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

MATERIALS PROCEDURE

# PROCEDURE TO APPROVE COATED STEEL U-CHANNEL MATERIAL

## 1. PURPOSE

1.1 To establish a procedure to approve coated steel u-channel sign supports (henceforth referred to as "supports") for use on West Virginia Division of Highways (WVDOH) projects.

1.2 To ensure the ongoing manufactured quality of the above-mentioned product.

## 2. SCOPE

2.1 This procedure shall apply to all supports used for WVDOH projects.

## 3. REFERENCED DOCUMENTS

3.1 Materials Procedure 707.02.14: Procedure To Approve Coated Steel U-Channel Sign Support Breakaway Spice Device Products.

3.2 ASTM A1075 Standard Specification for Flanged Steel U-Channel Supports.

3.3 WVDOH Standard Specifications for Roads and Bridges, Sections 657.2.11 and 709.56.

3.4 ASTM A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

## 4. APPROVAL PROCEDURE FOR SUPPORTS

4.1 The manufacturer shall submit a certification statement that identifies the following information for 2 lb./ft or 3 lb./ft supports that are being submitted for evaluation.

4.2 The manufacturer shall submit a certification statement stating that all supplied steel for u-channel supports are domestic. The certified statement shall be signed by a representative of the manufacturer who has authority to bind the company.

4.3 An evaluation and sampling of material at the manufacturer's facility or facilities may be conducted by WVDOH personnel, or by its designee, for conformance to the appropriate ASTM specification. Five samples of each size support shall be obtained at each facility. Each sample can be of any length greater than two feet. Supports must be drilled or punched and representative of the finished product.

4.4 The supports will be tested to the mechanical and chemical requirements of ASTM A1075 at an minimum of grade 60, and the applicable coating requirements contained in Sections 3.3

4.5 The material will be inspected for proper hole alignment, spacing, and clearance. All supports shall have a hole spacing that is consistent at 1-in center to center without misalignment relative to one another and relative to the centerline of the support web. All hole clearances after coating shall allow for the insertion of a 5/16-in galvanized bolt by hand, without interference from excessive coating buildup.

4.6 Subsequent inspection of the manufacturing facilities shall be conducted on a one (1) year frequency.

4.7 Once the above requirements are met, laboratory approval numbers will be assigned to indicate WVDOH Specification conformance and approval of the product(s). Individual lab approval numbers will be issued for the manufacturer's 2 lb./ft support, 3 lb./ft supports.

4.8 After lab tests and evaluations are conducted of a list of all manufactures producing #2 and #3 supports is completed, the list will be sent to the control group of the Materials Control Soils & Testing division to be combined with a list of recommended breakaway safety devices supplied by Traffic Engineering Division (MP 707.02.14). Additionally, it should be noted that there shall be no approved list of supports without recommended breakaway safety devices for each size of support.

4.9 Once the above requirements are met, laboratory approval numbers will be assigned to indicate WVDOH Specification conformance and approval of the product(s). Individual lab approval numbers will be issued for the manufacturer's 2 lb./ft support, 3 lb./ft support, and separate approval numbers indicating manufactures recommended breakaway devices for each size support.

4.10 Revocation of approved source status may result from furnishing material that does not comply with Specifications or may be revoked at the recommendation of traffic engineering division.

4.11 "Approved Source" status may be reinstated based on the findings of an investigation. The reinstatement process will commence upon the receipt of a letter of request from the manufacturer. The letter of request should indicate reasons for reinstatement and documentation to substantiate such reasons.

## 5. SHIPPING DOCUMATION

5.1 The manufacturing mill shall furnish to the project (when purchase order material is shipped) a shipping document. This document will include the following information:

1. Date of shipment
2. Project or purchase order number
3. Description and quantity of materials shipped
4. Current laboratory approval numbers for all materials shipped

## 6. PROCEDURE AT DELIVERY SITE

6.1 District personnel will visually inspect each shipment and review information on the shipping document in accordance with Section 5.1.

6.2 All shipments that are damaged, incomplete, or otherwise considered to be in noncompliance with the specifications shall be rejected. A list of approved products as described herein is available to all contractors, fabricators, and suppliers by accessing the WVDOH Approved Product List Webpage.[1]

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

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

MATERIALS PROCEDURE

# PROCEDURE TO APPROVE COATED STEEL U-CHANNEL SIGN SUPPORT BREAKAWAY SPLICE DEVICE PRODUCTS

## 1. PURPOSE

1.1 To establish a procedure to approve coated steel u-channel sign support (henceforth referred to as "supports") manufacturer recommended breakaway splice device products (henceforth referred to as "breakaway devices") for use on West Virginia Division of Highways (WVDOH) projects.

1.2 To ensure the ongoing manufactured quality of the above-mentioned products.

## 2. SCOPE

2.1 This procedure shall apply to all breakaway devices described herein, used for WVDOH projects.

## 3. REFERENCED DOCUMENTS

3.1 Materials Procedure 707.02.13: Procedure To Approve Coated Steel U-Channel Material

3.2 ASTM A1075, Standard Specification for Flanged Steel U-Channel supports.

3.3 WVDOH Standard Specifications for Roads and Bridges, Sections 657.2.11 and 709.56.

3.4 ASTM A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

3.5 Manual for Assessing Safety Hardware (MASH), Latest Edition.

## 4. APPROVAL PROCEDURE FOR BREAKAWAY DEVICES

4.1 The manufacturer shall submit a certification statement that identifies the Brand name and or model number of the manufacturer's breakaway device. The manufacturer shall also recommend the breakaway device to be evaluated for each support size.

4.2 The manufacturer shall submit a certification statement stating that all supplied steel components of breakaway devices are domestic. The certified statement shall be signed by a representative of the manufacturer who has authority to bind the company.

4.3 Once the above requirements, those specified in MP 707.02.13, and those specified in Specification 709.53 are met, laboratory approval numbers will be assigned to indicate WVDOH Specification conformance and approval of the product(s). Individual lab approval numbers will be issued for the manufacturer's recommended breakaway devices for each size support. Breakaway device lab approval numbers will not be issued or kept active without WVDOH acceptance and approval of the manufacturer's support that the breakaway device is recommended for use with.

4.4 Revocation of approved source status may result from furnishing material that does not comply with Specifications or may be revoked at the recommendation of Traffic Engineering Division based on issues such as poor performance or maintenance concerns.

4.5 "Approved Source" status may be reinstated based on the findings of an investigation. The reinstatement process will commence upon the receipt of a letter of request from the manufacturer. The letter of request must indicate reasons for reinstatement and documentation to substantiate such reasons.

## 5. SHIPPING DOCUMATION

5.1 The manufacturer shall furnish to the project (when purchase order material is shipped) a shipping document. This document will include the following information:

1. Date of shipment
2. Project or purchase order number
3. Description and quantity of materials shipped
4. Current laboratory approval numbers for all materials shipped

## 6. PROCEDURE AT DELIVERY SITE

6.1 District personnel will visually inspect each shipment and review information on the shipping document in accordance with Section 5.1.

6.2 All shipments that are damaged, incomplete, or otherwise considered to be in noncompliance with the specifications shall be rejected. A list of approved products as described herein is available to all contractors, fabricators, and suppliers by accessing the WVDOH Approved Product List Webpage.[1]

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Director

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

Materials Control, Soils and Testing Division

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

MATERIALS PROCEDURE

# PROCEDURE FOR DETERMINING A REDUCED UNIT PRICE TO BE PAID FOR UNDERDRAIN AGGREGATE WHICH DOES NOT CONFORM TO THE GRADING REQUIREMENTS OF THE GOVERNING SPECIFICATIONS

## 1. PURPOSE

1.1 This procedure will define a range of non-conformance in the grading of underdrain aggregate that would not be expected to affect its performance to an extent which would necessitate its removal from the project, and will provide a method for reducing the price to be paid for said nonconforming aggregate. Grading characteristics of underdrain aggregate shall be evaluated in accordance with MP300.00.51.

## 2. SCOPE

2.1 This procedure shall apply only to those aggregates specified for use for underdrains.

## 3. DEFINITION OF TERMS

3.1 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.

3.2 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.

3.3 Single test value: The results of testing a sample in accordance with AASHTO test methods T11 and T27.

## 4. ACCEPTANCE FOR GRADATION

The material shall be sampled and tested in accordance with MP 700.00.06. Acceptance for gradation shall be based on test results of consecutive random samples from a lot. A sublot is the quantity of material represented by a single gradation test as defined in MP 700.00.06. A lot shall be considered the quantity of material represented by an average test value, not to exceed five sublots. In the case where only one sample is needed for the total plan quantity, the sublot shall be considered the lot.

The average shall start on the second sample result. The average is continued for the third through fifth sample result, averaging all previous sample results. Thereafter, only the last consecutive five sample results will be averaged, i.e., second test value through sixth test value, third test value through seventh test value, and so forth as defined in MP 300.00.51.

4.1 When the test value of a lot and the test value of the last sublot, or when the last three consecutive individual test values of a lot fall outside the gradation limits of Table 704.6.2A in the current West Virginia Standard Specifications for Roads and Bridges, the lot of material represented will be considered nonconforming to the extent that the last of its sublots are nonconforming.

4.2 When a sublot is non-conforming and material in the sublot has been incorporated into the work, the sublot shall be tested in accordance with Section 6 to determine the necessity for removal and the price for the quantity of material represented by the nonconforming sublot shall be reduced in accordance with section 8. In no event, however, shall a sublot of material have its price adjusted more than once, and the first adjustment which is determined shall apply.

## 5. SAMPLING FREQUENCYAND TESTING

5.1 Sampling frequency and testing shall be in accordance MP 307.00.50.

## 6. ACCEPT OR REMOVE BASED ON DIAMETER OF PERCENT PASSING

6.1 When a sublot of material is nonconforming, the average value representing said sublot shall be plotted such that the relative size can be determined for the 85 percent passing ($D_{85}$) and the 15 percent passing ($D_{15}$). Plot the percent finer from the sieve analysis results on a graph with the particle size on the horizontal axis decreasing from left to right and the percent passing on the vertical axis increasing from bottom to top. Draw horizontal lines on the chart representing fifteen percent and eighty five percent passing. Draw vertical lines from the intercept of the gradation lines with fifteen and eighty five percent of the passing curve to the horizonal axis and read the diameter on the horizontal scale.

Thus determined, these values shall be entered in the following formulas:

$D85 < 4\ D15$

$D85 >$ size of pipe opening (perforation)

Where: D85 = 85 percent passing size
D15 = 15 percent passing size

If the above formulas are met such that the size at 85 percent passing is less than four (4) times the size at 15 percent passing, and the size at 85 percent passing is greater than the perforation size, then the following procedure shall apply. If one or both formulas are not met, then the material shall be removed from the project site at the Contractors' expense.

## 7. DEGREE OF NONCONFORMANCE

7.1 When a sublot of material is to have its price adjusted, the percentage point difference between the nonconforming test value and the specification limit shall be determined for each sieve size determined to be nonconforming. sieve size. The total measure of non-conformance is the sum of all non-conformances on the various sieves for that sublot

When the total degree of nonconformance has been established and it is 12.0 or less, the material will be paid for at an adjusted contract price as specified in Table 1.

**Table 1**

| % of Non-Conformance | % Reduced Price |
|---|---|
| 1.0 to 3.0 | 2% |
| 3.1 to 5.0 | 4% |
| 5.1 to 8.0 | 7% |
| 8.1 to 12.0 | 11% |

7.2 When the degree of nonconformance is greater than 12.0, the nonconforming sublot shall be resolved on an individual basis, requiring a special investigation by the Engineer to determine the appropriate course of action to be followed. Pending resolution of the matter, additional lifts of base or pavement shall not be placed over the nonconforming material.

**8. DETERMINATION OF EQUITABLE ADJUSTMENT**

8.1 When the total percent of non-conformance has been established and it is

12.0 or less, Table 1 shall be initiated. When the total percent of non-conformance is greater than 12.0, each nonconforming situation will be resolved on an individual basis, requiring a special investigation by the Engineer to determine the appropriate course of action to be followed.

8.2 METHOD OF EQUITABLE REDUCTION

Dollar reduction shall be calculated by:
(A) quantity of nonconforming sub LOT x (B) percent reduction from Table 1 x (C) unit contract price= (D) price reduction.

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Percent of→ Percent¶
Non-conformance→ Reduced price¶
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1.0 to 3.0→ 2%¶
3.1 to 5.0→ 4%¶
5.1 to 8.0→ 7%¶
8.1 to 12.0→ 11%¶

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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

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 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 placing 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 either plastic or hardened concrete for quality control purposes shall be certified as a WVDOH PCC Inspector.

4.2.4.2 Any Laboratory which tests the hardened concrete 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 all of the applicable requirements in ASTM C1077 for a concrete testing laboratory, including curing facilities, testing

equipment, technician proficiency, and recordkeeping. Each Laboratory shall be inspected and verified, at least once every three years, by the Cement and Concrete Reference Laboratory (CCRL), and subsequent documentation shall be provided showing that the subject Laboratory and personnel meet the applicable requirements of ASTM C1077 for a concrete laboratory.

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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, to MCS&T Division. 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. 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 who test contractor hardened concrete QC specimens on WVDOH projects must be listed on the Division's Approved List of Concrete Cylinder Testing Labs.

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
$\pi$ = 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 $\pi$ 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.

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 Site Manager. 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.

Charts and Forms:

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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

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

4.2.8 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.

4.2.8.1 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 Weight(s) (ounces), Temperature ($^{o}$F/$^{o}$C), Cylinder I.D., Initial Counter, Final Counter, Target Consistency (in/mm), Actual Consistency (in/mm), Target Air (%), Actual Air (%), Truck Number.

4.2.8.2 All batch tickets for concrete delivered by means of nonagitator 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 Pozzolan (lb/kg), Weight of Fine Aggregate (lb/kg), Weight of Coarse Aggregate (lb/kg), Admixture Name(s) and Weight(s) (ounces), Temperature ($^{o}$F/$^{o}$C), Target Consistency (in/mm), Actual Consistency (in/mm), Target Air (%), Actual Air (%), Truck Number.

4.2.8.3 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 (6 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).

4.2.9 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.

4.2.10 Non-Conforming Materials:

4.2.10.1 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,

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mutually agreeable to the Division and the Contractor shall be provided by the Contractor.

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4.2.11 Types of QC Plans:

4.2.11.1 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.

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

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

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

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 shall not 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 paper, 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.

Ronald L. Stanevich, P.E.
Director
Materials Control, Soils & 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

MP 603.10.40 P
SUPERCEDES SEPTEMBER 9, 2018
REVISED:

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

MATERIALS PROCEDURE

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# INSPECTION AND ACCEPTANCE PROCEDURES FOR PRESTRESSED CONCRETE BRIDGE MEMBERS

## 1. PURPOSE

1.1 To set forth procedures for the inspection and acceptance of prestressed concrete bridge members, including beams, pier caps, deck panels, and any other prestressed members, and the approval of the plants at which they are fabricated.

## 2. SCOPE

2.1 This procedure will apply to all prestressed concrete bridge members supplied for use on West Virginia Division of Highways projects and to all prestressed concrete bridge member fabricators that supply material for use on West Virginia Division of Highways projects.

## 3. INSPECTION

3.1 All prestressed concrete bridge member 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.

3.1.1 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 fabrication of precast items.

3.1.1.1 Sampling and testing of component materials shall be done in accordance with MP 603.02.10. All component materials shall be approved prior to the start of fabrication.

3.1.1.2 Any fabricator which does not produce for the WVDOH for a period of 2 years shall be removed from the approved fabricator list and the fabricator will need to be approved

again before they can do work. Sampling of component materials will not continue when the plant is removed from the approved fabricator list.

3.1.1.3 Personnel from the Fabricator required to be present during the initial on-site visit and meeting between WVDOH and Fabricator personnel 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.

3.1.1.4 Prior to beginning fabrication of any prestressed concrete bridge members, the Fabricator shall provide written notification to MCS&T Division at least one calendar week in advance of the date on which fabrication is to begin. 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.

3.1.2 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.

3.1.3 The Inspector, as a minimum, shall be registered with the Precast/Prestressed Concrete Institute (PCI) as a Level II Quality Control Technician.

3.2 The Inspector shall be present at any or all times during fabrication including casting bed layout, steel placement, stressing operations, concrete testing, placing, and finishing, detensioning operations, camber measurements, testing hardened concrete cylinders, post-pour inspections, and repairs.

3.2.1 Fabricators must provide adequate lighting to illuminate the casting bed to allow for visual inspection of the entire rebar assembly and setup. Fabricators must make forms safely accessible for visual inspection of the setup down in the form for the entire length of the bed.

3.3 After fabrication is completed and prior to shipment, the Fabricator shall provide MCS&T Division with a written request for Final Inspection a minimum of one calendar week prior to the desired date of inspection. This written request may be in the form of an e-mail. Upon receipt of the written request for Final Inspection from the Fabricator, MCS&T Division will notify the Fabricator of the earliest possible date of this inspection. Effective communication from the Fabricator to MCS&T Division and Consultant Inspection Agency is key to avoiding any scheduling conflicts regarding Final Inspection.

3.4 At Final Inspection, the Inspector shall witness any compressive strength tests which may be required, inspect repairs as needed, and conduct a thorough visual examination of each member. After the Final Inspection is completed, the Inspector shall provide the Fabricator with a copy of the inspection report documenting the findings of the Final Inspection and any other observations or notes taken by the Inspector during fabrication, a completed copy of the Inspector's checklist. 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.

3.5 The Inspector shall use the checklist and inspection forms which are included as Attachments to this MP. The Fabricator shall also document all required information on the applicable Attachments.

## 4. ACCEPTANCE

4.1 Upon completion of the inspection of a member, the subject member shall be classified in one of two ways. The first way is that the member does not contain any defects. The second way is that the member contains some type of defect.

4.1.1 If a member meets all specification requirements and does not contain any defects, the Inspector will stamp the subject member as accepted by MCS&T Division.

4.2 If a member contains some type of defect, it will be classified into one of the following three categories. These categories are: Category I (Cosmetic Defects), Category II (Dimensional Tolerances), and Category III (Structural Defects).

4.2.1 Category I defects include cosmetic defects such as minor spalls with no exposed reinforcing steel or prestressing strand, bug holes and minor surface irregularities, etc. Category I defects shall also include cracks up to and including 16 mils in width for which repair procedures are addressed by the standard specifications. Prior to the start of fabrication, the Fabricator shall submit to MCS&T Division, for approval, the proposed repair procedures for Category I defects which may be encountered.

4.2.1.1 Any Category I defect(s) will first be noted by the Inspector and may be subsequently repaired by the Fabricator as per the Fabricator's pre-approved repair procedure. The Inspector shall inspect the repair(s), and if the repair(s) is satisfactory, and if all other aspects of the member meet specifications, the Inspector will stamp the subject member as accepted by MCS&T Division.

4.2.2 Category II addresses any aspect of a member which exceeds the dimensional tolerances set forth in the Specifications. The Inspector will document that variance(s) and notify the Fabricator. At this point, the Fabricator may seek acceptance of the subject member

by sending a written notification to the Contractor including a copy of the Inspector's report and any other pertinent data. If the Contractor agrees to accept the subject member with the defect at the original contract price, then the Contractor shall provide a written statement to District Construction personnel and MCS&T Division stating such.

4.2.2.1 The Contractor, or his designated representative (i.e. the Fabricator), shall then contact MCS&T Division and provide them with a report containing all relevant information and a detailed summary of the dimensional variation(s) in the subject member for which the Fabricator is seeking acceptance. MCS&T Division shall then contact the Designer (either Engineering Division, or the appropriate District, or Engineer of Record) and District Construction personnel and forward this information to them. If the member was designed by a Consultant, Engineering Division may forward the information to the appropriate Consultant. The Designer will then analyze the dimensional variation(s) and provide a written statement to the Contractor, the Fabricator, MCS&T Division, and District Construction personnel as to whether it will affect the structural performance of the subject member. After receipt of that statement from the Designer, District Construction personnel shall then provide a written statement to the Contractor, the Fabricator, and MCS&T Division as to whether the dimensional variation will create construction difficulties.

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4.2.2.2 If the Designer states that this dimensional variation(s) will adversely affect the structural performance of the member, or if District Construction states that it will create construction difficulties, or if the Contractor does not agree to accept the subject member with the defect at the original contract price, MCS&T Division will not accept the subject member. MCS&T Division will assign a laboratory number to this subject member, which notes that the member does not meet specifications, and will include a thorough explanation as to why the member does not meet specification requirements. If acceptance of the subject member is still desired, the acceptance would need to be by the District by means of a District Materials Inspection Report (DMIR).

4.2.2.3 If the Designer does not feel qualified to perform the analysis outlined in Section 4.2.2 and make the decision as to whether or not the dimensional variation will affect the structural performance of the subject member, the Designer shall inform MCS&T Division of this fact, and MCS&T Division will relay this to the Fabricator. The Fabricator may then elect to have the defect(s) evaluated by a Division approved, qualified, independent Engineer in the same manner that the Designer would analyze the defect(s). The Division would then review and take into consideration this Engineer's analysis as part of the acceptance decision.

4.2.3 Category III defects include structural defects (spalls that expose prestressing strand or reinforcing steel, honeycombed areas, etc.) and cracks for which the specifications

require evaluation by the Designer. If a member contains any structural defect(s), the defect(s) will be noted in the Inspector's report. The Fabricator shall then provide the Contractor with detailed information regarding the type, size, and location of the defect(s). It is then the Contractor's, or his designated representative's, responsibility to contact MCS&T Division and provide them with a report containing all relevant information and a detailed summary of the structural defect(s) in the subject member for which the Fabricator is seeking acceptance. MCS&T Division shall then contact the Designer (either Engineering Division, or the appropriate District) and forward this information to them. MCS&T Division shall also contact District Construction to inform them of the situation. In situations when the member(s) was designed by a Consultant, Engineering Division may forward the information to the appropriate Consultant. The Designer will then analyze the subject defect(s) and provide a written statement to the Contractor, the Fabricator, District Construction, and to MCS&T Division as to the effect of the defect(s), if the member will be structurally adequate, if a repair may be made, and if, in their opinion, the service life of the member will be reduced because of the defect. It shall also be documented in the Inspector's report whether or not, in the opinion of the Inspector, the service life of the member will be reduced because of the defect.

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4.2.3.1 If the Designer does not feel qualified to make the decision concerning the effect of the defect(s), they shall inform MCS&T Division of this fact, and MCS&T Division will relay this to the Fabricator. The Fabricator may then elect to have the defect(s) evaluated by a Division approved, qualified, independent Engineer in the same manner that the Designer would analyze the defect(s). The Division would then review and take into consideration this Engineer's analysis as part of the acceptance decision.

4.2.3.2 Category III defect Scenario 1 – Category III defect which will adversely affect the structural performance of the member:

If the Designer states that the defect(s) will adversely affect the structural performance of the subject member, the Division will not accept the subject member.

4.2.3.3 Category III defect Scenario 2 – Category III defect which will not adversely affect the structural performance of the member and will not reduce the service life of the member:

If the Designer states that the defect(s) will not adversely affect the structural performance of the subject member, and that a repair should be made, and if MCS&T Division and the Designer agree that the service life of the member will not be reduced, the Fabricator shall submit a repair procedure to MCS&T Division for approval. If the repair procedure is approved, the Fabricator may proceed with the approved repairs in the presence of the Inspector. If the repair(s) is satisfactory, the Inspector will stamp the subject member as accepted by MCS&T Division.

4.2.3.4 Category III defect Scenario 3 – Category III defect which will not adversely affect the structural performance of the member, but which will reduce the service life of the member:

Deleted: member

If the Designer states that the defect(s) will not adversely affect the structural performance of the subject member, and that a repair should be made, but if either MCS&T Division or the Designer feels that the service life of the member will be reduced, the Fabricator may submit a repair procedure to MCS&T Division for approval. If the repair procedure is approved, the Fabricator may proceed with the approved repairs in the presence of the Inspector. After the inspection of the repair(s), the Inspector will document whether or not the repair(s) is satisfactory. Since the service life of the member will be reduced, MCS&T Division will not accept the subject member. MCS&T Division will assign a laboratory number to this member, which notes that the member does not meet specifications, and will include a thorough explanation as to why the member does not meet specification requirements. MCS&T Division will then contact the District, forward all information relevant to the subject member to the District, and based on the quality of the repairs and the degree to which the service life of the member will be reduced, it is the District's option whether or not to accept the subject member. If the District decides to accept the member, it will be paid for at a reduced contract unit bid price based on the Contractor's invoiced cost of the fabricated member as billed by the Fabricator. This cost does not include the cost of items such as bearing pads, guardrail items, delivery charges, etc., which are incidental to the cost of the member. If the District accepts the subject member with this type of defect and reduced service life, it shall be accepted by means of a DMIR.

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

RLS:Mt

**ATTACHMENT: PRESTRESSED CONCRETE BRIDGE BEAMS**
**WVDOT DIVISION OF HIGHWAYS MCS&T DIVISION**
***INSPECTION CHECKLIST***

**PROJECT NAME:** _____ **AUTHORIZATION:** _____

**PROJECT NUMBER: (State)** _____ **(Fed.)**_____

**BRIDGE NUMBER:** _____ **COUNTY:** _____ **DISTRICT:** _____

**MANUFACTURER:** _____ **JOB NUMBER:** _____

**PROPOSED PRODUCTION DATE(S):** _____
**INSPECTION AGENCY:** _____ **INSPECTOR(S):** _____

## Preliminary Verifications

**SHOP DRAWING REVIEW**

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

**Concrete Strength Requirements:** _____ **at release** _____ **at 28 days**

Beam Type: _____ Total Number of Beams: _____

**Finish Requirements: Top:** _____ **Bottom/Sides:** _____ **Ends:** _____

**Notes:** _____

_____

_____

**CONCRETE COMPONENTS**

**Cement Source:** _____ **Mix Design Lab Number:** _____

**Cement Type:** _____ **Lab Number:** _____

**Coarse Aggregate:** _____ **Lab Number:** _____

**Fine Aggregate:** _____ **Lab Number:** _____

**Batch Water Source:** _____ **Lab Number (if applicable):** _____

**Admixtures:** _____

**STEEL COMPONENTS**

**Bearing Plate:** **Fabricator:** _____

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

**Reinforcement: Supplier(s):** _____

**Description:** _____ **Lab Number:** _____

_____

_____

**Prestressing Strand: Manufacturer:** _____ **Description:** _____

**Coil Numbers:** _____

**Lab Numbers:** _____

**Inserts:** **Supplier(s):** _____

**Description:** _____ **Lab Number:** _____

_____

_____

**SHIPLOOSE MATERIAL**

**Sole Plate:** **Fabricator:** _____

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

**Bearing Pad:** **Fabricator:** _____

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

**Diaphragm:** **Fabricator:** _____

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

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

**Anchor Rod:** **Supplier:** _____ **Description:** _____

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

**Repairs:** **Approved Repair Procedure:** _____

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

**Repair Witnessed:** _____

**Repair Satisfactory?** _____

**Comments:** _____

_____

_____

_____

_____

_____

_____

_____

_____

## Form Inspection *(Pre-Placement)*

| BEAM NUMBER | | | | | |
|---|---|---|---|---|---|
| Formwork constructed of metal w/ concrete foundation | | | | | |
| Form clean & free of debris | | | | | |
| Form dimensionally correct | | | | | |
| Length (bulkhead to bulkhead) | | | | | |
| Depth of form | | | | | |
| Width at top flange | | | | | |
| Width at bottom flange | | | | | |
| Width of web | | | | | |
| End square | | | | | |
| Skew dimensions | | | | | |
| Location of inserts, sleeves, blockouts, etc. | | | | | |
| Reinforcing steel (condition) | | | | | |
| Size and grade | | | | | |
| Location & lapping lengths | | | | | |
| Spacing & Clearances | | | | | |
| Chairs, spacers properly used | | | | | |
| Hold Down locations (draped strand) | | | | | |
| Form properly sealed at joints & edges | | | | | |
| Release agent applied | | | | | |
| Strand Placement | | | | | |
| Number of strand | | | | | |
| Strand location (vertical & horizontal) | | | | | |
| Strand free of damage or contaminants | | | | | |
| Strand Tensioning | | | | | |
| Jack & gauge calibration | | | | | |
| Initial load | | | | | |
| Final Load | | | | | |
| Elongation | | | | | |
| Theoretical vs. Actual (within 5%) | | | | | |
| Strand symmetrically loaded | | | | | |
| Check for strand slippage | | | | | |
| Bearing plate location | | | | | |
| | | | | | |
| | | | | | |

## Concrete Placement

| | | | | | |
|---|---|---|---|---|---|
| **Ambient temperature, weather conditions** | | | | | |
| **Concrete Temperature** | | | | | |
| **Concrete quality (appearance)** | | | | | |
| **Placement (start/completion times)** | | | | | |
| **1st Lift** | | | | | |
| **2nd Lift** | | | | | |
| **3rd Lift** | | | | | |
| **QC Tests performed per specification** | | | | | |
| **Slump** | | | | | |
| **Air content** | | | | | |
| **Compressive strength cylinders** | | | | | |
| **Concrete placed within specified time restrictions** | | | | | |
| **Concrete properly vibrated** | | | | | |
| **External vibration applied** | | | | | |
| **Internal vibration per specification** | | | | | |
| **Top surface per specification** | | | | | |
| **Lifting loops per specification** | | | | | |
| | | | | | |
| | | | | | |
| **Curing per specification** | | | | | |
| **Heat sensors properly installed** | | | | | |
| **Beams adequately covered** | | | | | |
| **Compressive strength cylinders stored with beams** | | | | | |
| | | | | | |
| | | | | | |
| **Stress Transfer** | | | | | |
| **Cylinders loaded to failure per specification** | | | | | |
| **Release strength met – record average of 2 tests (psi)** | | | | | |
| **Strands properly cut** | | | | | |
| **Strands detensioned in specified sequence** | | | | | |
| | | | | | |
| | | | | | |

## Product Inspection *(Post-Placement)*

| | | | | | |
|---|---|---|---|---|---|
| **Visual inspection for damage** | | | | | |
| **Note size & location of cracks, spalls, honeycomb, etc.** | | | | | |
| **Discuss damaged areas with QC Manager** | | | | | |
| **Beams in need of repair** | | | | | |
| **Repair method approved?** | | | | | |
| **Dimensional Tolerances met?** | | | | | |
| **Length** | | | | | |
| **Width(s)** | | | | | |
| **Depth** | | | | | |
| **Inserts, sleeves, etc.** | | | | | |
| **Stirrups (horiz.& vert. within tolerance)** | | | | | |
| **Finish per specification** | | | | | |
| **Top scored per specification** | | | | | |
| **Fascia finish as specified** | | | | | |
| **Camber** | | | | | |
| **Lifting loops OK** | | | | | |
| **Beams properly transported** | | | | | |
| **Beams stored on proper dunnage at bearing points** | | | | | |
| **Noticeable sweep?** | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| **Design shipping strength (28 day) met? (avg of 2 tests)** | | | | | |
| **Repairs satisfactory** | | | | | |
| **Beam stamped for shipment** | | | | | |
| | | | | | |
| **Concrete Sealer (Silane) applied as specified** | | | | | |
| **Interior Sides blast cleaned (within 5 days of shipment)** | | | | | |
| | | | | | |
| | | | | | |

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

MATERIALS PROCEDURE

# GUIDE FOR APPROVAL OF SUPPLEMENTARY CEMENTITIOUS MATERIALS (SCMs)

## 1. PURPOSE

1.1 To set forth the Division's approval procedures for Supplementary Cementitious Materials (SCMs) used in portland cement concrete.

## 2. SCOPE

2.1 This procedure will apply to all SCMs used in portland cement concrete that is used on West Virginia Division of Highways projects.

## 3. INITIAL APPROVAL

3.1 In order for a SCM to be initially approved for use, the producer of the SCM shall first submit a certified statement to the Materials Control, Soils and Testing (MCS&T) Division that all SCMs shipped to Division projects will conform to the applicable specification requirements. The certified statement shall be signed by a representative of the producer having legal authority to bind the company.

3.2 The producer shall also submit, to MCS&T Division, quality control test data on the SCM to be certified. This data shall consist of test results developed from production samples during the last six months. These test results shall include results of all tests that are required by the specifications.

3.3 After the Producer has completed Sections 3.1 and 3.2, and if all test data submitted in Section 3.2 meets the applicable specification requirements, a representative of MCS&T Division shall obtain a sample of the SCM from the source of production. The MCS&T Division shall test this sample, and if it meets specification requirements, a representative of the MCS&T Division shall obtain a second sample of the SCM from the source of production or distribution (i.e. terminal). The MCS&T Division shall then test this second sample.

3.3.1 If either of the two samples obtained in Section 3.3 do not meet specification requirements, the SCM will not be approved. If, at this time, the producer still seeks Division approval of the subject SCM, a minimum of ninety calendar days (from the date that the non-conforming sample was obtained) must elapse before the approval process may begin again (starting with Section 3.1).

3.4 If the second sample obtained in Section 3.3 also meets specification requirements, the SCMs will be placed on the Division's approved list and the producer may begin to supply the subject material for use on Division projects.

## 4. APPROVED LIST

4.1 Once each quarter, or any time the list is updated, the MCS&T Division shall provide a list of all currently approved SCMs.

4.2 The producer and the District Materials Sections will be notified of any changes in the approved status of a SCM.

4.3 No SCM may be used in portland cement concrete that is supplied to West Virginia Division of Highways projects unless it is on the Division's approved list of SCMs.

## 5. MAINTAINING APPROVED STATUS

5.1 In order to maintain approved status of the subject SCM, the producer shall submit test data on a monthly basis in the same manner as described in Section 3.2.

5.2 Also, Division representatives from each District Materials Section shall obtain samples of the subject SCM at every point of use (i.e. ready-mix plants, etc.) that is located within their District. A minimum of one sample shall be obtained from each particular location every six months. Within one week of obtaining these samples, the District personnel shall forward them to the MCS&T Division, where they shall be tested.

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5.2.1 If any of the samples, obtained by District Personnel as outlined in Section 5.2, fail to meet the specification requirements, personnel from the MCS&T Division shall immediately obtain a sample of the subject material at the source of production or distribution (i.e. terminal). The MCS&T Division shall then test this sample.

5.2.2 If the sample obtained in Section 5.2.1 meets specification requirements, personnel from the MCS&T Division shall obtain a second sample at the source of production or distribution (i.e. terminal). If this second sample meets specification requirements, no further action is required, and the subject source may remain on the Division's approved list.

5.2.3 If either of the samples obtained in Sections 5.2.1 or 5.2.2 do not meet specification requirements, the subject material shall be removed from the Division's approved list.

5.2.4 If, within a twelve-month period, two or more samples obtained as outlined in Section 5.2 (of the same material from the same approved source) fail to meet specification requirements, personnel from the MCS&T Division shall conduct an investigation into the possible reasons for the non-specification material. If the outcome of this investigation indicates a problem with material from the subject approved source, removal of that source from the approved list shall be permitted.

5.2.5 If a SCM is removed from the approved list, it may be reinstated at the discretion of the Division when sufficient sampling and testing (at the source of production or distribution) has been conducted to ensure that material being produced is once again within the limits of the specifications.

5.3 If, in a two-year period, no samples from an approved source of a SCM, as outlined in Section 5.2, are received by MCS&T from the Districts, then that source of SCM shall be considered as inactive, and it may be removed from the Division's approved list of SCMs.

5.3.1 If the Division elects to keep that source of SCM on the approved list of SCMs, then MCS&T shall obtain additional samples at that source, as outlined in Sections 3.3 and 3.4.

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Director
Materials Control, Soils and Testing Division

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

# MATERIALS PROCEDURE
# ACCEPTANCE CRITERIA FOR GENERAL INDUSTRIAL GRADE ELECTRICAL ITEMS.

## 1. PURPOSE

1.1 To establish procedures for qualifying general industrial grade electrical item vendors acceptable to supply items for use on West Virginia Division of Highways (WVDOH) projects.

1.2 To establish a procedure for maintaining a record of such information.

1.3 To establish a procedure for transmitting such information to the districts and to contractors of WVDOH projects.

## 2. SCOPE

2.1 This procedure shall apply to all vendors who supply general electrical items such as copper wire, switches, conduit fittings, PVC conduit, industrial surge protectors, fuse's and other miscellaneous associated hardware.

2.2 This procedure shall apply to all vendors of electrical items furnished to West Virginia Division of Highways (WVDOH) projects and purchase orders. The division may elect to use other control procedures when special conditions dictate.

## 3. APPLICABLE DOCUMENTS

3.1 WVDOH standard specifications for roads and bridges sections 715.42

## 4. ACCEPTANCE PROCEDURE

4.1 With each shipment, the vendor of industrial grade electrical items shall provide shipping documents which contain either the electrical vendor's approved source

number, or the approval number that was assigned to the shipping document or invoice as per Section 6 below.

## 5. ACCEPTANCE PROCEDURE (APPROVED SOURCE)

5.1 For a vendor to be considered an approved source of general electrical items, the vendor must comply with the following requirements where applicable:

5.2 The vendor is to submit a written statement to the WVDOH Materials Control, Soils and Testing Division indicating intention to be included on the WVDOH approved source list as an approved source general electrical item.

5.3 The prospective source shall submit a certified statement that all material shipped to the Division will conform to all NEMA, ASTM, and UL specifications where applicable, the certified statement shall be signed by a representative of the vendor who has the authority to bind the company.

5.4 A yearly evaluation of materials at the vendor's facility will be conducted by department personnel, or by its designee, to insure confidence in the ability of the vendor to supply a quality product within WVDOH specifications. After evaluation, a materials inspection report "MIR" shall be generated detailing any issues for granting

5.5 All steel, iron and glass materials at the prospective source must be melted and manufactured domestically, and in accordance to section 106.1.1. of the WVDOH Standard Specifications for Roads and Bridges.

5.6 Once the above requirements are met, an approval number will be assigned to the vendor to indicate WVDOH conformance. This approval number shall be active for one year. Acceptance of a manufacturer's facility can be verified by accessing the WVDOH online approved source list.

5.7 Revocation of approved source status may result from material supplied to projects that does not comply with WVDOH specifications.

5.8 "Approved Source" status may be reinstated at the discretion of the Materials Control, Soils and Testing Division based on the findings of an investigation. The reinstatement process will commence upon the receipt of a letter of request from the vendor to the

Materials Control, Soils and Testing Division. The letter of request should indicate reasons for reinstatement, and documentation to substantiate such reasons.

## 6. ACCEPTANCE PROCEDURES (NON-APPROVED SOURCE)

6.1 General electrical items used in highway construction will require an evaluation on a lot-by- lot basis, provided the material meets the following requirements:

6.2 All materials to be inspected must not have been incorporated into the project as per section 106.3 of the WVDOH standard specifications for roads and bridges, otherwise approval may not be granted.

6.3 An invoice or shipping document must be provided indicating items and quantities shipped, the document must have a unique tracking number affixed, and the contract identification number of the highway project.

6.4 Certifications will be required for nonstandard items if requested to indicate specifications being primarily to section 715.42 but not limited to, the WVDOH standard specifications for roads and bridges.

6.5 Certification may be required indicating the material is melted and manufactured domestically conforming to section 106 of the WVDOH standard specifications for roads and bridges.

6.6 If the results of the testing reveal that the material complies with all applicable specifications, a direct coverage approval number will be issued by the Division that shall be affixed to the invoice or shipping documents.

## 7. DOCUMENTATION REPORT

7.1 The approved source list for vendors of general electrical items shall be updated once a year, this list can be updated at any time with the addition of a new facility, or with the removal of a facility.

7.2 A current approved list of vendors of general electrical items will be available to all contractors, fabricators, and suppliers by accessing the West Virginia Department of Transportation approved source list website.

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