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

1.0 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.

2.0 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.

3.0 INSPECTION

3.1 All Prestressed Concrete Bridge Member Fabricators (hereafter referred to as the Fabricator) shall be approved by 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 Prior to beginning fabrication of any prestressed concrete bridge members, the Fabricator shall provide written notification to Materials Control Soils and Testing (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.

3.1.1.1 The Fabricator approval process 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.

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

3.1.1.3 Personnel from the Fabricator required to be present during the initial on-site visit and meeting between WVDOH and Fabricator personnel shall include representatives from Production and Quality Control. Any questions and concerns regarding WVDOH requirements, including applicable Specifications, Materials Procedure (MP's), Standard Details, and QC/QA Inspections shall be addressed at this meeting.

3.1.2 Shop Drawings must be approved by the West Virginia Division of Highways, and 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.

3.3 After fabrication is completed, 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. 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.

3.4 After the final inspection is completed, the Inspector shall provide the Fabricator with a copy of the inspection report documenting the findings of the final inspection and any other observations or notes taken by the Inspector during fabrication. The final report shall also include 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.

4.0 ACCEPTANCE

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

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

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

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

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 defects include dimensional tolerance. If any aspect(s) of a member exceeds the dimensional tolerances set forth in the specifications, the Inspector will document that variance(s). At this point, if the Fabricator still seeks acceptance of the subject member, the Fabricator shall provide the Contractor with 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.

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 of which the Fabricator is seeking acceptance. MCS&T Division shall then contact the Designer (either Engineering Division, or the appropriate District) and District Construction personnel and forward this information to them. In situations when 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 or not 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 or not 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 acceptance of the subject member is still desired, the acceptance would need to be by the District by means of a District Materials Inspection Report (DMIR).

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

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

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

Aaron C. Gillispie, P. E., Director
Materials Control, Soils and Testing Division

ACG:Ms

PRESTRESSED CONCRETE BRIDGE BEAMS

INSPECTION CHECKLIST

PROJECT NAME: _____ **AUTHORIZATION:** _____

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

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

MANUFACTURER: _____ **JOB NUMBER:** _____

PROPOSED PRODUCTION DATE(S): _____

INSPECTION AGENCY: _____ **INSPECTOR(S):** _____

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Preliminary Verifications

DATE: _____

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:

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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: _____

Admixtures: _____ Lab Number: _____

_____ Lab Number:_____

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: _____

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Inserts: Supplier(s): _____

Description: _____Lab Number: _____

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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:** _____

Other: _____

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Form Inspection *(Pre-Placement)*

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

Concrete Placement

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

Product Inspection *(Post-Placement)*

Visual inspection for damage					
Note size & location of cracks, spalls, honeycomb, etc.					
Discuss damaged areas with QC Manager					
Beams in need of repair					
Repair method approved?					
Dimensional Tolerances met?					
Length					
Width(s)					
Depth					
Inserts, sleeves, etc.					
Stirrups (horiz.& vert. within tolerance)					
Finish per specification					
Top scored per specification					
Fascia finish as specified					
Camber					
Lifting loops OK					
Beams properly transported					
Beams stored on proper dunnage at bearing points					
Noticeable sweep?					
Design shipping strength (28 day) met? (avg of 3 tests)					
Repairs satisfactory					
Beam stamped for shipment					
Concrete Sealer (Silane) applied as specified					
Interior Sides blast cleaned (within 5 days of shipment)					