
1. ABSENT TESTING OF MATERIAL

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

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

Applicable MPS:

MP 307.00.50

MP 401.03.50

MP 601.03.50

MP 717.04.21

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

MATERIALS PROCEDURE

CRITERIA TO APPROVE PLAIN REINFORCING STEEL BARS USED IN CONCRETE

1. PURPOSE

- 1.1 To establish procedures for qualifying manufactures of plain steel reinforcing bars acceptable 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 WVDOH Personnel and contractors on WVDOH projects.

2. SCOPE

- 2.1 This procedure shall apply to all manufactures who produce plain uncoated reinforcing steel bars.

3. APPLICABLE DOCUMENTS

WVDOH Specifications for Roads and Bridges, Section 709.1

National Transportation Product Evaluation Program "NTPEP"

*American Association of State Highway and Transportation Officials "AASHTO"
section M31*

WVDOH Form HL-468

4. ACCEPTANCE PROCEDURE

- 4.1 With each shipment, of plain rebar material to a WVDOH project, the rebar manufacturer or distributor shall provide shipping documents which contain an Approved Source List (APL) source lab number reflecting materials meeting quality specified by the WVDOH.

5. ACCEPTANCE PROCEDURE (APPROVED SOURCE)

- 5.1 For a new manufacturer to be considered as an approved source of plain rebar, the manufacturer must comply with the following requirements.
- 5.2 The manufacturer is to complete form HL-468 attainable from the website: https://transportation.wv.gov/highways/mcst/Pages/newproduct_evaluationprocedure.aspx and submit it to the WVDOH Materials Control, Soils and Testing (MCS&T) Division new products email address, indicating intention to be included on the WVDOH APL as an approved source manufacturer of plain rebar.
- 5.3 A current certificate indicating membership and compliance with the National Transportation Product Evaluation Program “NTPEP” requirements.
- 5.4 After the NTPEP compliance documents have been evaluated, the Division will conduct quality assurance (QA) sampling at the source to verify compliance to AASHTO M31. This Division QA sampling and testing shall be performed prior to source approval and once a year thereafter. Division QA sampling shall consist of 3 bars with a minimum length of three feet, from 5 separate heats, all sampling shall be unbiased and sampled randomly from the most recent stocks or straight from production. Sampling may also be done from a WVDOH project location, should material be available at the project site.
- 5.5 If laboratory testing meets or exceeds the requirements of AASHTO M31, the manufacturer will be assigned a seven-digit approved source number and be placed on the APL for plain rebar. This approval will be active for one year.
- 5.6 If testing outlined in Section 5.4 is performed on material supplied by a manufacturer who is not on the APL, and the testing does not meet the requirements of AASHTO M31, or the manufacturer is not in compliance with NTPEP requirements, the manufacturer will not be added to the APL.
- 5.6.1 If testing outlined in Section 5.4 is performed on material supplied by a manufacturer who is on the APL, and the testing does not meet the requirements of AASHTO M31, or the manufacturer is not in compliance with NTPEP requirements, the manufacturer will be removed from the APL. Also, any material from that manufacturer that is supplied to WVDOH projects, after the date on which it was determined that the AASHTO M31 or NTPEP requirements were not met, will be rejected from those WVDOH projects.
- 5.6.2 If the manufacturer informs the WVDOH MCS&T Division in writing that issues causing noncompliance with NTPTP requirements and/or failure to meet the requirements of AASHTO M31 have been resolved, the manufacturer may request a reevaluation of their facility. That reevaluation shall be in accordance with sections 5.2 thru 5.5. If the results of that reevaluation confirm WVDOH requirements have been met, the manufacturer will be added to the APL.
- 5.7 If a manufacturer is currently listed on the APL for plain rebar, a yearly renewal evaluation of that manufacturer shall be conducted consisting of the above sections 5.3 thru 5.6.

6 DOCUMENTATION REPORT

- 6.1 The APL for “plain” reinforcing steel bars “rebar” used on WVDOH projects may be updated at any time with the addition of a new manufacturer, or with the removal of a manufacturer.
- 6.2 A current APL of reinforcing steel bar manufacturers is available accessing the current West Virginia Department of Transportation approved source list website: https://transportation.wv.gov/highways/mcst/Pages/APL_By_Number.aspx

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

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

MATERIALS PROCEDURE

CRITERIA TO APPROVE FENCE SUPPLIERS AND THEIR MATERIALS.

1. PURPOSE

- 1.1 To establish equipment, procedure, documentation, and documentation transmittal requirements for the tightening of anchor bolt nuts associated with signing, signal, lighting, and intelligent transportation systems (ITS) related roadway ancillary structures.
- 1.1.1 This Materials Procedure is specifically focused on the procedure to be followed when tightening anchor bolt nuts and does not address all requirements and procedures pertaining to the installation of ancillary structures. Individual component pre-inspection and repair, structure pre-assembly, structure installation preparation, pre-application of protective coatings, overall installation procedure, and proper tightening of structural connection bolts are included as part of the Standard Specifications.

2. MATERIALS AND EQUIPMENT

- 2.1 The mandatory materials and equipment required to properly tighten the anchor bolts include lubricant, snug tightening wrenches, and a hydraulic fastener tightening wrench.
- 2.1.1 Wrenches used for a snug tightening are to have an appropriate handle length in order to achieve a level of initial snug tightening as predictable and uniform as possible. The handle length used for fasteners 3/4-inch to 1-1/4-inches in diameter is to be 23-inches. The handle length used for fasteners 1-1/2-inches to 2-1/4-inches in diameter is to be 36-inches.
- 2.1.2 Beeswax or toilet ring wax may be used as lubricant.
- 2.1.3 Hydraulic wrenches and accompanying documentation are to meet the requirements herein.
- 2.1.3.1 The wrenches are to be capable of generating the necessary torque in order to tighten the anchor bolt nuts as described herein.
- 2.1.3.2 The hydraulic wrench consists of a wrench and a hydraulic power pack to power and operate the wrench.

- 2.1.3.3 Hydraulic wrenches are to have the wrench and the pressure or torque readout gauge associated with the power pack calibrated regularly. Prior to the tightening of any anchor bolt nuts, the project Engineer is to be provided with separate calibration certificates for the wrench and the gauge. The dates of the calibrations are to be one year or less prior to the ~~advertising date of the Contract~~date that the bolt tightening is performed. The certificates are to be from a calibration lab that is International Organization for Standardization (ISO) 17025 accredited, with the certificate indicating as such. The certificate for each is to display a serial number matching that shown on the wrench or gauge. If the gauge does not provide readings directly in torque values, the calibration certificate is to be accompanied by calibration charts which equate gauge pressure readings to torque values. Example calibration certificates and charts are included as part of attached Exhibit B.

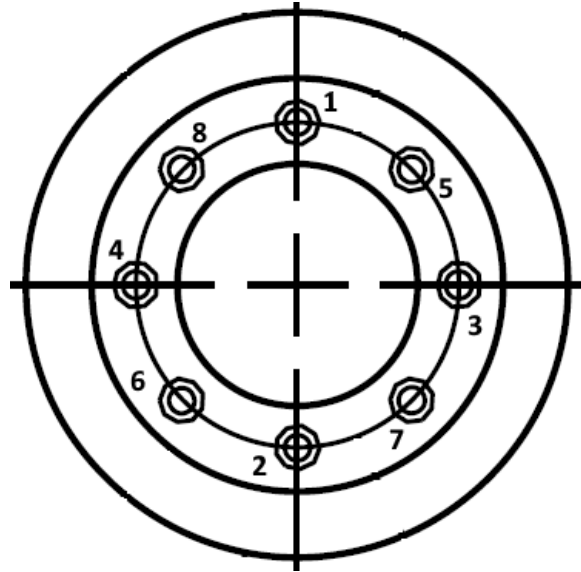
3. DOCUMENTATION

- 3.1 The tightening of all anchor bolt nuts is to be documented using the form “WVDOH ANCILLARY STRUCTURE ANCHOR BOLT TIGHTENING RECORD” (documentation form) attached as Exhibit A.

4. PROCEDURES

- ~~4.1 Clean the anchor bolt threads with a wire brush or equivalent and lubricate the anchor bolt threads.~~
- ~~4.2~~
- ~~4.3 If the lubricant pre-coated nuts have gotten wet at any point, reapply lubricant to the threads and the bearing surface face of the nuts.~~
- ~~4.4~~
- ~~4.54.1 After installing the leveling nuts and washers, placing the structure support leg, and adjusting the leveling nuts and washers as described in the Standard Specifications, install the top nuts and washers and~~ Install the top nuts and washers and snug tighten the top nuts using the appropriate handle length wrench. Snug tightening is to proceed from nut to nut in a star pattern and the specific sequence chosen is to be indicated on the base plate by numbering the sequence using a permanent marker (see figures below). Snug tightness is considered to be the tightness which exists due to the full effort of a

person using a spud wrench with the appropriate length handle for the bolt being tightened.



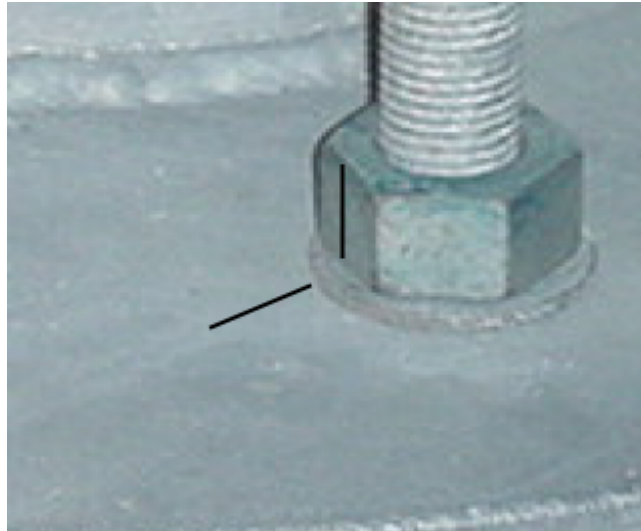
EXAMPLE NUT TIGHTENING SEQUENCE FOR 8 BOLT BASE PLATE



SNUG TIGHTENING SEQUENCE NUMBERING ON BASE PLATE

4.64.2 After verifying that all nuts and washers have been brought into firm contact and the necessity or unnecessary for repeating the snug tightening procedure with beveled washers has been determined and performed if required, a reference position for each nut in snug tight condition is to be established by using a permanent marker to place a

mark on one of the nut flats and a corresponding mark on the base plate (see figure below).



MARKING OF NUT SNUG TIGHT REFERENCE POSITION

4.74.3 Fully tighten the top nuts using the hydraulic wrench.

4.7.14.3.1 Full tightness of each nut is achieved by rotating the nut a prescribed number of flats beyond the reference position. Rotation is to be 1/3 (2 flats) beyond the reference

position for bolts 1-1/2-inches in diameter or less. Rotation is to be 1/6 (1 flat) beyond the reference position for bolts greater than-1-1/2 inches in diameter.

4.7.24.3.2 Tightening is to proceed from nut to nut in the same star pattern that was used for the snug tightening procedure and is to be achieved over two cycles. Using a structure with 2-inch anchor bolts as an example, each nut is to be tightened ½ flat. Each nut is to then be tightened an additional ½ flat. The amount of torque, as indicated on the power pack gauge, at the point when the full rotation of each nut is achieved is to be recorded on the documentation form. If the gauge associated with the power pack does not provide a torque readout, the pressure readout is to be recorded and the associated torque is to be determined from the power pack calibration charts and recorded on the documentation form.

4.8.4.4 Upon completion of the tightening of all nuts, a verification torque (T_v) is to be applied to each nut using the same hydraulic wrench and power pack that was used to tighten the nuts. This step is necessary to verify threads have not been stripped and is not intended to tighten the nuts further. The verification torque should be insufficient to further turn and tighten the nuts. The required verification torque is to be calculated using the following formula and documented on the documentation form:

$$T_v = 0.12 (D_b) F_i$$

Where:

T_v = verification torque (inch-kips)

D_b = nominal body diameter of the anchor bolt (inches)

F_i = 60% of the anchor bolt minimum tensile strength (kips) (= 45 ksi for ASTM F1554 Grade 55)

Multiply T_v by 83.3 to calculate T_v in ft-lbs

If the gauge associated with the power pack does not provide a torque readout, the pressure readout required to achieve the verification torque is to be determined from the power pack calibration charts.

4.8.14.4.1 The documentation form is to be marked where indicated to indicate that application of the verification torque did not result in further turning of each nut. If the application of the verification torque results in further turning of any nuts, the Traffic Engineering Division should be notified of this issue.

4.9.4.5 At least 48-hours after the tightening and verification torque procedures are completed, a torque equal to 110% of the T_v torque ($1.10T_v$) is to be applied to each nut using the same hydraulic wrench and power pack that was used to tighten the nuts. This step is necessary to verify threads have not been stripped and is not intended to tighten the nuts further. The $1.10T_v$ torque should be insufficient to further turn and tighten the nuts. If the gauge associated with the power pack does not provide a torque readout, the pressure readout required to achieve a torque of $1.10T_v$ is to be determined from the power pack calibration charts.

4.9.14.5.1 The documentation form is to be marked where indicated to indicate that application of the $1.10T_v$ torque did not result in further turning of each nut. If the application of

the 1.10Tv torque results in further turning of any nuts, the Traffic Engineering Division should be notified of this issue.

5. DOCUMENTATION TRANSMITTAL

- 5.1 Upon completion of all procedures described herein and the documentation form being completed in its entirety, the Engineer is to transmit an electronic copy of the documentation form to the email address **XXXXXXXXXX**, which is established by the Traffic Engineering Division for this purpose. Prior to transmittal, the calibration certificates for the wrench and power pack pressure or torque readout gauge, as well as the calibration charts for the gauge, should be attached to the documentation form and included with the submittal. The subject line of the email should be named using the following format: *D(District Number)-(Contract ID Number)-(Sign, Signal, Lighting, or ITS) Structure (Structure Number as indicated on the project Plans)*. Examples of this would be D4-2016000994-Sign Structure 6 and D7-2006001093-Lighting Structure HML1. An example of all documents that should be included as part of a complete transmittal is attached as Exhibit B.

RLS:W

ATTACHMENTS

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

EXHIBIT A

Base Plate 4 Diagram

Full Tightness Gauge Pressure and Torque Values		1	2	3	4	5	6	7	8
PSI									
foot-lbs									

Mark Each Box to Indicate Application of Tv did not Result in Further Turning of Nut		1	2	3	4	5	6	7	8

Mark Each Box to Indicate Application of 1.10Tv did not Result in Further Turning of Nut		1	2	3	4	5	6	7	8

Date of Tightening

Date of Application of 1.10Tv

Installation Contractor

Bolt Tightening WVDOH Rep. (Print)

Contractor Rep. (Print)

Application of 1.10Tv WVDOH Rep. (Print)

Contractor Rep. (Signature)

WVDOH Project Engineer (Print)

EXHIBIT B

Base Plate 4 Diagram

Full Tightness Gauge Pressure and Torque Values		1	2	3	4	5	6	7	8
PSI									
foot-lbs									

Mark Each Box to Indicate Application of Tv did not Result in Further Turning of Nut		1	2	3	4	5	6	7	8

Mark Each Box to Indicate Application of 1.10Tv did not Result in Further Turning of Nut		1	2	3	4	5	6	7	8

Date of Tightening

Date of Application of 1.10Tv

Installation Contractor

Bolt Tightening WVDOH Rep. (Print)

Contractor Rep. (Print)

Application of 1.10Tv WVDOH Rep. (Print)

Contractor Rep. (Signature)

WVDOH Project Engineer (Print)

EXAMPLE WRENCH CALIBRATION CERTIFICATE



CERTIFICATE INDICATES LAB IS ISO 17025 ACCREDITED

CERTIFICATE OF CALIBRATION

WRENCH MODEL AND SERIAL NUMBER

CERTIFICATE # TW-01193

Industrial Bolting Technologies certifies that the instrument below has been calibrated in accordance with IBT calibration procedures under the conditions noted below using laboratory standards which are traceable to SI units.

The uncertainty represents an expanded uncertainty at approximately the 95% confidence level using a coverage factor of k=2.

The information on this certificate applies only to the identified instrument and may not be reproduced, except in full, without the written consent of Industrial Bolting Technologies, Inc.

MODEL	2503MFRMH
SERIAL #	0916506063
TYPE	Click
CAL DATE	9/2/2021
CAL DUE	5/2/2022
ACCURACY	(+/-) 4%
RANGE MAX	260
RANGE MIN	48

Customer	IBT		
Address	6 McCown Circle Charleston, WV 25311		
Tech:	Temp (°F)	RH %	
Chris Silva	75.2	52	
Test Method:		TI-CAL-1	

CALIBRATION DATE

AS FOUND				
PERCENT OF RANGE	WRENCH SETTING		AS FOUND	TOLERANCE
100%	250	FTLB	251.56 FTLB	(+/-) 4%
60%	150	FTLB	147.14 FTLB	(+/-) 4%
20%	50	FTLB	47.596 FTLB	(+/-) 4%

AS LEFT				
PERCENT OF RANGE	WRENCH SETTING		AS LEFT	TOLERANCE
100%	250	FTLB	248.38 FTLB	(+/-) 4%
60%	150	FTLB	147.98 FTLB	(+/-) 4%
20%	50	FTLB	48.286 FTLB	(+/-) 4%

STANDARDS USED FOR CALIBRATION

MODEL USED	MFGR	SERIAL #	CERT #	EXPIRES	RANGE
MTMDP-4L-100	AWS	10963-1	25500-1	7/23/2022	10-100 IN-LBS
MTMDP-4L-500	AWS	10963-2	25501-1	7/23/2022	50-500 IN-LBS
MTMDP-4L-250	AWS	10963-3	25502-1	7/23/2022	25-250 FT-LBS
MTMDP-4L-750	AWS	10963-4	25503-1	7/23/2022	75-750 FT-LBS

Expanded Uncertainty	
Range	k=2
10-100 inlb	1.08 inlb
50-500 inlb	4.98 inlb
25-250 ftlb	7.44 ftlb
75-750 ftlb	8.86 ftlb

Industrial Bolting Technologies, Inc.
 6 McCown Circle
 Charleston, WV 25313
 Phone: (304) 744-9489
 Fax: (304) 744-9480
www.torsionx.com www.toolcal.com

9/2/2021

SIGNATURE

DATE

EXAMPLE GAUGE CALIBRATION CERTIFICATE AND CHARTS



CERTIFICATE INDICATES LAB IS ISO 17025 ACCREDITED

Certificate of Calibration

CERTIFICATE # 14-03066

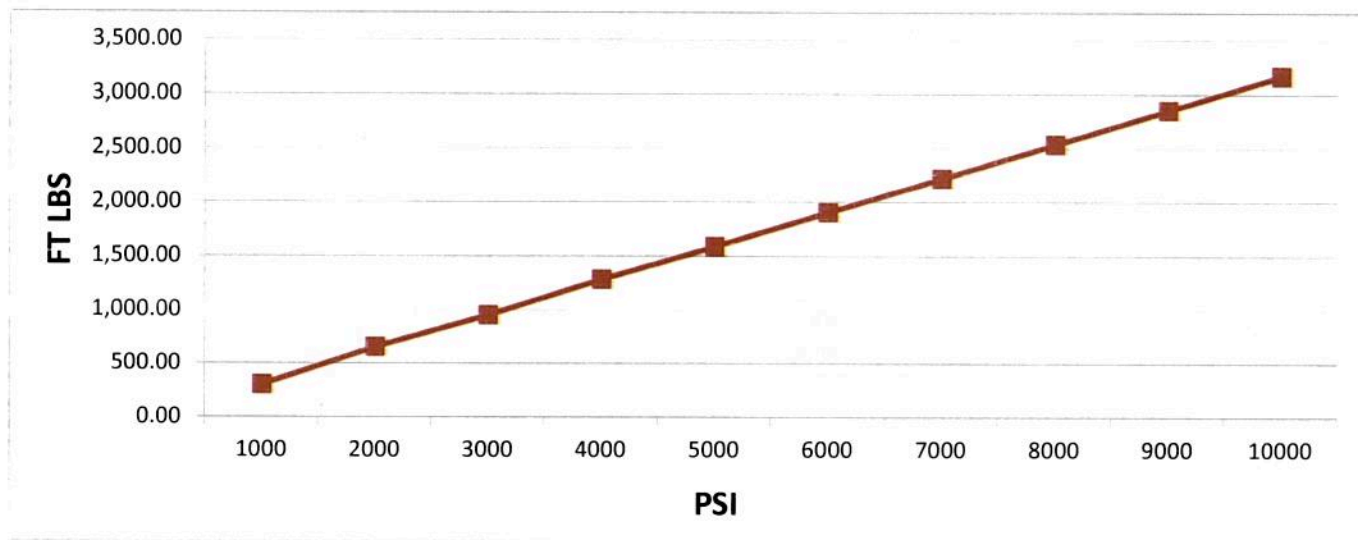
Calibration Date:	August 18, 2021
Calibration Due:	February 18, 2022
Temperature (F):	74.3
Relative Humidity(%)	57
Test Method:	TI-CAL-7, TI-CAL-8

Model Number:	3MD
Serial Number:	353228
Type:	Hydraulic
Technician:	PERRY WHITE
Signature:	

Customer:	IBT
Address:	6 MCCOWN CIRCLE CHARLESTON, WV 2531

GAUGE MODEL AND SERIAL NUMBER

CALIBRATION DATE



TEST EQUIPMENT

Manufacturer	AKO	AKO
Model Number	TSD20011	TSD10KPT
Serial Number	6240	127064
Accuracy (+/-)	0.5%	0.1%
Calibration Certificate #	21238-1	21239-1
Calibration Due Date	10/15/2021	10/15/2021

CALIBRATION CHART



Calibration Date:	8/18/2021	Model Number:	3MD
Calibration Due:	2/18/2022	Serial Number:	353228

PSI	FT/LBS	PSI	FT/LBS	PSI	FT/LBS	PSI	FT/LBS	PSI	FT/LBS
100	2	2100	692	4100	1307	6100	1940	8100	2573
200	52	2200	721	4200	1337	6200	1971	8200	2605
300	93	2300	752	4300	1368	6300	2003	8300	2637
400	125	2400	776	4400	1401	6400	2035	8400	2669
500	163	2500	797	4500	1434	6500	2067	8500	2702
600	195	2600	836	4600	1465	6600	2098	8600	2732
700	228	2700	880	4700	1496	6700	2131	8700	2764
800	259	2800	903	4800	1527	6800	2163	8800	2797
900	287	2900	924	4900	1560	6900	2194	8900	2828
1000	306	3000	956	5000	1591	7000	2225	9000	2860
1100	351	3100	987	5100	1622	7100	2257	9100	2891
1200	397	3200	1017	5200	1654	7200	2289	9200	2923
1300	426	3300	1048	5300	1685	7300	2321	9300	2954
1400	458	3400	1081	5400	1717	7400	2353	9400	2986
1500	491	3500	1113	5500	1749	7500	2384	9500	3018
1600	524	3600	1145	5600	1780	7600	2416	9600	3049
1700	556	3700	1177	5700	1812	7700	2447	9700	3081
1800	589	3800	1222	5800	1844	7800	2479	9800	3112
1900	623	3900	1267	5900	1876	7900	2511	9900	3143
2000	659	4000	1288	6000	1908	8000	2542	10000	3177

Tv = 900 ft-lbs = 2,787 psi*

1.10Tv = 990 ft-lbs = 3,110 psi*

Industrial Bolting Technologies certifies that the above instrument has been calibrated in accordance with IBT calibration procedures under the conditions noted above using laboratory standards which are traceable to SI units. The uncertainty represents an expanded uncertainty at approximately the 95% confidence level using a coverage factor of k=2.

***DETERMINED USING LINEAR INTERPOLATION BETWEEN ADJACENT DATA POINTS**

Expanded Uncertainty

Range	k = 2	Units
0-20,000	78.52	FT/LBS

The information on this certificate applies only to the identified instrument and may not be reproduced, except in full, without the written consent of Industrial Bolting Technologies, Inc.

Industrial Bolting Technologies, Inc.
 6 McCown Circle
 Charleston, WV 25313
 Phone:(304)744-9489
 Fax:(304)744-9480

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MP 601.03.50 – Section 4.2.4

ADD THE FOLLOWING AT THE END OF SUBSECTION 4.2.4:

Any QC testing that is not performed in accordance with the methods and procedures required by the Specifications shall be considered an invalid test, and the applicable penalty for the cost associated with that test, in accordance with MP 109.00.20, will be assessed to the contractor, along with the applicable price adjustment in Section 105.3. The test specimen(s) represented by an invalid test shall be considered as not meeting Specifications and documented accordingly. The Division may, however, use the results of an invalid test to determine if material may be accepted and allowed to remain in place and if payment may be made for the material represented by the invalid test. In the event of a failure or invalid test, and at the discretion of the Construction Engineer, a forensic examination may be done to evaluate the material acceptance and price adjustment of the material.

Commented [BDA1]: Comments from Dale Hill in notes – If rejected based on testing which was not performed correctly, is there any further movement for forensic investigation for acceptance of the material.

If the technician didn't get the samples within 24 hours etc, close the lid, etc, a lot of things that can go wrong, a great liability for the contractor without forensic investigation.

Penalize payment based on failing cylinders. Further NDT testing investigation or even coring.

Unfair to say "fail" and base the decision on the failure to remain in place.

With Failing cylinders, ask for permission to investigate. (see notes on meeting.)

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 the Plant QC Plan. All classes of concrete, which may be used, shall be listed on the Field QC Plan.
- 4.2.3 Process control sampling, testing, and inspection should be an integral part of the Contractor's quality control system. In addition to the above requirements, the Contractor's QC Plan should document the process control requirements shown in Table 1 of Attachment 1. The process control activities shown in Table 1 are considered to be normal activities necessary to control the production and placement of a given product or material at an acceptable quality level. To facilitate the Division's activities, the Contractor, as per ML-25, shall retain all completed gradation samples until further disposition is designated by the Division.
- 4.2.4 All sampling and testing shall be in accordance with the methods and procedures required by the Specifications. Measuring and testing equipment shall be standard and properly calibrated as per the specified test procedures. If alternative sampling methods, procedures, and inspection equipment are to be used, they shall be detailed in the QC Plan.
- 4.2.4.1 Any individual who samples or tests plastic concrete for quality control purposes shall be certified as a WVDOH PCC Inspector.
- 4.2.4.2 Any Laboratory which tests the hardened concrete cylinders for the Contractor, for quality control purposes, shall be listed in the Contractor's QC Plan for field operations. This Laboratory shall provide evidence that it meets the applicable requirements in ASTM C1077, pertaining to testing hardened concrete cylinders, for a concrete testing

laboratory, including curing facilities, testing equipment, technician proficiency, participation in the CCRL Concrete Proficiency Sample Program (PSP), Quality Management System documentation, and recordkeeping. The only test required for these laboratories, in the CCRL Concrete PSP, is ASTM C39 (AASHTO T22), but it is recommended that the laboratory perform all the field test portions of these Proficiency Samples and maintain the results of these tests, in order to evaluate any root cause issues pertaining to compressive strength. Each Laboratory shall be inspected and evaluated initially, and at least once every regular inspection tour cycle (approximately 30 months) by the Cement and Concrete Reference Laboratory (CCRL). The ASTM standards pertaining to testing concrete cylinders, with which the subject laboratory must comply, include ASTM C39 (AASHTO T22), ASTM C617 (AASHTO T231) or ASTM C1231, and ASTM C511 (AASHTO M201). The Personnel Qualification requirements in Section 6 of ASTM C1077 regarding PE direction, Laboratory Supervisors, and concrete laboratory personnel testing certifications also apply, except that a Laboratory Supervisor with at least five years experience in construction materials testing shall be a permissible substitution for the licensed professional engineer. Subsequent documentation shall be provided to the Division showing that the subject Laboratory and personnel meet the applicable requirements of ASTM C1077, pertaining to testing concrete cylinders, for a concrete laboratory.

- 4.2.4.3 Any Laboratory which desires to test Contractor hardened concrete QC specimens on WVDOH projects shall submit the evidence/documentation, required in Section 4.2.4.2, confirming compliance with ASTM C1077, with regards to testing concrete cylinders, to MCS&T Division at the following e-mail address: DOHMCSnTconcretelab@wv.gov. MCS&T Division will review this submittal. In this submittal, the subject Laboratory shall also explain how all deficiencies noted in the CCRL Laboratory Inspection Report have been addressed. All deficiencies noted in the CCRL Laboratory Inspection Report shall be resolved to the satisfaction of the Division within 90 days from the date of the CCRL Laboratory Inspection Report. Once MCS&T Division determines that the subject Laboratory is in compliance with the applicable requirements of ASTM C1077, and all deficiencies have been adequately resolved, that Laboratory will be placed on the Division's Approved List of Concrete Cylinder Testing Labs. All laboratories which test Contractor hardened concrete QC specimens on WVDOH projects must be listed on the Division's Approved List of Concrete Cylinder Testing Labs. A listing of these laboratories is available on the WVDOT internet site at the following link: https://transportation.wv.gov/highways/mcst/Pages/APL_By_Number.aspx. All Division Approved Laboratories shall provide the Division with the CCRL Lab Number for their laboratory and agree to allow DOH, CCRL, and AASHTO RE:source to freely share information about assessment reports, proficiency samples, corrective actions, quality management system, and personnel competency and certification records.

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

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

Where:

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

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

4.2.6 Miscellaneous Concrete:

The Contractor is not required to perform the process control testing required by Part C of Table 1 of Attachment 1 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 yd³ (19 m³) per day, incorporated into items that will not adversely affect the traffic carrying capacity of a completed facility. Such items would not include any concrete intended for major structures, permanent mainline or ramp pavements, or any other structurally critical items part of, or adjacent to the roadway.

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

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

- 1 Sidewalks
2. Curb and Gutter
3. Slope walls for under drain outlet pipes
4. Temporary pavements and pipe crossings
5. Building floors

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

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

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

4.2.7 Documentation:

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

4.2.8 Charts and Forms:

All conforming and non-conforming inspections and test results shall be kept complete and shall be available at all times to the Division during the performance of the 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 WVDOT form T300 using the material codes listed in the online computer systems user guide. The original gradation data shall be submitted to the District Materials Section within 72 hours of obtaining the gradation sample. Test data for Portland Cement Concrete shall be charted in accordance with the applicable requirements of MP 601.03.52. Gradation test data shall be plotted in accordance with the applicable requirements of MP 300.00.51. The Contractor may use other types of control charts as deemed appropriate by the Division.

It is normally expected that testing and charting will be completed within 48 hours after sampling. The Contractor shall also ensure that all Material Suppliers prepare and submit the HL-441 form (weekly supplier report) in a timely manner

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

4.2.9 Batch Tickets

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

- 4.2.9.1 All batch tickets for Structural Concrete and Portland Cement Concrete Pavement Concrete transported by truck mixers shall have all of the following items pre-printed on the ticket: Producer/Supplier Code, Producer/Supplier Name, Producer/Supplier Location, Mix Design Laboratory Reference Number, Date, Sequence Number, Volume (yd^3/m^3), Time Batched, Time Unloaded, Contract Identification Number (CID #), Federal and/or State Project Number, Material Code, Material Name, Water Allowed (Gallon/Liter), Water at Plant (gallon/liter), Weight of Ice at Plant (lb/kg), Water at Job (Gallon/Liter), Weight of Cement (lb/kg), Weight(s) of Pozzolan(s) (lb/kg), Weight of Fine Aggregate (lb/kg), Weight of Coarse Aggregate (lb/kg), Admixture Name(s) and Dose (ounces/mL), Temperature ($^{\circ}\text{F}/^{\circ}\text{C}$), Cylinder I.D., Initial Counter, Final Counter, Target Consistency (in/mm), Actual Consistency (in/mm), Target Air (%), Actual Air (%), Truck Number.
- 4.2.9.2 All batch tickets for concrete delivered by means of non-agitator trucks or truck agitators shall have all of the following items pre-printed on the ticket: Producer/Supplier Name, Mix Design Laboratory Reference Number, Date, Sequence Number, Volume (yd^3/m^3), Time Batched, Time Unloaded, CID#, Federal and/or State Project Number, Material Code, Material Name, Water Allowed (Gallon/Liter), Water at Plant (Gallon/Liter), Weight of Ice at Plant (lb/kg), Weight of Cement (lb/kg), Weight of SCM (lb/kg), Weight of Fine Aggregate (lb/kg), Weight of Coarse Aggregate (lb/kg), Admixture Name(s) and Weight(s) (ounces/grams), Temperature ($^{\circ}\text{F}/^{\circ}\text{C}$), Target Consistency (in/mm), Actual Consistency (in/mm), Target Air (%), Actual Air (%), Truck Number.
- 4.2.9.3 The batch ticket in the case of either type of concrete shall be a pre-printed batch ticket prepared by the plant. This ticket may be either computer generated or a standard

pre-printed form with blank spaces provided in which all of the required data shall be recorded. The data items listed above that are completed in the field (such as Time Unloaded, Actual Consistency, etc.) must have a space on the batch ticket for completion. Volume is to be reported to the nearest 0.01 yd³ (0.01 m³). Consistencies are to be reported to the nearest 0.25 inch (5 mm). Target and Actual Air are to be reported to the nearest 0.1% (to the nearest 0.25% if the volumetric method is used).

4.2.10 Corrective Action:

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

4.2.11 Non-Conforming Materials:

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

4.2.12 Types of QC Plans:

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

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

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

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

4.3 Master QC Plan

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

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

5. ACCEPTANCE SAMPLING AND TESTING

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

6. ABSENT TESTING OF MATERIAL

- 6.1 If the Contractor fails to perform testing of the material in accordance with the Contractor's Division Approved Quality Control Plan, payment for the material represented by the failed testing shall be withheld, pending the Engineer's decision whether or not to allow the material to remain in place.
- 6.1.1 If the Engineer allows the material to remain in place, the Division shall not pay for the material represented by the absent test. However, the Division shall pay for the cost of the placement of the material, including labor and equipment. The invoice or material supplier cost (if applicable), determined at the time of shipment, shall be used to calculate the cost of material when evaluating the total cost of labor and equipment.

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

RLS:Mt

Attachments

TABLE 1

**CONTRACTORS PROCESS CONTROL
REQUIREMENTS**

**STRUCTURAL CONCRETE AND
PORTLAND CEMENT CONCRETE PAVEMENT**

Minimum frequency*

A. PLANT AND TRUCKS

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

B. AGGREGATES

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

2. Coarse Aggregates

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

3. Optimized Aggregates

- | | |
|--------------|---|
| a. Gradation | Per section 601.3.2.4.1 of the Specifications |
| b. Moisture | Daily |

C. PLASTIC CONCRETE

1. Entrained Air Content

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

2. Consistency**

- | | |
|-------------------|--|
| Pavement Concrete | One per 500 yd ³ (380 m ³) or fraction thereof, with a minimum of two per day |
|-------------------|--|

Structural Concrete (except Bridge Superstructure)	One per 100 yd ³ (75 m ³) or fraction thereof, with a minimum of one per ½ day of operation
Bridge Superstructure	One for first batch and one for every fifth batch thereafter
3. Temperature	Per Specification
4. Yield	
Pavement Concrete	Per Section 501.3 of the Specifications and one for each five days of operation after the first five days of operation
Structural Concrete	Per Section 601.3.2.3 of the Specifications and one for each ten sets of cylinders after the first ten
5. Compressive Strength***	
Pavement Concrete	One set of concrete cylinders for each 350 yd ³ (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 Division 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 Division 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 WVDOT 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. _____
West Virginia Division 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. _____
West Virginia Division 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: XXXXXXXX
P/S Code: (If a Plant)

Dear Sir,

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

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

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

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

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

Very truly yours,

Name, Title

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

MATERIALS CONTROL, SOILS AND TESTING DIVISION
MATERIALS PROCEDURE

BASIS FOR CHARGES FOR NON-SUBMITTAL
OF SAMPLING & TESTING DOCUMENTATION IN A TIMELY MANNER

1. PURPOSE

- 1.1 Provide a unit cost per test to be assessed to the Contractor when testing is not complete and/or submitted by the contractor in a timely manner. Documentation not submitted is limited to those tests listed in Table 1 of Attachment 1 of this procedure. Periodic updates of this table shall be the responsibility of the Director of Materials Control, Soils and Testing Division or their designee.

2. SCOPE

- 2.1 This procedure is applicable to those circumstances where a construction item by specification and/or MP ~~is not properly tested or the documentation~~ is not complete and/or submitted in a timely manner of seven (7) days for compaction, fourteen days (14) for gradations and thirty five days (35) for concrete cylinder breaks from the sampling date.

3. GENERAL

- 3.1 As stated in Section 106.3.1.2 of the ~~Standard~~ Specifications, it is the intent of the specifications that lots and sublots of materials, products, items of construction or completed construction meet testing specification requirements at the time of submission. In this case submission refers to the time when the contractor has completed the work and offers the finished 'product' to the Division for final acceptance testing.
- 3.2 In the case where no test was performed, or no documentation was submitted for material placed according to the required quality control per specifications, the price for the absent test/documentation will be assessed in accordance with Table 1. This penalty will also include the cost of the material placed that the absent test/documentation was to represent, if the material was left in place.
- 3.3 Test results must be emailed to the District Material Supervisor as a PDF that has been signed in blue. This must be submitted in the time frame stated above in Section 2.1. The original document shall be mailed to the District Materials Supervisor following the email.

Commented [MMA1]: Do we want to limit ourselves to this? There may be additional tests that come up later or which are added by SP.

Commented [BDA2]: We can update the list as we go? Maybe make this a separate document

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

TABLE 1 — COST PENALTIES PER ITEM

COST FOR FAILING TO TEST OR SUBMIT DOCUMENTATION FOR MATERIAL PLACED

Commented [MMA3]: I'm not sure if we want to list this by item. That could get pretty lengthy. For example, concrete is also used in Sections 609 & 625). I think it's best just to associate the penalty with a test, at least for items that use concrete, but which refer to 501 or 601 for concrete requirements.

ITEM#	TEST		COST
207	IN-PLACE DENSITY (5 TESTS)	\$140.00 ea	\$700.00
	GRADATION (EACH TEST)		\$700.00
	PLASTIC INDEX, LIQUID LIMITS		\$700.00
212	IN-PLACE DENSITY (5 TESTS)	\$140.00 ea	\$700.00
	GRADATION (EACH TEST)		\$700.00
307 & 308	IN-PLACE DENSITY (5 TESTS)	\$140.00 ea	\$700.00
	GRADATION (EACH TEST)		\$700.00
	PLASTIC INDEX, LIQUID LIMITS		
311	CRUSHED PARTICLE ANALYSIS		\$700.00
	GRADATION (EACH TEST)		\$700.00
401 & 402	CORING (EACH CORE) PWL		\$700.00
	PAVEMENT SMOOTHNESS		\$700.00
	(PER LANE MILE)		\$700.00
	ASPHALT MIX TEST		CONTENT
	AIR VOIDS		
			\$700.00
405	GRADATION (EACH TEST)		\$700.00
495	GRADATION (EACH TEST)		\$700.00
601	A-BAR or OPTIMIZED GRADATION (EACH TEST)		\$700.00
	CYLINDER TEST/BREAK REPORT		\$700.00
	RAPID CHLORIDE PERMEABILITY TEST		\$700.00
	AIR AND SLUMP TESTS		\$700.00
	IMPROPER/NO CURING TEMPERATURES FOR CYLINDERS		\$700.00
603	GROUT BREAK REPORT (EACH TEST)		\$700.00
	GROUT STRENGTH REPORT		\$700.00
604	IN-PLACE DENSITY (5 TESTS)	\$140.00 ea	\$700.00
	GRADATIONS >60"		\$700.00
605	ABAR (EACH TEST)		\$700.00
	CYLINDER BREAK REPORT		\$700.00
	PERMEABILITY		\$700.00
	AIR AND SLUMP TESTS		\$700.00
	IMPROPER/NO CURING TEMPERATURES		\$700.00
	REFER TO THE 601 PENALTIES		
609	REFER TO 601 PENALTIES		
501	A-BAR or OPTIMIZED GRADATION (EACH TEST)		\$700.00
	CYLINDER TEST/BREAK REPORT		\$700.00
	IMPROPER/NO CURING TEMPERATURES FOR CYLINDERS		\$700.00
	AIR AND SLUMP TESTS		\$700.00
	EARLY CYLINDER BREAK REPORTS		\$700.00
	REFER TO THE 601 PENALTIES		

Commented [MMA4]: I added optimized gradation since that will now be an alternative to A-bar.

Commented [MMA5]: Are we lumping slump and air together as one test with a \$700 penalty, or are we saying \$700 for air test and \$700 for slump test?

Commented [MMA6]: I don't think that we need to include this section. Concrete used for cast in place 605 items falls under 601.

Commented [CKA7]: Mike inlets are still cast in the field and requires full testing.

Commented [MMA8]: We just need to make it clear whether we are we lumping slump and air together as one test with a \$700 penalty, or if we saying \$700 for air test and \$700 for slump test.

MP-MP 109.2000.0020
 SUPERCEDGES: APRIL 2000
 REVISED: FEBRUARY 2022
 ATTACHEMENT 1

506	CYLINDER BREAK REPORTS REFER TO THE 601 PENALTIES	\$700.00
606	GRADATION (EACH TEST)	\$700.00
614	CONCRETE TESTING CYLINDER BREAK REPORT IMPROPER/NO CURING TEMPERATURES GROUT CUBE TESTING GROUT STRENGTH REPORT	\$700.00 \$700.00 \$700.00 \$700.00 \$700.00
625	REFER TO THE 601 PENALTIES	
626	IN-PLACE DENSITY (5 TESTS) \$140.00 ea GRADATION (EACH TEST) PLASTIC INDEX, LIQUID LIMITS REFER TO THE 207 & 601 PENALTIES	\$700.00 \$700.00 \$700.00
679	CYLINDER TEST/BREAK REPORTS RAPID CHLORIDE PERMEABILITY A-BAR or OPTIMIZED GRADATION (EACH TEST)	\$700.00 \$700.00 \$700.00
	\$700.00	
	AIR AND SLUMP TESTS IMPROPER/NO CURING TEMPERATURES FOR CYLINDERS	\$700.00 \$700.00
720	FAILURE TO RUN PROFILER	\$700.00

Commented [MMA9]: I don't think that we need to include this section. Concrete used for 506 items falls under 501 or 601.

Commented [MMA10]: I don't think that we need to include this section. Concrete used for 614 items falls under 601.

Commented [CKA11]: You are correct. It has to come from an approved source. Grout testing isn't needed either. Grout testing is needed for concrete bridge beam filler.

Commented [MMA12]: We just need to make it clear whether we are we lumping slump and air together as one test with a \$700 penalty, or if we saying \$700 for air test and \$700 for slump test.

Commented [CKA13]: Every load is tested for this item however Class K is also tested every load but doesn't fall under this item so should I type that in as Air/Slump each

Any item that is not mentioned or will be added at a later date and has a required test referenced in the Special Provision or in the Specifications will be subject to a penalty for not performing the test or providing required documentation

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

MATERIALS PROCEDURE

PREPARING MATERIALS INSPECTION REPORTS

1. PURPOSE

- 1.1 To set forth a Standard Materials Inspection Report Format
-

2. SCOPE

- 2.1 To establish a standard format in the style, form, substance, and frequency of Materials Inspection Reports
-

3. INSTRUCTIONS

- 3.1 Format - All Materials Inspection Reports shall conform to the format used herein. See attachments for templates for each section.
-

4. MEMORANDUM

- 4.1 A memorandum conforming to the format contained herein (attachment 1) shall accompany all Materials Inspection Reports
- 4.1.1 The memorandum shall be sent to the attention of the District Engineer or District Manager with a CC to the District Materials Supervisor and the District Construction Engineer.
- 4.1.2 The memorandum shall summarize the findings, observations, and deficiencies (if any) of the Inspection.
-

5. REPORT

- 5.1 A report conforming to the format contained herein shall accompany all Materials Inspection Reports. (See attached Template for relevant section)
-

6. FREQUENCY

- 6.1 Materials Inspections shall be conducted bi-annually in conformance with Federal Regulations (Federal Highways Administration's (FHWA's) Testing Program to Control Materials and Construction, section IV, Part 2A).
-

7. RESPONSE

- 7.1 The District Materials Supervisor shall respond within thirty (30) days of receipt of the Materials Inspection Report detailing what corrective action, if any will be taken to ensure compliance with testing procedures.



WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

Division of Highways

1900 Kanawha Boulevard East • Building Five • Room 110
Charleston, West Virginia 25305-0430 • (304) 558-3505

D. Alan Reed, P.E.
State Highway Engineer

Jimmy Wriston, P. E.
Secretary of Transportation
Commissioner of Highways

DATE of MEMO

MEMORANDUM

**TO: NAME OF DISTRICT ENGINEER/SUPERVISOR
DISTRICT NUMBER, TITLE OF ABOVE PERSON**

**FROM: RONALD L. STANEVICH, P.E.
DIRECTOR
MATERIALS CONTROL, SOILS AND TESTING DIVISION**

SUBJECT: INSPECTION OF DISTRICT (#) AGGREGATE LABORATORY

Attached is Materials Inspection Report (MIR) Number XXXXXX pertaining to the subject inspection. It is our intent to perform such inspections at least once every other year in each district.

The (GROUP) Laboratory testing apparatus inspection resulted in XX recommendations as noted in section X and X. It was recommended that (explain deficiencies and what was done to fix them).

The (GROUP) Laboratory testing procedures inspection resulted in X deficiencies (explain deficiencies and what was done to fix them). The AASHTO re:source proficiency samples had X deficiencies (if applicable - explain deficiencies and what was done to fix them - The corrective action reports are attached to the end of this MIR, detailing the ratings and what has been done to mitigate the deficiencies). The District Materials Supervisor is asked to write a response to this Division within 30 days of receipt stating how the deficiencies were or will be corrected.

If you have any questions or need additional information, please feel free to contact Mr. David Matics of this Division at (304) 414-6634.

RLS:Md

Attachment

cc: MCS&T Group Supervisor
District Construction Engineer, District Materials Supervisor



WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

Division of Highways

1900 Kanawha Boulevard East • Building Five • Room 110
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D. Alan Reed, P.E.
State Highway Engineer

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Secretary of Transportation
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DATE of MEMO

MEMORANDUM

**TO: NAME OF DISTRICT ENGINEER/SUPERVISOR
DISTRICT NUMBER, TITLE OF ABOVE PERSON**

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DIRECTOR
MATERIALS CONTROL, SOILS AND TESTING DIVISION**

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If you have any questions or need additional information, please feel free to contact Mr. David Matics of this Division at (304) 414-6634.

RLS:Md

Attachment

cc: MCS&T Group Supervisor
District Construction Engineer, District Materials Supervisor

REPORT NUMBER: XXXXXXXX
MATERIALS INSPECTION REPORT
SUBJECT: Inspection of Aggregate Laboratory
LOCATION Choose an item.
INSPECTED BY: Inspector's Name
TECHNICIAN: Technician's Name
DATE OF INPSECTION: Click or tap to enter a date.
DATE OF REPORT: Click or tap to enter a date.

1. OBJECTIVE

- 1.1. To inspect the laboratory testing equipment, test procedures, operator technique, reporting and documentation of test data, and to verify compliance with standard methods of testing.
- 1.2. To evaluate apparatus and procedures used in performing the tests for aggregate and soil as described in:

AASHTO R 18	Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
AASHTO M 92	Wire-Cloth Sieves for Testing Purposes
AASHTO M 231	Weighing Devices Used in the Testing of Materials
AASHTO T 11	Materials Finer Than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
AASHTO T 19	Bulk Density ("Unit Weight") and Voids in Aggregate
AASHTO T 27	Sieve Analysis of Fine and Coarse Aggregates
AASHTO T 84	Specific Gravity and Absorption of Fine Aggregate
AASHTO T 85	Specific Gravity and Absorption of Coarse Aggregate
AASHTO T 89	Determining the Liquid Limit of Soils
AASHTO T 90	Determining the Plastic Limit and Plasticity Index of Soils
AASHTO T 265	Laboratory Determination of Moisture Content of Soils
ML-25	Procedure for Monitoring the Activities Related to Sieve Analysis of Fine and Coarse Aggregate

MP 700.00.54	Procedure for Evaluating Quality Control Sample Test Results with Verification Sample Test Results
MP 703.00.21	Standard Method of Test for Percent Crushed Particles

- 1.3. To determine if any deficiencies exist, a Division developed procedure checklist is used. This checklist is based on the AASHTO and Division accepted procedures for the applicable tests.

2. DISCUSSION

- 2.1. The subject laboratory inspection is part of this Division's overall Aggregate Quality Assurance Program. It was developed to evaluate the District's proficiency in performing those tests common to project Quality Control. In addition to apparatus and testing inspection, reporting and documentation was also reviewed to ensure adequate handling of the test data.

3. APPARATUS

- 3.1. The laboratory workroom was checked for compliance with the acceptable range for room temperature, 68°F to 86°F (20°C to 30°C). The temperature at the time of inspection was Click or tap here to enter text.°F (Click or tap here to enter text.°C).
- 3.2. The temperature of the oven used for aggregate testing was checked for compliance within the specified limits of 230 ± 9°F (110 ± 5°C). The oven temperature was Click or tap here to enter text.°F (Click or tap here to enter text.°C).
- 3.3. The coarse and fine aggregate splitters used in separating samples for testing purposes were examined and found to be in good physical condition.
- 3.4. The thermometers in use at the time of inspection were checked to determine compliance with applicable requirements. All thermometers were within the acceptable range of 1°F (0.5°C).
- 3.5. The mechanical shaking devices and their respective timers used for sieve analysis of aggregates in use at the time of inspection were examined and found to comply with the requirements of AASHTO T 11 and AASHTO T 27.

3.6. The laboratory's balances used for aggregate listed below were examined:

Adam Equipment CPWplus 75	Direct Read – Top Load Digital Balance 0.02kg to 75kg
Mettler PM200	Direct Read – Top Load Digital Balance 0.001 g to 200 g
Mettler PE16	Direct Read – Top Load Digital Balance to 16,000 g
Mettler Toledo XS16001L	Direct Read - Top Load Digital Balance 0.1 g to 16,000 g

The laboratory's balances were found to be in good working order.

3.7. The equipment used for the determination of the minus No. 200 material in aggregate was examined and found to conform to the requirements of AASHTO T 11.

3.8. Sieves used in determining the particle size of aggregate were examined and found to conform to the specifications in AASHTO M 92 with one exception:

a) EXAMPLE: The No.8 sieve exhibited corrosion and minor deformations in the wire cloth. The sieve was replaced during the inspection.

3.9. All equipment and measures used in determining the unit weight of aggregate were checked and found to conform to the requirements of AASHTO T 19, with the following exception:

a) EXAMPLE: The 1/3 measure's calibration date was past the yearly calibration deadline. The measure was properly re-calibrated during the inspection. The new calibration date was updated on the measure.

3.10. All equipment used in determining the fine aggregate specific gravity were checked and found to conform to the requirements of AASHTO T 84.

3.11. The water tank and basket used for holding samples of coarse aggregate for specific gravity were examined and were found to conform to the requirements of AASHTO T 85.

- 3.12. The equipment used for the determination of the liquid limit and plastic limit was examined and found to conform to the requirements of AASHTO T 89 and AASHTO T 90.

4. PROCEDURES

- 4.1. The procedure used in determining the percent crushed particles was observed and was found to conform to the procedure described in MP 703.00.21.
- 4.2. The procedure used in determining the amount of material in aggregate finer than a No. 200 sieve was observed and found to conform to the procedure described in AASHTO T 11.
- 4.3. The procedure used in determining the unit weight of aggregate was observed and found to conform to the procedure described in AASHTO T 19.
- 4.4. The procedure used in determining the sieve analysis of coarse and fine aggregate was observed and found to conform to the procedure described in AASHTO T 27.
- 4.5. The procedures used in determining the specific gravity and absorption of fine and coarse aggregates were observed and found to conform to the procedures described in AASHTO T 84 and AASHTO T 85, respectively.
- 4.6. The procedures used in determining the liquid limit of soils (3-point method) and plastic limit of soils were observed and found to conform to the procedures described in AASHTO T 89 and AASHTO T 90, respectively.

5. AASHTO RE:SOURCE PROFICIENCY SAMPLES

- 5.1. AASHTO re:source proficiency samples are provided, at a cost, to all Districts twice a year. Included with the samples are directions for preparation and a scope of tests to be performed. Once testing has been completed and results obtained each District submits these results via the AASHTO re:source website. AASHTO re:source then compiles the results from all participating laboratories across the nation and calculates a standard deviation that is used to rate each lab on a scale from 0-5, 5 being the best. If a District has a rating less than 3 on any individual test MCS&T requires them to submit a Proficiency Sample Corrective Action Report and the reports are to be kept on record. Corrective action reports are independent to the response from the materials supervisor at the conclusion of the laboratory inspection.
- 5.2. The AASHTO re:source Fine Aggregate Proficiency Samples [#Click or tap here to enter text.](#) resulted in zero ratings less than 3.
- 5.3. The AASHTO re:source Fine Aggregate Proficiency Samples [#Click or tap here to enter text.](#) resulted in zero ratings less than 3.

- 5.4. The AASHTO re:source Fine Aggregate Proficiency Samples #Click or tap here to enter text. resulted in zero ratings less than 3.
- 5.5. The AASHTO re:source Coarse Aggregate Proficiency Samples #Click or tap here to enter text. resulted in zero ratings less than 3.

6. REPORTING AND DOCUMENTATION OF TEST DATA

- 6.1. Reporting and documentation of completed laboratory results were reviewed and found to be acceptable.

7. CONCLUSIONS

- 7.1. The verification of test equipment and procedures and their conformance to the applicable specification requirements are documented in the preceding sections.
- 7.2. The Aggregate Laboratory testing apparatus inspection resulted in two (EXAMPLES) deficiencies as noted in section 3.8 and 3.9. To correct these deficiencies the technician re-calibrated the measure prior to performing the AASHTO T 85 procedure and replaced one No 8 sieve to comply with AASHTO M92.
- 7.3. The Aggregate Laboratory testing procedures inspection resulted in zero deficiencies.
- 7.4. Deficiencies noted in this report were discussed with laboratory personnel at the time of inspection. The Materials Supervisor is asked to write a response to this Division, stating how any deficiencies were, or will be corrected. There were no AASHTO re:source corrective actions to attach to the Materials Inspection Report, since the scores on the assessment were all satisfactory.

Click here to enter text.
Click here to enter text.

Click or tap here to enter text.
Aggregate and Soils Group Supervisor

RLS: Me

REPORT NUMBER: XXXXXXXX

MATERIALS INSPECTION REPORT

SUBJECT: Inspection of Asphalt Laboratory

LOCATION Choose an item.

INSPECTED BY: Inspector's Name

TECHNICIAN: Technician's Name

DATE OF INPSECTION: Click or tap to enter a date.

DATE OF REPORT: Click or tap to enter a date.

1.0 OBJECTIVE

- 1.1. To inspect the laboratory testing equipment, test procedures, operator technique, reporting and documentation of test data, and to verify compliance with standard methods of testing.
- 1.2. To evaluate laboratory equipment and procedures used to conduct testing for the quality assurance of Asphalt mixture, Superpave mix design and Marshall mix design as described in:

AASHTO R-47	REDUCING SAMPLES OF HMA TO TESTING SIZE (QUARTERING METHOD)
AASHTO R-68	PREPARATION OF ASPHALT MIXTURES BY MEANS OF THE MARSHALL APPARATUS
AASHTO T 312	DETERMINING THE DENSITY OF HOT MIX ASPHALT SPECIMENS BY MEANS OF THE SUPERPAVE GYRATORY COMPACTOR
AASHTO T 166	BULK SPECIFIC GRAVITY OF COMPACTED BITUMINOUS MIXTURES USING SATURATED SURFACE-DRY SPECIMENS
AASHTO T-331	BULK SPECIFIC GRAVITY (GMB) AND DENSITY OF COMPACTED HOT MIX ASPHALT (HMA) USING AUTOMATIC VACUUM SEALING METHOD
AASHTO T 209	MAXIMUM SPECIFIC GRAVITY OF BITUMINOUS PAVING MIXTURES
AASHTO T 245	RESISTANCE TO PLASTIC FLOW OF BITUMINOUS MIXTURES USING MARSHALL APPARATUS AND THE MATERIALS SECTION'S GUIDE FOR REHEATING AN ASPHALT MIX SAMPLE

AASHTO T 308 DETERMINING THE ASPHALT BINDER CONTENT OF HOT-MIX ASPHALT (HMA) BY THE IGNITION METHOD, (METHOD A)

AASHTO T 30 ANALYSIS OF EXTRACTED AGGREGATE

1.3. To determine if any deficiencies exist based on a Division developed procedure checklist. This checklist is based on the AASHTO and Division accepted procedures for the applicable tests.

2.0 DISCUSSION

2.1. The subject laboratory inspection is part of this Division's overall asphalt Quality Assurance Program. It was developed to evaluate the District's proficiency in performing those tests common to project Quality Control. In addition to equipment and testing inspection, reporting and documentation will also be reviewed to ensure adequate handling of the test data.

3.0 APPARATUS

1.1. As specified in AASHTO T 166 and T 209, the laboratory workroom was checked for compliance with the range for standard room temperature, $77\pm 9^{\circ}\text{F}$ ($25\pm 5^{\circ}\text{C}$). The temperature at the time of inspection was [Click or tap here to enter text.](#) $^{\circ}\text{F}$ ([Click or tap here to enter text.](#) $^{\circ}\text{C}$).

1.2. The thermometers in use at the time of inspection were checked to determine compliance with applicable requirements. All thermometers were within the acceptable range of 1°F (0.5°C).

1.3. The temperature of the oven used for aggregate testing was checked for compliance within the specified limits of $300\pm 15^{\circ}\text{F}$ ($149\pm 8^{\circ}\text{C}$). The oven temperature was [Click or tap here to enter text.](#) $^{\circ}\text{F}$ ([Click or tap here to enter text.](#) $^{\circ}\text{C}$).

3.1. The balance(s) in use at the time of inspection [Choose an item.](#) with the Division's calibrated weights. All balance(s) were within tolerances ($0.1\text{g} \pm 0.1\%$) set forth in AASHTO M231 for general purpose balances.

3.2. The Sieve shaker(s) in use at the time of inspection were checked for condition and were found to be in good working condition.

3.3. The Hot Plate(s) in use at the time of inspection were checked for condition and were found to be in good working condition.

4.0 PROCEDURES

4.1. The Inspector reviewed procedure AASHTO R-47, to reduce an Asphalt mixture sample to an appropriate testing size. The Technician was not required to demonstrate the procedure however the Technician's equipment used was found to [Choose an item.](#) to the AASHTO specification.

- 4.2. The Inspector reviewed procedure AASHTO R-68, to prepare a Marshall sample. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
- 4.3. The Inspector reviewed procedure AASHTO T-312, to prepare a Superpave sample. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure The Technician's equipment used was found to Choose an item. to the AASHTO specification.
- 4.4. The Inspector reviewed procedure AASHTO T-166, to test a pill for Bulk specific gravity. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
- 4.5. The Inspector reviewed procedure AASHTO T-331, to test a pill for Bulk specific gravity using the Vacuum sealing device. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
 - a) EXAMPLE OF NON_CONFORMITY: Technician did not engage the retention latch on the CoreLok device
- 4.6. The Inspector reviewed procedure AASHTO T-209, to test a sample for Theoretical Maximum specific gravity. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
 - a) EXAMPLE OF NON_CONFORMITY: Sample was cooled to the touch, but not cooled to room temperature.
- 4.7. The Inspector reviewed procedure AASHTO T-245, to test a pill for stability and flow. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
- 4.8. The Inspector reviewed procedure AASHTO T-308, to test an asphalt mixture sample for asphalt content. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
- 4.9. The Inspector reviewed procedure AASHTO T-30, to test an asphalt mixture sample for gradation. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.

5.0 REPORTING AND DOCUMENTATION OF TEST DATA

- 5.1. Several District acceptance/verification samples were reviewed and found accurate and free from errors in calculations and data transfer.
- 5.2. Several acceptance and verification samples evaluation, using MP 700.00.54 were reviewed and found accurately performed according to the Materials Procedure.
- 5.3. Several T401 and T407 compaction forms were reviewed and found to be complete and accurately calculated.
- 5.4. Several JMF field design verifications were reviewed and found to be complete and accurately calculated. Proper targets were selected with appropriate ranges assigned.

6.0 CONCLUSION

- 6.1. The verification of test equipment and procedures and their conformance to the applicable specification requirements are documented in the preceding sections.
- 6.2. The asphalt laboratory general testing equipment inspection resulted in zero findings as noted in Section 3.1.
- 6.3. The asphalt laboratory testing procedure inspection was conducted this year and resulted in two (EXAMPLE) deficiencies as noted in Section 4.5. and 4.6.
- 6.4. The asphalt laboratory procedural equipment inspection resulted in zero deficiencies, as noted in Section 4.6.
- 6.5. Any deficiencies noted in equipment and/or procedures were discussed with laboratory personnel at the time of inspection.
- 6.6. The documentation inspection resulted in no deficiencies, as noted in Section 5.0.
- 6.7. Any deficiencies noted in reporting and documentation were discussed with district personnel at the time of the inspection.

Click here to enter text.

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Click or tap here to enter text.

Asphalt Group Supervisor

REPORT NUMBER: XXXXXXXX

MATERIALS INSPECTION REPORT

SUBJECT: Inspection of Concrete Laboratory

LOCATION District 6 - Moundsville, WV

INSPECTED BY: Inspector's Name

TECHNICIAN: Technician's Name

DATE OF INPSECTION: Click or tap to enter a date.

DATE OF REPORT: Click or tap to enter a date.

1. OBJECTIVE

- 1.1. To inspect the laboratory testing equipment, test procedures, calibration of equipment, documentation of test data, and to verify compliance with standard methods of testing.
- 1.2. To evaluate apparatus and procedures used in performing the tests for concrete as described in:

AASHTO M 201	Curing Facilities
AASHTO R 18	Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
AASHTO T 22	Determining Compressive Strength of Cylindrical Concrete Specimens
AASHTO T 23	Making and Curing Concrete Test Specimens in the field
AASHTO T 119	Slump of Hydraulic Cement Concrete
AASHTO T 121	Unit Weight of Concrete
AASHTO T 152	Air Content of Freshly Mixed Concrete by the Pressure Method
AASHTO T 196	Air Content of Freshly Mixed Concrete by the Volumetric Method
AASHTO T 309	Standardization of thermometer
ASTM C39	Standard Test Method for Compressive Strength of Cylinders Concrete Specimens

ASTM C 1231 Use of Unbonded Caps in Determination of
Compressive Strength of Hardened Cylindrical
Concrete Specimens

- 1.3. To determine if any deficiencies exist by a Division developed procedure checklist. This checklist is based on the AASHTO, ASTM, and Division accepted procedures for the applicable tests.

2. DISCUSSION

- 2.1. The subject laboratory inspection is part of this Division's overall Concrete Quality Assurance Program. It was developed to evaluate the District's proficiency in performing those tests common to project Quality Control. In addition to testing and inspection, calibration of apparatus and recordkeeping were also reviewed to ensure that apparatus meet the specifications.

3. APPARATUS

- 3.1. The laboratory water storage tank was checked for compliance with the acceptable range for water temperature, 69.8°F to 77.0°F. The temperature at the time of inspection was °F.
- 3.2. The water in the storage tank was saturated with lime to comply with the requirement of AASHTO M 201.
- 3.3. The specimens were fully immersed in the tank storage water.
- 3.4. The laboratory was keeping temperature record of water storage tank.
- 3.5. The water in the storage tank is being thoroughly stirred more than once a month.
- 3.6. The tank is being cleaned and refilled with water containing 3 g/L of calcium hydroxide every two-year period.
- 3.7. The field thermometer was standardized to comply with the requirement of AASHTO T 309.
- 3.8. The apparatus and testing accessories used in the test for slump for hydraulic cement concrete were examined and found to conform to the requirements of AASHTO T 119. The critical dimensions of equipment were checked by the district on [Click or tap to enter a date.](#)

- 3.9. The standardization records and equipment for volumetric air content test were not checked during this inspection because the district noted that this test has not been performed in a long time (more than 10 years). The equipment and standardization for this test method will be verified if a project, requiring this test, arises in this district. **does this need to stay in here since they don't seem to do it?**
- 3.10. The apparatus and testing accessories used in the test for air content of freshly mixed concrete by pressure method was examined and found to conform to the requirements of AASHTO T 152. The standardization record of apparatus was maintained by the district (date of standardization - Click or tap to enter a date.).
- 3.11. The apparatus and testing accessories used in the test for unit weight of cement concrete was examined and found to conform to the requirements of AASHTO T 121. The calibration record of apparatus was maintained by the district (date of calibration - Click or tap to enter a date.).
- 3.12. The scale used for measuring the weight in the test for unit weight was examined for the standardization and found to comply with the requirements of AASHTO M 231.
- 3.13. The Unbonded caps and Retaining Rings for determination of compressive strength of hardened cylindrical concrete specimens were examined and found to comply with the requirements of ASTM C 1231. The record of caps usages was maintained by the district.
- 3.14. Molds for concrete test specimens were examined and found to comply with the requirements of AASHTO T 23.
- 3.15. The method of transportation of Specimens from field to laboratory was discussed with the district, and the response was found to comply with the requirements of AASHTO T 23.
- 3.16. The apparatus for testing compressive strength of cylindrical concrete specimens was examined and found to comply with the requirements of AASHTO T 22. The calibration record of testing machine was maintained by the district (calibrated date - Click or tap to enter a date.).

4. PROCEDURES

- 4.1. The Technician was asked to demonstrate the procedure to determine the compressive strength of cylindrical concrete specimen and was found to comply with the requirements of AASHTO T22 (ASTM C39) with the following exception:
- a) Technician did not recheck perpendicularity of specimen before reaching 10% of anticipated load was applied as per ASTM C39 (Section 8.4.2).

5. CONCLUSIONS

- 5.1. The concrete laboratory testing apparatus inspection resulted in no deficiencies.
- 5.2. The laboratory testing procedures inspection resulted in one deficiency and is noted in section 4.1a.

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Concrete Supervisor's Name
Cement and Concrete Group Acting Supervisor

RLS: Mtwd

Attachment

REPORT NUMBER: XXXXXXXX
MATERIALS INSPECTION REPORT
SUBJECT: Inspection of Aggregate Laboratory
LOCATION Choose an item.
INSPECTED BY: Inspector's Name
TECHNICIAN: Technician's Name
DATE OF INPECTION: Click or tap to enter a date.
DATE OF REPORT: Click or tap to enter a date.

1. OBJECTIVE

- 1.1. To inspect the laboratory testing equipment, test procedures, operator technique, reporting and documentation of test data, and to verify compliance with standard methods of testing.
- 1.2. To evaluate apparatus and procedures used in performing the tests for aggregate and soil as described in:

AASHTO R 18	Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
AASHTO M 92	Wire-Cloth Sieves for Testing Purposes
AASHTO M 231	Weighing Devices Used in the Testing of Materials
AASHTO T 11	Materials Finer Than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
AASHTO T 19	Bulk Density ("Unit Weight") and Voids in Aggregate
AASHTO T 27	Sieve Analysis of Fine and Coarse Aggregates
AASHTO T 84	Specific Gravity and Absorption of Fine Aggregate
AASHTO T 85	Specific Gravity and Absorption of Coarse Aggregate
AASHTO T 89	Determining the Liquid Limit of Soils
AASHTO T 90	Determining the Plastic Limit and Plasticity Index of Soils
AASHTO T 265	Laboratory Determination of Moisture Content of Soils
ML-25	Procedure for Monitoring the Activities Related to Sieve Analysis of Fine and Coarse Aggregate

MP 700.00.54	Procedure for Evaluating Quality Control Sample Test Results with Verification Sample Test Results
MP 703.00.21	Standard Method of Test for Percent Crushed Particles

- 1.3. To determine if any deficiencies exist, a Division developed procedure checklist is used. This checklist is based on the AASHTO and Division accepted procedures for the applicable tests.

2. DISCUSSION

- 2.1. The subject laboratory inspection is part of this Division's overall Aggregate Quality Assurance Program. It was developed to evaluate the District's proficiency in performing those tests common to project Quality Control. In addition to apparatus and testing inspection, reporting and documentation was also reviewed to ensure adequate handling of the test data.

3. APPARATUS

- 3.1. The laboratory workroom was checked for compliance with the acceptable range for room temperature, 68°F to 86°F (20°C to 30°C). The temperature at the time of inspection was Click or tap here to enter text.°F (Click or tap here to enter text.°C).
- 3.2. The temperature of the oven used for aggregate testing was checked for compliance within the specified limits of 230 ± 9°F (110 ± 5°C). The oven temperature was Click or tap here to enter text.°F (Click or tap here to enter text.°C).
- 3.3. The coarse and fine aggregate splitters used in separating samples for testing purposes were examined and found to be in good physical condition.
- 3.4. The thermometers in use at the time of inspection were checked to determine compliance with applicable requirements. All thermometers were within the acceptable range of 1°F (0.5°C).
- 3.5. The mechanical shaking devices and their respective timers used for sieve analysis of aggregates in use at the time of inspection were examined and found to comply with the requirements of AASHTO T 11 and AASHTO T 27.

3.6. The laboratory's balances used for aggregate listed below were examined:

Adam Equipment CPWplus 75	Direct Read – Top Load Digital Balance 0.02kg to 75kg
Mettler PM200	Direct Read – Top Load Digital Balance 0.001 g to 200 g
Mettler PE16	Direct Read – Top Load Digital Balance to 16,000 g
Mettler Toledo XS16001L	Direct Read - Top Load Digital Balance 0.1 g to 16,000 g

The laboratory's balances were found to be in good working order.

3.7. The equipment used for the determination of the minus No. 200 material in aggregate was examined and found to conform to the requirements of AASHTO T 11.

3.8. Sieves used in determining the particle size of aggregate were examined and found to conform to the specifications in AASHTO M 92 with one exception:

a) EXAMPLE: The No.8 sieve exhibited corrosion and minor deformations in the wire cloth. The sieve was replaced during the inspection.

3.9. All equipment and measures used in determining the unit weight of aggregate were checked and found to conform to the requirements of AASHTO T 19, with the following exception:

a) EXAMPLE: The 1/3 measure's calibration date was past the yearly calibration deadline. The measure was properly re-calibrated during the inspection. The new calibration date was updated on the measure.

3.10. All equipment used in determining the fine aggregate specific gravity were checked and found to conform to the requirements of AASHTO T 84.

3.11. The water tank and basket used for holding samples of coarse aggregate for specific gravity were examined and were found to conform to the requirements of AASHTO T 85.

- 3.12. The equipment used for the determination of the liquid limit and plastic limit was examined and found to conform to the requirements of AASHTO T 89 and AASHTO T 90.

4. PROCEDURES

- 4.1. The procedure used in determining the percent crushed particles was observed and was found to conform to the procedure described in MP 703.00.21.
- 4.2. The procedure used in determining the amount of material in aggregate finer than a No. 200 sieve was observed and found to conform to the procedure described in AASHTO T 11.
- 4.3. The procedure used in determining the unit weight of aggregate was observed and found to conform to the procedure described in AASHTO T 19.
- 4.4. The procedure used in determining the sieve analysis of coarse and fine aggregate was observed and found to conform to the procedure described in AASHTO T 27.
- 4.5. The procedures used in determining the specific gravity and absorption of fine and coarse aggregates were observed and found to conform to the procedures described in AASHTO T 84 and AASHTO T 85, respectively.
- 4.6. The procedures used in determining the liquid limit of soils (3-point method) and plastic limit of soils were observed and found to conform to the procedures described in AASHTO T 89 and AASHTO T 90, respectively.

5. AASHTO RE:SOURCE PROFICIENCY SAMPLES

- 5.1. AASHTO re:source proficiency samples are provided, at a cost, to all Districts twice a year. Included with the samples are directions for preparation and a scope of tests to be performed. Once testing has been completed and results obtained each District submits these results via the AASHTO re:source website. AASHTO re:source then compiles the results from all participating laboratories across the nation and calculates a standard deviation that is used to rate each lab on a scale from 0-5, 5 being the best. If a District has a rating less than 3 on any individual test MCS&T requires them to submit a Proficiency Sample Corrective Action Report and the reports are to be kept on record. Corrective action reports are independent to the response from the materials supervisor at the conclusion of the laboratory inspection.
- 5.2. The AASHTO re:source Fine Aggregate Proficiency Samples [#Click or tap here to enter text.](#) resulted in zero ratings less than 3.
- 5.3. The AASHTO re:source Fine Aggregate Proficiency Samples [#Click or tap here to enter text.](#) resulted in zero ratings less than 3.

- 5.4. The AASHTO re:source Fine Aggregate Proficiency Samples #Click or tap here to enter text. resulted in zero ratings less than 3.
- 5.5. The AASHTO re:source Coarse Aggregate Proficiency Samples #Click or tap here to enter text. resulted in zero ratings less than 3.

6. REPORTING AND DOCUMENTATION OF TEST DATA

- 6.1. Reporting and documentation of completed laboratory results were reviewed and found to be acceptable.

7. CONCLUSIONS

- 7.1. The verification of test equipment and procedures and their conformance to the applicable specification requirements are documented in the preceding sections.
- 7.2. The Aggregate Laboratory testing apparatus inspection resulted in two (EXAMPLES) deficiencies as noted in section 3.8 and 3.9. To correct these deficiencies the technician re-calibrated the measure prior to performing the AASHTO T 85 procedure and replaced one No 8 sieve to comply with AASHTO M92.
- 7.3. The Aggregate Laboratory testing procedures inspection resulted in zero deficiencies.
- 7.4. Deficiencies noted in this report were discussed with laboratory personnel at the time of inspection. The Materials Supervisor is asked to write a response to this Division, stating how any deficiencies were, or will be corrected. There were no AASHTO re:source corrective actions to attach to the Materials Inspection Report, since the scores on the assessment were all satisfactory.

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Aggregate and Soils Group Supervisor

RLS: Me

REPORT NUMBER: XXXXXXXX

MATERIALS INSPECTION REPORT

SUBJECT: Inspection of Asphalt Laboratory

LOCATION Choose an item.

INSPECTED BY: Inspector's Name

TECHNICIAN: Technician's Name

DATE OF INPSECTION: Click or tap to enter a date.

DATE OF REPORT: Click or tap to enter a date.

1.0 OBJECTIVE

- 1.1. To inspect the laboratory testing equipment, test procedures, operator technique, reporting and documentation of test data, and to verify compliance with standard methods of testing.
- 1.2. To evaluate laboratory equipment and procedures used to conduct testing for the quality assurance of Asphalt mixture, Superpave mix design and Marshall mix design as described in:

AASHTO R-47	REDUCING SAMPLES OF HMA TO TESTING SIZE (QUARTERING METHOD)
AASHTO R-68	PREPARATION OF ASPHALT MIXTURES BY MEANS OF THE MARSHALL APPARATUS
AASHTO T 312	DETERMINING THE DENSITY OF HOT MIX ASPHALT SPECIMENS BY MEANS OF THE SUPERPAVE GYRATORY COMPACTOR
AASHTO T 166	BULK SPECIFIC GRAVITY OF COMPACTED BITUMINOUS MIXTURES USING SATURATED SURFACE-DRY SPECIMENS
AASHTO T-331	BULK SPECIFIC GRAVITY (GMB) AND DENSITY OF COMPACTED HOT MIX ASPHALT (HMA) USING AUTOMATIC VACUUM SEALING METHOD
AASHTO T 209	MAXIMUM SPECIFIC GRAVITY OF BITUMINOUS PAVING MIXTURES
AASHTO T 245	RESISTANCE TO PLASTIC FLOW OF BITUMINOUS MIXTURES USING MARSHALL APPARATUS AND THE MATERIALS SECTION'S GUIDE FOR REHEATING AN ASPHALT MIX SAMPLE

AASHTO T 308 DETERMINING THE ASPHALT BINDER CONTENT OF HOT-MIX ASPHALT (HMA) BY THE IGNITION METHOD, (METHOD A)

AASHTO T 30 ANALYSIS OF EXTRACTED AGGREGATE

1.3. To determine if any deficiencies exist based on a Division developed procedure checklist. This checklist is based on the AASHTO and Division accepted procedures for the applicable tests.

2.0 DISCUSSION

2.1. The subject laboratory inspection is part of this Division's overall asphalt Quality Assurance Program. It was developed to evaluate the District's proficiency in performing those tests common to project Quality Control. In addition to equipment and testing inspection, reporting and documentation will also be reviewed to ensure adequate handling of the test data.

3.0 APPARATUS

1.1. As specified in AASHTO T 166 and T 209, the laboratory workroom was checked for compliance with the range for standard room temperature, $77\pm 9^{\circ}\text{F}$ ($25\pm 5^{\circ}\text{C}$). The temperature at the time of inspection was [Click or tap here to enter text.](#) $^{\circ}\text{F}$ ([Click or tap here to enter text.](#) $^{\circ}\text{C}$).

1.2. The thermometers in use at the time of inspection were checked to determine compliance with applicable requirements. All thermometers were within the acceptable range of 1°F (0.5°C).

1.3. The temperature of the oven used for aggregate testing was checked for compliance within the specified limits of $300\pm 15^{\circ}\text{F}$ ($149\pm 8^{\circ}\text{C}$). The oven temperature was [Click or tap here to enter text.](#) $^{\circ}\text{F}$ ([Click or tap here to enter text.](#) $^{\circ}\text{C}$).

3.1. The balance(s) in use at the time of inspection [Choose an item.](#) with the Division's calibrated weights. All balance(s) were within tolerances ($0.1\text{g} \pm 0.1\%$) set forth in AASHTO M231 for general purpose balances.

3.2. The Sieve shaker(s) in use at the time of inspection were checked for condition and were found to be in good working condition.

3.3. The Hot Plate(s) in use at the time of inspection were checked for condition and were found to be in good working condition.

4.0 PROCEDURES

4.1. The Inspector reviewed procedure AASHTO R-47, to reduce an Asphalt mixture sample to an appropriate testing size. The Technician was not required to demonstrate the procedure however the Technician's equipment used was found to [Choose an item.](#) to the AASHTO specification.

- 4.2. The Inspector reviewed procedure AASHTO R-68, to prepare a Marshall sample. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
- 4.3. The Inspector reviewed procedure AASHTO T-312, to prepare a Superpave sample. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure The Technician's equipment used was found to Choose an item. to the AASHTO specification.
- 4.4. The Inspector reviewed procedure AASHTO T-166, to test a pill for Bulk specific gravity. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
- 4.5. The Inspector reviewed procedure AASHTO T-331, to test a pill for Bulk specific gravity using the Vacuum sealing device. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
 - a) EXAMPLE OF NON_CONFORMITY: Technician did not engage the retention latch on the CoreLok device
- 4.6. The Inspector reviewed procedure AASHTO T-209, to test a sample for Theoretical Maximum specific gravity. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
 - a) EXAMPLE OF NON_CONFORMITY: Sample was cooled to the touch, but not cooled to room temperature.
- 4.7. The Inspector reviewed procedure AASHTO T-245, to test a pill for stability and flow. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
- 4.8. The Inspector reviewed procedure AASHTO T-308, to test an asphalt mixture sample for asphalt content. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.
- 4.9. The Inspector reviewed procedure AASHTO T-30, to test an asphalt mixture sample for gradation. The Technician was required to demonstrate the procedure. The Technicians procedure was found to Choose an item. to the AASHTO procedure. The Technician's equipment used was found to Choose an item. to the AASHTO specification.

5.0 REPORTING AND DOCUMENTATION OF TEST DATA

- 5.1. Several District acceptance/verification samples were reviewed and found accurate and free from errors in calculations and data transfer.
- 5.2. Several acceptance and verification samples evaluation, using MP 700.00.54 were reviewed and found accurately performed according to the Materials Procedure.
- 5.3. Several T401 and T407 compaction forms were reviewed and found to be complete and accurately calculated.
- 5.4. Several JMF field design verifications were reviewed and found to be complete and accurately calculated. Proper targets were selected with appropriate ranges assigned.

6.0 CONCLUSION

- 6.1. The verification of test equipment and procedures and their conformance to the applicable specification requirements are documented in the preceding sections.
- 6.2. The asphalt laboratory general testing equipment inspection resulted in zero findings as noted in Section 3.1.
- 6.3. The asphalt laboratory testing procedure inspection was conducted this year and resulted in two (EXAMPLE) deficiencies as noted in Section 4.5. and 4.6.
- 6.4. The asphalt laboratory procedural equipment inspection resulted in zero deficiencies, as noted in Section 4.6.
- 6.5. Any deficiencies noted in equipment and/or procedures were discussed with laboratory personnel at the time of inspection.
- 6.6. The documentation inspection resulted in no deficiencies, as noted in Section 5.0.
- 6.7. Any deficiencies noted in reporting and documentation were discussed with district personnel at the time of the inspection.

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Asphalt Group Supervisor

REPORT NUMBER: XXXXXXXX

MATERIALS INSPECTION REPORT

SUBJECT: Inspection of Concrete Laboratory

LOCATION District 6 - Moundsville, WV

INSPECTED BY: Inspector's Name

TECHNICIAN: Technician's Name

DATE OF INPSECTION: Click or tap to enter a date.

DATE OF REPORT: Click or tap to enter a date.

1. OBJECTIVE

- 1.1. To inspect the laboratory testing equipment, test procedures, calibration of equipment, documentation of test data, and to verify compliance with standard methods of testing.
- 1.2. To evaluate apparatus and procedures used in performing the tests for concrete as described in:

AASHTO M 201	Curing Facilities
AASHTO R 18	Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
AASHTO T 22	Determining Compressive Strength of Cylindrical Concrete Specimens
AASHTO T 23	Making and Curing Concrete Test Specimens in the field
AASHTO T 119	Slump of Hydraulic Cement Concrete
AASHTO T 121	Unit Weight of Concrete
AASHTO T 152	Air Content of Freshly Mixed Concrete by the Pressure Method
AASHTO T 196	Air Content of Freshly Mixed Concrete by the Volumetric Method
AASHTO T 309	Standardization of thermometer
ASTM C39	Standard Test Method for Compressive Strength of Cylinders Concrete Specimens

ASTM C 1231 Use of Unbonded Caps in Determination of
Compressive Strength of Hardened Cylindrical
Concrete Specimens

- 1.3. To determine if any deficiencies exist by a Division developed procedure checklist. This checklist is based on the AASHTO, ASTM, and Division accepted procedures for the applicable tests.

2. DISCUSSION

- 2.1. The subject laboratory inspection is part of this Division's overall Concrete Quality Assurance Program. It was developed to evaluate the District's proficiency in performing those tests common to project Quality Control. In addition to testing and inspection, calibration of apparatus and recordkeeping were also reviewed to ensure that apparatus meet the specifications.

3. APPARATUS

- 3.1. The laboratory water storage tank was checked for compliance with the acceptable range for water temperature, 69.8°F to 77.0°F. The temperature at the time of inspection was °F.
- 3.2. The water in the storage tank was saturated with lime to comply with the requirement of AASHTO M 201.
- 3.3. The specimens were fully immersed in the tank storage water.
- 3.4. The laboratory was keeping temperature record of water storage tank.
- 3.5. The water in the storage tank is being thoroughly stirred more than once a month.
- 3.6. The tank is being cleaned and refilled with water containing 3 g/L of calcium hydroxide every two-year period.
- 3.7. The field thermometer was standardized to comply with the requirement of AASHTO T 309.
- 3.8. The apparatus and testing accessories used in the test for slump for hydraulic cement concrete were examined and found to conform to the requirements of AASHTO T 119. The critical dimensions of equipment were checked by the district on [Click or tap to enter a date.](#)

- 3.9. The standardization records and equipment for volumetric air content test were not checked during this inspection because the district noted that this test has not been performed in a long time (more than 10 years). The equipment and standardization for this test method will be verified if a project, requiring this test, arises in this district. **does this need to stay in here since they don't seem to do it?**
- 3.10. The apparatus and testing accessories used in the test for air content of freshly mixed concrete by pressure method was examined and found to conform to the requirements of AASHTO T 152. The standardization record of apparatus was maintained by the district (date of standardization - Click or tap to enter a date.).
- 3.11. The apparatus and testing accessories used in the test for unit weight of cement concrete was examined and found to conform to the requirements of AASHTO T 121. The calibration record of apparatus was maintained by the district (date of calibration - Click or tap to enter a date.).
- 3.12. The scale used for measuring the weight in the test for unit weight was examined for the standardization and found to comply with the requirements of AASHTO M 231.
- 3.13. The Unbonded caps and Retaining Rings for determination of compressive strength of hardened cylindrical concrete specimens were examined and found to comply with the requirements of ASTM C 1231. The record of caps usages was maintained by the district.
- 3.14. Molds for concrete test specimens were examined and found to comply with the requirements of AASHTO T 23.
- 3.15. The method of transportation of Specimens from field to laboratory was discussed with the district, and the response was found to comply with the requirements of AASHTO T 23.
- 3.16. The apparatus for testing compressive strength of cylindrical concrete specimens was examined and found to comply with the requirements of AASHTO T 22. The calibration record of testing machine was maintained by the district (calibrated date - Click or tap to enter a date.).

4. PROCEDURES

- 4.1. The Technician was asked to demonstrate the procedure to determine the compressive strength of cylindrical concrete specimen and was found to comply with the requirements of AASHTO T22 (ASTM C39) with the following exception:
- a) Technician did not recheck perpendicularity of specimen before reaching 10% of anticipated load was applied as per ASTM C39 (Section 8.4.2).

5. CONCLUSIONS

- 5.1. The concrete laboratory testing apparatus inspection resulted in no deficiencies.
- 5.2. The laboratory testing procedures inspection resulted in one deficiency and is noted in section 4.1a.

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Concrete Supervisor's Name
Cement and Concrete Group Acting Supervisor

RLS: Mtwd

Attachment

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

MATERIALS PROCEDURE

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. Batch scales shall be calibrated in accordance with MP 700.00.03 at a minimum once per year.

- 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 Procedures, 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. This report shall include the findings of the Final Inspection and any other observations or notes taken by the Inspector during fabrication, including 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 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 the 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.
- 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 rejected by MCS&T, the subject member may be accepted 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 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 the Designer's 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, in the opinion of the Inspector, the service life of the member will be reduced because of the defect.
- 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:

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 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 District Construction, 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 price based on 40% of the Contract Unit Bid Price. . 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.

RLS:Mt

ATTACHEMENT

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

**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 (<i>Pre-Placement</i>)

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)					
1 st Lift					
2 nd Lift					
3 rd 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 (<i>Post-Placement</i>)

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 (horizontal. & vertical 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					
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

INSPECTION AND ACCEPTANCE PROCEDURES
FOR PRECAST CONCRETE PRODUCTS

1. PURPOSE

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

2. SCOPE

- 2.1 This procedure will apply to all precast concrete products supplied for use on West Virginia Division of Highways projects and to all precast concrete product fabricators that supply material for use on West Virginia Division of Highways projects.
- 2.2 For prestressed concrete members refer to MP 603.10.40 "Inspection and Acceptance Procedure for Prestressed Concrete Bridge Beams."

3. FABRICATOR APPROVAL

- 3.1 All precast concrete product fabricators (hereafter referred to as the Fabricator) shall be approved by Materials Control Soils and Testing MCS&T Division prior to the start of any work for the WVDOH. If not listed on the WVDOH Approved List of Precast Concrete Fabricators, a Fabricator shall contact MCS&T Division a minimum of six weeks prior to the planned date on which fabrication is to begin to initiate the approval process.
- 3.2 In order for a Fabricator to be approved and listed on the WVDOH Approved List of Precast Concrete Fabricators, they must be NPCA (National Precast Concrete Association) certified, QCAST (American Concrete Pipe Association) Certified, or have an equivalent type of certification.
- 3.3 The process for approving a Fabricator shall include, but not be limited to, an on-site visit to the fabrication plant by a WVDOH representative from MCS&T Division. During this visit, the WVDOH Quality Assurance (QA) personnel shall inspect the fabrication facility, ~~the and~~ Quality Control (QC) lab, ~~and~~ meet with QC, ~~and~~ other key personnel from the Fabricator, ~~and sample component~~ **Component** materials which will be used in the fabrication of precast items shall be sampled for testing. Batch scales shall be calibrated in accordance with MP 700.00.03 at a minimum once per year.

- 3.3.1 Sampling and testing of component materials shall be done in accordance with MP 603.02.10. Copies of recent component delivery tickets should be presented on the day of sampling. All component materials must be approved prior to the start of fabrication.
- 3.3.1.1 Any Fabricator which does not produce for the WVDOH for a period of 2 years shall be removed from the Approved Fabricator list. After removal from the approved list, before a Fabricator can again produce for the WVDOH, they must repeat the approval process. Sampling of component materials will not continue when the plant is not listed on the Approved Fabricator list.
- 3.3.2 Personnel from the Fabricator required to be present during the initial on-site visit and meeting between WVDOH and Fabricator shall include representatives from Production and Quality Control. Any questions and concerns regarding WVDOH requirements, including applicable Specifications, Materials Procedure (MP's), Standard Details, and QC/QA Inspections shall be addressed at this meeting.
- 3.3.3 The Fabricator must submit the Quality Control Manual/Plan for review at this meeting.
- 3.4 All Concrete Mix Designs which will be used on products fabricated for the WVDOH must be submitted for review & approval, prior to the start of fabrication. Any design mix with an aggregate(s) that has a reactivity class R1, R2, or R3, as shown as in Approved Aggregates Source List, shall be developed in accordance with WVDOH specifications, subsection 601.3.1.1. If an aggregate Source is not listed on the Approved Aggregates Source List, the Division will test the fine and coarse aggregate from the Source, in accordance with AASHTO T 303, to determine the reactivity class of the aggregate prior to its use on any WVDOH project. The Division will inform the Fabricator of the reactivity class of aggregates that they are proposing to use. If a cement Source and/or a SCM Source are not listed on the Approved Source List, the Division will test cement and/or SCM from that Source prior to its use on any WVDOH project.
- 3.5 The Fabrication Plant QC Personnel, as a minimum, shall be a certified ACI Grade I Concrete Field Testing Technician and/or a WVDOH PCC Inspector. In addition, if Self-Consolidating Concrete (SCC) is used, Fabrication Plant QC Personnel shall be a certified ACI SCC Testing Technician.

4. FABRICATION & INSPECTION OF PRODUCTS

- 4.1 Prior to beginning fabrication of any precast concrete products, the Fabricator shall provide written or email notification to MCS&T Division at least one calendar week in advance of the date on which fabrication is to begin.
- 4.1.1 Depending upon the precast items being fabricated, MCS&T Division may choose to monitor fabrication. Fabrication of structurally significant products such as box

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

- 4.1.2 After fabrication has begun, the Fabricator shall keep MCS&T Division and the Inspector (whether a WVDOH employee or a contract employee representing the WVDOH) informed in advance of the days on which fabrication will take place.
- 4.2 Shop Drawings must be approved by the West Virginia Division of Highways prior to the start of any work by the Fabricator. The Inspector must have a copy of these approved shop drawings prior to start of any work by the Fabricator.
- 4.3 Concrete cylinders shall be made for compressive strength testing with 6-inch by 12-inch (150 mm by 300 mm) or 4-inch by 8-inch (100 mm by 200 mm) molds. The cylinders are to be cured in the same area as the products for which they represent (Field Cured as outlined in AASHTO T23) until tested to create a curing environment similar to the product that they represent. A compressive strength test shall consist of the average result of a set of cylinders, which is at least two cylinders. Form removal isn't to be allowed until concrete has reached 50% of the design strength, unless otherwise specified. If forms are stripped from box culverts at 50% of the design strength, another curing method from section 601.12, or AASHTO M259, or M273 (whichever is applicable) must be used until 70% of the design strength is obtained.
- 4.3.1 For both conventional concrete and SCC mixes, a minimum of one set of compressive strength cylinders shall be fabricated from every 7 yards of concrete, or fraction thereof, with a minimum of one set per day per mix design. Both the form removal strength and the 28-day strength must be confirmed by a set of cylinders. Cylinders shall be the same size as those used in the initial approved mix design. For conventional concrete, slump, temperature, and air content tests shall be conducted on the first batch of concrete each day and every time that cylinders are fabricated. For SCC mixes, spread, temperature, and air content tests shall be conducted on every batch. For all types of concrete, unit weight and yield tests shall be conducted on the first batch of concrete each day and thereafter as deemed necessary by Quality Control and Quality Assurance Personnel.
- 4.4 When required, absorption tests are to be conducted in accordance with ASTM C642-13, and tests should be conducted on a weekly basis for each mix design used, at a minimum, unless otherwise specified.
- 4.5 Unless otherwise specified, plastic concrete shall have an air content measured at $7.0 \pm 2.0\%$.
- 4.5.1 Prior to the use of Self-Consolidating Concrete in precast items all mix designs must be submitted to MCS&T for approval and meet the requirements of the following table. Test results from trial batches produced by the laboratory which designed it shall be included in the submittal. The compressive strength of the design mix shall be at least 15% above the specified design strength.

Table 4.5.1 - SCC Mix Design Acceptance

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

4.5.2 The following table lists the criteria for SCC production.

Table 4.5.2 - SCC Production Acceptance

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

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

5. FINAL INSPECTION

5.1 After fabrication is completed and prior to shipment, the precast items will be stored on dunnage. The Fabricator shall provide MCS&T Division with a written or email request for final inspection a minimum of one calendar week prior to the desired date of inspection. Effective communication from the Fabricator to MCS&T Division and Consultant Inspection Agency is the key to avoiding any scheduling conflicts regarding final inspection.

5.2 At the final inspection, the fabricator shall provide the inspector with documentation of required data pertinent to the product(s) being produced. Attached to this document

is a sample inspection sheet to be used as a guide for presenting this information. This documentation is also available on the [MCS&T Division Website](#)¹.

- 5.2.1 For the final inspection, the Inspector may witness compressive strength tests if required, inspect repairs as needed, and conduct a thorough visual examination of each member. A copy of the Inspector's daily reports, a copy of the final inspection report, and all other pertinent information provided to the Inspector by the Fabricator shall be kept on file by MCS&T Division.
- 5.2.2 For box culverts, trial fitting of adjacent pieces, prior to shipping, will be required as part of the final inspection process. Each adjacent box culvert will be stacked in pairs vertically; the gaps between each pair will be measured, and dunnage will be placed below the bottom culvert to prevent damage. The maximum gap between the adjacent pieces shall not exceed ½ inch (13 mm), unless otherwise stated in the construction plans.

6. ACCEPTANCE & REJECTION

- 6.1 Upon completion of final inspection, if a precast product meets all specification requirements and does not contain any defects, the Inspector will stamp the precast product as accepted by MCS&T Division and provide a 7-digit Laboratory Reference Number for shipment.
- 6.2 If, however, the precast product does not meet all specification requirements due to damage, defect, or dimensional tolerance, the product must be further evaluated before potential acceptance by the MCS&T Division or the District for which the product was produced, as discussed further in the next sections.
 - 6.2.1 Minor damage and/or defects may be repaired in accordance with the pre-approved repair procedures which should be incorporated within the Fabricator QC Plan. For cracks 4 mils (0.1 mm) or less a silane treatment may be used. Cracks between 4 mils (0.1 mm) and 16 mils (0.4 mm) shall be repaired by epoxy injection in accordance with Section 603.10.2. Products with cracks exceeding 16 mils (4 mm) shall be rejected by MCS&T. If repairs appear satisfactory and all other specifications are met, the Inspector shall stamp the product as approved for shipment. MCS&T Division will issue a 7-digit Laboratory Reference Number for acceptance.
 - 6.2.2 Major damage and/or defects shall be evaluated on a case-by-case basis. If a product is approved for repair and if repairs appear satisfactory, the Inspector shall stamp the product as approved for shipment.
 - 6.2.3 If a product does not meet specification requirements due to dimensional measurements not within tolerance, the product must be evaluated by the contractor and or District as to its potential acceptance. If the decision is made to accept the product, acceptance shall be provided by the District through a DMIR. If, however, the product will not be

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

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

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

RLS:Mt
Attachment

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

MATERIALS PROCEDURE

ACCEPTANCE CRITERIA FOR EPOXY COATED REINFORCING STEEL

1. SCOPE

- 1.1 To establish a procedure to qualify approved and non-approved coating manufacturers of epoxy coated reinforcement steel bars 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.
- 1.4 This procedure shall apply to epoxy coated steel 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.

2. APPLICABLE DOCUMENTS

- a. *AASHTO M31 Standard Specification for Deformed and Plain Carbon and Low-Alloy Steel Bars for Concrete Reinforcement, most recent edition.*
- b. *ASTM A775 Standard Specification for Epoxy-Coated Steel Reinforcing Bars, most recent edition.*
- c. ~~*AASHTO MP18 Standard Specifications for Uncoated, Corrosion-Resistant, Deformed and Plain Chromium Alloyed, Billet-Steel Bars for Concrete Reinforcement and Dowel, most recent edition, WVDOH Form HL-468*~~

Commented [PCG1]: Delete AASTHO MP18 and replace with new product form

3. ACCEPTANCE PROCEDURE

- 3.1 With each shipment, the coating manufacturer shall provide shipping documents which contain either the coating manufacturer's "Approved Source" number or the approval number that was assigned to the material as per Section 6.

4. ACCEPTANCE PROCEDURE FOR APPROVED SOURCE

- 4.1 For a manufacturer to be considered as a source of epoxy coated reinforcing steel bars, the manufacturer must submit a certification statement indicating their intention to be

included on the WVDOH approved source list as an approved source of epoxy coated reinforcing steel.

~~4.2~~ The prospective source shall submit a certified statement that all material shipped to Division projects will conform to WVDOH specifications. This certified statement shall be signed by a representative of the coating manufacturer who has the authority to bind the company.

~~4.2~~ ~~4.2.1~~ ~~The manufacturer is to complete form HL-468 attainable from the website: https://transportation.wv.gov/highways/mcst/Pages/newproduct_evaluationprocedure.aspx and submit it to the WVDOH Materials Control, Soils and Testing (MCS&T) Division new products email address, indicating intention to be included on the WVDOH APL as an approved source manufacturer of epoxy coated reinforcing steel bars.~~

Commented [PCG2]: Insert section 4.2.1 to introduce the New Product Procedure to this MP.

~~4.3~~ ~~The prospective source shall have an acceptable historical record of compliance with WVDOH Specifications.~~

Commented [PCG3]: Delete Section 4.3. Check Section 4 numbering after this is deleted.

4.4 All plain steel reinforcement to be coated shall be selected from an approved source list of plain reinforcement steel maintained by the WVDOH.

Commented [PCG4]: Add period end of sentence

4.5 All epoxy powders used shall be selected from an approved source list of epoxy powders maintained by the WVDOH.

4.6 A copy of the coating manufacturer's Concrete Reinforcing Steel Institute (CRSI) certificate must be submitted indicating conformance to CRSI specifications.

4.7 Samples of epoxy coated reinforcement steel shall be obtained by WVDOH Division authorized personnel and shall have the epoxy component tested to ASTM A775 in WVDOH laboratories, unless other methods of verification such as material certifications are used should unforeseen circumstances arise.

4.8 An inspection of the coating facility may be conducted at any time to reinforce confidence in the ability of the facility to produce a quality product.

4.9 Once the above requirements are met, a laboratory approval number will be assigned to the coating facility to indicate WVDOH requirement conformance. This approval number shall be active for up to two years. Acceptance of a coater's facility can be verified by accessing the WVDOH online approved source lists.

~~4.10~~ Revocation of approved source status may result from revocation or expiration of CRSI Certification or furnishing material that does not comply with Specifications.

~~4.11~~ ~~4.11~~ ~~The WVDOH Division will annually obtain three (3) rebar samples yearly from different production lots at each manufacturer on the WVDOH APL. These samples will be tested by the Division and used to evaluate whether the manufacturer will remain on the APL.~~

Commented [PCG5]: Add Section 4.11. This is our section to do yearly QA sampling and testing to make sure the product should remain on the APL.

~~4.11.1~~ ~~If all three of the samples meet specification requirements fail, the manufacturer will remain on the APL.~~

Commented [PCG6]: Look at this language again. Not sure if I like the way it sounds.

~~4.11.2~~ ~~If one (1) of the three samples fails to meet specification requirements, the Division will obtain three additional rebar samples from the manufacturer resample. The Division will then test those~~

three samples, and if any of those three additional samples fail to meet specification requirements, the manufacturer will be removed from the APL.

4.10 4.11.3 ~~If more than one of the three annual~~ ~~(1) two (2) or more samples fails to meet specification requirements, the manufacturer will need recertification or be removed from the APL.~~

5. ACCEPTANCE PROCEDURE FOR NON-APPROVED SOURCE

5.1 Epoxy coated steel bars that have been coated by a non-approved coating manufacturer shall require evaluation on a ~~lot-by-lot~~ ~~lot-by-lot~~ basis under direct coverage, provided the material meets the following requirements.

Commented [PCG7]: correction

5.2 A copy of the coating manufacturer's CRSI certificate must be submitted indicating current conformance to CRSI specifications.

5.3 Samples of epoxy coated reinforcement steel shall be obtained by WVDOH Division authorized personnel to be tested in WVDOH laboratories, unless other methods of verification such as material certifications are used.

5.4 The metallic component of epoxy coated steel bars shall be ~~from an approved source as stated in Section 4.4 tested to conform to the requirements of AASHTO M31 or AASHTO MP18.~~

Commented [PCG8]: language to read better since we already have section 4.4 tell us what these bars should be from an APL source.

5.5 The epoxy component of epoxy coated steel bars shall be tested to conform to the ~~requirement~~s of ASTM A775.

Commented [PCG9]: Delte extra space between word and letter "s"

~~5.6~~ If the results of the testing reveal that the material is in full compliance with Specifications, an approval number will be issued by the Division that shall be affixed to the shipping documents.

~~5.6~~

6. DOCUMENTATION REPORT

6.1 An updated approved list of approved epoxy coated reinforcing steel bars, ~~shall be issued~~ once a year, but no longer than two. ~~The list, and mayean~~ be updated at any time with the addition of a new facility, or with a removal of a facility.

Commented [PCG10]: Make sentence read better

6.2 A current approved list of epoxy coated reinforcing steel shall be available to all contractors, fabricators, and suppliers by accessing the West Virginia Department of Transportation Approved Source.¹

¹ http://transportation.wv.gov/highways/mcst/Pages/Listings_Sorted.aspx

MP 709.01.51

SUPERCEDES ~~APRIL 2011~~ JANUARY 1995

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

~~RLS:Mp~~
~~RLS:Ph~~

Commented [PCG11]: Make sure to check all the spacing and numbers to make sure everything flows well once we accept the corrections.