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

MATERIALS PROCEDURES

QUALITY ASSURANCE PROCEDURES FOR PORTLAND CEMENT CONCRETE

1. PLANT AND EQUIPMENT INSPECTION STICKERS

1.1 Physical plants and equipment, which prepare materials for, or deliver materials to, applicable projects shall be regularly inspected and approved by an authorized representative of the Division. The process for this inspection is shown in the Plant Inspection Flow Chart in Attachment 1.

1.2 The inspections and approval shall be documented on the MC-4 Form (sample show in Attachment 2 and live form available on the MCS&T webpage) and confirmed by an inspection sticker supplied by the Materials Control, Soils & Testing Division (MCS&T). The inspection sticker will indicate the following:

1. Name of inspector
2. Plant or portion thereof, or singular piece of equipment inspected.
3. Date of inspection
4. Date of expiration of approval
5. Lab Number

1.3 Inspections may be made at any time at the discretion of the Division, and the status of the inspected facility shall be determined by the latest inspection. The date of expiration of approval, as noted on latest inspection sticker, shall be the last day on which the facility is considered to be approved by Division, and such facility must have an approved status at time of preparing materials for or delivering materials to applicable projects.

1.4 The sole purpose of the inspection sticker is to inform all concerned that a plant, or portion thereof, or a singular piece of equipment has been inspected. The sticker indicates that it has been found to substantially meet all requirements of the specifications and is approved to supply materials to applicable projects. Said inspection sticker shall therefore be affixed to the equipment or displayed in other manners so that the purpose as above stated will be fulfilled.

1.5 The stickers shall be applied and each District shall maintain records of these inspections in ProjectWise. The records shall include all the items listed in 1.2.

1.6 A plant or portion thereof, or a singular piece of equipment, shall be approved for a period not to exceed six (6) months. The period of approval shall be determined, in general, by the age, physical condition, or durability of the plant or equipment, and the inspection interval shall be such that the Division will have reasonable assurance that the plant or equipment is maintained in an acceptable manner.

1.6.1 During the plant inspection, the plant must demonstrate their capability to produce an E-Ticket as defined in Section 109.20.1 of the Specifications. A sample ticket shall be provided to the inspector, and compliance with this requirement shall be documented on the MC-4 form.

1.6.2 After each time a plant has been inspected, the District shall notify the Director of MCS&T, or their designee. MCS&T will generate a list of approved plants and post these on the Division Webpage[1].

1.7 Additional information regarding inspections and a sample of an inspection sticker is contained in Attachment 3.

2. QUALITY ASSURANCE IN PORTLAND CEMENT CONCRETE

2.1 PURPOSE

The purpose of this procedure is to establish guidelines which will aid Division personnel in implementing in a prescribed and uniform manner the Division's Quality Assurance Program for portland cement concrete, said program being directed primarily to maintaining a predetermined and acceptable level of assurance that portland cement concretes do conform to their governing specification.

2.2 DEFINITION OF TERMS

2.2.1 QUALITY ASSURANCE

Quality Assurance is an expression of confidence which the Division has in its program of acceptance testing and inspection which determines conformance of materials and construction to governing specification. A Quality Assurance Program is a planned program of acceptance testing and inspection which is conducted by the Division for the express purpose of maintaining a predetermined and acceptable level of assurance that construction materials do conform to governing specifications. Part of any Quality Assurance Program, is an awareness and knowledge of the Producer's Quality Control Program and the level of Quality Control maintained by that Producer.

2.2.2 QUALITY CONTROL

Quality Control is a planned program of testing, inspection and related activities conducted by a concrete Producer for the purpose of measuring the various properties of concrete and its component materials which are governed by the specification and controlling these properties within the limits of the specification.

[1] https://transportation.wv.gov/highways/mcst/pages/default.aspx

2.3 GENERAL DISCUSSION

The Division and the Contractor-Supplier industry have jointly participated in a program whose primary objective is to improve the quality of concrete in highway construction. One of the outcomes of this program is that the Division will run a smaller risk of having non-conforming materials incorporated into the work, and the Contractor-Supplier industry will run a smaller risk of having suitable materials rejected.

The following major developments are outgrowths of the program just mentioned:

2.3.1 Portland cement concrete technician's certification is available in the Contractor-Supplier industry to implement a program of Quality Control.

2.3.2 The requirement for a Contractor (or his authorized representative, a subcontractor or a commercial supplier) to do Quality Control of portland cement concrete and to have in his service a Certified Portland Cement Concrete Technician is specified in Sub-articles 501.4.2 and 601.4.2 of the Standard Specifications.

2.3.3 The requirement for a Contractor (or his authorized representative, a subcontractor or a commercial supplier) to have a field laboratory which is equipped and maintained in specified manner so as to aid in the conduct of a Quality Control Program is specified in Sub-articles 501.5.1 and 601.5.1 of the Standard Specifications.

2.3.4 Concrete batch plants and hauling equipment are regularly inspected by the Division, and their approval as conforming to requirements of governing specification is attested to by an inspection sticker (See Section 1 of this MP for details).

2.3.5 The requirement to do concrete design, using the particular sources of materials that are to be used in the work, is specified in articles 501.3 and 601.3.1 of the Standard Specifications. This requirement allows commercial concrete suppliers to have laboratory design work done for the various classes of concrete to be supplied, and it guards against the possibility of source materials changing appreciably and affecting the quality of subsequent concrete work.

Although all producers should maintain an acceptable level of Quality Control, it is reasonable to assume that a number of producers will maintain a level of Quality Control well above the minimum accepted level.

It is generally agreed that an acceptable level of Quality Assurance may be maintained with less acceptance testing and inspection when the level of Quality Control is increased.

The capability to perform a positive and sustained level of Quality Control in practically all producer plants today is now well established. Also, the Division has the means for measuring the level of Quality Control maintained by each producing plant. Accordingly, it would be desirable to pursue a Quality Assurance Program which takes into account the level of Quality Control in a Producer's plant so that an acceptable level of Quality Assurance could be maintained with a minimum cost (man-hours and dollars) to the Department. As previously stated the purpose of this procedure is to establish guidelines which will aid Department

personnel in implementing, in a prescribed and uniform manner, such a Quality Assurance Program.

2.4 DIRECTIVE

Concrete plants will be inspected in accordance with Section 1 of this MP and the condition of conformance will be determined. Those plants which are found to conform to the specifications will be identified as Class A plants, and those which do not conform will be identified as Class B plants. The level of Quality Control at each concrete plant will also be evaluated.

Those plants which have a high level of Quality Control will be considered to have a Level 1 Quality Control, and those plants which have a lower level of Quality Control will be considered to have a Level 2. All concrete plants will then be rated with one of the following classification numbers Al, A2 or B.

2.4.1 LEVEL 1 QUALITY CONTROL

All plants producing concrete which reasonably conforms to the specification requirements, and which satisfies the following additional requirements, will be considered to have LEVEL 1 Quality Control:

2.4.1.1 The compressive strength of the concrete produced by the plant shall have a coefficient of variation of 0.15 or less and the average compressive strength shall be equal to or greater than the specified requirement plus 2 1/2 standard deviations.

2.4.1.2 The air content of the concrete produced by the plant shall have a coefficient of variation of 0.18 or less, and the average air content shall not differ from the specified optimum value by more than one standard deviation.

2.4.1.3 The consistency of the concrete produced by the plant shall have a coefficient of variation of 0.20 or less, and the average consistency shall not differ from the specified optimum value by more than two standard deviations.

2.4.1.4 The plant shall maintain an adequate Quality Control Program for aggregate gradation.

2.4.2 LEVEL 2 QUALITY CONTROL

All plants which fail to meet one or more of the requirements specified in 2.4.1 will be considered to have LEVEL 2 Quality Control.

2.4.3 PHYSICAL PLANT-EVALUATION

District personnel will inspect and evaluate concrete plants in conformance with Section 1 of this MP. A copy of the inspection data, which is specified in Subsection 1.5, will be transmitted to the Materials Division immediately after the inspection is completed.

2.4.4 LEVEL OF QUALITY CONTROL - EVALUATION

The evaluation of the level of Quality Control maintained by concrete plants will be performed and maintained current by the Materials Division. The initial evaluation of the level of Quality Control will be based on an analysis of historical data. There after, tests for strength, entrained air, and consistency will be made by certified personnel on random samples taken from plant production. This test data will be used by the Materials Division to update the statistical parameters and maintain a current and valid evaluation of each plant's Quality Control level. The Materials Division will publish a list of concrete plants with their rating numbers, said publication to be updated monthly.

2.4.5 CLASS Al PLANTS - TEST AND INSPECTION REQUIREMENTS

Concrete from Class Al concrete plant shall be sampled and tested by certified personnel on a project-by-project basis, at random, with the frequency specified in Table 1 of MP 601.03.50.

Plant inspection and monitoring of batching operations at Class Al concrete plants shall be performed by District personnel on a random basis during production for Division Projects.

A concrete batch ticket, as defined in Section 5.2.9 of MP 601.03.50, shall be initiated and signed at the plant and accompany each delivery to the project.

2.4.6 CLASS A2 PLANTS - TEST AND INSPECTION REQUIREMENTS

Concrete from Class A2 concrete plants shall be sampled and tested by certified personnel on a project- by-project basis, at random, with the frequency specified in Table 1 of MP 601.03.50.

Plant inspection and monitoring of batching operations at Class A2 concrete plants shall be performed by District personnel on a continual basis during the time that concrete for items other than miscellaneous concrete are being produced for Division projects.

2.4.7 CLASS B PLANTS

Concrete purchased by a Contractor for use on Division projects shall be supplied from Class Al or A2 plants. Concrete purchased through competitive bidding with Purchase order contracts shall be supplied from Class Al or A2 plants. Class B plants are not considered to be eligible to compete with Class A plants in the furnishing of concrete to applicable projects.

In the event it is not practical to obtain small quantities of concrete for miscellaneous items (See 2.4.8) from a Class Al or A2 plant and a survey reveals that a Class B plant is conveniently situated with respect to the construction site, then a direct purchase of concrete by the Division from the Class B plant may be accomplished in conformance with the applicable Division procedures. The direct purchase of concrete from Class B plants shall also be made to conform to the requirements set out in Subsection 2.5 entitled QUALITY ASSURANCE OF DIRECT PURCHASE CONCRETES FROM CLASS B PLANTS. Plant

inspection at Class B plants and the sampling, testing and documentation of concrete from Class B plants shall also conform to the requirements set out in Subsection 2.5.

2.4.8 SMALL QUANTITIES FOR MISCELLANEOUS ITEMS

Miscellaneous concrete shall be defined as relatively small quantities 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 other structurally critical items.

The following items are suggested as a guideline in establishing miscellaneous concrete:

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

2.5 QUALITY ASSURANCE OF DIRECT PURCHASE CONCRETE FROM CLASS B PLANTS

2.5.1 PURPOSE

The purpose of this instruction is to provide guidance in specifying direct purchase of concrete and for inspection and testing of direct purchase concrete from Class B plants, so that a predetermined and acceptable level of Quality Assurance may be maintained by Division personnel. This instruction is set apart from the main directive in Subsection 2.4 because it is the intent to have concrete from Class B plants used in highway work only when it is not practical or economical to obtain concretes from Class A1 or A2 plants.

2.5.2 DEFINITION OF TERMS

2.5.2.1 Direct Purchase - Direct purchase is a formal procedure used to purchase materials for government agencies, including the Division of Highways) when it is not practical or economical to use the procedure of competitive bidding. Direct purchase requisitions will always specify the name of the proposed supplier as well as product name, quantity, specifications, etc.

2.5.3 GENERAL DISCUSSION

When highway work requiring portland cement concrete is being done by Division forces, and it is found to be impractical or uneconomical to obtain concrete from a Class Al or A2

plant but that it would be practical to obtain it from a Class B plant, then the purchase of concrete from a Class B plant shall be made to conform to the requirements of article 2.5.4.

2.5.4 INSTRUCTION

The purchase of portland cement concrete from a Class B plant will be permitted only after a field condition survey has been conducted and properly documented which indicates that it would be impractical and uneconomical to obtain concrete from a Class Al or A2 plant, and that a Class B plant does exist from which a direct purchase of concrete could practically and economically be made.

Procedures for making direct purchases of concrete shall be as prescribed by the appropriate State Agency. The method of specifying direct purchase concrete shall be as follows:

1. Specify the class of concrete.
2. Specify that the concrete mix design will be approved by the Division.
3. Specify that a Division inspector will be at the plant during the full time that concrete is being batched to direct the batching operation, and that batching shall not commence until the inspector is present.

In addition to the Quality Assurance activity performed at the plant, the Division will sample and test as deemed necessary all direct purchase order LOTS of concrete used in highway maintenance work.

3. PLANT APPROVAL STATUS

3.1 PLANT CERTIFICATION

3.1.1 When District Personnel determine that a Concrete Plant, which is not already listed as a Class A1, A2, or B plant on the Division's Approved Source Page, has met the requirements of this Materials Procedure, the Specifications, and all other applicable Materials Procedures, they shall notify MCS&T Division and provide all applicable documentation and information to MCS&T Division.

3.1.2 MCS&T Division shall then notify the subject Concrete Plant that they are approved to begin production for WVDOH projects. MCS&T Division shall also add that Concrete Plant to the Division's Approved Source Page and begin monthly evaluations of that Concrete Plant as outlined in this MP and MP 711.03.26.

3.2 PLANT DE-CERTIFICATION

3.2.1 When District Personnel determine that a Concrete Plant, which is listed as a Class A1, A2, or B plant on the Division's Approved Source Page, is not complying with the requirements of this MP, the Specifications, or any other applicable Materials Procedure, they shall immediately notify MCS&T Division and provide all applicable documentation and information to MCS&T Division. This information shall include a summary of the reason(s) for the de-certification of the subject Concrete Plant.

3.2.2 MCS&T Division shall then immediately notify the subject Concrete Plant and all applicable WVDOH District and Divisions that the subject Concrete Plant is no longer approved to supply concrete for WVDOH projects.

3.2.3 If the subject Concrete Plant, which has been de-certified and removed from approved status, desires re-approval, they shall initiate the re-approval process by submitting a plan of corrective action, which addresses all of the reasons for which that Plant was de-certified. This plan of corrective action shall be submitted to the District in which the Concrete Plant is located and to MCS&T Division.

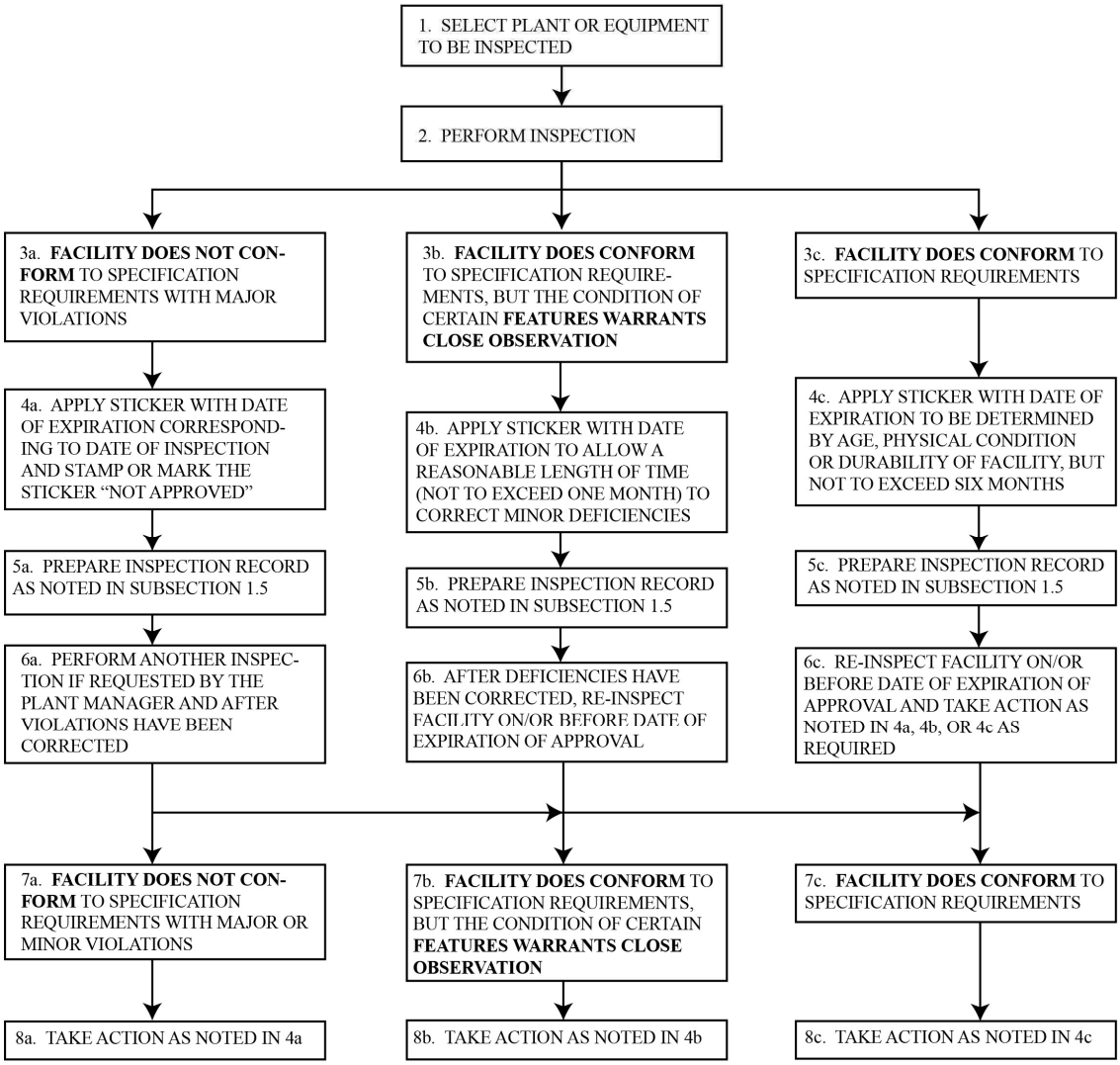
Michael Mance

Digitally signed by Michael Mance
Date: 2025.08.25 16:18:44 -04'00'

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

MP 601.05.50 Steward – Cement and Concrete Section
MAM:T
ATTACHMENT

Plant Inspection Flow Chart



MC-4 Plant Inspection Form

Form MC-4
Rev 4/24/23

West Virginia Division of Highways
Materials Control, Soils and Testing Division
Checklist For Inspection of Transit Mix & Central Mix Concrete Plants

Plant Inspected:	Date:	Date Sticker Expires:
Location:	Facility Code:	Sticker No. Assigned:
Plant Officials:		
E-Ticketing Requirements Met: Yes: ☐ No: ☐		

I. Plant Type:	Transit Mix: ☐	Central Mix: ☐	Combination: ☐

II. Aggregates:

Are the Stockpiles Segregated:	Yes ☐	No ☐	Any Foreign Matter in the Stockpiles:	Yes ☐	No ☐
Stockpiles Properly Separated:	Yes ☐	No ☐	Type of Base:		
Method of Handling Aggregates:					
Does Concrete Plant Stockpile Non-specification Materials:				Yes ☐	No ☐
If Yes, Are These Materials Properly Segregated From Specification Materials:				Yes ☐	No ☐
Source of Supply of Fine Aggregate:					
Source of Supply of Coarse Aggregate:					
Are all materials ordered to comply with West Virginia Division of Highways Specifications:				Yes ☐	No ☐

III. Scales:

Cement:				
Dial ☐	Capacity:	Increments:		
Load Cell ☐	Capacity:	Increments:		
Do Scales Comply With Specifications:			Yes ☐	No ☐
Aggregates:				
Dial ☐	Capacity:	Increments:		
Load Cell ☐	Capacity:	Increments:		
Do Scales Comply With Specifications:			Yes ☐	No ☐
Separate Scales for Cement and Aggregates:			Yes ☐	No ☐
Overall Condition of Scales:				
Date Sealed By Dept. of Weights & Measures:	Cement:	Aggregate:		

IV. Bins and Hoppers:

Number of Bin Compartments for Fine Aggregate:		Number of Bin Compartments for Coarse Aggregate:		
Maximum Size Batch:	Is the Cement Hopper Equipped with a Vibrator:		Yes ☐	No ☐
Is the Aggregate Hopper Equipped with a Vibrator:			Yes ☐	No ☐
Operation of the Hoppers Satisfactory: Yes ☐	No ☐	If "No", Why?		
Type of Cement Bin:		Number of Bins:	Capacity of Each Bin:	

V. Water:

Type of Water Measuring Device:	Scales ☐	Meter ☐	Truck Mixer Tanks ☐	
Automatic ☐	Manual ☐	Does Device Meet Specifications:	Yes ☐	No ☐
Date Sealed by Dept. of Weights & Measures:	Scales:	Meter:		

VI. Admixtures:

Brands Used:			
Air Entrainment:	Automatic Dispenser:	Yes ☐	No ☐
Retarder:	Automatic Dispenser:	Yes ☐	No ☐
Other Admixtures (Name & Type):	Automatic Dispenser:	Yes ☐	No ☐

VII. Central Mixer:

Condition of Drum:	Condition of Blades:	
Does Automatic Timing Device Meets Specifications:	Yes ☐	No ☐
Remarks:		

VIII. Truck Mixers:

Trucks Equipped with Electronic Counters:	Yes ☐	No ☐	Number of Trucks Added to Fleet Since Last Inspection:
Number of Trucks Deleted From Fleet Since Last Inspection:			
Truck Mixers Now Failing to Meet Specifications:			

TRUCK NUMBER	REASON FOR FAILURE

IX. Testing of Materials:

Tests of Aggregates Performed at Plant by:	Qualified:	Yes ☐	No ☐
Does Testing Equipment Comply with Specifications:		Yes ☐	No ☐
If "No", What Equipment Fails:			
Approved Test Weights Available in the Plant:	Yes ☐	No ☐	Date Last Checked:

X. General Condition of Plant:

XI. Any Further Remarks:

XII. Rating Assigned:	A ☐	B ☐	Plant Inspected By:

Sample Plant Inspection Sticker

West Virginia Division of Highways
CHECKED & ACCEPTED
INSPECTOR: _____ **DATE:** _____ **LAB NUMBER:** _____ **DISTRICT:** _____
DATE OF EXPIRATION **MONTH/DAY/YEAR** _____/_____/_____
PLANT / TRUCK