Materials Procedures Committee Meeting

Meeting Date: 1/21/2020 - 1:00 PM

	MP Number	Champion	MP Title	Up for Vote?
1	**401.03.50**	**Dave Matics, Mike Mance**	GUIDE FOR QUALITY CONTROL PLANS FOR ASPHALT CONCRETE	n
2	**601.03.50**	**Dave Matics, Mike Mance**	GUIDE FOR QUALITY CONTROL AND ACCEPTANCE REQUIREMENTS FOR PORTLAND CEMENT CONCRETE	n
3	**717.04.21**	**Dave Matics, Mike Mance**	GUIDE FOR QUALITY CONTROL OF COMPACTION	n
4	**106.03.50 - Supp**	**Dan Brayack**	WEST VIRGINIA TECHNICIAN INSPECTOR CERTIFICATION PROGRAM HANDBOOK	n
5	**700.00.06**	**Dave Matics**	AGGREGATE SAMPLING PROCEDURES	n
&6	**604.02.40**	**Andrew Thaxton**	INSPECTION AND ACCEPTANCE PROCEDURES FOR PRECAST CONCRETE PRODUCTS	y
	*Up for Vote			
	&New			

MP 401.03.50 Guide for Quality Control Plans for Asphalt

- Clarify the use of Asphalt Items QC Plan. Is this both the Asphalt Field QCP and the Asphalt Plant QCP combined? Is it appropriate to define the different QCPs at the beginning of the MP?

- Clarify the requirement or flexibility (shall/may) of the Master QCP and when it applies. For example, see Section 5.1.

MP 601.03.50 Guide for Quality Control and Acceptance Requirements for Portland Cement Concrete

- In Sections 4.3.2, 4.3.3, and 4.3.6, I would consider adding explanatory clauses stating something along the lines of, "If the Contractor elects to utilize a Master QCP, then the Contractor shall…" However, if Mike is satisfied with the language as is, then I'm OK with it.

MP 717.04.21 Guide for Quality Control of Compaction

- Clarify reference to Table E in Section 5.2.28

- Clarify language in Section 5.4.2 requiring submission of a Master Compaction QC Plan.

- Consider rewording awkward formulation in Section 6.3, possibly mirroring corresponding language in other MPs. For example, MP 601.03.50 or MP 307.00.50.

Thanks,
Matt

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

MATERIALS PROCEDURE

GUIDE FOR QUALITY CONTROL PLANS FOR ASPHALT

1. PURPOSE

1.1 This procedure presents uniform Quality Control (QC) guidelines for Contractor (and/or Producer(s)) to develop their QC Plan. All items listed are believed necessary to assure adequate product QC.

1.2 This procedure also creates a more uniform process for District Materials to review and approve Quality Control Plans for use on projects.

2. SCOPE

2.1 This Material Procedure (MP) is applicable to, but not limited to the following Asphalt Items:

a. Base
b. Wearing
c. Patching and Leveling Courses
d. All P.W.L. Items
e. Skid

3. GENERAL REQUIREMENTS

3.1 As stated in the Specifications, a QC Plan must be developed by the Contractor and/or Producer and submitted to the Engineer prior to construction. Acceptance of the Quality Control Plan by the Engineer will be contingent upon its concurrence with these guidelines. For this reason, the plan should clearly describe the methods by which the Quality Control Program will be conducted. For example, the items to be controlled, tests to be performed, testing frequencies, sampling locations and techniques all should be included and each item should be listed separately. Also, a detailed plan of action regarding disposition of non-specification material should be included. Such a plan should provide for immediate notification of all parties involved in the event non-conforming situations are detected. Attachment #1 may be used as an example Quality Control Plan for plant operations using all items that are applicable to the specific type of plant items produced. Attachment #2 may be used as an example Quality Control Plan for field operations using all items that are applicable to field work.

Commented [DB1]: MP 401.03.50 Guide for Quality Control Plans for Asphalt

- Clarify the use of Asphalt Items QC Plan. Is this both the Asphalt Field QCP and the Asphalt Plant QCP combined? Is it appropriate to define the different QCPs at the beginning of the MP?
- Clarify the requirement or flexibility (shall/may) of the Master QCP and when it applies. For example, see Section 5.1.

3.2 Inspection and testing records shall be maintained, kept current, and made available for review by the Engineer throughout the life of the contract. All other documentation, such as date of inspections, tests performed, temperature measurements, and any accuracy, calibration, or re-calibration checks performed on production or testing equipment should be recorded.

3.3 The Contractor shall maintain standard calibrated equipment and certified personnel in accordance with contract and Specification requirements for the item(s) being produced.

3.4 The Division reserves the right to review all pertinent documents concerning equipment calibration used for testing and proof of certified personnel performing tests.

4. MASTER QUALITY CONTROL PLAN

4.1 The intent of a Master QC Plan is to facilitate the approval process in a more uniform manner. The Contractor may submit a Master QC when their workload in a given District is routinely repetitive for the year.

4.1.1 The Contractor may submit a new Master Asphalt Items QC Plan each year to each District in which they have or expect to have work. If the Contractor does not have work or does not have a history of work in a given District for the year, then a Master QC Plan shall not be submitted to that District.

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

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

4.1.4 The District shall review the referenced Master QC Plan to ensure it covers all items in the project. If the referenced Master QC Plan is found to be insufficient for some items on the project, the District shall request the Contractor to submit additional information for QC of those items as an addendum on a project specific basis. When the District is satisfied with the QC Plan for this project, a letter shall be sent to the Contractor acknowledging approval (see Attachment #5 for an example), with the following attached: the Contractor's project QC Plan request letter and the Master QCP approval letter. This shall then be placed in the project's incoming-mail mailbox in ProjectWise.

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

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

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

5. ASPHALT FOR MAINTENANCE

5.1 The provisions of this MP will also apply to asphalt plant run purchase orders that are picked up at the plant by the Division's Maintenance forces. Yearly Master Plant and Field QCP's apply to Laydown Asphalt Purchase Orders awarded to vendors. Exceptions to this are as specified in the Purchase Order Maintenance Contract.

6. ACCEPTANCE PLAN

6.1 The Asphalt Material shall be accepted in accordance with the material's specific MP and the Standard Specifications.

6.2 Key Dates for Site Manager

6.2.1 Once the Quality Control Plan is approved for the project the key date shall be entered into the current AASHTOWare software by the appropriate District Materials personnel. The first date entered shall be the date the Project Quality Control Plan letter is received. The second date shall be when the district approves the quality control plan for use on the project.

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 entire item shall be withheld, pending the Engineer's decision whether or not to allow the material to remain in place.

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.

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

RLS: J
ATTACHMENTS

ATTACHMENT #1 – EXAMPLE QC PLAN FOR PLANT OPERATIONS

Mr./Ms/Mrs _____
West Virginia Division of Highways
District: ____Engineer/Manager
_____,West Virginia

Dear Mr/Ms./Mrs _____

Subject: Asphalt Concrete Yearly
Master Quality Control
Plan for Plant Operations

We are submitting our asphalt concrete hot-mix asphalt Quality Control Plan, developed in accordance with Section 401 of the _____ Standard Specifications, the _____ Supplemental Specifications, MP 401.03.50 and the _____Special Provisions.

1. Make of Plant Type Location

_____

2. The Quality Control program is under the direction of _____ to be contacted at Plant/Office in person, by telephone # and /or email address:_____

3. Sampling and testing will be performed by qualified personnel as per WVDOH Specification Section 106 Control of Materials.

4. The types of asphalt paving materials to be produced and controlled are as follows:
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____
5. Prior to production of the items, we will submit (on Division Form T-400) our plant mix formula for each type of mix. Only approved materials will be incorporated in the mix.

6. During the production operations of the asphalt concrete we will perform at a minimum Quality Control tests in accordance with the attached schedule.

7. All testing and evaluation will be completed within 24 hours of sampling and all documentation will be completed and submitted to the Division on approved processing forms within 72 hours or production will be halted until these items are current.

ATTACHMENT #1 – EXAMPLE QC PLAN FOR PLANT OPERATIONS (CONTINUED)

8. Material found to be noncomplying shall not be incorporated into the roadway. In the event that non-specification material is incorporated into the project, the Division of Highways District Materials Supervisor will be notified immediately.

9. We will notify all appropriate Division of Highways personnel at least 24 hours before the scheduled work is to begin.

10. (Statement of disposition of nonconforming material)

_____

_____

_____

_____

Very truly yours,

_____
Company Representative

ATTACHMENT #1 – EXAMPLE QC PLAN FOR PLANT OPERATIONS (CONTINUED)

GUIDE FOR QUALITY CONTROL PLANS FOR ASPHALT CONCRETE

TEST OR ACTION	FREQUENCY	TEST METHOD	METHOD OF DOCUMENTATIO
Construction of stockpile to prevent segregation intermingling	Constant	Visual	Diary
Coarse aggregate unit weight	One test before start of operation	AASHTO T19	T304
Stockpile & cold bin gradations	Plant setup and as needed to control production	AASHTO T27 and T11	T300
Calculate % aggregate from each bin, calibration cold bin	Plant setup		T415
Check feeder gate output at gate setting to be used	Plant setup. If bins overflow or run dry.		Plant Inspection Form and Diary
Select screen sizes	Plant setup		Plant Inspection Form
Determine hot bin gradation, calculate combined gradations	Weekly during production	AASHTO T27 and T11	T300 and T415
Calibrate hot bins, select gate openings, and calculate batch weights	Plant setup and change in material source		Plant Inspection Form and Diary
Check accuracy of scales	Plant setup and weekly accuracy checks. Zero balance and sensitivity each ½ day of operation	Construction Manual – 700 Series	Plant diary and T603
Calibrate asphalt pump, calculate settings	Plant setup		Plant Inspection Form
Check metering pump at setting to be used	Plant setup and monthly		Plant Inspection Form and Diary
Reset metering pump to compensate for temperature change	Plant setup and each temperature change of 10 °F (6 °C)		Plant Inspection Form and Diary
Adequate heated storage for liquid asphalt	Plant setup		Plant Inspection Form

ATTACHMENT #1 – EXAMPLE QC PLAN FOR PLANT OPERATIONS (CONTINUED)

GUIDE FOR QUALITY CONTROL PLANS FOR MARSHALL DESIGNED ASPHALT CONCRETE

TEST OR ACTION	FREQUENCY	TEST METHOD	METHOD OF
Calculating mixing time	Plant setup and when paddle pitch or dam gate changed		Plant Inspection Form and Diary
Ross Count (degree of coating)	Only if mixing time is less than 45 seconds	AASHTO T195	Diary
Coarse aggregate face fracture (Gravel only)	One test before start of operation Every 10,000 ton (9,000 Mg) thereafter	MP 703.00.21	T302
Complete mix face fracture (When using gravel)	One per week	MP 703.00.21	T302
Check moisture content of aggregate	Plant setup and daily		Diary
Temperature check	Minimum of one check of mix per hour at plant		Plant Control Chart and Diary
Asphalt Content	In accordance with WVDOH MP 401.02.27	AASHTO T308 (Method A)	T417, T423 and Control Charts
Aggregate Gradation (cold feed, hot bins, or completed mix)		AASHTO T27 plus T11 or AASHTO T30	T300, T404, or T417 Plus T425
Daily Mix Property Testing: Stability and Flow, % Air Voids, and % Voids-in-Mineral Aggregate (VMA)		AASHTO T245 or ASTM D5581, AASHTO T269, T166, T209, and MS-2 Manual	T406 and T423

ATTACHMENT #1 – EXAMPLE QC PLAN FOR PLANT OPERATIONS (CONTINUED)

GUIDE FOR QUALITY CONTROL PLANS FOR SUPERPAVE DESIGNED ASPHALT CONCRETE

TEST OR ACTION	FREQUENCY	TEST METHOD	METHOD OF DOCUMENTATIO
Calculating mixing time	Plant setup and when paddle pitch or dam gate changed		Plant Inspection Form and Diary
Ross Count (degree of coating)	Only if mixing time is less than 45 seconds	AASHTO T195	Diary
Coarse aggregate face fracture (Gravel only)	One test before start of operation Every 10,000 ton (9,000 Mg) thereafter	ASTM D5821	T302
Complete mix face fracture (When using gravel)	One per week	ASTM D5821	T302
Check moisture content of aggregate	Plant setup and daily		Diary
Temperature check	Minimum of one check of mix per hour at plant		Plant Control Chart and Diary
Gyratory Compaction	In accordance with WVDOH MP 401.02.29	AASHTO TP4	T419
Aggregate Gradation		AASHTO T30	T417 and T425
Asphalt Content		AASHTO T308 (Method A)	T417 and Control Charts
Percent Air Voids		AASHTO T166, T209, and T269	T419 and Control Charts
Percent Voids in Mineral Aggregate (VMA)		AASHTO PP-28	
Percent Voids Filled With Asphalt (VFA)		AASHTO PP-28	

ATTACHMENT #2 – EXAMPLE QC PLAN FOR FIELD OPERATIONS

Mr./Ms/Mrs _____
West Virginia Division of Highways
District: ____Engineer/Manager
_____,West Virginia

Subject: Asphalt Concrete Yearly Master Quality Control Plan for Field Operations

Dear Mr./Ms/Mrs. _____

We are submitting our asphalt concrete hot-mix asphalt Quality Control Plan, developed in accordance with Section 401 of the _____ Standard Specifications, the _____ Supplemental Specifications, MP 401.03.50 and the _____ Special Provisions.

1. The field operation is under the direction of _____ by telephone # and /or email address:_____

2. _____ will be responsible for insuring that all items of work will comply with Division specifications.

3. During the placement operation of the asphalt concrete pavement we will perform, at a minimum, Quality Control tests as per the attached schedule. Sampling and testing will be performed by qualified personnel as per WVDOH Specification Section 106 Control of Materials.

4. All sampling and testing will be completed within the time limits specified by the Division or work will be halted.

5. Material found to be non-complying shall not be incorporated into the roadway. In the event that non-specification material is incorporated into the project, the Division representative will be notified immediately.

6. We will notify all appropriate Division personnel at least 24 hours before work is scheduled to begin.

Very truly yours,

_____
Company Representative

ATTACHMENT #2 – EXAMPLE QC PLAN FOR FIELD OPERATIONS (CONTINUED)

GUIDE FOR QUALITY CONTROL PLANS FOR FIELD

TEST OR ACTION	FREQUENCY	TEST METHOD	METHOD OF DOCUMENTATI
Temperature of mix	1 per hour	Section 401 of Standard Specifications	Diary
Temperature of base	1 per hour	Section 401 of Standard Specifications	Diary
Temperature of mat	1 test per hour of placement	Section 401 of Standard Specifications	T401
Density	5 tests per 1000 feet (300 meters) of paving width or rollerpass when applicable.	Section 401 of Standard Specifications	T401 or T407
Tack/Prime Application Rate	Each load or per ½ day of operation whichever occurs first	Section 408/409 of Standard Specifications	Diary
Calibration of Nuclear Gauge	As per MP 717.04.21	As per MP 717.04.21	Factory Data Sheet
Distribution of Test Data	Within 24 hours of completion of testing of a Lot	As per MP 717.04.21	As per MP 717.04.21

ATTACHMENT #3 – MASTER PLAN ACCEPTANCE FOR CONSTRUCTION SEASON

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

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

Dear Mr./Ms/Mrs. _____,

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

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

Very Truly Yours,

_____
Title

ATTACHMENT #4A – REQUEST TO USE MASTER QC FOR PLANT

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

RE: Asphalt Concrete Quality Control plan for Plant - Project

Fed. Project No. _____

State Project No. _____

Contract ID No. _____

County : _____

Description _____

Dear Mr./Ms/Mrs. _____,

We would like to use our approved Master Quality Control Plan, reference number _____ for the project referenced above.

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. He/She can be contacted in person at the plant, by telephone _____ or at email account _____

Very Truly yours,

_____
Company Representative

ATTACHMENT #4B – REQUEST TO USE MASTER QC FOR FIELD

EXAMPLE

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

RE: Asphalt Concrete Quality Control plan for Field - Project

Fed. Project No _____

State Project No. _____

Contract ID No. _____

County : _____

Description _____

Dear Mr./Ms/Mrs. _____,

We would like to use our approved Master Quality Control Plan, reference number _____ for the project referenced above.

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. He/She can be contacted in person at the project, by telephone _____ or at email account _____.

Very Truly yours,

_____
Company Representative

ATTACHMENT #5 – DISTRICT ACCEPTANCE OF MASTER QC PLAN FOR SPECIFIC PROJECT

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

RE: _____ Asphalt Items QC Plan

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

Dear Mr./Ms/Mrs. _____,

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

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

For Division/District use

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

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

Very Truly Yours,

_____
Title

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
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.

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.

3. GENERAL REQUIREMENTS

3.1 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.

4. QUALITY CONTROL PLAN

4.1 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

Commented [DB1]: **MP 601.03.50 Guide for Quality Control and Acceptance Requirements for Portland Cement Concrete**

•In Sections 4.3.2, 4.3.3, and 4.3.6, I would consider adding explanatory clauses stating something along the lines of, "If the Contractor elects to utilize a Master QCP, then the Contractor shall…" However, if Mike is satisfied with the language as is, then I'm OK with it.

test frequency to be utilized. Quality control sampling and testing performed by the Contractor may be utilized by the Division for acceptance.

4.1.1 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.

4.1.2 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.

4.2 Quality Control Plan Guidelines

4.2.1 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.

4.2.2 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.

4.2.3 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.

4.2.4 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.

4.2.4.1 Any individual who samples or tests plastic concrete for quality control purposes shall be certified as a WVDOH PCC Inspector.

4.2.4.2 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 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 Cement and Concrete Reference Laboratory (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.

4.2.4.3 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. A listing of these laboratories is available on the WVDOT internet site at the following link: https://transportation.wv.gov/highways/mcst/Pages/APL_By_Number.aspx. 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.

4.2.5 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 AASTO 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.

4.2.6 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.

4.2.6.1 Miscellaneous concrete shall be defined as relatively small quantities, not exceeding 25 yd^3 (19 m^3) 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

4.2.6.2 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.

4.2.6.3 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.

4.2.7 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.

4.2.8 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 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. 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

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

4.2.9 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-printed on the ticket. In the case of Portland Cement Concrete 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-printed 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-printed on the ticket.

4.2.9.1 All batch tickets for Structural Concrete and Portland Cement Concrete Pavement Concrete transported by truck mixers shall have all of the following items pre-printed on the ticket: Producer/Supplier Code, Producer/Supplier Name, Producer/Supplier Location, Mix Design Laboratory Reference Number, Date, Sequence Number, Volume (yd^3/m^3), Time Batched, Time Unloaded, Contract Identification Number (CID #), Federal and/or State Project Number, Material Code, Material Name, Water Allowed (Gallon/Liter), Water at Plant (gallon/liter), Weight of Ice at Plant (lb/kg), Water at Job (Gallon/Liter), Weight of Cement (lb/kg), Weight(s) of Pozzolan(s) (lb/kg), Weight of Fine Aggregate (lb/kg), Weight of Coarse Aggregate (lb/kg), Admixture Name(s) and Dose (ounces/mL), Temperature ($^oF/^oC$), Cylinder I.D., Initial Counter, Final Counter, Target Consistency (in/mm), Actual Consistency (in/mm), Target Air (%), Actual Air (%), Truck Number.

4.2.9.2 All batch tickets for concrete delivered by means of non-agitator trucks or truck agitators shall have all of the following items pre-printed on the ticket: Producer/Supplier Name, Mix Design Laboratory Reference Number, Date, Sequence Number, Volume (yd^3/m^3), Time Batched, Time Unloaded, CID#, Federal and/or State Project Number, Material Code, Material Name, Water Allowed (Gallon/Liter), Water at Plant (Gallon/Liter), Weight of Ice at Plant (lb/kg), Weight of Cement (lb/kg), Weight of SCM (lb/kg), Weight of Fine Aggregate (lb/kg), Weight of Coarse Aggregate (lb/kg), Admixture Name(s) and Weight(s) (ounces/grams), Temperature ($^oF/^oC$), Target Consistency (in/mm), Actual Consistency (in/mm), Target Air (%), Actual Air (%), Truck Number.

4.2.9.3 The batch ticket in the case of either type of concrete shall be a pre-printed batch ticket prepared by the plant. This ticket may be either computer generated or a standard pre-printed form with blank spaces 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 space on the batch ticket for completion. Volume is to be reported to the nearest 0.01 yd^3 (0.01 m^3). Consistencies are to be reported to the nearest 0.25 inch (5 mm). Target and Actual Air are to be reported to the nearest 0.1% (to the nearest 0.25% if the volumetric method is used).

4.2.10 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.

4.2.11 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.

4.2.12 Types of QC Plans:

4.2.12.1 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.

4.2.12.2 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.

4.2.12.3 A Contractor may submit a Master QC Plan for Plant and/or Field operations instead of a Project Specific QC Plan.

4.2.12.4 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.

4.3 Master QC Plan

4.3.1 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.

4.3.2 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.

4.3.3 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).

4.3.4 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.

4.3.5 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.

4.3.5.1 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.

4.3.5.2 A Master QC Plan that has been approved for project use shall be good for the duration of that project.

4.3.5.3 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: WVDOT ORGS > District Organization #> Materials > Year > Master QC Plans).

4.3.6 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.

5. ACCEPTANCE SAMPLING AND TESTING

5.1 Acceptance sampling and testing is the responsibility of the Division. Quality control tests by the Contractor may be used for acceptance.

5.2 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.

5.3 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.

5.4 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.

6. ABSENT TESTING OF MATERIAL

6.1 If the Contractor fails to perform testing of the material in accordance with the Contractor's Division Approved Quality Control Plan, payment for the entire item shall be withheld, pending the Engineer's decision whether or not to allow the material to remain in place.

6.1.1 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.

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

RLS:Fm

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. 75mm	Daily
c. Ā for Combined Coarse Aggregates Fine Aggregates and Cement	Per section 601.3.2.4 of the Specifications
d. 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 (75 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 T 23 and MP 601.04.20. They shall be tested in accordance with AASHTO T 22 and the applicable section of the Standard 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 4.2.5 of MP 601.03.50.

8. Testing of Miscellaneous Concrete will be as specified in Section 4.2.6 and Sub-Sections 4.2.6.1 thru 4.2.6.3 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 WVDOH 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 project.

7. *State that batch tickets will conform to requirements of MP601.03.50 Section 4.3.9 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. He/She 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. He/She 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: XXXXXXX
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:

WVDOT 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

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

MATERIALS PROCEDURE

GUIDE FOR QUALITY CONTROL OF COMPACTION

1. PURPOSE

1.1 This procedure sets forth minimum guidelines for the Contractor's Quality Control (QC) Plan for embankment, subgrade, pipe and random fill used as structure backfill material and aggregate base courses. It is intended that these requirements be used as a procedural guide in detailing the inspection, sampling, and testing necessary to maintain compliance with the specification requirements.

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

2. SCOPE

2.1 This procedure is applicable to all items requiring compaction control except asphalt pavements. This outlines the QC procedures for Compaction items 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.

3. REFERENCED DOCUMENTS

a) MP 207.07.20 - Nuclear Field Density - Moisture Test for Random Material Having Less Than 40% of +3/4 Inch Material

b) MP 700.00.24 - Nuclear Density Test By The Roller Pass Methods Revised December 2008

c) MP 700.00.50 - Procedure for Monitoring the Contractor's Compaction Testing of Bituminous Concrete, Base Course, Embankment, Sub-Grade and Pipe and Structural Backfill

d) MP 712.21.26 - Procedure for Determining Random Location of Compaction Tests

e) WV Division of Highways Construction Manual, Current Edition

f) WV Division of Highways Standard Specifications, Current Edition & Supplementary

Commented [DB1]: MP 717.04.21 Guide for Quality Control of Compaction

- Clarify reference to Table E in Section 5.2.28
- Clarify language in Section 5.4.2 requiring submission of a Master Compaction QC Plan.
- Consider rewording awkward formulation in Section 6.3, possibly mirroring corresponding language in other MPs. For example, MP 601.03.50 or MP 307.00.50.

4. GENERAL REQUIREMENTS

4.1 The Contractor shall provide and maintain a QC system that will provide assurance that all materials submitted to the Division for acceptance will conform to the contract requirements whether natural, manufactured or processed by the Contractor, or procured from suppliers. The QC Plan should clearly describe the methods by which the QC Program will be conducted. For example, the items to be controlled, tests to be performed, testing frequencies, sampling locations and techniques all should be included etc. Each item should be listed separately.

4.1.1 A detailed plan of action regarding disposition of non-specification material shall be included. Such a plan shall provide for immediate notification of the Division in the event of a non-conforming situation or instance.

4.2 Inspection and testing records shall be maintained, kept current, and made available for review by the Engineer throughout the life of the contract. All other documentation, such as date of inspections, tests performed, temperature measurements, and any accuracy, calibration, or re-calibration checks performed on production or testing equipment shall be recorded and kept.

4.3 The Contractor shall maintain standard calibrated equipment and qualified personnel in accordance with the contract and Specification requirements for the applicable material.

5. QUALITY CONTROL PLAN

5.1 The Contractor shall prepare a QC Plan detailing the type and frequency of inspection, sampling, and testing necessary to measure and control the compaction 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. QC sampling and testing performed by the Contractor may be utilized by the Division for acceptance.

5.1.1 A QC Plan shall 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 as listed in section 5.2 thru 5.4.5.2.

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 QC PLAN MINIMUM REQUIREMENTS

5.2.1 The QC Plan should be on Company Letterhead, be addressed to the District which it pertains, and include the items to be controlled. An example/template is provided in **Attachment 1**.

5.2.2 Provide the name of the Person who is responsible for the Company's QC program and will be liaison with the Division's personnel.

5.2.3 List all inspectors' names performing compaction tests on the project and their date becoming a Certified Soils Compaction Inspector as per WVDOH Specification Section 106 Control of Materials.

5.2.4 Compaction field tests will be performed according to MP 207.07.20, MP 700.00.24, and Standard Specification 716.32.3

5.2.5 Soft shale tests are to be done as per Section 716 of the Standard Specifications.

5.2.6 Specify in the plan the methods by which each item will be tested. Table A and Table B summarizes the different materials, minimum frequencies, and the appropriate test procedure or method for controlling each material.

Table A- COMPACTION CONTROL OF AGGREGATE BASE COURSES

TEST PROCEDURE	LOT SIZE	NUMBER OF TEST	MATERIAL TYPE			
			PORTLAND CEMENT TREATED AGGREGATE BASE COURSE	CRUSHED AGGREGATE BASES AND SUBBASE COURSES	HOT-MIX HOT-LAID BITUMINOUS TREATED BASE COURSE	SOIL CEMENT BASE COURSE
MP 700.00.24	2000 FEET	1 PER SUBLOT 5 PER LOT	X	X	X	
MP 207.07.20	2000 FEET	1 PER SUBLOT 5 PER LOT				X

Table B - COMPACTION CONTROL OF EMBANKMENT BACKFILL AND SUBGRADE

TEST	**LOT SIZE**	**NUMBER OF TESTS**	**MATERIAL WITH LESS THAN 40% RETAINED ON ¾" (19.0 mm) SIEVE**	**MATERIAL WITH 40% OR MORE RETAINED ON ¾" (19.0 mm) SIEVE AND CAN BE PLACED IN A 12" (300 mm) LOOSE LIFT OR LESS**		**MATERIAL THAT CAN BE PLACED IN A LOOSE LIFT GREATER THAN 12" (300 mm)**		**GRANULAR SUBGRADE**	**SELECT MATERIAL FOR BACKFILLING AND CLASS 1 AGGREGATE**
				UNIFORM	NON-UNIFORM	ROCK	HARD SHALE		
MP 207.07.20	SEE STD. SPECS.	1 PER SUBLOT 5 PER LOT	X						

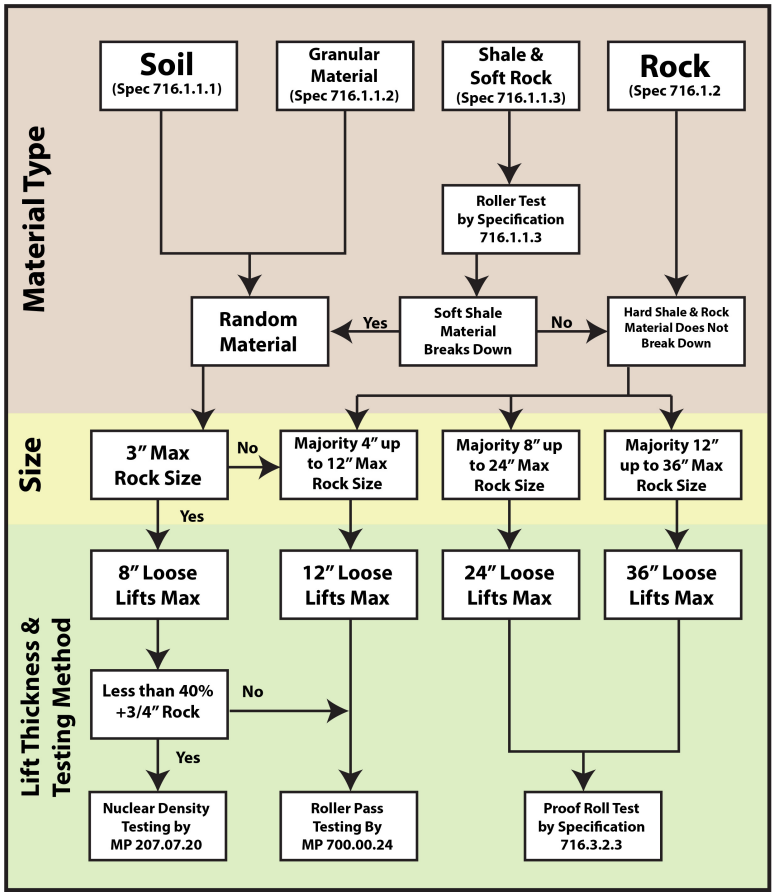
MP 700.00.24	SEE STD. SPECS.	1 PER SUBLOT, 5 PER LOT		X [1]	X [1]. [2]			X	X
PROOF Rolling		1 REPORT PER LIFT				X	X		

1. If a hole for a direct transmission density reading cannot be readily made due to the coarse material, proof roll the lift.

2. If density readings are varying above 105 percent or below 95 percent and the material appears to be non-uniform, proof roll the lift.

5.2.7 A flow chart for embankment material, Table C, shall serve as a guide for identifying material types, maximum rock size, lift thickness and compaction test method. This table shall be included in the QC Plan for making field decisions to ensure that each type of material is properly placed and compacted.

Table C – Guide for Quality Control of Embankment Material



5.2.8 The plan shall include a statement that all necessary testing equipment will be provided to perform the procedures MP 700.00.24, MP 207.07.20, and Specification 716.3.2 and lists the required testing equipment for compaction tests. The plan shall list the make and model of equipment for proof rolling and its weight per Specification 716.3.2. The plan shall list the make and model and operating weight of the roller(s) to be used for the soft shale tests and per Specification 716.1.1.3.

5.2.9 List the type of gauge to be used (…i.e., Troxler 3430, etc). The calibration frequency must be acceptable to the Division. Gauges must be calibrated as per the manufacturer's requirements. This information shall be given to the Division upon their request.

5.2.10 If applicable, outline the procedure for performing a stability check on gauges that are not within the tolerance range for standard counts during the interval between calibrations. Standard counts derived during the stability check for stable gauges may be used in lieu of the manufacturer's standards. Gauges found to be unstable cannot be used until repaired and calibrated.

5.2.11 Include in the plan the lot and sublot sizes to be used for testing each type of installation. During construction, some flexibility in lot sizes may be made if the situation warrants in order to maintain a workable system. For example, two or more areas containing small quantities of embankment material might be combined into one lot at the Contractor's option and subject to the Division's approval.

5.2.12 Specify the maximum time period for completion of a lot of embankment material. As a guide, if the desired lot size cannot be obtained within seven calendar days, then the material placed up to that time would constitute the lot and the specified number of tests for a lot would still be performed.

5.2.13 Specify in the plan when quality control tests for base and subgrade will be performed. QC tests are to be performed after the material has been shaped and final rolling has been completed.

5.2.14 The Contractor is responsible for the accuracy of their individual testing and calculations.

5.2.15 List the forms and method of distribution for tests and measurements.

5.2.16 Compaction test results are reported on forms specified in MP 207.07.20 and MP 700.00.24. The forms are supplied by the Division and available on the MCS&T Webpage[1]. Each form consists of an original and one copy. The original of a completed form is submitted to the Division's project supervisor and the other copy is for the Contractor's records.

5.2.17 Indicate the length of time after tests and measurements are completed that documentation will be provided.

5.2.17.1 Test results and measurements are made available to project personnel for review on a daily basis. Formal submission of measurements should be made within 24 hours after the measurements are taken and test results within 24 hours after testing of a lot is completed.

5.2.17.2 Tests performed in a lot before final rolling is completed should be submitted to the Project Supervisor and retained in the project files. This includes test documents for failing lots and moisture checks.

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

5.2.18 List the compaction equipment giving the quantity, make, model, and weight or applied force at which each roller will be operated. If ballast will be added to a roller, indicate the type and quantity of ballast and the method for verifying the gross weight. Attach the manufacturer's specifications for compaction capabilities for each roller to the plan or state the procedure for verifying the compaction capabilities of each roller in cases where the manufacturer's specifications are not available. This equipment shall meet the requirements as per 207.7.5 of the Standards Specifications.

5.2.19 Indicate in the plan that a minimum of a 10-ton (9.07 Mg) roller will be used for testing as per MP 700.00.24 for soil and granular material only.

5.2.20 Rollers used to breakdown soft shale shall be in accordance with 716.1.1.3 of the Standard Specifications and shall have a minimum of 1.5 tons per linear foot of roller or drum.

5.2.21 Specify the method by which proof rolling will be conducted on embankment materials. The materials to be proof rolled are summarized in Table B in Section 5.2.6.

5.2.22 List the number of passes to be made and corrective measures if soft areas are detected. Documentation should include the type of material, number of passes, and corrective action if soft areas are detected.

5.2.23 For equipment used for proof rolling explain how the gross weight will be determined for any ballast added to the operating weight. For alternate proof rollers, attach to the QC Plan the calculations used to determine that the roller meets specifications. Also, attach the manufacturer's specifications for all proof rollers to the Plan. The following calculation is used to determine if an alternate proof roller meets specifications:

ENGLISH Metric

$$c = \frac{\sqrt{(ab\pi)}}{2} \qquad c = \frac{\sqrt{(ab\pi)}}{50.8}$$

Where:

a = weight (force) on a single tire = pounds (kg x .009807 = kN)
b = operating tire pressure = psi (kPa)
c = weight (force) per inch (mm) width of tire = pounds per inch (Nm)
The weight (force) per inch (mm) width of tire must be equal to or greater than 1315 pounds (9.067 kN/mm).

5.2.24 Outline the procedure for notifying the Division when the test section in MP 700.00.24 will be performed. The Division should be notified a minimum of 24 hours in advance unless other arrangements acceptable to the Division can be made.

5.2.25 Laboratory testing for random material is not required unless the material has unusual characteristics or differs from the soil and rock data used to develop the design. Testing to develop density curves, specific gravities, organic content, etc. may be required.

5.2.26 A list of test procedures is contained in Section 716 of the WVDOH Standard Specifications as a guideline for required testing should the need arise for random material.

5.2.27 Design a plan of action for the disposition of non-specification material, such as material with excessive moisture, excessive organic content, etc. These materials shall be stockpiled away from the embankment or fill placement areas. The Project Supervisor should be immediately notified in the event a nonconformance situation is detected.

5.2.28 List the method(s) and frequencies per Table E (attached) by which lift thickness measurements will be taken. If surveying of compacted lifts is not utilized, then the maximum loose lifts per Table C shall be measured.

5.3 TYPES OF QC PLAN

5.3.1 QC Plans which are intended for use on more than one project shall be defined as Master QC Plans. Section 5.4 outlines the procedures for Master QC Plan submittal and approval.

5.3.2 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 name/description, CID#, Federal and/or State Project Number.

5.3.3 A contractor may submit a Master QC Plan for field operations instead of a Project Specific QC Plan.

5.3.4 Once any QC Plan is approved for a project, the key date shall be entered in ASSHTOWare software 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.

5.4 MASTER QUALITY CONTROL PLAN

5.4.1 The intent of Master QC Plans is to facilitate the approval process in a more uniform manner. A Master QC Plan can be submitted to the Division/District by the Contractor when their work in a given District is routinely repetitive for the year. The Master Quality Control Plan is applicable for only the calendar year for which it has been approved.

5.4.2 The Contractor shall submit the Master Compaction QC Plan yearly to each District in which they have work in. If the Contractor does not have work in a given District for the year then no Master QC Plan shall be submitted to that District.

5.4.3 The District will review the submitted Master QC Plan and assign a laboratory reference number upon approval for future referencing. The District will acknowledge approval of Master QC Plan to the Contractor by letter (see **Attachment #2** for an example), which will include the laboratory reference number and a copy of the approved Master QC Plan attached. This will then be scanned and placed in ProjectWise under the appropriate District's Org for that Contractor.

5.4.4 Once a project has been awarded, if a contractor elects to use the approved Master Compaction QC Plan on that project, the Contractor shall submit a letter requesting to use the Master QC Plan for that project. This letter must be on the Contractor's letterhead, be addressed to the District Engineer/Manager or their designee, and contain the following information: project number, CID#, project name/ description, type of Quality Control Plan and the laboratory reference number for the Master QC Plan (See **Attachment #3** for an example).

5.4.5 The District shall review the referenced Master QC Plan to ensure that it covers all items in the project. If the referenced Master QC Plan is found to be insufficient for some items on the project, the District shall request the Contractor to submit additional information for QC of those items as an addendum on a project specific basis. When the District is satisfied with the QC Plan for this project, a letter shall be sent to the Contractor acknowledging approval (see **Attachment #4** for an example), with the following attached: the Contractor's project QC Plan request letter and the Master QCP approval letter. This shall then be placed in the project's incoming-mail mailbox in ProjectWise.

5.4.5.1 A Master QC Plan that has been approved for project use shall be acceptable for the duration of that project, even if that project continues into subsequent calendar years, unless otherwise directed by the District.

5.4.5.2 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. (i.e., WVDOT ORGS > District Organization #> Materials > Year>Master QC Plans…)

6. CERTIFICATION & ACCEPTANCE SAMPLING AND TESTING

6.1 The Contractor shall certify that compaction testing and sampling is in conformance with the approved QC plan, referenced MP's and referenced Standard Specifications in a letter format on the company's letterhead. The certification shall summarize what materials where encountered and the compaction method/lift

thickness utilized. The letter shall state whether any deviations from the requirements of the QC plan, MP's, and Standard Specifications exist, and why.

6.2 Acceptance sampling and testing is the responsibility of the Division. QC tests by the Contractor may be used for acceptance.

6.3 The Division shall sample and test for applicable items completely independent of the contractor at a frequency equal but not limited to approximately ten (10) percent of the frequency for testing given in the approved Quality Control 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.

6.4 MP 700.00.50, MP 207.07.20, and Standard Specification 716.3.2.3 outlines the procedures to be followed for acceptance of compaction testing.

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 entire untested material shall be withheld, pending the Engineer's decision whether or not to allow the material to remain in place.

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.

7.1.1.1 If there is no material cost, the deduction shall be assessed on the tonnage of material that was failed to be tested via a District Materials Inspection Report (DMIR).

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

RLS : Bbe

Attachments

ATTACHMENT 1 - EXAMPLE GUIDE FOR COMPACTION QUALITY CONTROL PLAN

The Acme Company
20 First St.
Somewhere, WV XXXXXXX

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

RE: (YEAR) Master Compaction QC Plan
DISTRICT: _____

Dear Mr./Ms/Mrs. _____

We are submitting our Compaction Quality Control Plan for field control, developed in accordance with sections 716 and 717 of the (year) WVDOH Standards and Specifications, (year) WVDOH Supplemental specifications, MP 700.0024, MP 207.07.20, MP 712.21.26 and MP 700.00.50.

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

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

2.) Specify the methods by which each item will be tested .(IE.. 207,307…etc). Table A and Table B (attached) summarizes the different materials, minimum frequencies, and the appropriate test procedure or method for controlling each material. A flow chart for embankment material, Table C (attached), is intended to serve as a guide for making field decisions to insure that each type of material is properly placed.

3.) Testing Equipment used will be as required in MP 700.00.24 and MP 207.07.20.

4.) Type of gauge to be used (IE…. Troxler 3430, etc). State that calibration information is available upon request by the Division/District.

5.) Outline the procedure for performing a stability check on nuclear gauges which are not within the tolerance range for standard counts during the interval between calibrations. Gauges found to be unstable cannot be used until repaired and calibrated.

6.) Include in the plan the lot and sublot sizes to be used for testing each type of installation.

7.) Specify the maximum time period for completion of a lot of embankment material.

8.) Specify in the plan when quality control tests for base and subgrade will be performed.

9.) List the forms and method of distribution for tests and measurements. (The forms are specified in MP 207.02.20 and MP 700.00.24.) State that test results will be made available to WVDOH personnel on a daily basis.

10.) List the compaction equipment giving the quantity, make, model, and weight or applied force at which each roller will be operated. If ballast will be added to a roller, indicate the type and quantity of ballast and the method for verifying the gross weight. Attach the manufacturer's specifications for compaction capabilities for each roller to the plan or state the procedure for verifying the compaction capabilities of each roller in cases where the manufacturer's specifications are not available.

11.) Indicate in the plan that a minimum of a 10 ton (9.07 Mg) roller will be used for testing as per 700.00.24.

12.) Indicate in the plan that when shale materials are encountered, the shale hardness test will be performed to determine if material is a soft shale as per 716.1.1.3 of the WVDOH Standards and Specifications.

13.) Specify the method by which proof rolling will be conducted on embankment materials. The materials to be proof rolled are summarized in Table B (attached).

14.) Laboratory testing for random material is not required unless the material has unusual characteristics or differs from the soil and rock data used to develop the design. Testing to develop density curves, specific gravities, organic content, etc. may be required. The Yearly Quality Control Plan should state that these additional tests must be performed by qualified Aggregate testing personnel as per as per WVDOH Specification Section 106 Control of Materials.

15.) Design a plan of action for the disposition of non-specification material.

16.) List the method(s) and frequencies by which the lift thickness measurements will be taken.

Very Truly Yours,

_____
Title

ATTACHMENT 2

**** WVDOH LETTERHEAD ****

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

RE: Compaction Master QCP
Description: 20XX Year

Dear Mr./Ms/Mrs. _____,

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

- 207001-001 Unclassified Excavation		- 207002-001 Subgrade
- 211-001	- 307001 Items	- 604 items
- 212 Items	- 605 items	-etc….

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

Very Truly Yours,

_____
Title

ATTACHMENT 3

The ACME COMPANY
20 First St.
Somewhere, WV XXXXX

********** **EXAMPLE** **********

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

RE: Compaction Quality Control plan
for Field ---- Project

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

Dear Mr./Ms/Mrs. _____,

We would like to use our approved Yearly Master Quality Control Plan, reference number _____ for the project referenced above. All Compaction items on the referenced project are covered by the Master Quality Control Plan.

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

Very Truly Yours,

_____
Title

ATTACHMENT 4

**** WVDOH LETTERHEAD ****

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

RE: Compaction QC Plan
Project CID#: ########
Fed/State Project #: NHPP- ## - ####.##
Description: Falling Slide
County : XXXXXXX

Dear Mr./Ms/Mrs. _____,

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

- 207001-001 Unclassified Excavation - 207002-001 Subgrade
- 307001 Items - 604 items - 212 Items -etc….

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

For Division/District
The Master Quality Control Plan can be reviewed in ProjectWise folder shown below:

WVDOTORG> D0# > year > MASTERQCPLANS > Contractors >Contractor Name >
Name of Quality Control Plan

Very Truly Yours,

_____
Title

WEST VIRGINIA TECHNICIAN_INSPECTOR CERTIFICATION PROGRAM HANDBOOK

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Welcome to the West Virginia Department of Transportation Inspector Training Certification Program (TICP). The purpose of the West Virginia Division of Highways (WVDOH) Technician and Inspector Certification Program is to improve the quality assurance of embankments, subgrades, base course, asphalt and Portland cement concrete by the certification of industry and Division of Highways personnel. This document is to establish guidelines for this purpose.

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

This document, along with MP 106.03.50, is applicable to all requirements, guidelines, and other support documents of the Division of Highways that reference conditions, methods, and levels of qualification specific to the Division of Highways training and certification program.

There are often changes and additions to the TICP, so please, thoroughly review this document as well as the Materials Division Website to find out about any changes that may pertain to you

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CERTIFICATION BOARD

As per MP 106.03.50 the certification board members shall be as follows:

State Highway Engineer
Human Resources Director
Materials Control Soils & Testing Director
Quality Assurance Training Program Administrator
Applicable Materials Control Soils and Testing Group Supervisor's

Application and Sign-Up Instructions
For sign-up instructions, please visit the WVDOH MCST Webpage[1] for Instructions:

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

CERTIFICATIONS

The TICP offers certification classes in the following disciplines:

Portland Cement Concrete Inspector
Portland Cement Concrete Technician
Aggregate Sampling
Aggregate Technician
Soils & Aggregate Compaction Technician
Asphalt Field & Compaction Technician
Asphalt Plant Technician

ALL CERTIFICATIONS ARE VALID FOR A THREE-YEAR PERIOD

CLASS SUPPLY LIST

We recommend that participants bring the following items with them to the certification classes.

1) **Laptop Computer or Tablet (Mandatory)**
2) **Photo ID**
3) **Current WV specification book and the latest supplemental to the specification book. You will need this during the test. These are also available in printable PDF format on the WVDOH Webpage.[2]**
4) **Hand held calculator**
   (No electronic devices other than a Hand held calculators are allowed to be used during testing.)
5) **2 -#2 Pencils**
6) **Hi-lighters**
7) **Sticky Notes**
8) **Ruler / Straight edge**

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SPECIAL NEEDS AND REQUESTS

Applicants with special needs should notify the Training Certification Program coordinator prior to the class to insure that the training location is prepared to accommodate their needs.

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

RECIPROCAL CERTIFICATIONS

The West Virginia Division of Highways may recognize reciprocity certifications from other states. Please see M.P 106.03.51 for detailed instructions. M.P. 106.03.51

American Concrete Institute (ACI) Field Testing Grade I certification will be accepted as a portion of the West Virginia PCC Inspector training. However, the applicant must pass the online West Virginia PCC. Inspector written certification test before a certification will be issued.

Acceptance of WVDOT Certifications by other state agencies is at the sole discretion of the other agency.

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.

The purpose of the schools is to provide helpful information and instruction for persons preparing to take the technician/inspector examinations. These courses are designed to provide instruction for persons with a basic foundation in the subject matter.

CERTIFICATIONS

All certifications listed in the sections below require written examinations. Some of the listed certifications require a practical examination after successful completion of the written examination. It is the responsibility of the applicant to determine which certification is applicable to his/her assignment. Following is a description of the certifications listing relevant information about each:

AGGREGATE CERTIFICATIONS

Aggregate Technician - The written examination for an Aggregate Inspector consists of the following areas:

- Specifications
- Aggregate Specifications and Procedures
- Aggregate Fundamentals
- Sampling, Control, and Inspection of Aggregates
- Aggregate Testing

After successful completion of the written examination, the applicant will be required to pass a practical examination consisting of his/her demonstration of testing common to normal aggregate quality requirements. Certification as an Aggregate Inspector qualifies the employee, either Industry or Division, to perform sampling and/or testing of aggregates relevant to the quality control program or acceptance program respectively.

Aggregate Sampling

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

- Specifications
- Sampling Fundamentals
- Sampling Methods and Equipment
- Gradations
- T11 Wash Test

The Aggregate Sampling Inspector requires the successful completion of the examination. Certification as an Aggregate Sampling Inspector qualifies the employee, either Industry or Division, to perform sampling of aggregates relevant to the quality control program or acceptance program respectively.

The Aggregate Sampling Inspector certification examination must be re-taken every year in order to keep the certification. The test will be available online throughout the year, but may only be attempted two twice per year. A score of 70 is required for passing.

Why is the AGG SAMPLING cert have to be retaken every year? Also, I thought Gradations and T11 test was more for Agg. Tech, not Agg Sampler.

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COMPACTION CERTIFICATIONS

Soils & Aggregate Compaction Technician (SACT) - The written examination for the Soils & Aggregate Compaction Technician consists of the following areas:

- Specifications
- Compaction Test Procedures
- Radiation Safety and Nuclear Gauge
- Test Procedure Problems

After successful completion of the written examination, the applicant will be required to pass a practical examination demonstrating his/her proficiency in using the testing equipment. Certification of the Compaction Technician qualifies the employee, either Industry or Division, to conduct tests on all soil construction materials that require compaction testing.

Asphalt & Field Compaction Technician (AFCT) – The written examination for the Asphalt & Field Compaction Technician consists of the following areas:

- Specs
- Compaction Test Procedures
- Rad Safety
- Test Procedures
- Etc.

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CONCRETE CERTIFICATIONS

Concrete Technician

The written examination for a Concrete Technician consists of the following areas:

- Specifications
- Fundamentals
- Sampling and Testing
- Control and Inspection
- Mix Proportioning and Adjustment

The Concrete Technician requires only the successful completion of the written examination; no practical examination is required. Certification of the Concrete Technician qualifies the employee, either Industry or Division, to make plant and mix adjustments, proportioning, and other duties.

Concrete Inspector

The written examination for a Concrete Inspector consists of the following areas:

- Specifications
- Fundamentals
- Sampling and Testing

- Control and Inspection
- Specifications

After successful completion of the written examination, the applicant will be required to pass a practical examination demonstrating his/her proficiency in conducting tests common to concrete quality control. Certification as a Concrete Inspector qualifies the employee, either Industry or Division, to perform sampling and/or testing of concrete relevant to the quality control program or acceptance program respectively.

ASPHALT MIXTURE CERTIFICATIONS

Asphalt Plant Technician

The written examination for the Asphalt Plant Technician consists of the following areas:

- Specifications
- Fundamentals
- Sampling and Testing
- Control and Inspection
- Mix Proportioning and Adjustment

After successful completion of the written examination, the applicant will be required to pass a practical examination demonstrating their proficiency in conducting tests common to Asphalt quality control. Certification of the Asphalt Technician qualifies the employee, either Industry or Division, to take asphalt mixture samples, perform quality control or quality assurance testing on plant produced asphalt mixture, make plant and mix adjustments, aggregate proportioning, and other duties.

EXAMINATIONS

All participants shall be required to furnish their own laptop or tablet to take the final course exams. Examinations, both written and practical, will be coordinated by the Materials Control, Soils & Testing Division of the Division of Highways. The locations and dates of the examinations will be announced at least four weeks prior to being given. The examinations may be held on a regional basis when feasible. All written examinations will be a one-part, 'open-book' type, with a time limit. If the applicant does not pass the examination the first time, a re-test may be attempted. If the re-test examination is not passed, the applicant may not take another test in the same calendar year without first attending the certification school. Practical examinations require performance of the tests required by the specifications for the material type involved.

There will be a minimum two written examinations per certification topic.

After the applicant passes the written examination, they will be granted two attempts within a 12-month calendar year to pass the practical exam. All practical examinations are pass / fail. If an applicant fails the practical, the applicant may not take another practical test in the same calendar year without first attending the certification school.

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For example:
1. Next regularly scheduled test session shown on the certification calendar
2. Same day

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COURSE PRE-REQUISITES

It is highly recommended that courses be attended in sequence, with all pre-requisites fulfilled, before the applicant attends the next course in a series.

RECOMMENDED PRE-REQUISITES AND CLASS ORDER

AGGREGATE PATH		COMPACTION PATH		PORTLAND CEMENT CONCRETE PATH		ASPHALT PATH
Aggregate Sampling		Aggregate Sampling on-line		Aggregate Sampling on-line		Aggregate Sampling on-line
Accuplacer Arithmetic Score of 40+		Accuplacer Arithmetic Score of 40+		Accuplacer Arithmetic Score of 40+ (PCC Inspector)		Accuplacer Arithmetic Score of 40+
				level math class (PCC Technician)		
Aggregate Technician		Soils and Aggregate Compaction Technician		[2] PCC Inspector		Asphalt Field & Compaction Technician
				PCC Technician		OR
						Asphalt Plant Technician

**** It is highly recommended that Agg. Sampling & Agg. Tech. are taken before any other certification classes**

[2] PCC. Inspector should be taken before PCC. Technician.

[3] MATH 115 or a college level (100 level) math class should be taken before PCC Technician.

The Aggregate Sampling is an online class. The class can only be attempted two times per year. In order to keep the certification the aggregate sampling class must be taken every three years and a score of 70% is required for passing.

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CERTIFICATION AND RECERTIFICATION

Certification

An individual must pass the examination in each level for which they are requesting certification. Unless otherwise noted, to pass the written examinations, the applicant must obtain minimum score of 70 percent. If an applicant fails to receive a minimum score of 70% on the first exam, they will be given another attempt to score a 70%. If they fail to receive a 70% on the second exam attempt, they may not take another exam for the respective certification without first taking the respective certification class.

Upon successfully completing the requirements for certification, the applicant may print their certification card from the divisions web-site. http://dotftp.wv.gov/materialsdir/

This certification is not transferable. A certification shall be valid for *Three* years and expire December 31, of the 3rd year of certification.

The renewal of all certifications shall require a written exam and a hand on practical exam, where applicable. All applicants are also required to be actively working in the field for which they are seeking to be re-certified.

During the 3-year period the technician should be able to provide documentation of testing.

Re-Certification

Applicants will be given one attempt to pass a recertification exam and practical exam. Any applicant that fails to acquire a minimum score of 70% on a re-certification exam will not have their certification renewed. The applicant may not take another certification exam without first taking the respective certification class.

The certification holder shall be responsible updating their personal information on the online learning website. http://www.onlinelearning.wv.gov/student/home.html

Certification holders shall be responsible to ensure that their certifications stay current. The West Virginia Division of highways will no longer mail reminder letters to certification holders.

If an applicant seeking recertification disagrees with a recertification decision, they may file a written appeal with the board. (See Appealing a Decision).

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TESTING PROTOCOL

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.

I.A. PROFICIENCY TESTING

Requirements are under review and will be posted as they become available.

REVOCATION OF CERTIFICATION

WVDOT TICP grants certification upon satisfactory completion and maintenance of certain conditions and may be revoked upon any breach of these conditions. 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 are, but not limited to:

- Deliberate falsification of field or quality control test results or records.

- Deliberate falsification of calculations, test results or materials
- Cheating on certification exams or performance evaluations.

- Submittal of false information on certification applications.

- 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.

The Program Administrator will take the lead in gathering facts and investigating any allegations which may require revocation of a certification. The review board will notify the individual in writing of intent to revoke certification(s).

Appealing a Decision

Any individual who disagrees with a decision by the 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.

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

Not later than 20 business days after receiving a request for a meeting from the individual, the board will schedule a meeting in which the individual can present their case. If the board was not persuaded by the documentation provided by the individual and the board continues to believe that revocation of the certification is warranted, the individual may file a written appeal to the State Highway Engineer for review. All information including any letter(s) of explanation from the individual will accompany the documents submitted to the State Highway Engineer. The board will mail the decision of the State Highway Engineer for or against revocation of certification to the individual concerned. The decision by the state highway engineer is final.

The length of revocation shall be as follows:

First Offense

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.).

Second Offense

This may include revocation of all certifications for up to for five years. There is also the possibility of demotion and reduced pay. After the revocation period the individual may obtain recertification by passing respective certification exam and a practical (if applicable.)

Third Offense

This may include revocation of all certifications for life. There is also the possibility of termination, demotion and reduced pay.

Contact Information

If you have any questions about our program or need more information. Please contact; Qaschoolscoordinator@wv.gov

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Page 12: [1] Deleted **Dan Brayack** **10/27/20 7:40:00 AM**

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

MATERIALS PROCEDURE

AGGREGATE SAMPLING PROCEDURES

1. PURPOSE

1.1 To provide a uniform procedure for obtaining aggregate samples.

2. SCOPE

2.1 This procedure shall apply to the following:

(a) Process Control sampling by the Contractor.

(b) Acceptance Sampling by the Division.

(c) Independent Assurance Sampling by the Division.

(d) Record Sampling by the Division.

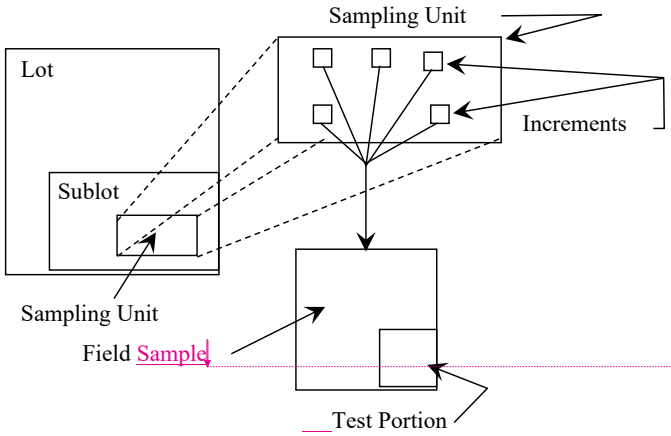
3. GENERAL

3.1 Taking a good sample is just as important as conducting a good test. The sampler must use every precaution to obtain samples that will show the true nature and condition of the material they represent.

3.2 Most aggregates are mixtures of various particle sizes, which tend to separate, or segregate, during transporting or stockpiling. For this reason, aggregate samples should be obtained at the last practical point before the material is incorporated into the finished product or before compaction.

3.3 Frequency of sampling will be in accordance with the applicable directives for the type sample being procured.

4. DEFINITION OF TERMS



4.1 Lot: The quantity of material represented by an average test value, not to exceed five individual test values, calculated in accordance with MP 300.00.51.

4.2 Sublot: The quantity of material represented by a single test value. In the case where only one sample is needed for the total plan quantity, the sublot may be considered the Lot.

4.3 Sampling Unit: The quantity of material within the sublot from which increments are obtained to be combined into a field sample.

4.4 Increment: The portion of material removed from the sampling unit to be combined into a field sample.

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4.5 Field Sample: A composite of increments.

4.6 Test Portion: The material split from the field sample to be used in performing a specific test.

4.7 Random Location: A location whose position depends entirely on chance. In other words, one location has as good a chance being selected as any other.

5. CONTRACTOR RESPONSIBILITY

5.1 The Contractor shall provide all reasonable facilities and furnish the Division the information, assistance and samples required by the Engineer and Inspector for proper inspecting or testing of materials and workmanship.

Deleted: The Contractor shall provide suitable equipment needed for proper inspection and sampling, including required access and any special equipment necessary to comply with the appropriate sampling techniques outlined herein. (See Section 105.5 (5th Paragraph) and Section 105.11 (1st Paragraph) of the 2000 Standard Specifications for Roads and Bridges.)…

5.2 All materials and each part or detail of the work shall be subject to inspection by the Engineer. The Engineer or a representative shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection. To facilitate the inspection of materials, all delivery tickets shall contain as a minimum the information required in MP 700.00.01.

6. SAMPLING PROCEDURES

6.1 There are four general areas from which aggregate samples are usually obtained. These include (1) Sampling from the roadway after the aggregate has been placed, but prior to compaction, (2) Sampling from a conveyor belt, (3) Sampling from a flowing stream of aggregate, and (4) Sampling from stockpiles.

6.1.1 Sampling from the roadway (e.g., bases and subbases)

The first step in obtaining a roadway sample is to locate the sublot. This is usually the quantity of material that will be represented by the one sample and is defined as a section of roadway of given width and length.

The next step is to randomly locate a sampling unit within the sublot. A sampling unit is defined as an area having dimensions of approximately12 feet by 12 feet, or an area of approximately 144 square feet in locations having any dimension less than 12 feet. Locating the sampling unit is accomplished by use of

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random numbers contained in Attachment I. Any pair of numbers (decimals) may be used to locate a sampling unit within the sublot. To locate the sampling unit in a sublot defined by area, the length of the area, in feet, is multiplied by one decimal of the pair, and width is multiplied by the other decimal. The resulting distances are to be measured from one end and one side of the area.

For example, a sublot of material consists of base course aggregate 26 feet wide from Station 956+00 to 965+00. The total length in feet is thus 96,500 minus 95,600, or 900 feet. A pencil tossed on Attachment I points to the pair of decimals 0.115 and 0.447. To locate the sampling unit, the first decimal is multiplied by the length of the sublot, and the companion decimal is multiplied by the width. The length value will be measured from Station 956+00 and the width value from the left-hand edge of the base. Thus, 900 multiplied 0.115 equals 104, and 26 multiplied by 0.447 equals 12, so the sampling unit would be located at Station 956+00 plus 1+04, or 957+04 at 12 feet from the left edge. This point could define the center or any corner of the sampling unit. If we use the center, a 12-foot by 12-foot sampling unit would fall between Stations 956+98 and 957+10 with longitudinal boundaries at 6 feet and 18 feet from the left edge of the base.

Five approximately equal increments are then located within the sampling unit. This is also best accomplished by means of the random numbers in Attachment 1. Procedures to follow are essentially the same as those set forth for locating the sample unit. The five increments are taken from the sampling unit and combined to form a field sample whose weight equals or exceeds the minimum recommended in Table 1. All increments shall be taken from the roadway for the full depth of the material being sampled, care being taken to exclude any foreign material which may have been incorporated during the normal construction process. The specific areas from which each increment is to be removed shall be clearly marked; a metal template placed over the area is a definite aid in securing approximately equal increment weights.

6.1.2 Sampling from a Conveyor Belt

The first step in obtaining a sample from the conveyor belt is to define the sublot. This is generally defined as a unit of time, i.e., a half-day or a day's production. The next step is to randomly locate a sampling unit within the sublot. A sampling unit in this case is generally considered to be the material contained within the length of the conveyor. Locating the sampling unit is accomplished by use of the random numbers contained in Attachment I. Any number may be used to locate a sampling unit within the sublot. To locate the sampling unit in a sublot defined by time, the length of time, usually in minutes, is multiplied by the random decimal obtained from Attachment I.

For example, a sublot of material consists of concrete aggregate used in a half-day's production estimated to be between 8:00 a.m. and 12:00 noon. A pencil

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tossed on Attachment I points to decimal 0.279. Thus, the sampling unit would be located somewhere within the four-hour period (8:00 a.m. to 12:00 noon). Four (hours) multiplied by 60 (minutes per hour) multiplied by 0.279 equals 67 minutes. The sampling unit would be located 67 minutes after the 8:00 a.m. startup; or at 9:07 a.m. (or as soon thereafter as practical).

Five randomly located, approximately equal increments are obtained from the sampling unit and combined to form a field sample whose weight equals or exceeds the minimum recommended in Table 1. The location of the five increments is determined by multiplying the length of the belt by five random numbers. The conveyor belt is stopped while the increments are being obtained. Two templates, conforming to the shape of the belt and spaced such that the material contained between them will yield an increment of the required size, are inserted into the aggregate stream on the belt. All material between the templates is carefully scooped into a suitable container, including all fines on the belt collected with a brush and dustpan.

6.1.3 Sampling from a Flowing Aggregate Stream (bin or belt discharge).

Definition of the sublot and location of the sampling unit is generally identical with sampling from a conveyor belt, with the exception that the sampling unit in this case is defined as that material which will flow during a five-minute period. Once the sampling unit is located, five approximately equal increments, randomly spaced, are obtained and combined to form a field sample whose weight equals or exceeds the minimum recommended in Table 1. Each increment is taken from the entire cross-section of the material as it is being discharged. It is usually necessary to have a special device constructed for use at each individual plant. This device will consist of a pan of sufficient size to intercept the entire cross-section of the discharge stream and hold the required quantity of material. A set of rails may be necessary to support the pan as it is passed under the discharge stream. If the sampling pan overflows, it should be struck level so that only material that is within the pan is retained.

6.1.4 Sampling from a Stockpile

If possible, stockpile sampling should be avoided when sampling to determine the gradation of an aggregate. However, circumstances sometimes make it necessary, and when this occurs a sampling plan and the number of samples to be taken must be considered for each specific case. Stockpiled aggregates tend to segregate with the coarser particles rolling to the outside base of the pile, which makes gradation representation difficult. Because of this, every effort should be made to enlist the services of power equipment (such as a front-end loader) to develop a separate

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small sampling pile composed of material taken from various levels and depths in the main stockpile. Increments from this pile may be combined, thoroughly mixed, and reduced by quartering and/or sample splitter to obtain the field sample. Methods for quartering and splitting samples are given in AASHTO R76. If power equipment is not available, hand sampling may be employed to obtain at least three increments per sample: One increment taken from the top one third of the pile, one from the middle and one from the bottom third. When hand sampling, the outer layer of the pile should be removed (scraped away with the shovel) at the point prior to sampling.

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7. WEIGHTS REQUIRED

7.1 Field Sample Weights

Field sample weights as listed in Table I are minimum values. Actual weights required must be predicated on the type and number of tests to which the material is to be subjected. The amounts specified in Table I will provide adequate material for routine gradation and quality analysis.

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7.2 Test Portion Weight

The weight of the test portion to be obtained from the field sample for a specific test will be defined in the Standard Procedures of the test involved. Reduction of the field sample into test portions is done with a sample splitter. The weight of test portion recommended for gradation testing is given in Table II.

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8. TRANSPORTING SAMPLES

8.1 Testing at Site of Sampling

Samples taken for testing in the field may be placed in any suitable clean container of appropriate size which is secure enough to prevent loss of material when transporting the sample to the testing location.

8.2 Samples to be Shipped from Site of Sampling

Samples to be shipped should be placed in standard sampling sacks. If the sample contains an appreciable quantity of fine material, a plastic liner should be put in the sack to prevent loss of the fines. Each sack must be securely tied to prevent loss of material in transit. It is also essential that sample identification be maintained from the field to the testing site. Each sack must have appropriate indelible identification attached and enclosed so that field reporting, laboratory logging, and test reporting may be facilitated.

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

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Attachments

TABLE I

WEIGHT OF SAMPLES

NOMINAL MAXIMUM SIZE OF PARTICLES*		MINIMUM WEIGHT OF FIELD SAMPLES	
Sieve Size		Kilo	lb
No. 8		10	25
No. 4		10	25
3/8	in.	10	25
1/2	in.	15	35
3/4	in.	25	55
1	in.	50	110
1 1/2	in.	75	165
2	in.	100	220
2 1/2	in.	125	275
3	in.	150	330
3 1/2	in.	175	385

*The nominal maximum size of particles is defined as the largest sieve size listed in the applicable specifications upon which any material is permitted to be retained. Exception: If the specification tolerances are such that no sieve listed has a range of X-100 percent passing, then the next smallest standard sieve, as listed in Table I, and below that sieve which 100 percent must past will be considered the nominal maximum size.

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TABLE II

TEST PORTION FOR GRADATION

NOMINAL MAXIMUM SIZE OF PARTICLES	MINIMUM WEIGHT OF TEST PORTION	
Sieve Size	Kilo	lb
No. 8	0.1	0.3
No. 4	0.5	1.0
3/8 in.	1.0	2.0
1/2 in.	2.0	4.0
3/4 in.	5.0	11.0
1 in.	10.0	22.0
1 1/2 in.	15.0	33.0
2 in.	20.0	44.0
2 1/2 in.	35.0	77.0
3 in.	60.0	130.0
3 1/2 in.	100.0	220.0

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ATTACHMENT I

RANDOM NUMBERS

.858	.082	.886	.125	.263	.176	.551	.711	.355	.698
.576	.417	.242	.316	.960	.879	.444	.323	.331	.179
.587	.288	.835	.636	.596	.174	.866	.685	.066	.170
.068	.391	.139	.002	.159	.423	.629	.631	.979	.399
.140	.324	.215	.358	.663	.193	.215	.667	.627	.595
.574	.601	.623	.855	.339	.486	.065	.627	.458	.137
.966	.589	.751	.308	.025	.836	.200	.055	.510	.656
.608	.910	.944	.281	.539	.371	.217	.882	.324	.284
.215	.355	.645	.450	.719	.057	.287	.146	.135	.903
.761	.883	.711	.388	.928	.654	.815	.570	.539	.600
.869	.222	.115	.447	.658	.989	.921	.924	.560	.447
.562	.036	.302	.673	.911	.512	.972	.576	.838	.014
.481	.791	.454	.731	.770	.500	.980	.183	.385	.012
.599	.966	.356	.183	.797	.503	.180	.657	.077	.165
.464	.747	.299	.530	.675	.646	.385	.109	.780	.699
.675	.654	.221	.777	.172	.738	.324	.669	.079	.587
.269	.707	.372	.486	.340	.680	.928	.397	.337	.564
.338	.917	.942	.985	.838	.805	.278	.898	.906	.939
.130	.575	.195	.887	.142	.488	.316	.935	.403	.629
.011	.283	.762	.988	.102	.068	.902	.850	.569	.977
.683	.441	.572	.486	.732	.721	.275	.023	.088	.402
.493	.155	.530	.125	.841	.171	.794	.850	.797	.367
.059	.502	.963	.055	.128	.655	.043	.293	.792	.739
.996	.729	.370	.139	.306	.858	.183	.464	.457	.863
.240	.972	.495	.696	.350	.642	.188	.135	.470	.765

MP 604.02.40
SUPERSEDES: AUGUST 2019
REVISED: AUGUST 2020

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.

3.3 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 and Quality Control (QC) lab, meet with QC and other key personnel from the Fabricator, and sample component materials which will be used in the fabrication of precast items.

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 Any Fabricator which does not produce for the WVDOH 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 classes 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. In addition, if Self-Consolidating Concrete (SCC) is used, Fabrication Plant QC Personnel shall be a certified ACI SCC Testing Technician.

4. FABRICATION & INSPECTION OF PRODUCTS

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.

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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 6-inch by 12-inch (150 mm by 300 mm) or 4-inch by 8-inch (100 mm by 200 mm) molds. The cylinders are to be cured in the same area as the products for which they represent (Field Cured as outlined in AASHTO T23) 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 isn't to be allowed 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 AASHTO M259, or M273 (whichever is applicable) must be used until 70% of the design strength is obtained.

4.3.1 For both conventional concrete and SCC mixes, a minimum of one set of compressive strength cylinders shall be fabricated from every 7 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.

4.4 When required, absorption tests are to be conducted in accordance with ASTM C642-13, and tests should be conducted on a weekly basis for each mix design used, at a minimum, unless otherwise specified.

4.5 Unless otherwise specified, plastic concrete shall have an air content measured at 7.0 ± 2.0%.

4.5.1 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 4.5.1 - SCC Mix Design Acceptance

Fresh Property	**Mix Design Batch Acceptance Criteria**
Air Content	7.0± 1.5%
Spread (ASTM C1611)	Target ± 1.5 inches (38 mm) 2 seconds ≤T_{50}≤ 7 seconds Visual Stability Index ≤1.0
Passing Ability (ASTM C1621)	J-Ring Value ≤1 inch (25 mm)
Segregation Resistance (ASTM C1610)	Segregation ≤ 12%
Unit Weight and Yield	±2% of Theoretical

4.5.2 The following table lists the criteria for SCC production.

Table 4.5.2 - SCC Production Acceptance

Fresh Property	**Production Acceptance Criteria**
Air Content	7.0± 2.0%
Spread (ASTM C1611)	Target ± 2 inches (50 mm) 2 seconds ≤T_{50}≤ 7 seconds Visual Stability Index ≤1.0
Concrete Temperature	<90°F (32°C)
Unit Weight and Yield	±2% of Theoretical

4.5.3 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.

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 one calendar week 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 stacked in pairs vertically; the gaps between each pair will be measured, and dunnage will be placed below the bottom 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.

6.2 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 or the District for which the product was produced, as discussed further in the next sections.

6.2.1 Minor damage and/or defects may be repaired in accordance with the pre-approved repair procedures which should be incorporated within the Fabricator QC Plan. For cracks 4 mils (0.1 mm) or less a silane treatment may be used. Cracks between 4 mils (0.1 mm) and 16 mils (0.4 mm) shall be repaired by epoxy injection in accordance with Section 603.10.2. Products with cracks exceeding 16 mils (4 mm) shall be rejected by MCS&T. If repairs appear satisfactory and all other specifications are met, the Inspector shall stamp the product as approved for shipment. MCS&T Division will issue a 7-digit Laboratory Reference Number for acceptance.

6.2.2 Major damage and/or defects shall be evaluated on a case-by-case basis. If a product is approved for repair and if repairs appear satisfactory, the Inspector shall stamp the product as approved for shipment.

6.2.3 If a product does not meet specification requirements due to dimensional measurements not within tolerance, the product must be evaluated by the contractor and or District as to its potential acceptance. If the decision is made to accept the product, acceptance shall be provided by the District through a DMIR. If, however, the product will not be

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

accepted, the Inspector will reject the product, and MSC&T Division will apply a Laboratory Reference Number documenting the rejected product.

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ATTACHMENT