOH approved designs and classes of PCC controlled by this QCP listed below:
- Class B - Class B modified - Class K -etc.

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

For Division Reference: The Master Quality Control Plan can be reviewed in ProjectWise at the folder shown below:

WVDOH ORG>D0#>year>MASTER QC PLANS>Contractors or Plant>Company
>folder>Name of file (i.e.: 2016 04 05 M#160001 PCC Plant QCP)

Very truly yours,

Name, Title