

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

METHOD OF **EVALUATING** OF NON-STANDARD OR  
NON-CONFORMING MATERIALS IN CONSTRUCTION VIA ST-1

**1. PURPOSE**

- 1.1 To provide guidelines of sampling, testing, and resolution of all materials that may be addressed in the plans but are not otherwise addressed by the current edition of the Standard Specifications and Supplementals (Standard Specifications) and/or Materials Control, Soils and Testing Division (MCS&T) Materials Procedures.
- ~~1.2 Provide a method for accepting material that does not meet the requirements of the above-mentioned documents and is not otherwise addressed in those documents.~~
- ~~1.3 Provide guidelines and/or course of action/inaction when a material test has not been performed or has been performed incorrectly.~~

**2. DEFINITIONS**

- 2.1 ST-1: Special Testing Form 1- The ST-1 is a historic WVDOH document which has been used to provide an acceptance method for a material that does not have a prescribed acceptance method or is otherwise outside the scope of the normal acceptance procedure. This form has evolved over the years, but it is still used for the original purpose. An ST-1 is to be done before the material is placed.
- 2.2 DMIR: District Materials Inspection Report – A DMIR is an investigation typically into a material failure or any other situation where there is no prescribed method for the resolution of a material on a project. A DMIR can have several outcomes including, but not limited to: Remove and replace, a price reduction, or accept in place etc.
- 2.3 AWP: AASHTOWare Project Management Software – This is the generic term for the suite of software used by the WVDOH to manage and process projects. This system manages contracts, samples, tests and other aspects of projects.
- 2.4 Authorize a Sample – This is a technical AWP term in which the user closes or locks the sample. Authoring a sample indicates that the sample has been resolved in the system and the system will allow the project to proceed through certification. This does not have any indication of whether the sample has passed or failed.
- 2.5 Concur/Non-Concur of Sample – This is a technical AWP term in which the reviewer indicates their acceptance of a sample. A “Non-Concur” typically requires additional action to accept the material in the system.
- 2.6 Sample ID – This is a technical AWP term which refers to the “key” field for a record in the AWP database.

**Commented [1]:** This sentence is of the form 'Independent Clause - conjunction - dependent clause'. Such sentences should be separated with a comma placed before the conjunction.

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### 3. SCOPE

- 3.1 This procedure applies to all materials that do not have an acceptance, or non-conformance resolution already established in the Standard Specifications, or any other WVDOH documents.
- ~~3.2 This procedure applies to situations where the resolution of a non-conformance issue is not clearly defined or described by the Standard Specifications or other WVDOH documents, or if District wishes to diverge from these documents.~~
- ~~3.3~~3.2 This procedure applies to situations where additional documentation for evaluation is required by the Standard Specifications or other WVDOH documents.

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### 4. PROCEDURE

- 4.1 The ST-1 form shall be submitted to MCS&T with documentation and/or data sheets pertaining to the proposed material. Pre-sampled material cannot be used until authorization is received from the MCS&T ~~Division or the non-conformance has been resolved.~~
- ~~4.1.1~~ Payment for this material shall be withheld upon MCS&&T's non-concurrence with the ST-1, pending a DMIR.
- ~~4.1.14.1.2~~ Unless otherwise directed from MCS&T, in the instance where the Specifications refer to multiple component materials in a system and each of these component materials have specific material requirements, each of these component items shall be submitted on a separate ST-1.
- ~~4.2~~ ~~DMIR—A District Materials Inspection Report (DMIR) shall be submitted to MCS&T for consideration and either concurrence/non-concurrence for the following situations:~~
- ~~4.2.1~~ ~~The Material did not meet the Standard Specifications or other Division Testing Requirements.~~
- ~~4.2.2~~ ~~The Material is not addressed in the Standard Specifications or other Division Documents and has been placed before testing (ST-1 or methods were not utilized).~~
- ~~4.2.3~~ ~~Sampling and/or testing was not done correctly, samples or documentation was lost, or testing otherwise cannot be used to represent or accept the material.~~
- ~~4.2.4~~ ~~The resolution of the material has not been addressed in a change order or other contractual document.~~

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### 5. ST-1 DOCUMENTATION AND SUBMISSION TO MCS&T

- 5.1 The live ST-1 Form is available as a fillable pdf file on the Division Webpage<sup>1</sup>. A sample of this form is attached. This form shall be filled out with all the listed

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<sup>1</sup> <https://transportation.wv.gov/highways/mcst/Pages/tbox.aspx>

information pertaining to the material that the contractor proposes to use or has used. All required fields must be completed before submitting the ST-1 to MCS&T.

- 5.1.1 The District must electronically send the fillable PDF form. This cannot be hand-written and scanned (the Sample ID must be available to be selected for Copy and Paste).
- 5.2 The ST-1 shall be submitted by District Construction to the District Materials Supervisor. The District shall then generate the sample in AWP and associate all line items before submitting the ST-1 sample to MCS&T for review and concurrence/non-concurrence. A workflow guideline for this is available in the MCS&T ProjectWise folder (location provided by request.)
- 5.3 The ST-1 shall be sent to the ST-1/DMIR mailbox ([St1dmir@wv.gov](mailto:St1dmir@wv.gov)).
- 5.3.1 ST-1 Request Email files shall be submitted in the following format for both the subject of the email and the file name for the submission: ST-1-District Lab Number-CID Contract ID. An example follows,
- 5.3.2 ST-1-MXZXXXXX-CID 2019001346
- 5.4 The sample shall be logged and sent to the applicable MCS&T section to review. If the subject material(s) meets the project requirements, MCS&T will concur with the sample and the reviewer will then authorize the sample in AWP.
- 5.4.1 An email will be generated by the District Material Supervisor to the District Materials Supervisor notifying them that the ST-1 has been concurred and authorized. The District will place the ST-1 and MCS&T email into ProjectWise under the Contract ID and associated line item number.
- 5.5 If the material fails to meet the minimum requirements, the reviewer will mark the sample as non-concur, then authorize the ST-1 sample in AWP. MCS&T will send the ST-1 to the District Materials Supervisor stating why the ST-1 was not concurred. The District will place the ST-1 and MCS&T email into ProjectWise under the Contract ID and associated line item number.

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~~6. ——— **DMIR DOCUMENTATION AND SUBMISSION TO MCS&T**~~

- ~~6.1 ——— The live DMIR form is available on the WVDOH MCS&T Webpage<sup>†</sup>. A sample of this form is attached. All required fields must be completed before submitting the DMIR to MCS&T.~~
- ~~6.1.1 ——— The preparer of the DMIR, typically the Materials Supervisor, or their designee, shall clearly state all of the details that initiated the DMIR and shall include the following categories of information:~~
  - ~~1. — General/Project information~~
  - ~~2. — Materials information~~
  - ~~3. — Type of deviation~~
  - ~~4. — Situation~~
  - ~~5. — Review~~
  - ~~6. — Conclusion~~

- ~~7. Review and Signatures from Construction Engineer and Materials Supervisor~~  
~~8. Supporting Documentation~~
- ~~6.1.2 A description of the material, known quantities, technical issues, or any requirement from the applicable Specifications, Contract Proposal, Project Plans, Material Procedures (MPs), Standard Details, Special Provisions, AASHTO, ASTM, or any Non-Specification issues shall be provided.~~
- ~~6.1.3 A justification and any supporting and/or relevant detail shall be provided.~~
- ~~6.1.4 The conclusion shall clearly state and justify the final price assessment resolution (which may be \$0.00), including all applicable fees and penalties.~~
- ~~6.1.5 The assessment fees should be listed individually and with a final total price assessment. Justification of the price assessment shall be provided.~~
- ~~6.1.6 The Supporting Documentation shall provide the necessary information and evidence for the materials inspection.~~
- ~~6.2 The District shall generate the sample and associate all line items before submitting the DMIR sample to MCS&T for review and concurrence/non-concurrence. A workflow guideline for this is available in the MCS&T ProjectWise folder (location provided by request.)~~
- ~~6.3 The DMIR shall be sent to the ST-1/DMIR mailbox ([St1dmir@wv.gov](mailto:St1dmir@wv.gov)). The sample shall be logged and sent to the applicable MCS&T section to review. If the subject material(s) meets the project requirements, MCS&T will concur with the sample and the reviewer will then authorize the sample in AWP.~~
- ~~6.3.1 The District must electronically send the fillable PDF form. This cannot be hand-written and scanned (the Sample ID must be able to be selected for Copy and Paste).~~
- ~~6.4 After MCS&T has reviewed and authorized the DMIR sample (whether be concur or non-concur), the DMIR will be sent to Contract Administration.~~

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

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DIVISION OF HIGHWAYS  
MATERIALS CONTROL, SOILS AND TESTING DIVISION  
MATERIALS PROCEDURE

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METHOD OF EVALUATING OF NON-STANDARD OR  
NON-CONFORMING MATERIALS IN CONSTRUCTION VIA DMIR

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**1. PURPOSE**

- ~~1.1 To provide guidelines of sampling, testing, and resolution of all materials that may be addressed in the plans but are not otherwise addressed by the current edition of the Standard Specifications and Supplementals (Standard Specifications) and/or Materials Control, Soils and Testing Division (MCS&T) Materials Procedures.~~
- ~~1.21.1~~ Provide a method for accepting-evaluating material that does not meet the requirements of the above-mentioned documents and is not otherwise addressed in those documents.
- ~~1.31.2~~ Provide guidelines and/or course of action/inaction when a material test has not been performed or has been performed incorrectly.
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**2. DEFINITIONS**

- 2.1 ST-1: Special Testing Form 1- The ST-1 is a historic WVDOH document which has been used to provide an acceptance method for a material that does not have a prescribed acceptance method or is otherwise outside the scope of the normal acceptance procedure. This form has evolved over the years, but it is still used for the original purpose. An ST-1 is to be done before the material is placed.
- 2.2 DMIR: District Materials Inspection Report – A DMIR is an investigation typically into a material failure or any other situation where there is no prescribed method for the resolution of a material on a project. A DMIR can have several outcomes including, but not limited to: Remove and replace, a price reduction, or accept in place etc.
- 2.3 AWP: AASHTOWare Project Management Software – This is the generic term for the suite of software used by the WVDOH to manage and process projects. This system manages contracts, samples, tests and other aspects of projects.
- 2.4 Authorize a Sample – This is a technical AWP term in which the user closes or locks the sample. Authoring a sample indicates that the sample has been resolved in the system and the system will allow the project to proceed through certification. This does not have any indication of whether the sample has passed or failed.
- 2.5 Concur/Non-Concur of Sample – This is a technical AWP term in which the reviewer indicates their acceptance of a sample. A “Non-Concur” typically requires additional action to accept the material in the system.
- 2.6 Sample ID – This is a technical AWP term which refers to the “key” field for a record in the AWP database.

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### 3. SCOPE

- ~~3.1 This procedure applies to all materials that do not have an acceptance, or non-conformance resolution already established in the Standard Specifications, or any other WVDOH documents.~~
- 3.23.1 This procedure applies to situations where the resolution of a non-conformance issue is not clearly defined or described by the Standard Specifications or other WVDOH documents, or if District wishes to diverge from these documents.
- ~~3.3 This procedure applies to situations where additional documentation for acceptance is required by the Standard Specifications or other WVDOH documents.~~

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### 4. PROCEDURE

- ~~4.1 The ST-1 form shall be submitted to MCS&T with documentation and/or data sheets pertaining to the proposed material. Pre-sampled material cannot be used until authorization is received from the MCS&T Division or the non-conformance has been resolved.~~
- ~~4.1.1 Payment for this material shall be withheld upon MCS&T's non-concurrence with the ST-1, pending a DMIR.~~
- 4.24.1 DMIR – A District Materials Inspection Report (DMIR) shall be submitted to MCS&T for consideration and either concurrence/non-concurrence for the following situations:
- 4.2.14.1.1 The Material did not meet the Standard Specifications or other Division Testing Requirements.
- 4.2.24.1.2 The Material is not addressed in the Standard Specifications or other Division Documents and has been placed before testing (ST-1 or evaluation methods were not utilized).
- 4.2.34.1.3 Sampling and/or testing was not done correctly, samples or documentation was lost, or testing otherwise cannot be used to represent or accept the material.
- 4.2.44.1.4 The resolution of the material has not been addressed in a change order or other contractual document.

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### ~~5. ST-1 DOCUMENTATION AND SUBMISSION TO MCS&T~~

- ~~5.1 The live ST-1 Form is available as a fillable pdf file on the Division Webpage<sup>1</sup>. A sample of this form is attached. This form shall be filled out with all the listed information pertaining to the material that the contractor proposes to use or has used. All required fields must be completed before submitting the ST-1 to MCS&T.~~

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<sup>1</sup>~~<https://transportation.wv.gov/highways/mcst/Pages/tbox.aspx>~~  
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- ~~5.1.1 The District must electronically send the fillable PDF form. This cannot be hand-written and scanned (the Sample ID must be available to be selected for Copy and Paste).~~
- ~~5.2 The ST-1 shall be submitted by District Construction to the District Materials Supervisor. The District shall then generate the sample in AWP and associate all line items before submitting the ST-1 sample to MCS&T for review and concurrence/non-concurrence. A workflow guideline for this is available in the MCS&T ProjectWise folder (location provided by request.)~~
- ~~5.3 The ST-1 shall be sent to the ST-1/DMIR mailbox ([St1dmir@wv.gov](mailto:St1dmir@wv.gov)).~~
- ~~5.3.1 ST-1 Request Email files shall be submitted in the following format for both the subject of the email and the file name for the submission: ST-1 District Lab Number-CID Contract ID. An example follows,~~
- ~~5.3.2 ST-1 MXZXXXX CID 2019001346~~
- ~~5.4 The sample shall be logged and sent to the applicable MCS&T section to review. If the subject material(s) meets the project requirements, MCS&T will concur with the sample and the reviewer will then authorize the sample in AWP.~~
- ~~5.4.1 An email will be generated by the District Material Supervisor to the District Materials Supervisor notifying them that the ST-1 has been concurred and authorized. The District will place the ST-1 and MCS&T email into ProjectWise under the Contract ID and associated line item number.~~
- ~~5.5 If the material fails to meet the minimum requirements, the reviewer will mark the sample as non-concur, then authorize the ST-1 sample in AWP. MCS&T will send the ST-1 to the District Materials Supervisor stating why the ST-1 was not concurred. The District will place the ST-1 and MCS&T email into ProjectWise under the Contract ID and associated line item number.~~

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## **6.5. DMIR DOCUMENTATION AND SUBMISSION TO MCS&T**

- ~~6.15.1~~ The live DMIR form is available on the WVDOH MCS&T Webpage<sup>1</sup>. A sample of this form is attached. All required fields must be completed before submitting the DMIR to MCS&T.
- ~~6.1.15.1.1~~ The preparer of the DMIR, typically the Materials Supervisor or their designee, shall clearly state all details that initiated the DMIR and shall include the following categories of information:
1. General/Project information
  2. Materials information
  3. Type of deviation
  4. Situation
  5. Review
  6. Conclusion
  7. Review and Signatures from Construction Engineer and Materials Supervisor
  8. Supporting Documentation

- ~~6.1.25.1.2~~ A description of the material, known quantities, technical issues, or any requirement from the applicable Specifications, Contract Proposal, Project Plans, Material Procedures (MPs), Standard Details, Special Provisions, AASHTO, ASTM, or any Non-Specification issues shall be provided.
- ~~6.1.35.1.3~~ A justification and any supporting and/or relevant detail shall be provided.
- ~~6.1.45.1.4~~ The conclusion shall clearly state and justify the final price assessment resolution (which may be \$0.00), including all applicable fees and penalties.
- ~~6.1.55.1.5~~ The assessment fees should be listed individually and with a final total price assessment. Justification of the price assessment shall be provided.
- ~~6.1.65.1.6~~ The Supporting Documentation shall provide the necessary information and evidence for the materials inspection.
- ~~6.25.2~~ The District shall generate the sample and associate all line items before submitting the DMIR sample to MCS&T for review and concurrence/non-concurrence. A workflow guideline for this is available in the MCS&T ProjectWise folder (location provided by request.)
- ~~6.35.3~~ The DMIR shall be sent to the ST-1/DMIR mailbox (~~St1dmir@wv.gov~~).~~St1dmir@wv.gov~~). The sample shall be logged and sent to the applicable MCS&T section to review. If the subject material(s) meets the project requirements, MCS&T will concur with the sample and the reviewer will then authorize the sample in AWP.
- ~~6.3.15.3.1~~ The District must electronically send the fillable PDF form. This cannot be hand-written and scanned (the Sample ID must be able to be selected for Copy and Paste).
- ~~5.4~~ After MCS&T has reviewed and authorized the DMIR sample (whether be concur or non-concur), the DMIR will be sent to Contract Administration.
- ~~6.3.25.4.1~~ If MCS&T does not concur with the DMIR, payment for the material shall be withheld, pending a change order. If MCS&T does not concur with the DMIR, the final disposition of the material acceptance shall be the responsibility of Contract Administration.

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

MATERIALS PROCEDURE

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INSPECTION AND ACCEPTANCE PROCEDURES  
FOR PRECAST CONCRETE PRODUCTS

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**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.
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**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."
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**3. FABRICATOR APPROVAL**

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

- 3.3.1 Sampling and testing of component materials shall be done in accordance with MP 603.02.10. Copies of recent component delivery tickets should be presented on the day of sampling. All component materials must be approved prior to the start of fabrication.
- 3.3.1.1 Any Fabricator which does not produce for the WVDOH for a period of 2 years shall be removed from the Approved Fabricator list. After removal from the approved list, before a Fabricator can again produce for the WVDOH, they must repeat the approval process. Sampling of component materials will not continue when the plant is not listed on the Approved Fabricator list.
- 3.3.2 Personnel from the Fabricator required to be present during the initial on-site visit and meeting between WVDOH and Fabricator shall include representatives from Production and Quality Control. Any questions and concerns regarding WVDOH requirements, including applicable Specifications, Materials Procedure (MP's), Standard Details, and QC/QA Inspections shall be addressed at this meeting.
- 3.3.3 The Fabricator must submit the Quality Control Manual/Plan for review at this meeting.
- 3.4 All Concrete Mix Designs which will be used on products fabricated for the WVDOH must be submitted for review & approval, prior to the start of fabrication. Any design mix with an aggregate(s) that has a reactivity classes R1, R2, or R3, as shown as in Approved Aggregates Source List, shall be developed in accordance with WVDOH specifications, subsection 601.3.1.1. If an aggregate Source is not listed on the Approved Aggregates Source List, the Division will test the fine and coarse aggregate from the Source, in accordance with AASHTO T 303, to determine the reactivity class of the aggregate prior to its use on any WVDOH project. The Division will inform the Fabricator of the reactivity class of aggregates that they are proposing to use. If a cement Source and/or a SCM Source are not listed on the Approved Source List, the Division will test cement and/or SCM from that Source prior to its use on any WVDOH project.
- 3.5 The Fabrication Plant QC Personnel, as a minimum, shall be a certified ACI Grade I Concrete Field Testing Technician and/or a WVDOH PCC Inspector. In addition, if Self-Consolidating Concrete (SCC) is used, Fabrication Plant QC Personnel shall be a certified ACI SCC Testing Technician.
- 3.6 All Precast Concrete items shall be accepted by Direct or Master Coverage except when a Fabricator is certified as an Approved Source of concrete lagging as defined in Section 7.0.

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- 4. FABRICATION & INSPECTION OF PRODUCTS FOR DIRECT & MASTER COVERAGE**
- 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 for wet cast concrete is not permitted-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 ASTM C1577 AASHTO M259, or M273 (whichever is applicable) must be used until 70% of the design strength is obtained. Form removal limitations do not apply to elements fabricated with dry cast concrete. Dry cast concrete is defined as concrete with a slump less than 1-inch.
- 4.3.1 For both conventional wet cast 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.
- 4.3.2 For dry cast mixes, the 28-day strength shall be confirmed by a set of compressive strength cylinders. Compressive strength testing for form removal is not required for

dry cast mixes. A minimum of three sets of compressive strength cylinders shall be fabricated every day of production. Additionally, there shall also be in addition with a minimum of two compressive strength cylinders fabricated for each item fabricated. The cylinders are to be fabricated in the molds on the vibration table in accordance with ASTM C497. For dry cast mixes, slump testing is not required, and concrete temperature testing shall be performed on the first batch of concrete each day and every time that cylinders are fabricated. A unit weight and yield test shall be done at least once a day.

- 4.4 When required, for wet cast and SCC mixes, 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. For dry cast mixes, an absorption test, in accordance with ASTM C642, shall be performed at least once for every day’s production, and the maximum allowable absorption shall be 9%.
- 4.5 Unless otherwise specified, for conventional wet cast and SCC mixes, plastic concrete shall have an air content measured at  $7.0 \pm 2.0\%$ . For dry cast concrete, the air content test requirement is waived.
- 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	$7.0 \pm 1.5\%$
Spread (ASTM C1611)	Target $\pm 1.5$ inches (38 mm) $2 \text{ seconds} \leq T_{50} \leq 7 \text{ seconds}$ Visual Stability Index $\leq 1.0$
Passing Ability (ASTM C1621)	J-Ring Value $\leq 1$ inch (25 mm)
Segregation Resistance (ASTM C1610)	Segregation $\leq 12\%$
Unit Weight and Yield	$\pm 2\%$ of Theoretical

- 4.5.2 The following table lists the criteria for SCC production.

Table 4.5.2 - SCC Production Acceptance

<b>Fresh Property</b>	<b>Production Acceptance Criteria</b>
Air Content	7.0± 2.0%
Spread (ASTM C1611)	Target ± 2 inches (50 mm) 2 seconds ≤ T <sub>50</sub> ≤ 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.
- 4.5.4 Precast elements fabricated with dry cast concrete shall be limited to a maximum wall thickness of 12 inches when single sided vibration is used and 18 inches when double sided vibration is used. Dry cast box culverts sizes shall be limited to those specified in ASTM C1577.

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## 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<sup>1</sup>.
- 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.

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## 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.

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

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

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## 7. PROCEDURE FOR APPROVED SOURCE OF PRECAST CONCRETE LAGGING

### 7.1

Precast concrete Fabricators may be classified as an Approved Source of precast concrete lagging if they have met the requirements of Section 3 and are producing lagging which is made in accordance with the relevant WVDOT Standard Details. Once classified as an Approved Source of precast concrete lagging, an Approved Source Lab Number will be assigned to the Fabricator for material tracking.

### 7.2

MCS&T Division may perform regular quality assurance inspections prior to shipment and/or, monitor fabrication of lagging from a Fabricator that is an Approved Source. The Approved Source Lab Number shall be noted on all shipping documents from the fabricator, and material coverage will be requested under the assigned Approved Source Lab Number. All relevant concrete test data, component material information, QC inspection data, and shipping information shall be kept on file at the Fabricator for the last three years of fabrication and be shall available upon request by the Division. Failure to produce requested documentation may result revocation of the Fabricator's Approved Source certification status.

### 7.3

Approved Sources will be evaluated by the Division by random audits. Audits will be conducted on the material that is available to the Inspector at the time of the audit. All documentation and records for the pieces must be made available to the Inspector on the day of the audit and must be complete, current, and accurate. Failure to produce records shall be a cause for decertification.

### 7.3.1

All shipping documentation, concrete test data, and component material certifications shall be made available to the Inspector for review. These documents shall include all documents from material that has been shipped to state projects since the last audit. If data indicates that any material did not conform to this MP, the applicable Specifications, or Standard Detail; and was used in a state project, then the Fabricator will be de-certified as an Approved Source of precast concrete lagging.

### 7.3.2

In addition to documentation, the audit will consist of fabrication monitoring, test observance, and a visual inspection of material that is stocked for shipping on the day of the audit.

#### 7.3.2.1

Each material test monitored during the audit must be performed in accordance with the applicable Standards, and Specifications. Visual inspection of stocked material will include quality checks of surface finish for cracks, spalls, and other surface blemishes after all repairs have been performed and dimensional checks. The material shall be properly stored to avoid handling damage and be accessible to the Inspector. Audits shall be graded on a point system deducted from 100 and weighted based on the Non-Conformance Points found per Table 7.3. A minimum score of 75 shall be considered passing.

TABLE 7.3

<u>Audit Category</u>	<u>Non-Conformance Points</u>
<u>Material Test Data Review</u>	<u>10 (per error)</u>
<u>Component Material Certification Review</u>	<u>10 (per error)</u>
<u>Shipping Documentation</u>	<u>10 (per error)</u>
<u>Stocked Material Visual Inspection</u>	<u>15 (per defect)</u>
<u>Dimension Check</u>	<u>20 (per error)</u>
<u>Test Performance Check</u>	<u>15 (per Test)</u>

### 7.3.4

When a Fabricator, which is an Approved Source, fails an audit, the Fabricator must submit a written corrective actions plan to bring their QC program back into compliance with this MP and corresponding Specifications during a probationary period of one month during which time the fabricator must prove they have fulfilled the corrective actions they submitted before supplying the material again. If the Fabricator fails to bring their material back into compliance within the probationary period, the Approved Source status will be revoked for a minimum of one year from the date of the end of the probationary period, or until the Fabricator has corrected the nonconformances listed during the failed audit. Two failing audits in a year shall result in revocation of the

Fabricator's Approved Source status for one year from the date of the last failed audit. Any evidence of document falsification shall result in immediate loss of Approved Source status, and removal from the Approved List of Concrete Fabricators for a minimum 2 years. Depending on the severity and the legality of the falsified documents the removal may be permanent.

7.3.5

Non-Conforming material received by WVDOH projects and reported to MCS&T shall result in an immediate failing audit and will require the Fabricator to submit corrective actions. If the Fabricator fails the subsequent audit, it will result in the loss of their Approved Source status.

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RLS:Mt  
[Attachment](#)